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# 2019 IEEE Thesaurus

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Version 1.0

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Created by  
The Institute of  
Electrical and  
Electronics  
Engineers (IEEE)

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# 2019 IEEE Thesaurus

The IEEE Thesaurus is a controlled vocabulary of almost 10,410 descriptive engineering, technical and scientific terms, as well as IEEE-specific society terms [referred to as “descriptors” or “preferred terms”]. \* Each descriptor included in the thesaurus represents a single concept or unit of thought. The descriptors are considered the preferred terms for use in describing IEEE content. The scope of descriptors is based on the material presented in IEEE journals, conference papers, standards, and/or IEEE organizational material. A controlled vocabulary is a specific terminology used in a consistent and controlled fashion that results in better information searching and retrieval.

Thesaurus construction is based on the ANSI/NISO Z39.19-2005(2010) standard, *Guidelines for the Construction, Format, and Management of Monolingual Controlled Vocabulary*. The Thesaurus vocabulary uses American-based spellings with cross references to British variant spellings. The scope and structure of the IEEE Thesaurus reflects the engineering and scientific disciplines that comprise the Societies, Councils, and Communities of the IEEE in addition to the technologies IEEE serves.

IEEE has developed its controlled vocabulary through consultation with subject matter experts (specialists in a particular field) and specialists in information analysis. The IEEE Thesaurus thus provides a controlled vocabulary of subject headings to help people categorize or search for engineering and computing concepts, especially IEEE published content.

The IEEE Thesaurus also provides a conceptual map through the use of semantic relationships such as broader terms (BT), narrower terms (NT), 'used for' relationships (USE/UF), and related terms (RT). These semantic relationships identify theoretical connections between terms.

*Italic text denotes Non-preferred terms.*

**Bold text is used for preferred headings.**

Abbreviations used in the Thesaurus:

BT - Broader term  
NT - Narrower term  
RT - Related term  
USE- Use preferred term  
UF - Used for

\*Refer to ANSI/NISO NISO Z39.19-2005 (R2010) Sections 5 through 8 for detailed information on controlled vocabularies, display formats, usage and spelling, and selection criteria for descriptors (<http://www.niso.org/kst/reports/standards> ).



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<b>1/f noise</b>		<i>3D accelerators</i>	
UF:	1f	USE:	Hardware acceleration
	Pink noise		
BT:	Noise	<i>3D displays</i>	
		USE:	Three-dimensional
<i>1f</i>		displays	
USE:	1/f noise	<i>3D modeling</i>	
<i>2-D displays</i>		USE:	Three-dimensional
USE:	Two dimensional	displays	
displays		<i>3D modelling</i>	
<i>2-d hole gas</i>		USE:	Three-dimensional
USE:	Two dimensional hole	displays	
gas		<i>3D printing</i>	
<i>2-D photonic crystals</i>		USE:	Three-dimensional
USE:	Photonic crystals	printing	
<i>21CN</i>		<i>3D reconstruction</i>	
USE:	Next generation	USE:	Three-dimensional
networking		displays	
<i>21st century networks</i>		<i>3G</i>	
USE:	Next generation	USE:	3G mobile
networking		communication	
<i>2D displays</i>		<b>3G mobile communication</b>	
USE:	Two dimensional	UF:	3G
displays			3rd generation mobile
<i>2d hole gas</i>		communication	
USE:	Two dimensional hole		IMT-2000
gas			Third generation
<i>2D photonic crystals</i>		mobile communication	
USE:	Photonic crystals		UMTS
<i>3-D displays</i>			Universal mobile
USE:	Three-dimensional	telecommunication service	
displays		BT:	Mobile communication
<i>3-D modeling</i>		RT:	4G mobile
USE:	Three-dimensional	communication	
displays			Ambient networks
<i>3-D modelling</i>		cellular systems	Land mobile radio
USE:	Three-dimensional		MIMO communication
displays		communication	Multiaccess
<i>3-D reconstruction</i>			Next generation
USE:	Three-dimensional	networking	
displays			OFDM
<i>3-D reconstruction</i>			Radio access networks
USE:	Three-dimensional	communication	Spread spectrum
displays			Telecommunication
		computing	



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Time division  
synchronous code division multiple  
access

*3G partnership project*

USE: 3GPP

**3GPP**

UF: 3G partnership project  
3rd generation

partnership project

BT: Standards  
organizations

**3GPP Standards**

BT: Standards publications  
NT: Long Term Evolution

*3rd generation mobile communication*

USE: 3G mobile  
communication

*3rd generation partnership project*

USE: 3GPP

**4G mobile communication**

UF: 4th generation mobile  
communication

BT: Mobile communication  
RT: 3G mobile

communication

communication

communication

cellular systems

Long Term Evolution  
Next generation

networking

Radio access networks  
Spread spectrum

communication

Telecommunication  
computing

Time division  
synchronous code division multiple  
access

*4K UHD*

USE: UHDTV

*4th generation mobile communication*

USE: 4G mobile  
communication

**5G**

USE: 5G mobile  
communication

**5G mobile communication**

UF: 5G  
5th generation mobile

systems

5th generation systems  
5th generation

wireless systems

BT: Mobile communication  
RT: 4G mobile

communication

Land mobile radio  
Land mobile radio

cellular systems

Next generation

networking

Ultra-dense networks

*5th generation mobile systems*

USE: 5G mobile  
communication

*5th generation systems*

USE: 5G mobile  
communication

*5th generation wireless systems*

USE: 5G mobile  
communication

**802.11**

USE: IEEE 802.11 Standard

**802.11e**

USE: IEEE 802.11e Standard

**802.11g**

USE: IEEE 802.11g Standard

**802.11n**

USE: IEEE 802.11n Standard

**802.15**

USE: IEEE 802.15 Standard

**802.16**

USE: IEEE 802.16 Standard

**802.3**

USE: IEEE 802.3 Standard



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<i>8K UHD</i>		BT:	Writing
USE:	UHDTV	RT:	Information retrieval Information services
<i>9/11</i>			
USE:	Terrorism	<b>AC generators</b>	
<i>9/11 attack</i>		UF:	Alternating current generators
USE:	Terrorism	BT:	Generators
<i>911 attack</i>		RT:	Pulse width modulation
USE:	Terrorism	NT:	Induction generators Synchronous generators
<i>A/D</i>		<i>AC llght emitting diode lamps</i>	
USE:	Analog-digital conversion	USE:	LED lamps
<i>A/D conversion</i>		<b>AC machines</b>	
USE:	Analog-digital conversion	UF:	Alternating current machines
<i>A/D converter</i>		BT:	Electric machines
USE:	Analog-digital conversion	RT:	AC-AC converters Pulse width modulation Sensorless control Windings
<i>AAL</i>		NT:	AC motors Induction machines Synchronous machines
USE:	Ambient assisted living		
<i>ABC algorithms</i>		<b>AC motors</b>	
USE:	Artificial bee colony algorithm	UF:	Alternating current motors
<b>Abdomen</b>		BT:	AC machines Motors
BT:	Body regions	RT:	Pulse width modulation Pulse width modulation
<i>Abrasive water jet cutting</i>		inverters	
USE:	Water jet cutting	width modulation	Space vector pulse
<b>Abrasives</b>		NT:	Hysteresis motors Induction motors
BT:	Production materials		
<b>Absorption</b>		<b>AC-AC converters</b>	
BT:	Materials science and technology	UF:	AC-AC convertors AC-AC power conversion
RT:	Semiconductor detectors	BT:	Converters Power conversion
<b>Abstract algebra</b>		RT:	AC machines
BT:	Algebra	<i>AC-AC convertors</i>	
NT:	Galois fields Modules (abstract algebra)	USE:	AC-AC converters
<b>Abstracts</b>		<i>AC-AC power conversion</i>	
		USE:	AC-AC converters
		<b>AC-DC power converters</b>	



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UF: AC-DC power convertors  
AC/DC power converters  
Analog-to-digital  
converter  
Analog-to-digital  
convertor  
BT: Power conversion  
RT: Machine vector control  
Pulse width modulation  
inverters  
Voltage multipliers  
Voltage-source  
converters  
NT: Rectifying circuits

## *AC-DC power convertors*

USE: AC-DC power converters

## *AC-LED Lamps*

USE: LED lamps

## *AC/DC power converters*

USE: AC-DC power converters

## **Accelerated aging**

BT: Aging  
Materials testing

## *Accelerated computing*

USE: Hardware acceleration

## *Accelerated testing*

USE: Life estimation

## **Acceleration**

BT: Mechanical factors  
RT: Accelerometers  
Gravity

## *Acceleration measurement*

USE: Accelerometers

## **Accelerator architectures**

BT: Computer architecture

## *Accelerator beams*

USE: Particle beams

## **Accelerator magnets**

BT: Magnetic devices  
Particle accelerators

## **Accelerometers**

UF: Acceleration  
measurement  
BT: Measurement  
RT: Acceleration

## **Access control**

BT: Security  
RT: Biometrics (access  
control)

Building services  
Capability-based  
security  
Communication system  
security

Computer security  
Countermeasures

Identification of  
persons

Smart cards  
Trust management  
Whitelists  
NT: Authorization  
Blacklisting  
Multi-factor

authentication  
Password

## *Access point base station*

USE: Femtocell networks

## **Access protocols**

BT: Protocols  
RT: CAPTCHAs  
NT: Media Access Protocol

## *Access rights*

USE: Permission

## **Accident prevention**

BT: Industry applications  
RT: Explosion protection  
Preventive maintenance  
Risk analysis  
Safety devices  
NT: Accidents

## **Accidents**

BT: Accident prevention  
RT: Domestic safety  
Electric shock  
Emergency services  
Explosions  
Fires



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	Hazardous areas	BT:	Acoustics
	Occupational health	RT:	Piezoelectric devices
	Occupational safety	NT:	Acoustic waveguides
	Oil pollution		Acoustoelectric
	Product safety	devices	
	Risk analysis		Acoustooptic devices
NT:	Aerospace accidents	devices	Bulk acoustic wave
	Electrical accidents		Film bulk acoustic
	Industrial accidents	resonators	Surface acoustic wave
	Marine accidents	devices	
	Railway accidents		
	Road accidents		
<b>Accreditation</b>		<b>Acoustic diffraction</b>	
BT:	Educational programs	BT:	Acoustic propagation
RT:	Conformance testing		
	Training	<b>Acoustic distortion</b>	
<b>Accuracy</b>		BT:	Distortion
BT:	Mathematics	RT:	Acoustic noise
			Acoustic signal
<b>Acoustic applications</b>		processing	
UF:	Ultrasonic		Loudspeakers
applications			Nonlinear acoustics
BT:	Acoustics	<i>Acoustic distortion measurement</i>	
RT:	Acoustic measurements	USE:	Distortion measurement
	Biomedical acoustics		
NT:	Acoustic communication	<b>Acoustic emission</b>	
(telecommunication)		BT:	Acoustics
	Acoustic imaging	RT:	Acoustic noise
	Acoustic testing		Acoustic testing
			Nondestructive testing
<b>Acoustic arrays</b>		<b>Acoustic imaging</b>	
BT:	Acoustic transducers	BT:	Acoustic applications
RT:	Acoustic signal	RT:	Acoustic testing
processing			Oceanographic
	Array signal	techniques	
processing			
	Sonar	<b>Acoustic materials</b>	
<b>Acoustic beams</b>		UF:	Acoustic metamaterials
BT:	Beams	BT:	Materials
		RT:	Piezoelectric
<b>Acoustic communication</b>		materials	
(telecommunication)		<b>Acoustic measurements</b>	
BT:	Acoustic applications	BT:	Measurement
	Telecommunication	RT:	Acoustic applications
services			Acoustic testing
RT:	Mobile communication		Anechoic chambers
	OFDM		Biomedical acoustics
	Wireless networks		Frequency measurement
<b>Acoustic devices</b>			Phase measurement
UF:	Ultrasonic devices		Seismic measurements



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Wavelength measurement	BT: Signal detection
<i>Acoustic metamaterials</i>	RT: Acoustic noise
USE: Acoustic materials AND Metamaterials	NT: Sonar detection
<b>Acoustic noise</b>	<b>Acoustic signal processing</b>
UF: Audible noise	UF: Audio enhancement
Audio restoration	BT: Signal processing
BT: Acoustics	RT: Acoustic arrays
RT: Acoustic distortion	Acoustic distortion
Acoustic emission	Acoustic transducers
Acoustic signal	NT: Active noise reduction
detection	Speech processing
Environmental factors	<i>Acoustic surface waves</i>
Mechanical factors	USE: Surface acoustic waves
Vibrations	<b>Acoustic testing</b>
NT: Background noise	BT: Acoustic applications
Noise cancellation	Materials testing
Noise level	RT: Acoustic emission
Noise reduction	Acoustic imaging
Working environment	Acoustic measurements
noise	Photoacoustic effects
<b>Acoustic phonetics</b>	<b>Acoustic transducers</b>
BT: Acoustics	BT: Transducers
Phonetics	RT: Acoustic signal
<b>Acoustic propagation</b>	processing
BT: Acoustics	Array signal
RT: Acoustic pulses	processing
Waves	NT: Acoustic arrays
NT: Acoustic diffraction	<i>Acoustic wave attenuation</i>
<b>Acoustic pulses</b>	USE: Acoustic waves AND Attenuation
BT: Acoustics	<b>Acoustic waveguides</b>
RT: Acoustic propagation	BT: Acoustic devices
<b>Acoustic reflection</b>	<b>Acoustic waves</b>
BT: Reflection	UF: Acoustic wave
RT: Acoustic scattering	attenuation
<b>Acoustic refraction</b>	BT: Acoustics
BT: Acoustic waves	RT: Seismic waves
<b>Acoustic scattering</b>	NT: Acoustic refraction
BT: Scattering	Acoustoelectric
RT: Acoustic reflection	effects
Waves	Surface acoustic waves
<b>Acoustic sensors</b>	<b>Acoustical engineering</b>
BT: Sensors	BT: Engineering - general
<b>Acoustic signal detection</b>	<b>Acoustics</b>
	UF: Ultrasonics





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effects	BT: Physics RT: Acoustoelectric	USE: Magnetoacoustic effects
effects	Fourier transforms Magnetoacoustic	<b>Acoustooptic devices</b> BT: Acoustic devices RT: Acoustooptic effects
	Phonons Resonators Vibrations	<b>Acoustooptic effects</b> BT: Acoustics RT: Acoustooptic devices NT: Piezooptic effects
	NT: Acoustic applications Acoustic devices Acoustic emission Acoustic noise Acoustic phonetics Acoustic propagation Acoustic pulses Acoustic waves Acoustooptic effects Biomedical acoustics Cepstral analysis Music Nonlinear acoustics Psychoacoustics Reverberation Spectral shape Underwater acoustics	<b>Acquired immune deficiency syndrome</b> UF: AIDS Acquired immunodeficiency syndrome BT: Diseases
		<i>Acquired immunodeficiency syndrome</i> USE: Acquired immune deficiency syndrome
<b>Acoustoelectric devices</b>		<b>Actinium</b> BT: Chemical elements
UF: Electroacoustic		<b>Action potentials</b> UF: Bioelectric potentials BT: Physiology RT: Axons Membrane potentials Neurons White matter
BT: Acoustic devices		<i>Activated sludge process</i> USE: Sludge treatment
RT: Acoustoelectric		<b>Activation analysis</b> BT: Chemical analysis
effects	Piezoelectric devices Pulsed electroacoustic	<b>Active appearance model</b> BT: Computer vision
methods	Surface acoustic wave	<b>Active circuits</b> BT: Circuits NT: Active inductors Gyrators Operational amplifiers
devices		<b>Active contours</b> BT: Motion analysis
<b>Acoustoelectric effects</b>		<i>Active disturbance rejection control</i> USE: Robust control
UF: Electroacoustic		
effects	BT: Acoustic waves Electric fields	
	RT: Acoustics Acoustoelectric	
devices	Semiconductor	
materials	NT: Pulsed electroacoustic	
methods		
<i>Acoustomagnetic effects</i>		



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## Active filters

BT: Filters  
NT: Band-pass filters

## Active inductors

BT: Active circuits  
Inductors  
RT: Gytrators  
Integrated circuits  
MOSFET circuits

## Active matrix addressing

BT: Active matrix  
technology

## Active matrix liquid crystal displays

UF: AMLCDs  
Active-matrix liquid-crystal displays  
BT: Active matrix  
technology  
Liquid crystal  
displays

## Active matrix organic LEDs

USE: Active matrix organic  
light emitting diodes

## Active matrix organic light emitting diodes

UF: AMOLEDs  
Active matrix organic  
LEDs  
Active matrix organic  
light-emitting diodes  
BT: Active matrix  
technology  
Organic light emitting  
diodes

## Active matrix organic light-emitting diodes

USE: Active matrix organic  
light emitting diodes

## Active matrix technology

UF: Active-matrix  
BT: Displays  
NT: Active matrix  
addressing  
Active matrix liquid  
crystal displays  
Active matrix organic  
light emitting diodes

Thin film transistors

## Active noise reduction

BT: Acoustic signal  
processing  
Noise reduction  
NT: Echo cancellers

## Active pixel sensors

BT: Image sensors

## Active RFID tags

BT: RFID tags

## Active shape model

BT: Image processing  
Pattern recognition

## Active-matrix

USE: Active matrix  
technology

## Active-matrix liquid-crystal displays

USE: Active matrix liquid  
crystal displays

## Activities

USE: IEEE activities

## Activity recognition

BT: Cognition  
Pattern recognition  
Sensor systems  
RT: Computer vision

## Actuators

UF: Dielectric  
electroactive polymer actuators  
Electroactive polymer  
actuators  
Electrostrictive  
polymer actuators  
Ionomeric polymer-  
metal composite actuators  
Nanoactuators  
BT: Control equipment  
RT: Control systems  
Servomechanisms  
Servosystems  
Shape memory alloys  
NT: Dielectric elastomer  
actuators  
Electrostatic  
actuators



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	Hydraulic actuators	UF:	Adaptive codes
	Intelligent actuators	BT:	Data compression
	Microactuators		
	Piezoelectric		
actuators		<b>Adaptive control</b>	
	Pneumatic actuators	UF:	Self-tuning regulators
		BT:	Adaptive systems
		RT:	Cognitive systems
<b>Ad hoc networks</b>			Control systems
BT:	Computer networks		Disturbance observers
RT:	Cross layer design		Iterative learning
	Data communication		
	Land mobile radio	control	
	Mobile computing	<i>Adaptive equalisers</i>	
	Multicast	USE:	Adaptive equalizers
communication			
	Protocols	<b>Adaptive equalizers</b>	
	Wireless LAN	UF:	Adaptive equalisers
	Wireless sensor	BT:	Equalizers
networks			
NT:	AODV	<b>Adaptive estimation</b>	
	Mesh networks	BT:	Statistics
	Mobile ad hoc networks		
	Vehicular ad hoc	<b>Adaptive filters</b>	
networks		BT:	Adaptive signal
			processing
<i>Ad hoc On Demand Distance Vector</i>		<b>Adaptive learning</b>	
USE:	AODV	BT:	Education
		RT:	Distance learning
<b>Adaptation models</b>			Human computer
BT:	Adaptive algorithms	interaction	
			User interfaces
<b>Adaptive algorithms</b>			
BT:	Algorithms	<b>Adaptive mesh refinement</b>	
NT:	Adaptation models	BT:	Numerical analysis
<i>Adaptive antenna arrays</i>			
USE:	Adaptive arrays	<b>Adaptive optics</b>	
		BT:	Optics
<b>Adaptive arrays</b>			
UF:	Adaptive antenna	<b>Adaptive scheduling</b>	
arrays		BT:	Scheduling
		RT:	Adaptive systems
			Production control
		<b>Adaptive signal detection</b>	
detection	Array signal	BT:	Adaptive signal
			processing
processing	Radar countermeasures	RT:	Adaptive arrays
	Radio communication		Blind source
countermeasures		separation	
			Source separation
<i>Adaptive codes</i>		<b>Adaptive signal processing</b>	
USE:	Adaptive coding	BT:	Signal processing
<b>Adaptive coding</b>			



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NT: Adaptive filters	UF: Fuel additives
detection	BT: Materials
	RT: Production materials
<b>Adaptive systems</b>	<i>Adenoviridae</i>
BT: Cybernetics	USE: Adenoviruses
Systems engineering	
and theory	<b>Adenoviruses</b>
RT: Adaptive scheduling	UF: Adenoviridae
Learning systems	BT: Microorganisms
Neural networks	
NT: Adaptive control	<i>Adhesive bonding</i>
Cognitive radar	USE: Adhesives
Line enhancers	
Multi-agent systems	<b>Adhesive strength</b>
Variable structure	BT: Materials testing
systems	
<i>ADAS</i>	<b>Adhesives</b>
USE: Advanced driver	UF: Adhesive bonding
assistance systems	BT: Bonding
	NT: Conductive adhesives
	Nonconductive
<b>Add-drop multiplexers</b>	adhesives
BT: Multiplexing equipment	
NT: Optical add-drop	<b>Adiabatic</b>
multiplexers	BT: Power electronics
<b>Added delay</b>	
BT: Delay systems	<i>Adjacent channel interference</i>
	USE: Interchannel
<b>Adders</b>	interference
BT: Circuits	
RT: Digital integrated	<b>Admission control</b>
circuits	BT: Quality of service
	RT: Bandwidth
	Logic circuits
<i>Additive manufacturing</i>	<b>Admittance</b>
USE: Three-dimensional	UF: Electric admittance
printing	BT: Electric variables
	RT: Admittance measurement
<i>Additive metric</i>	Impedance
USE: Maximum likelihood	
detection	<b>Admittance measurement</b>
<b>Additive noise</b>	BT: Electric variables
BT: Noise	measurement
NT: AWGN	RT: Admittance
Additive white noise	Impedance measurement
<b>Additive white noise</b>	
BT: Additive noise	<b>Adsorption</b>
RT: Gaussian noise	BT: Surface morphology
	RT: Interface phenomena
	Molecular sieves
	Surfactants

## Additives

## Advanced driver assistance systems



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UF:	ADAS	Aircraft navigation
BT:	Vehicle safety	Aircraft propulsion
RT:	Collision avoidance	Command and control
	Intelligent vehicles	Electronic warfare
	Vehicle-to-everything	Military equipment
		Radar
<i>Advanced Research Projects Agency Network</i>		Sensor systems
USE:	ARPANET	Sonar
		Telemetry
<i>Advanced TV</i>		
USE:	HDTV	<b>Aerospace biophysics</b>
		BT: Aerospace engineering
<i>Advanced video coding</i>		Biophysics
USE:	Video coding	RT: Human factors
<b>Advertising</b>		<b>Aerospace components</b>
BT:	Marketing management	BT: Aerospace materials
<i>Aerial robots</i>		<b>Aerospace control</b>
USE:	Unmanned aerial	UF: Aircraft control
vehicles		Flight control
		BT: Aerospace and
<b>Aerodynamics</b>		electronic systems
BT:	Dynamics	RT: Aerodynamics
	Mechanical factors	Aerospace simulation
RT:	Aerospace control	Aircraft
	Shock waves	Hardware-in-the loop
	Wind tunnels	simulation
<b>Aerosols</b>		Missiles
BT:	Electrostatic	Motion control
processes		Space vehicles
RT:	Liquids	Velocity control
	Particle production	NT: Air traffic control
	Spraying	Attitude control
		Ground support
<b>Aerospace accidents</b>		<b>Aerospace electronics</b>
BT:	Accidents	UF: Aerospace
RT:	Aerospace safety	instrumentation
	Space vehicles	Aircraft electronics
NT:	Air accidents	Aircraft
<b>Aerospace and electronic systems</b>		instrumentation
RT:	Auditory displays	Avionics
	Digital signal	Space vehicle
processing		electronics
	Programming	Space vehicle
	Systems engineering	instrumentation
and theory		BT: Aerospace engineering
NT:	Aerospace control	RT: Aircraft
	Aerospace engineering	Space vehicles
	Aerospace materials	Total ionizing dose
	Aircraft manufacture	<b>Aerospace engineering</b>



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BT: Aerospace and electronic systems	Aerospace industry	Aerospace industry
RT: Aerospace industry	Aerospace materials	Ion beam effects
	Lightweight structures	Space shuttles
NT: Aerospace biophysics		Space vehicles
	Aerospace electronics	NT: Air safety
	Aerospace safety	<b>Aerospace simulation</b>
	Aerospace simulation	UF: Flight simulation
	Aerospace testing	BT: Aerospace engineering
	Artificial satellites	RT: Aerospace control
	Space technology	Aerospace testing
		Wind tunnels
<i>Aerospace ground equipment</i>		<b>Aerospace testing</b>
USE: Ground support		BT: Aerospace engineering
		Testing
<i>Aerospace ground services</i>		RT: Aerospace simulation
USE: Ground support		NT: Wind tunnels
<b>Aerospace industry</b>		<b>Affective computing</b>
BT: Manufacturing industries		BT: Artificial intelligence
RT: Aerospace engineering		Human computer interaction
Aerospace materials		RT: Behavioral sciences
Aerospace safety		Cognitive systems
Aircraft manufacture		Emotion recognition
Lightweight structures		Human factors
		Psychology
<i>Aerospace instrumentation</i>		<b>Africa</b>
USE: Aerospace electronics		BT: Continents
<b>Aerospace materials</b>		<i>Afterburners</i>
UF: Aircraft materials		USE: Incineration
Spacecraft materials		
BT: Aerospace and electronic systems		<i>Ag</i>
		USE: Silver
	Production materials	<i>Age factors</i>
RT: Aerospace engineering		USE: Aging
Aerospace industry		<i>Age of information</i>
Aircraft manufacture		USE: Information age
Lightweight structures		
Space vehicles		<i>Aged</i>
NT: Aerospace components		USE: Aging
		<i>Ageing</i>
<i>Aerospace navigation</i>		USE: Aging
USE: Aircraft navigation		
<b>Aerospace propulsion</b>		<b>Agent-based modeling</b>
BT: Propulsion		BT: Computational modeling
		Software agents
<b>Aerospace safety</b>		
BT: Aerospace engineering		
Safety		
RT: Aerospace accidents		



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RT:	Multi-agent systems	Agriculture
		Applicators
		Blades
<b>Aggregates</b>		
BT:	Materials	
RT:	Building materials	<b>Agricultural products</b>
		BT:
<i>Agile computing</i>		RT:
USE:	Agile software	Irrigation
development		NT:
		Cotton
		Crops
<b>Agile manufacturing</b>		Dairy products
BT:	Manufacturing systems	Sugar
RT:	Computer integrated	Wool
manufacturing		
	Flexible manufacturing	<b>Agriculture</b>
systems		UF:
		BT:
<b>Agile software development</b>		RT:
UF:	Agile computing	engineering
BT:	Software development	
management		Agricultural machinery
NT:	Scrum (Software	Animals
development)		Dairy products
		Genetic engineering
<b>Aging</b>		Pest control
UF:	Age factors	Soil pollution
	Aged	Vegetation mapping
	Ageing	NT:
BT:	Materials science and	Agricultural products
technology		Aquaculture
RT:	Ambient assisted	Fertilizers
living		Greenhouses
	Assisted living	Irrigation
	Cataracts	
	Electric breakdown	<b>AI</b>
	Energy storage	USE:
	Gerontology	intelligence
	Insulation life	
	Life estimation	<b>AIDS</b>
	Reliability	USE:
	Senior citizens	Acquired immune
NT:	Accelerated aging	deficiency syndrome
		<i>Aids for the handicapped</i>
		USE:
<b>Agricultural engineering</b>		Assistive technology
BT:	Engineering - general	
RT:	Agricultural machinery	<b>AIEE Standards</b>
	Agriculture	BT:
		IEEE Standards
<b>Agricultural machinery</b>		
UF:	Combine harvesters	<b>Air accidents</b>
	Tractors	BT:
BT:	Machinery	Aerospace accidents
RT:	Agricultural	RT:
engineering		Air safety
		Air traffic control
		<i>Air bags</i>
		USE:
		Automotive components



# 2019 IEEE Thesaurus

## Air cleaners

UF: Air filters  
Air purifiers  
BT: Machine components  
RT: Air pollution  
Cleaning  
Purification

## Air conditioning

BT: Cooling  
RT: Building services  
Buildings  
Compressors  
Ducts  
Fans  
HVAC  
Ventilation  
Vents  
NT: Central air

conditioning

## Air filters

USE: Air cleaners

## Air gaps

UF: Air-gap  
BT: Electromagnetic  
analysis  
RT: Electrodes  
Spark gaps

## Air interface

USE: Communication channels

## Air pollutants

USE: Air pollution

## Air pollution

UF: Air pollutants  
BT: Air quality  
Pollution  
RT: Air cleaners  
Ash  
Atmospheric  
measurements  
Exhaust gases  
Flue gases  
Fossil fuels  
Global warming  
Incineration  
Industrial pollution  
Meteorology  
Thermal pollution

## Air purifiers

USE: Air cleaners

## Air quality

BT: Atmosphere  
RT: Atmospheric  
measurements  
Environmental factors  
NT: Air pollution  
Indoor air quality

## Air safety

BT: Aerospace safety  
RT: Air accidents

## Air traffic control

BT: Aerospace control  
RT: Air accidents  
Air transportation  
Control systems  
Radio navigation

## Air transportation

BT: Transportation  
RT: Air traffic control  
Global Positioning

## System

NT: Aircraft  
Airports

## Air-gap

USE: Air gaps

## Airborne radar

BT: Radar  
RT: Synthetic aperture

radar

## Aircraft

BT: Air transportation  
RT: Aerospace control  
Aerospace electronics  
Aircraft manufacture  
Aircraft navigation  
Aircraft propulsion  
Ground support  
Military aircraft  
Propellers  
NT: Airplanes  
Helicopters

## Aircraft control

USE: Aerospace control





# 2019 IEEE Thesaurus

## *Aircraft electronics*

USE: Aerospace electronics

## *Aircraft engines*

USE: Aircraft propulsion

## *Aircraft instrumentation*

USE: Aerospace electronics

## **Aircraft manufacture**

BT: Aerospace and  
electronic systems

RT: Aerospace industry  
Aerospace materials  
Aircraft

## *Aircraft materials*

USE: Aerospace materials

## **Aircraft navigation**

UF: Aerospace navigation  
Entry, descent and

## landing

BT: Aerospace and  
electronic systems

RT: Navigation  
Aircraft  
Course correction

## **Aircraft propulsion**

UF: Aircraft engines  
BT: Aerospace and  
electronic systems

RT: Propulsion  
Aircraft  
Engines  
Jet engines  
Turbines  
NT: Propellers

## *Airfoils*

USE: Automotive components

## **Airplanes**

BT: Aircraft

## **Airports**

BT: Air transportation

## *Al*

USE: Aluminum

## *AL203*

USE: Aluminum oxide

## **Alarm systems**

UF: Warning systems  
BT: Security  
RT: Monitoring  
Safety  
Safety devices  
NT: Smoke detectors

## **Alcoholic beverages**

BT: Ethanol

## **Alcoholism**

BT: Diseases

## **Algae**

BT: Organisms

## **Algebra**

BT: Mathematics  
RT: Nonlinear equations  
NT: Abstract algebra  
Boolean algebra  
Linear algebra  
Set theory

## **Algorithm design and analysis**

BT: Algorithms  
NT: Algorithmic efficiency  
Generative adversarial

## networks

## **Algorithm design and theory**

BT: Algorithms  
NT: Consensus algorithm

## **Algorithmic efficiency**

BT: Algorithm design and  
analysis  
RT: Computational  
complexity  
Software performance  
Software quality

## **Algorithms**

UF: Subroutines  
BT: Mathematics  
RT: Biometrics (access  
control)  
Ciphers  
Cyclic redundancy  
check  
Huffman coding  
Linear programming



# 2019 IEEE Thesaurus

decoding	Maximum likelihood	<i>All optical networks</i>
	Model checking	USE: All-optical networks
	Numerical stability	
	Random processes	<b>All-optical networks</b>
	Software	UF: All optical networks
	Software libraries	BT: Optical fiber networks
	Stability analysis	
NT:	Adaptive algorithms	<i>Allocation</i>
	Algorithm design and	USE: Resource management
analysis		
	Algorithm design and	<b>Alloying</b>
theory	Approximation	BT: Metals
		RT: Aluminum alloys
algorithms		Aluminum compounds
	Artificial bee colony	Barium compounds
algorithm		Bismuth compounds
	Backpropagation	Calcium
algorithms		Cobalt
	Basis algorithms	Cobalt alloys
	Change detection	Copper alloys
algorithms		Gallium alloys
	Classification	Gallium compounds
algorithms		Germanium alloys
	Clustering algorithms	Gold alloys
	Compression algorithms	Hafnium compounds
	Density estimation	Indium compounds
robust algorithm		Iron alloys
	Detection algorithms	Lithium
	Distributed algorithms	Lithium compounds
	Dynamic programming	Neodymium alloys
	Filtering algorithms	Nickel alloys
	Genetic algorithms	Niobium alloys
	Hash functions	Platinum alloys
	Heuristic algorithms	Silicon alloys
	Inference algorithms	Strontium compounds
	MLFMA	Tin alloys
	Machine learning	Titanium alloys
algorithms		Yttrium compounds
	Matching pursuit	NT: Intermetallic
algorithms		Shape memory alloys
	Maximum likelihood	
detection		<i>Alloys</i>
	Multicast algorithms	USE: Metals
	Parallel algorithms	
	Partitioning	<b>Alpha particles</b>
algorithms		BT: Nuclear physics
	Prediction algorithms	RT: Ions
	Projection algorithms	
	Pursuit algorithms	<i>Alphavoltaic power sources</i>
	Signal processing	USE: Radioactive materials
algorithms		
	Software algorithms	<i>Alternating current generators</i>
	Viterbi algorithm	USE: AC generators



# 2019 IEEE Thesaurus

*Alternating current machines*

USE: AC machines

*Alternating current motors*

USE: AC motors

## Alternators

BT: Electric machines

RT: Synchronous generators

## Altimetry

BT: Pressure measurement

RT: Atmospheric measurements

*Aluminium*

USE: Aluminum

*Aluminium alloys*

USE: Aluminum alloys

*Aluminium compounds*

USE: Aluminum compounds

*Aluminium industry*

USE: Metals industry

*Aluminium oxide*

USE: Aluminum oxide

## Aluminum

UF: Al  
Aluminium

BT: Chemical elements  
Metals

NT: Aluminum alloys  
Aluminum compounds

## Aluminum alloys

UF: Aluminium alloys

BT: Aluminum

RT: Alloying

## Aluminum compounds

UF: Aluminium compounds

BT: Aluminum

RT: Alloying

NT: Aluminum gallium

nitride

Aluminum nitride

Aluminum oxide

## Aluminum gallium nitride

BT: Aluminum compounds

Gallium compounds

RT: III-V semiconductor materials

Transistors

*Aluminum industry*

USE: Metals industry

## Aluminum nitride

BT: Aluminum compounds

## Aluminum oxide

UF: Al2O3

Aluminium oxide

BT: Aluminum compounds

RT: Ceramics

## Alzheimer's disease

BT: Dementia

RT: Gerontology

Hippocampus

## Ambient assisted living

UF: AAL

BT: Assisted living  
Information and

communication technology

RT: Aging

Assistive devices

## Ambient intelligence

BT: Consumer electronics  
Telecommunications

RT: Intelligent systems  
Internet of Things  
Ubiquitous computing  
User interfaces

## Ambient networks

UF: AN Project

BT: Mobile communication

RT: 3G mobile

communication

*Amblyopia*

USE: Vision defects

## Ambulatory surgery

BT: Surgery

*American Express*

USE: Credit cards



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# 2019 IEEE Thesaurus

*American National Institute of Standards*  
USE: ANSI

*American Standards Institute*  
USE: ASA

**Americium**  
BT: Chemical elements

**Amino acids**  
BT: Biochemistry

*AMLCDs*  
USE: Active matrix liquid  
crystal displays

**Ammeters**  
BT: Electric variables  
measurement  
RT: Current measurement

**Amniocentesis**  
BT: Medical tests  
RT: Genetics  
Ultrasonic imaging  
NT: Amniotic fluid  
Birth disorders

**Amniotic fluid**  
BT: Amniocentesis  
Fluids and secretions

*AMOLEDs*  
USE: Active matrix organic  
light emitting diodes

**Amorphous magnetic materials**  
BT: Magnetic materials

**Amorphous materials**  
BT: Materials  
NT: Diamond-like carbon  
Glass

**Amorphous semiconductors**  
BT: Semiconductor  
materials  
RT: Silicon  
Thin film devices

**Amorphous silicon**  
BT: Silicon

**Amperometric sensors**

BT: Electrochemical  
devices  
Gas detectors

**Amplifiers**  
BT: Signal processing  
RT: Frequency response  
Klystrons  
Optical fiber

amplifiers  
Rail to rail  
amplifiers  
Rail to rail operation  
NT: Broadband amplifiers  
Differential

amplifiers  
Distributed amplifiers  
Low-noise amplifiers  
Operational amplifiers  
Power amplifiers  
Preamplifiers  
Pulse amplifiers  
Radiofrequency  
amplifiers  
Resonators

*Amplify-and-forward cooperative  
communication*  
USE: Cooperative  
communication

**Amplitude estimation**  
BT: Parameter estimation  
RT: Reflection coefficient

**Amplitude modulation**  
BT: Modulation  
RT: Demodulation  
Intensity modulation  
NT: Amplitude shift keying  
Quadrature amplitude  
modulation

**Amplitude shift keying**  
UF: ASK  
BT: Amplitude modulation

**Amygdala**  
UF: Amygdalae  
Corpus amygdaloideum  
BT: Brain

*Amygdalae*  
USE: Amygdala



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# 2019 IEEE Thesaurus

<i>AN Project</i>		Submillimeter wave
USE:	Ambient networks	integrated circuits
		UHF integrated
<i>Anaesthesia</i>		circuits
USE:	Anesthesia	NT: CMOS analog integrated
		circuits
<b>Analog circuits</b>		Field programmable
BT:	Circuits	analog arrays
RT:	Microwave circuits	
	Millimeter wave	<b>Analog memory</b>
circuits		BT: Memory
	Neuromorphics	RT: Analog processing
	Submillimeter wave	circuits
circuits		<b>Analog processing circuits</b>
networks	Switched capacitor	BT: Analog circuits
		RT: Analog integrated
	UHF circuits	circuits
	VHF circuits	
NT: Analog integrated		Analog memory
circuits	Analog processing	Application specific
circuits		integrated circuits
		Mixed analog-digital
		integrated circuits
		Signal processing
<i>Analog CMOS integrated circuits</i>		
USE:	CMOS analog integrated	<i>Analog to digital conversion</i>
circuits		USE: Analog-digital
		conversion
<b>Analog computers</b>		<i>Analog to digital converter</i>
UF:	Analogue computers	USE: Analog-digital
BT:	Computers	conversion
RT:	Summing circuits	
<i>Analog digital integrated circuits</i>		<b>Analog TV</b>
USE:	Analog-digital	UF: Analogue TV
integrated circuits		BT: TV
<b>Analog integrated circuits</b>		<i>Analog-digital</i>
UF:	Analogue integrated	USE: Analog-digital
circuits		conversion
	Linear integrated	
circuits		<b>Analog-digital conversion</b>
BT:	Analog circuits	UF: A/D
	Integrated circuits	A/D conversion
RT:	Analog processing	A/D converter
circuits		Analog to digital
	MMICs	conversion
	Microwave integrated	Analog to digital
circuits		converter
	Millimeter wave	Analog-digital
integrated circuits		Analog-to-digital
	Neural network	conversion
hardware		Analog-to-digital
		converter



# 2019 IEEE Thesaurus

conversion      Analogue-digital

converters      Analogue-digital

    BT:      Data conversion

    RT:      Data acquisition

            Quantization (signal)

    NT:      Delta modulation

**Analog-digital integrated circuits**

    UF:      Analog digital

integrated circuits      Analogue digital

integrated circuits      Analogue-digital

integrated circuits      Minimum analog-digital

integrated circuits      BT:      Integrated circuits

            NT:      Mixed analog-digital

integrated circuits

*Analog-to-digital conversion*

    USE:      Analog-digital

conversion

*Analog-to-digital converter*

    USE:      AC-DC power converters

AND

conversion      Analog-digital

*Analog-to-digital convertor*

    USE:      AC-DC power converters

*Analogue CMOS integrated circuits*

    USE:      CMOS analog integrated

circuits

*Analogue computers*

    USE:      Analog computers

*Analogue digital integrated circuits*

    USE:      Analog-digital

integrated circuits

*Analogue integrated circuits*

    USE:      Analog integrated

circuits

*Analogue TV*

    USE:      Analog TV

USE:      Analog-digital

conversion

*Analogue-digital converters*

    USE:      Analog-digital

conversion

*Analogue-digital integrated circuits*

    USE:      Analog-digital

integrated circuits

**Analysis of variance**

    UF:      ANOVA

    BT:      Statistical analysis

**Analytic hierarchy process**

    BT:      Decision making

    RT:      Management

            Strategic planning

**Analytical models**

    BT:      Modeling

    RT:      Neuroinformatics

    NT:      Common Information

Model (computing)

**Anatomical structure**

    BT:      Medical diagnostic

imaging

**Anatomy**

    BT:      Biological systems

    NT:      Auditory system

            Biological tissues

            Body regions

            Cardiovascular system

            Circulatory system

            Digestive system

            Embryonic structures

            Endocrine system

            Fluids and secretions

            Human anatomy

            Immune system

            Integumentary system

            Lymphatic system

            Musculoskeletal system

            Nervous system

            Neuroanatomy

            Respiratory system

            Sense organs

            Stomatognathic system

            Urogenital system

*Analogue-digital conversion*

**Android (operating system)**



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# 2019 IEEE Thesaurus

BT:	Operating systems		
<b>Androids</b>		<b>Angular velocity control</b>	
BT:	Robots	BT:	Velocity control
RT:	Human factors	<b>Animal behavior</b>	
	Man-machine systems	BT:	Behavioral sciences
<b>Anechoic chambers</b>		<b>Animal structures</b>	
BT:	Test facilities	BT:	Animals
RT:	Acoustic measurements	NT:	Beak
	Antenna measurements		Feathers
	Electromagnetic		Tail
measurements		<b>Animals</b>	
	Immunity testing	BT:	Organisms
	TEM cells		Zoology
<b>Anemometers</b>		RT:	Agriculture
USE:	Fluid flow measurement		Biological systems
<b>Anesthesia</b>			Life sciences
UF:	Anaesthesia	NT:	Animal structures
BT:	Medical treatment		Birds
NT:	Anesthetic drugs		Bovine
<b>Anesthesiology</b>			Cats
BT:	Medical specialties		Dinosaurs
<b>Anesthetic drugs</b>			Dogs
BT:	Anesthesia		Horses
<b>Aneurism</b>			Insects
USE:	Aneurysm		Marine animals
<b>Aneurysm</b>			Mice
UF:	Aneurism		Rabbits
BT:	Medical conditions		Rats
<b>Angiocardiology</b>			Rodents
BT:	Biomedical imaging		Wildlife
RT:	Biomedical	<b>Animation</b>	
applications of radiation		UF:	Computer animation
<b>Angiography</b>		BT:	Graphics
UF:	Arteriography	RT:	Computer graphics
BT:	Biomedical imaging		Image generation
<b>Angioplasty</b>			Visual effects
BT:	Medical treatment		Visualization
<b>Angular velocity</b>		NT:	Facial animation
BT:	Mechanical variables	<b>Animatronics</b>	
measurement		BT:	Robotics and
RT:	Velocity control		automation
	Velocity measurement	<b>Anisotropic</b>	
		BT:	Filters
		<b>Anisotropic conductive films</b>	
		BT:	Conductive films
		<b>Anisotropic diffusion</b>	



# 2019 IEEE Thesaurus

USE: Anisotropic  
magnetoresistance

*Anisotropic effects*

USE: Anisotropic  
magnetoresistance

**Anisotropic magnetoresistance**

UF: Anisotropic diffusion  
Anisotropic effects  
Anisotropic  
magnetoresistance sensors

Anisotropic material  
Anisotropic processing  
Anisotropically  
Anisotropy

BT: Magnetoresistance

*Anisotropic magnetoresistance sensors*

USE: Anisotropic  
magnetoresistance

*Anisotropic material*

USE: Anisotropic  
magnetoresistance

*Anisotropic processing*

USE: Anisotropic  
magnetoresistance

*Anisotropically*

USE: Anisotropic  
magnetoresistance

*Anisotropy*

USE: Anisotropic  
magnetoresistance

**Annealing**

UF: Annealing temperature  
BT: Heat treatment  
Materials processing  
RT: Simulated annealing  
Softening  
Thermal factors  
NT: Rapid thermal  
annealing

*Annealing temperature*

USE: Annealing

*Announcements*

USE: IEEE news

**Anodes**

BT: Electrodes  
RT: Electron tubes

**Anomaly detection**

UF: Outlier detection  
BT: Data mining

**ANOVA**

USE: Analysis of variance

**ANSI**

UF: American National  
Institute of Standards  
BT: Standards  
organizations  
RT: ASA

**ANSI Standards**

BT: Standards publications  
RT: ASA Standards  
IEEE Standards  
ISO Standards  
NT: National Electric Code

**Ant colony optimization**

BT: Probability  
RT: Graph theory

**Antarctica**

BT: Geoscience  
NT: South Pole

**Antenna accessories**

UF: Antenna components  
BT: Antennas  
NT: Radomes

**Antenna arrays**

UF: Distributed antennas  
BT: Antennas  
RT: Broadband antennas  
SIMO communication  
SISO communication  
NT: Adaptive arrays  
Butler matrices  
Linear antenna arrays  
Log periodic antennas  
Microstrip antenna

arrays

Microwave antenna

arrays

Phased arrays  
Planar arrays



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# 2019 IEEE Thesaurus

<i>Antenna components</i>	NT:	Antenna accessories
USE: Antenna accessories		Antenna arrays
		Antenna radiation
<i>Antenna diversity</i>	patterns	Antenna theory
USE: Spatial diversity		Apertures
		Broadband antennas
<b>Antenna feeds</b>		Dielectric resonator
BT: Feeds	antennas	
RT: Antennas		Dipole antennas
Aperture coupled		Directional antennas
antennas		Directive antennas
		Feeds
<b>Antenna measurements</b>		Fractal antennas
BT: Measurement		Helical antennas
RT: Anechoic chambers		Horn antennas
Antennas		Leaky wave antennas
Electromagnetic		Loaded antennas
measurements		Log-periodic dipole
	antennas	
<i>Antenna phased arrays</i>		Microstrip antennas
USE: Phased arrays		Microwave antennas
		Mobile antennas
<b>Antenna radiation patterns</b>		Multifrequency
UF: Radiation pattern	antennas	
BT: Antennas		Omnidirectional
RT: Antenna theory	antennas	
NT: Near-field radiation		Patch antennas
pattern		Radar antennas
		Receiving antennas
<b>Antenna theory</b>		Rectennas
BT: Antennas		Reflector antennas
RT: Antenna radiation		Satellite antennas
patterns		Slot antennas
		Transmission line
	antennas	
NT: Current distribution		Transmitting antennas
Mode matching methods		UHF antennas
Frequency selective		Yagi-Uda antennas
surfaces		
<b>Antennas</b>		
BT: Antennas and	<b>Antennas and propagation</b>	
propagation	RT: Communication systems	
RT: Antenna feeds	Communications	
Antenna measurements	technology	
Beam steering		Signal processing
Butler matrices	NT: Antennas	
Fractals	Electromagnetic	
IEEE 802.11n Standard	propagation	
Microstrip antenna		Radio astronomy
arrays		
	<b>Anthropometry</b>	
Radio communication	BT: Measurement	
equipment	RT: Biomechanics	
	Biomedical measurement	
Spatial diversity		
Waveguide theory		



# 2019 IEEE Thesaurus

	Ergonomics		<i>Antiderivatives</i>	
	Human factors		USE: Integral equations	
<b>Anthropomorphism</b>			<i>Antiferroelectric materials</i>	
BT: Human factors			USE: Dielectric materials	
<i>Anti freeze</i>			<b>Antiferromagnetic materials</b>	
USE: Anti-freeze			BT: Magnetic materials	
<i>Anti-bacterial</i>			RT: Antiferromagnetic	
USE: Antibacterial activity			resonance	
<i>Anti-biotics</i>			<b>Antiferromagnetic resonance</b>	
USE: Antibiotics			BT: Magnetic resonance	
<b>Anti-freeze</b>			RT: Antiferromagnetic	
UF: Anti freeze			materials	
	Antifreeze		<i>Antifreeze</i>	
BT: Chemical compounds			USE: Anti-freeze	
RT: Methanol			<i>Antifreeze materials</i>	
<b>Anti-fungal</b>			USE: Coolants	
UF: Antifungal			<i>Antifungal</i>	
BT: Antibiotics			USE: Anti-fungal	
<b>Anti-parasitical</b>			<b>Antimony</b>	
UF: Antiparasitical			BT: Chemical elements	
BT: Antibiotics			<i>Antiparasitical</i>	
<b>Anti-virus software</b>			USE: Anti-parasitical	
BT: Software			<b>AODV</b>	
RT: Computer viruses			UF: Ad hoc On Demand	
Countermeasures			Distance Vector	
(computer)			BT: Ad hoc networks	
	Malware		Wireless networks	
	Security		<i>AOI</i>	
<i>Antibacterial</i>			USE: Information age	
USE: Antibacterial activity			<i>Apache hadoop</i>	
<b>Antibacterial activity</b>			USE: Cluster computing	
UF: Anti-bacterial			<i>Apache spark</i>	
	Antibacterial		USE: Cluster computing	
BT: Antibiotics			<i>APCVD</i>	
<b>Antibiotics</b>			USE: Atmospheric pressure	
UF: Anti-biotics			chemical vapor deposition	
BT: Drugs			<i>APDs</i>	
NT: Anti-fungal			USE: Avalanche photodiodes	
	Anti-parasitical			
	Antibacterial activity			
<b>Antidepressants</b>				
BT: Drugs				



# 2019 IEEE Thesaurus

## Aperture antennas

BT: Apertures  
RT: Aperture coupled antennas  
Reflector antennas

## Aperture coupled antennas

BT: Apertures  
RT: Antenna feeds  
Aperture antennas  
Microstrip antenna arrays  
Microstrip antennas

## Apertures

BT: Antennas  
RT: Couplers  
NT: Aperture antennas  
Aperture coupled antennas

## Appearance matching

USE: Image matching

## Appliances

USE: Home appliances

## Application programming interfaces

UF: Mobile application development  
BT: Computer interfaces  
RT: Software defined networking  
NT: WebRTC

## Application security

BT: Computer security

## Application software

BT: Software

## Application specific integrated circuits

UF: ASIC  
Custom integrated circuits  
Semicustom integrated circuits  
BT: Circuits  
Integrated circuits  
RT: Analog processing circuits  
CMOS logic circuits

Field programmable analog arrays  
NT: System-on-chip

## Application specific processors

BT: Program processors

## Application virtualization

UF: Cross platform virtualization  
Cross-platform virtualization  
BT: Computer applications  
RT: Emulation  
Network function virtualization  
Simulation  
NT: Edge computing

## Applicators

BT: Production equipment  
RT: Agricultural machinery  
Labeling

## Appraisal

BT: Human resource management  
RT: Incentive schemes  
Personnel

## Appropriate technology

BT: Technology  
RT: Microhydro power  
Picohydro power

## Approximate computing

BT: Computers and information processing

## Approximation algorithms

BT: Algorithms

## Approximation error

BT: Approximation methods

## Approximation methods

UF: Approximation theory  
BT: Numerical analysis  
RT: Least squares approximation  
Minimization methods  
Signal representation  
NT: Approximation error



# 2019 IEEE Thesaurus

approximation	Chebyshev	USE: Architecture
	Curve fitting	description languages
	Extrapolation	<b>Architecture</b>
	Function approximation	BT: Industries
	Interpolation	RT: Buildings
	Linear approximation	Structural engineering
	Mean square error	
methods	Perturbation methods	<i>Architecture (computer)</i>
		USE: Computer architecture
<i>Approximation theory</i>		<b>Architecture description languages</b>
USE: Approximation methods		UF: Architectural
		description languages
		BT: Computer languages
<b>Aquaculture</b>		
UF: Fisheries		
BT: Agriculture		
RT: Marine animals		
<b>Aquatic robots</b>		
UF: Swimming robots		
BT: Robots		
<i>Aquatic vehicles</i>		
USE: Underwater vehicles		
<i>Ar</i>		
USE: Argon		
<b>Arc discharges</b>		
UF: Arc flash		
	Arc-flash	
BT: Dielectric breakdown		
RT: Electrostatic		
discharges	High intensity	
discharge lamps	Light sources	
	Plasmas	
<i>Arc flash</i>		
USE: Arc discharges		
<i>Arc Lamps</i>		
USE: Lighting		
<i>Arc-flash</i>		
USE: Arc discharges		
<b>Archaea</b>		
BT: Organisms		
<i>Architectural description Languages</i>		
		USE: Architecture
		description languages
		<b>Architecture</b>
		BT: Industries
		RT: Buildings
		Structural engineering
		<i>Architecture (computer)</i>
		USE: Computer architecture
		<b>Architecture description languages</b>
		UF: Architectural
		description languages
		BT: Computer languages
		<b>Arctic</b>
		BT: Geoscience
		NT: North Pole
		<b>Area measurement</b>
		BT: Measurement
		RT: Size measurement
		<b>Argon</b>
		UF: Ar
		BT: Gases
		<b>Arithmetic</b>
		BT: Mathematics
		NT: Digital arithmetic
		Fixed-point arithmetic
		Floating-point
		arithmetic
		<b>Armature</b>
		BT: Electromechanical
		devices
		<i>Armpit</i>
		USE: Axilla
		<b>Arms</b>
		BT: Extremities
		NT: Wrist
		<i>Arms (robotic)</i>
		USE: Manipulators
		<b>ARPANET</b>
		UF: Advanced Research
		Projects Agency Network
		DARPANET
		BT: Communication systems



# 2019 IEEE Thesaurus

<i>ARQ</i>	RT:	Internet Packet switching	<b>Arsenic compounds</b>	UF:	Arsenite Arsine
	BT:			BT:	Arsenic
<i>request</i>	USE:	Automatic repeat	<i>Arsenite</i>	USE:	Arsenic compounds
<i>Array</i>	USE:	Arrays	<i>Arsine</i>	USE:	Arsenic compounds
<i>Array processing</i>	USE:	Arrays AND Parallel processing	<b>Art</b>	BT:	Graphics
				RT:	Computer graphics Layout
<b>Array signal processing</b>	UF:	Beamforming		NT:	Digital art Fractal art
	BT:	Signal processing			
	RT:	Acoustic arrays Acoustic transducers Adaptive arrays Blind source	<b>Arterial blood circulation</b>	BT:	Arteries
<i>separation</i>		Direction-of-arrival	<b>Arterial blood pressure</b>	BT:	Arteries
<i>estimation</i>		Signal resolution Source separation Time of arrival	<b>Arterial occlusion</b>	BT:	Arteries
<i>estimation</i>			<i>Arterial pressure</i>	USE:	Blood pressure
<b>Arrayed waveguide gratings</b>	UF:	AWG device	<i>Arterial wall structures</i>	USE:	Arteries
	BT:	Optical waveguides			
	RT:	Demultiplexing Integrated optics Multiplexing	<i>Arterial walls</i>	USE:	Arteries
<b>Arrays</b>	UF:	Array Array processing	<b>Arteries</b>	UF:	Arterial wall structures
	BT:	Data structures			Arterial walls Artery
	NT:	Sensor arrays		BT:	Blood vessels
				NT:	Arterial blood circulation
<b>Arresters</b>	BT:	Surge protection	<i>pressure</i>		Arterial blood
	RT:	Power system			Arterial occlusion Carotid arteries
<i>protection</i>		Power system	<i>Arteriography</i>	USE:	Angiography
<i>transients</i>		Varistors	<b>Arteriosclerosis</b>	BT:	Diseases
<b>Arsenic</b>	BT:	Chemical elements			
	NT:	Arsenic compounds			



# 2019 IEEE Thesaurus

NT: Atherosclerosis	Minimax techniques
Coronary	Natural languages
arteriosclerosis	Neural networks
Artery	Neurocontrollers
USE: Arteries	Pervasive computing
Arthritis	Posthuman
BT: Diseases	Prediction theory
Artificial bee colony algorithm	Radial basis function
UF: ABC algorithms	Robot learning
BT: Algorithms	Semantic Web
RT: Cooperative systems	Software agents
Optimization	Support vector
Particle swarm	Synapses
optimization	NT: Affective computing
Search problems	Autonomous robots
Artificial biological organs	Bio-inspired computing
UF: Artificial organs	Cognitive systems
BT: Prosthetics	Context awareness
RT: Biological systems	Cooperative systems
NT: Artificial heart	Decision support
Artificial limbs	Intelligent systems
Artificial fibers	Knowledge based
USE: Synthetic fibers	Knowledge engineering
Artificial fibres	Learning (artificial
USE: Synthetic fibers	Learning systems
Artificial heart	Machine learning
BT: Artificial biological	Prediction methods
organs	Virtual artifact
Artificial immune systems	Artificial limbs
BT: Immune system	BT: Artificial biological
Artificial intelligence	organs
UF: AI	Prosthetics
BT: Computational and	Artificial neural networks
artificial intelligence	BT: Neural networks
RT: Autonomous automobiles	RT: Mathematical model
Autonomous vehicles	Neuromorphic
Computational	engineering
intelligence	NT: Convolutional neural
Data mining	networks
Feedforward neural	Hebbian theory
networks	Self-organizing
Generative adversarial	feature maps
networks	Artificial organs
Independent component	USE: Artificial biological
analysis	organs



# 2019 IEEE Thesaurus

## Artificial satellites

BT: Aerospace engineering  
 RT: Satellite  
 communication  
 Satellites  
 Space technology  
 Space vehicles  
 NT: Earth Observing System  
 Low earth orbit  
 satellites  
 Military satellites  
 Space stations

## ASA

UF: American Standards  
 Institute  
 BT: Standards  
 organizations  
 RT: ANSI

## ASA Standards

BT: Standards publications  
 RT: ANSI Standards

## Ash

BT: Industrial waste  
 RT: Air pollution  
 Exhaust gases  
 Incineration  
 Volcanic ash  
 NT: Fly ash

## Asia

BT: Continents

## ASIC

USE: Application specific  
 integrated circuits

## ASK

USE: Amplitude shift keying

## Ask IEEE

BT: Document delivery  
 Information services

## Asphalt

UF: Bitumen  
 BT: Building materials

## Asphyxia

BT: Death

## Aspirin

BT: Drugs

## ASR

USE: Automatic speech  
 recognition

## Assemblers (program)

USE: Program processors

## Assembly

BT: Manufacturing  
 RT: Assembly systems  
 Manipulators  
 Manufacturing

## automation

NT: Fitting  
 Microassembly  
 Preforms  
 Soldering

## Assembly robots

USE: Robotic assembly

## Assembly systems

BT: Industrial electronics  
 Manufacturing  
 Production systems  
 RT: Assembly  
 Fitting  
 Industrial control  
 Manipulators  
 Manufacturing

## automation

Mobile robots  
 Robots  
 NT: Flexible electronics  
 Robotic assembly

## Asset management

UF: Asset-management  
 BT: Management  
 NT: Public infrastructure

## Asset-management

USE: Asset management

## Assisted living

BT: Medical services  
 RT: Aging  
 Geriatrics  
 Senior citizens  
 NT: Ambient assisted

## living



# 2019 IEEE Thesaurus

## Assistive devices

BT: Assistive technology  
RT: Ambient assisted

living

## Assistive robotics

USE: Rehabilitation

robotics

## Assistive technology

UF: Aids for the  
handicapped

Assistive devices  
Handicapped aids  
BT: Biomedical equipment  
RT: Communication aids  
Gaze tracking  
Gerontechnology  
Medical control

systems

Orthotics  
Prosthetics  
Rehabilitation

robotics

Sensory aids  
Sign language  
Wearable robots  
NT: Assistive devices  
Wheelchairs

## Assistive devices

USE: Assistive technology

## Association rules

BT: Data mining

## Associative memory

UF: Content addressable  
memory

BT: Memory  
RT: Neural networks

## Associative processing

BT: Data processing  
RT: Computers and  
information processing

## Astatine

BT: Chemical elements

## Asthma

USE: Respiratory system

## Astrochemistry

UF: Planetary chemistry  
BT: Chemistry

## Astronomy

BT: Science - general  
RT: Extraterrestrial

measurements

Gamma-ray detectors  
Telescopes  
NT: Astrophysics  
Extrasolar planets  
Observatories  
Radio astronomy  
Solar system

## Astrophysics

BT: Astronomy  
Physics  
RT: Gravity measurement  
NT: Orbits  
Stellar dynamics

## Asymptotic stability

BT: System analysis and  
design  
RT: Discrete-time systems  
Stability

## Asynchronous circuits

BT: Circuits

## Asynchronous communication

BT: Data communication  
RT: Web services

## Asynchronous transfer mode

BT: Data communication  
Protocols  
RT: B-ISDN  
Broadband  
communication  
ISDN  
Multiprotocol label  
switching  
SONET

## Atherosclerosis

BT: Arteriosclerosis

## Atmosphere

BT: Geoscience  
RT: Atmospheric  
measurements





# 2019 IEEE Thesaurus

NT: Meteorology	BT: Tritium batteries
NT: Air quality	BT: Energy conversion
Atmospheric modeling	Nuclear power
Atmospheric waves	generation
<b>Atmospheric measurements</b>	NT: Radioisotope
BT: Measurement	thermoelectric generators
RT: Air pollution	<b>Atomic beams</b>
Air quality	BT: Particle beams
Altimetry	RT: Atom lasers
Atmosphere	Atom optics
Geophysical	<b>Atomic clocks</b>
measurements	UF: Atomic frequency
Global warming	standards
Meteorology	BT: Clocks
Pressure gauges	RT: Frequency measurement
Remote sensing	International Atomic
Terrestrial atmosphere	Time
<b>Atmospheric modeling</b>	Masers
BT: Atmosphere	<i>Atomic energy</i>
Modeling	USE: Nuclear power
<b>Atmospheric pressure chemical vapor deposition</b>	generation
UF: APCVD	<b>Atomic force microscopy</b>
BT: Chemical vapor	BT: Microscopy
deposition	RT: Casimir effect
<i>Atmospheric sintering</i>	Magnetic force
USE: Materials preparation	microscopy
<b>Atmospheric waves</b>	Nanotechnology
BT: Atmosphere	Scanning microwave
Waves	microscopy
<b>Atmospheric-pressure plasmas</b>	<i>Atomic frequency standards</i>
BT: Plasmas	USE: Atomic clocks
<b>Atom lasers</b>	<i>Atomic Lasers</i>
UF: Single atom lasers	USE: Gas lasers
BT: Lasers	<b>Atomic layer deposition</b>
RT: Atom optics	BT: Chemical vapor
Atomic beams	deposition
Gas lasers	<b>Atomic measurements</b>
<b>Atom optics</b>	BT: Measurement
UF: Atomic optics	RT: Nuclear measurements
BT: Particle beam optics	Radiation detectors
RT: Atom lasers	Spectroscopy
Atomic beams	<i>Atomic optics</i>
<b>Atomic batteries</b>	USE: Atom optics
UF: Nuclear batteries	ATPG



# 2019 IEEE Thesaurus

USE: Automatic test pattern generation

## Atrial fibrillation

BT: Fibrillation

## Atrophy

BT: Medical conditions

## Attenuation

UF: Acoustic wave  
attenuation  
Electromagnetic wave

attenuation

Light attenuation

BT: Propagation

RT: Attenuation

measurement

Attenuators  
Diagnostic radiography  
Insertion loss

## Attenuation measurement

BT: Electric variables  
measurement

RT: Attenuation  
Loss measurement

## Attenuators

BT: Signal processing  
RT: Attenuation  
NT: Optical attenuators

## Attitude control

BT: Aerospace control  
RT: Position control

## Attitude determination

USE: Position measurement

## ATV

USE: HDTV

## Au

USE: Gold

## Audible noise

USE: Acoustic noise

## Audio coding

BT: Encoding  
Information theory  
RT: MPEG 7 Standard  
Rate distortion theory

Speech coding

## Audio compression

BT: Data compression

## Audio databases

BT: Database systems  
RT: File systems  
Multimedia databases

## Audio enhancement

USE: Acoustic signal processing AND  
Noise reduction

## Audio recording

BT: Recording

## Audio restoration

USE: Acoustic noise

## Audio systems

UF: Phonographs  
Sound systems  
Stereophonic systems  
BT: Consumer electronics  
RT: Digital audio

broadcasting

Music  
NT: Audio tapes  
Audio-visual systems  
Auditory displays  
Headphones  
Loudspeakers  
Microphones  
Pitch control (audio)  
Portable media players  
Sonification

## Audio tapes

BT: Audio systems

## Audio user interfaces

UF: Auditory icons  
BT: User interfaces  
RT: Multimedia computing

## Audio visual systems

USE: Audio-visual systems

## Audio watermarking

USE: Watermarking

## Audio-visual instructional aids



# 2019 IEEE Thesaurus

USE: Educational technology	RT: Materials science and technology
<b>Audio-visual systems</b>	Smart materials
UF: Audio visual systems	
Audiovisual systems	
BT: Audio systems	<b>Australia</b>
RT: Educational technology	BT: Continents
<i>Audiovisual systems</i>	<b>Authentication</b>
USE: Audio-visual systems	BT: Computer security
	RT: Blockchain
	CAPTCHAs
<b>Auditory displays</b>	Image processing
BT: Audio systems	Interactive systems
Communication	Password
equipment	Video signal
RT: Aerospace and	processing
electronic systems	NT: Multi-factor authentication
Communication aids	
<i>Auditory icons</i>	<b>Authoring systems</b>
USE: Audio user interfaces	UF: Authoring tools
	BT: Software tools
<b>Auditory implants</b>	RT: Computer aided instruction
UF: Auditory midbrain implants	Courseware
BT: Implants	Multimedia systems
	Web design
<i>Auditory midbrain implants</i>	
USE: Auditory implants	<i>Authoring tools</i>
	USE: Authoring systems
<b>Auditory system</b>	<i>Authorisation</i>
UF: Hearing	USE: Authorization
BT: Anatomy	
RT: Biomedical acoustics	<b>Authorization</b>
Head	UF: Authorisation
Hearing aids	BT: Access control
Psychoacoustics	RT: Privacy
NT: Psychoacoustic models	
<b>Augmented reality</b>	<b>Autism</b>
BT: Programming	BT: Medical conditions
Virtual reality	
RT: Extended reality	<b>Autobiographies</b>
Network slicing	UF: Memoirs
NT: Spatial augmented reality	BT: Biographies
X reality	<b>Autocorrelation</b>
<b>Augmented virtuality</b>	BT: Correlation
BT: Virtual reality	RT: Signal analysis
	Time series analysis
<b>Austenite</b>	<b>Automata</b>
UF: Gamma phase iron	UF: Finite state machines
BT: Iron alloys	BT: Robots



# 2019 IEEE Thesaurus

RT: Cognitive systems	Manufacturing
Cybernetics	automation
Intelligent systems	Pattern recognition
NT: Turing machines	
<i>Automated guided vehicles</i>	<b>Automatic programming</b>
USE: Autonomous vehicles	UF: Program generators
	BT: Programming
<b>Automated highways</b>	<i>Automatic protection switching</i>
BT: Automation	USE: Protection switching
Intelligent	
transportation systems	<b>Automatic repeat request</b>
RT: Road safety	UF: ARQ
Smart transportation	BT: Feedback
	communications
<i>Automated indexing</i>	<b>Automatic speech recognition</b>
USE: Machine assisted	UF: ASR
indexing	BT: Speech recognition
<i>Automated storage and retrieval systems</i>	
USE: Storage automation	<b>Automatic test equipment</b>
	BT: Test equipment
<b>Automatic control</b>	RT: Automatic testing
BT: Control systems	
NT: Power generation	<i>Automatic Test Markup Language</i>
control	USE: XML
<b>Automatic frequency control</b>	
BT: Frequency control	<b>Automatic test pattern generation</b>
	UF: ATPG
<i>Automatic gain control</i>	BT: Automatic testing
USE: Gain control	RT: Design automation
	NT: Test pattern
<b>Automatic generation control</b>	generators
BT: Automation	<b>Automatic testing</b>
Control systems	UF: Self testing
Power generation	BT: Automation
	Testing
<i>Automatic indexing</i>	RT: Automatic test
USE: Machine assisted	equipment
indexing	Maintenance
<b>Automatic logic units</b>	engineering
BT: Microprocessors	NT: Automatic test pattern
	generation
<b>Automatic meter reading</b>	Ring generators
BT: Meter reading	<b>Automatic voltage control</b>
RT: Flowmeters	UF: AVC
Smart meters	BT: Voltage control
	RT: Voltage
<b>Automatic optical inspection</b>	Voltage measurement
BT: Inspection	
RT: Machine vision	<b>Automation</b>



# 2019 IEEE Thesaurus

BT:	Robotics and		
automation		<b>Automotive components</b>	
RT:	Bagging	UF:	Air bags
	Biometrics (access		Airfoils
control)			Automobile parts
	Flash memories		Radiators (automotive)
	Home automation		Starter motors
	Information technology	(automotive)	
	Substation automation		Windscreen wipers
	ZigBee		Windscreens
NT:	Automated highways		Windshield wipers
	Automatic generation		Windshields
control		BT:	Mechanical products
	Automatic testing	RT:	Automobile manufacture
	Building automation		Automobiles
	Manufacturing		Automotive engineering
automation			Axles
	Office automation		Belts
	Storage automation		Brakes
	Vehicular automation		Camshafts
			Gears
<i>Automobile engineering</i>			Hoses
USE:	Automotive engineering		Internal combustion
		engines	
<b>Automobile manufacture</b>			Shock absorbers
BT:	Manufacturing systems		Steering systems
RT:	Automobiles		Suspensions
	Automotive components	(mechanical systems)	
	Automotive engineering		Tires
	Automotive materials		Torque converters
	Die casting		Water pumps
	Engines		Wheels
	Tires		
	Wheels		
		<b>Automotive electronics</b>	
<i>Automobile materials</i>		BT:	Automotive engineering
USE:	Automotive materials		
<i>Automobile parts</i>		<b>Automotive engineering</b>	
USE:	Automotive components	UF:	Automobile engineering
			Automotive
		BT:	Vehicular and wireless
		technologies	
<b>Automobiles</b>		RT:	Automobile manufacture
UF:	Cars		Automobiles
BT:	Road vehicles		Automotive components
RT:	Automobile manufacture		Diesel engines
	Automotive components		Road safety
	Automotive engineering		Wheels
	Automotive materials	NT:	Automotive
<i>Automotive</i>		applications	
USE:	Automotive engineering		Automotive electronics
			Power steering
<b>Automotive applications</b>			Vehicle crash testing
BT:	Automotive engineering		Vehicle detection
			Vehicle driving



# 2019 IEEE Thesaurus

Vehicle dynamics	Autonomous mental development
Vehicle safety	BT: Computational and artificial intelligence
<b>Automotive materials</b>	<i>Autonomous navigation</i>
UF: Automobile materials	USE: Autonomous robots
BT: Production materials	<b>Autonomous robots</b>
RT: Automobile manufacture	UF: Autonomous navigation
Automobiles	BT: Artificial intelligence
<b>Autonomic nervous system</b>	Autonomous systems
BT: Nervous system	Robots
NT: Parasympathetic	RT: Cognitive robotics
nervous system	Intelligent robots
system	
<b>Autonomic systems</b>	<b>Autonomous systems</b>
BT: Network operating	BT: Intelligent systems
systems	Robotics and automation
<b>Autonomous aerial vehicles</b>	NT: Autonomous robots
BT: Unmanned autonomous	Autonomous vehicles
vehicles	
<b>Autonomous agents</b>	<i>Autonomous trucks</i>
BT: Software agents	USE: Autonomous vehicles
<b>Autonomous automobiles</b>	<b>Autonomous underwater vehicles</b>
UF: Autonomous cars	UF: Underwater autonomous
Driver free	vehicles
automobiles	BT: Unmanned autonomous
Driver free cars	vehicles
Driver-free car	<b>Autonomous vehicles</b>
Driverless automobiles	UF: Automated guided
Driverless cars	vehicles
Robot automobiles	Autonomous cars
Robot cars	Autonomous driving
Self-driving	Autonomous trucks
automobiles	Unmanned autonomous
Self-driving car	vehicle
BT: Intelligent	BT: Autonomous systems
transportation systems	Intelligent vehicles
Mobile robots	RT: Artificial
RT: Artificial	intelligence
intelligence	Mechatronics
<i>Autonomous cars</i>	Multi-agent systems
USE: Autonomous automobiles	Vehicular automation
AND	NT: Unmanned autonomous
Autonomous vehicles	vehicles
<i>Autonomous driving</i>	<b>Autopsy</b>
USE: Autonomous vehicles	BT: Medical diagnosis
	RT: Pathology



# 2019 IEEE Thesaurus

*Autoregressive moving average models*  
USE: Autoregressive processes

## Autoregressive processes

UF: Autoregressive moving average models  
BT: Box Jenkins models  
RT: Statistics  
Noise  
Time series analysis

## Auxetic materials

UF: Auxetics  
BT: Materials

## Auxetics

USE: Auxetic materials

## Auxiliary transmitters

BT: Transmitters

## Availability

UF: System availability  
BT: Reliability  
RT: Maintenance  
engineering

## Avalanche breakdown

BT: Electric breakdown

## Avalanche photodiodes

UF: APDs  
BT: Photodiodes  
RT: Optical fiber  
communication  
Photomultipliers

## Avatars

BT: Graphical user interfaces  
Virtual reality

## AVC

USE: Automatic voltage control

## Avionics

USE: Aerospace electronics

## Awards

BT: IEEE indexing

## AWG device

USE: Arrayed waveguide gratings

## AWGN

BT: Additive noise  
Gaussian noise  
White noise

## AWGN channels

BT: Gaussian channels  
RT: Intersymbol interference  
White noise

## Axilla

UF: Armpit  
Underarm  
BT: Shoulder

## Axles

BT: Mechanical products  
RT: Automotive components  
Wheels

## Axons

BT: Nerve fibers  
RT: Action potentials  
Myelin  
White matter

## Azimuth

BT: Mathematics  
NT: Azimuthal angle  
Azimuthal component  
Azimuthal current  
Azimuthal harmonics  
Azimuthal plane

## Azimuthal angle

BT: Azimuth

## Azimuthal component

BT: Azimuth

## Azimuthal current

BT: Azimuth

## Azimuthal harmonics

BT: Azimuth

## Azimuthal plane

BT: Azimuth

## Azobenzene



# 2019 IEEE Thesaurus

BT: Polymers	<b>Backscatter</b>	BT: Reflection
RT: Smart materials		RT: Meteorological radar
<b>B-ISDN</b>		
UF: Broadband ISDN	<i>Backscattering</i>	USE: Scattering
BT: Broadband		
communication		
	ISDN	
RT: Asynchronous transfer	<b>Backstepping</b>	BT: Control nonlinearities
mode		
	Data communication	<i>Backward propagation</i>
	Frame relay	USE: Backpropagation
	Image communication	<i>Backwards propagation of errors</i>
	Multimedia	USE: Backpropagation
communication		
<i>B-Spline</i>		<i>Bacteria</i>
USE: Splines (mathematics)		USE: Microorganisms
<i>Ba</i>		<i>Bacterial content</i>
USE: Barium		USE: Microorganisms
<i>Babies</i>		<b>Bacterial infections</b>
USE: Pediatrics		BT: Diseases
<i>Baby</i>		<b>Bagging</b>
USE: Pediatrics		BT: Packaging
<b>Back</b>		RT: Automation
BT: Body regions		Packaging machines
		Plastic packaging
<i>Back propagation</i>		<b>Ball bearings</b>
USE: Backpropagation		BT: Machinery
		RT: Mechanical bearings
<b>Background noise</b>		Metal products
BT: Acoustic noise		Rolling bearings
<b>Backplanes</b>		<i>Ball grid arrays</i>
BT: Data buses		USE: Electronics packaging
<b>Backpropagation</b>		<b>Ball milling</b>
UF: Back propagation		BT: Production
Backward propagation		RT: Milling machines
Backwards propagation		<i>Ball screws</i>
of errors		USE: Mechanical products
BT: Learning systems		<i>Ballasts</i>
RT: Backpropagation		USE: Electronic ballasts
algorithms		
	Neural networks	
<b>Backpropagation algorithms</b>		<b>Ballistic magnetoresistance</b>
BT: Algorithms		BT: Magnetoresistance
RT: Backpropagation		
		<b>Ballistic transport</b>





# 2019 IEEE Thesaurus

BT: Electron emission  
NT: Electronic ballasts

NT: Narrowband  
Wideband

## Baluns

BT: Electromagnetic  
devices  
Impedance matching  
Microwave technology  
Transformers  
RT: Transmission lines

## Bamboo

BT: Natural fibers  
Plants (biology)

## Band gap

USE: Photonic band gap

## Band pass filters

USE: Band-pass filters

## Band-gap

USE: Photonic band gap

## Band-pass filters

UF: BPF  
Band pass filters  
Bandpass filters  
BT: Active filters  
RT: Frequency  
Signal processing  
NT: Filter banks

## Band-stop filters

USE: Notch filters

## Bandgap

USE: Photonic band gap

## Bandpass filters

USE: Band-pass filters

## Bandwidth

BT: Frequency  
RT: Admission control  
Computer network

## management

Direct sequence spread  
spectrum communication  
Information theory  
Radio communication  
Signal processing  
Spectral efficiency  
Spectroscopy

## Bandwidth allocation

USE: Channel allocation

## Bandwidth efficiency

USE: Spectral efficiency

## Bang bang control

USE: Bang-bang control

## Bang-bang control

UF: Bang bang control  
BT: Optimal control  
RT: Time factors

## Banking

BT: Industries  
RT: Finance  
NT: Online banking

## Bankruptcy

BT: Finance  
RT: Business  
Commercial law  
Economics

## Bar codes

UF: QR codes  
BT: Optical detectors  
Product codes  
RT: Internet of Things  
Inventory management

## Barges

USE: Boats

## Barium

UF: Ba  
BT: Metals  
NT: Barium compounds

## Barium compounds

BT: Barium  
RT: Alloying  
Yttrium barium copper

## oxide

## Baroreceptor reflex

USE: Baroreflex

## Baroreflex

UF: Baroreceptor reflex



# 2019 IEEE Thesaurus

	BT:	Cardiovascular system		RT:	Battery charge measurement
Bars					Battery chargers
	BT:	Structural shapes			Emergency power
	NT:	Billets		supplies	
Basal cell carcinoma					Lithium
					Lithium compounds
	USE:	Skin cancer			Power generation
					Uninterruptible power
Basal ganglia				systems	
	BT:	Brain		NT:	Lead acid batteries
					Lithium batteries
Base stations					Lithium-ion batteries
	BT:	Radio communication			Lithium-sulfur
equipment				batteries	
	RT:	Device-to-device			Nickel cadmium
communication				batteries	
		Femtocell networks			Solid state batteries
	NT:	Femtocells			
				Battery charge measurement	
Baseball				BT:	Charge measurement
	USE:	Sports		RT:	Batteries
					Battery chargers
Baseband					Battery powered
	BT:	Digital communication		vehicles	
		Radio communication			
	RT:	Passband		Battery chargers	
				UF:	Charging devices
Basis algorithms					Device chargers
	BT:	Algorithms		BT:	Power supplies
				RT:	Batteries
Batch manufacturing					Battery charge
	USE:	Batch production		measurement	
systems					Charging stations
				NT:	Electric vehicle
Batch processing				charging	
	USE:	Batch production			State of charge
systems					
				Battery management systems	
Batch production systems				BT:	Electrochemical
	UF:	Batch manufacturing		devices	
		Batch processing			
	BT:	Manufacturing systems		Battery powered vehicles	
				BT:	Electric vehicles
Batteries				RT:	Battery charge
	UF:	Flow batteries		measurement	
		Secondary cells			Charging stations
		Storage batteries			Energy storage
		Storage battery			Hybrid electric
	BT:	Electrochemical		vehicles	
devices					Solar powered vehicles
		Energy conversion			Traction motors
		Energy storage			Vehicle-to-grid



# 2019 IEEE Thesaurus

## Bayes methods

UF: Bayesian approach  
 Bayesian belief  
 networks  
 Bayesian estimation  
 Bayesian inference  
 Bayesian learning  
 Bayesian methods  
 Bayesian networks  
 BT: Probability  
 RT: Belief propagation  
 NT: Recursive estimation

## *Bayesian approach*

USE: Bayes methods

## *Bayesian belief networks*

USE: Bayes methods

## *Bayesian estimation*

USE: Bayes methods

## *Bayesian inference*

USE: Bayes methods

## *Bayesian Learning*

USE: Bayes methods

## *Bayesian methods*

USE: Bayes methods

## *Bayesian networks*

USE: Bayes methods

## Beak

BT: Animal structures  
 RT: Birds

## Beam steering

BT: Microwave technology  
 RT: Antennas

## *Beamforming*

USE: Array signal  
 processing

## Beams

UF: Electromagnetic beams  
 BT: Physics  
 NT: Acoustic beams  
 Laser beams  
 Molecular beams  
 Optical beams  
 Particle beams

## Bean model

UF: Pry and Bean model  
 BT: Superconductivity

## *Bearing estimation*

USE: Direction-of-arrival  
 estimation

## Behavioral sciences

BT: Systems, man, and  
 cybernetics  
 RT: Affective computing  
 Bio-inspired computing  
 Cyberethics  
 Emotion recognition  
 Ergonomics  
 Human factors  
 Medical services  
 Persuasive systems  
 Social computing  
 System dynamics  
 NT: Animal behavior  
 Cognition  
 Consumer behavior  
 Psychiatry  
 Psychology  
 Social intelligence

## Belief propagation

BT: Iterative algorithms  
 RT: Bayes methods

## Bellows

BT: Mechanical products  
 RT: Pistons  
 Pneumatic systems  
 Pumps  
 Vacuum systems

## Belts

UF: Cambelts  
 Seat belts  
 BT: Machine components  
 Machinery  
 RT: Automotive components  
 Camshafts  
 Fasteners

## *Benchmark problems*

USE: Benchmark testing

## *Benchmark tasks*

USE: Benchmark testing



# 2019 IEEE Thesaurus

## Benchmark testing

UF: Benchmark problems  
Benchmark tasks  
Benchmarking  
BT: Testing  
RT: Performance evaluation

## Benchmarking

USE: Benchmark testing

## Benign masses

USE: Benign tumors

## Benign tumors

UF: Benign masses  
BT: Tumors

## BER

USE: Bit error rate

## BER analysis

USE: Bit error rate

## BER performance

USE: Bit error rate

## Berkelium

BT: Chemical elements

## Berry phase

BT: Waves

## BERT

USE: Bit error rate

## Beryllium

BT: Chemical elements

## Bespoke production

USE: Job production systems

## Best practices

BT: Management  
Quality assurance  
RT: Business communication

## Beta rays

BT: Nuclear physics  
RT: Electrons

## Betavoltaic power sources

USE: Radioactive materials

## Bevel gears

USE: Gears

## Beverage industry

BT: Industries  
RT: Bottling  
Food industry

## BI

USE: Business intelligence

## Bi

USE: Bismuth

## Bi-stable circuits

USE: Bistable circuits

## Bibliographies

BT: Writing  
RT: Publishing

## Bibliometrics

BT: Publishing  
NT: Citation analysis

## BiCMOS integrated circuits

UF: BiMOS integrated  
circuits  
BT: Bipolar transistor  
circuits

## Bicycles

BT: Land vehicles  
RT: Sports equipment

## Bidirectional communication

USE: Bidirectional control

## Bidirectional control

UF: Bidirectional  
communication  
Bidirectional  
reflectance  
BT: Control systems

## Bidirectional power flow

BT: Power system control

## Bidirectional reflectance

USE: Bidirectional control

## Bifurcation

BT: Nonlinear equations  
RT: Chaos



# 2019 IEEE Thesaurus

## Big Data

BT: Data collection  
 RT: Data handling  
       Data mining  
       Data storage systems  
       Information management  
       Information processing  
       Information retrieval  
       Linked data  
       Neuroinformatics  
       NoSQL databases  
 NT: Big Data applications

## Big Data applications

BT: Big Data  
       Computer applications  
 RT: Cloud computing  
       Data analysis  
       Data systems  
       Information analysis  
       Information systems

## Bilinear systems

USE: Nonlinear systems

## Billets

BT: Bars

## Bills of materials

BT: Inventory management  
       Materials requirements

## planning

## BiMOS integrated circuits

USE: BiCMOS integrated  
 circuits

## Binary codes

BT: Codes  
 NT: Reflective binary  
 codes

## Binary decision diagrams

BT: Data structures

## Binary phase shift keying

UF: BPSK  
       Binary phase-shift  
 keying  
 BT: Phase shift keying

## Binary phase-shift keying

USE: Binary phase shift  
 keying

## Binary search trees

BT: Binary trees

## Binary sequences

BT: Sequences

## Binary trees

BT: Tree data structures  
 NT: Binary search trees

## Bio-computing

USE: Bio-inspired computing

## Bio-inspired computing

UF: Bio-computing  
       Biocomputing  
       Bioinspired computing  
       Biologically inspired  
 computing  
 BT: Artificial  
 intelligence  
       Biologically inspired  
 engineering  
 RT: Behavioral sciences  
       Biology  
       Machine learning  
       Mathematics  
       Neural networks  
       Social factors

## Bio-MEMS

USE: Biomedical  
 microelectromechanical systems

## Bio-nanotechnology

USE: Bionanotechnology

## Bioacoustics

USE: Biomedical acoustics

## Bioceramics

BT: Biological materials  
       Biomedical materials  
       Ceramics  
 RT: Ceramics industry  
       Prosthetics

## Biochemical analysis

BT: Biochemistry  
 RT: Biochips



# 2019 IEEE Thesaurus

## Biochemistry

UF: Enzymes  
Hormones  
Metabolic networks  
Metabolism  
BT: Biology  
Chemistry  
RT: Biological cells  
Bioreactors  
Cell signaling  
Computational

biochemistry

Drugs  
Molecular biophysics  
Pharmaceutical

technology

NT: Pharmaceuticals  
Amino acids  
Biochemical analysis  
Peptides  
Proteins  
Receptor

(biochemistry)

## Biochips

BT: Molecular biology  
RT: Biochemical analysis  
Microfluidics  
NT: Digital microfluidic

biochips

## Biocomputing

USE: Bio-inspired computing

## Biocontrol

USE: Biological control  
systems

## Biocybernetics

USE: Cybernetics

## Biodegradable materials

BT: Biodegradation

## Biodegradation

BT: Environmental  
management  
RT: Waste management  
NT: Biodegradable  
materials

## Biodiversity

BT: Biology  
NT: Biogeography

## Bioelectric phenomena

UF: Electrobiolgy  
BT: Biology  
RT: Brain  
Electrical accidents  
Electroencephalography  
Electromyography  
Electrooculography  
Nervous system  
NT: Electric shock

## Bioelectric potentials

USE: Action potentials

## Bioengineering

USE: Biomedical engineering

## Biofeedback

USE: Biological control  
systems

## Biofuels

BT: Fuels

## Biogeography

BT: Biodiversity

## Biographies

BT: Writing  
RT: Engineering profession  
NT: Autobiographies

## Biohazards

UF: Germ warfare  
BT: Hazards  
RT: Chemical hazards  
Green products  
Medical treatment  
Terrorism

## Bioimpedance

BT: Biomedical engineering  
Current  
RT: Blood flow

## Bioinformatics

BT: Engineering in  
medicine and biology  
RT: Biology  
Biomedical informatics  
Computational  
biochemistry  
Computational biology



# 2019 IEEE Thesaurus

biophysics  
 Computational  
 NT: Neuroinformatics  
*Bioinspired computing*  
 USE: Bio-inspired computing

## Biological cells

UF: Cell biology  
 Chromosomes  
 BT: Biology  
 RT: Biochemistry  
 Biological materials  
 Biomembranes  
 DNA  
 Microorganisms  
 Self-assembly  
 NT: Cell signaling  
 Cells (biology)  
 Chromosome mapping  
 Fibroblasts  
 RNA  
 Stem cells

*Biological clocks*  
 USE: Chronobiology

## Biological control systems

UF: Biocontrol  
 Biofeedback  
 BT: Systems, man, and  
 cybernetics  
 RT: Immune system  
 Legged locomotion  
 Prosthetics  
 NT: Biomarkers

*Biological effects of protons*  
 USE: Proton effects

## Biological effects of radiation

UF: Biological radiation  
 effects  
 BT: Radiation effects  
 RT: Biomedical  
 applications of radiation  
 Neutron capture  
 therapy  
 Occupational health  
 Proton therapy  
 Radiation protection

*Biological EPR*

USE: Electron paramagnetic  
 resonance

## Biological information theory

BT: Biology  
 Information theory  
 RT: DNA  
 Genetic communication

## Biological interactions

BT: Biological processes

## Biological macromolecules

USE: Molecular biophysics

## Biological markers

USE: Biomarkers

## Biological materials

BT: Materials  
 RT: Biological cells  
 Biomedical materials  
 Fats  
 Tissue engineering  
 NT: Bioceramics

## Biological membranes

USE: Biomembranes

## Biological neural networks

UF: Neuronal networks  
 BT: Neural networks  
 Neurophysiology

## Biological organs

USE: Biological systems

## Biological processes

BT: Biology  
 NT: Biological

## interactions

Chronobiology  
 Circadian rhythm  
 Coagulation  
 Molecular biology  
 Symbiosis

## Biological radiation effects

USE: Biological effects of  
 radiation

## Biological sensors

USE: Biosensors



# 2019 IEEE Thesaurus

## Biological system modeling

BT: Biology  
RT: Mechanobiology  
Synthetic biology

engineering

Bioinformatics

Biologically inspired

Computational biology

Immune system

Life sciences

## Biological systematics

USE: Systematics

NT:

Biochemistry

Biodiversity

Bioelectric phenomena

Biological cells

Biological information

## Biological systems

UF: Biological organs  
Organs (biological)

BT: Biology

RT: Animals

Artificial biological

theory

Biological processes

Biological system

organs

Biomedical engineering

NT: Anatomy

Molecular

modeling

Biological systems

Biology computing

Biophotonics

Biophysics

Cryobiology

Evolution (biology)

communication

Organisms

Genetics

Homeostasis

Mechanobiology

Microinjection

Nanobioscience

Physiology

Predator prey systems

Synthetic biology

Systematics

Systems biology

Vegetation

Zoology

## Biological techniques

BT: Biomedical engineering

RT: Biomedical equipment

## Biological tissue

USE: Biological tissues

## Biological tissues

UF: Biological tissue  
Tissues

BT: Anatomy

NT: Bone tissue

Breast tissue

Cardiac tissue

Connective tissue

Glands

Neoplasms

## Biology computing

BT: Biology

RT: Biomedical computing

Computers and

information processing

## Biologically inspired computing

USE: Bio-inspired computing

## Bioluminescence

BT: Luminescence

## Biologically inspired engineering

BT: Engineering - general

RT: Biology

Biomimetics

Complex systems

NT: Bio-inspired computing

## Biomagnetism

UF: Biomagnetism

BT: Biophysics

Magnetics

RT: Biomedical engineering

Magnetic fields

Magnetic materials

Magnetic particles

NT: Magnetoencephalography

## Biology

BT: Engineering in

medicine and biology

Science - general

RT: Bio-inspired computing

*Biomagnetism*



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# 2019 IEEE Thesaurus

USE:	Biomagnetics	Positron emission tomography
<b>Biomarkers</b>		Radiation effects
UF:	Biological markers	Radiography
	Human disease markers	Synchrotron radiation
BT:	Biological control	
systems		<b>Biomedical communication</b>
	Biomedical measurement	BT: Communication systems
NT:	Molecular biomarkers	Engineering in
<b>Biomass</b>		medicine and biology
BT:	Renewable energy	RT: Nanocommunication
sources		(telecommunication)
<b>Biomechanics</b>		Picture archiving and
BT:	Mechanical factors	communication systems
RT:	Anthropometry	NT: Biomedical telemetry
	Cell signaling	Telemedicine
	Mechanobiology	
	Wearable robots	<b>Biomedical computing</b>
<b>Biomechatronics</b>		UF: Medical computing
BT:	Mechatronics	BT: Engineering in
<b>Biomedical acoustics</b>		medicine and biology
UF:	Bioacoustics	RT: Biology computing
	Biomedical ultrasonics	Biomedical signal
BT:	Acoustics	processing
RT:	Acoustic applications	Computer applications
	Acoustic measurements	Picture archiving and
	Auditory system	communication systems
<i>Biomedical applications of</i>		Signal processing
<i>electromagnetic radiation</i>		NT: Biomedical informatics
USE:	Biomedical	Medical expert systems
applications of radiation		Medical information
<b>Biomedical applications of radiation</b>		systems
UF:	Biomedical	<b>Biomedical electrodes</b>
applications of electromagnetic		BT: Biomedical equipment
radiation		RT: Biomedical engineering
	Radiation therapy	Biomedical measurement
BT:	Biomedical engineering	Electrophysiology
	Nuclear and plasma	
sciences		<b>Biomedical electronics</b>
RT:	Angiocardiology	BT: Biomedical engineering
	Biological effects of	RT: Biomedical equipment
radiation		<b>Biomedical engineering</b>
	Biomedical imaging	UF: Bioengineering
	Cancer	BT: Engineering in
	Collimators	medicine and biology
	Computed tomography	RT: Biological systems
	Gamma-ray detectors	Biomagnetics
	Medical treatment	Biomedical electrodes
		Biomedical engineering
		education
		Biomedical monitoring



# 2019 IEEE Thesaurus

imaging		Biomedical optical			Biomedical electrodes
					Biomedical telemetry
		Colloidal lithography			Biomedical transducers
		Genetic communication			Catheters
		Genetic engineering			Cybercare
		Hospitals			Endoscopes
		Microfluidics			Gerontechnology
		Orthotics			Hypodermic needles
	NT:	Bioimpedance			Implants
		Biological techniques			Intracranial pressure
applications of		Biomedical	sensors		
	radiation				Lithotriptors
	Biomedical electronics				Medical instruments
processing		Biomedical signal			Pacemakers
					Stethoscope
	Biotechnology				Surgical instruments
	Cloning				
	Drug delivery				
	Neural engineering				
	Protein engineering				
	Tissue engineering				
<b>Biomedical engineering education</b>					
	BT:	Engineering education			
	RT:	Biomedical engineering			
<b>Biomedical equipment</b>					
	UF:	Clinical equipment			
		Medical equipment			
	BT:	Engineering in			
medicine and biology				NT:	
	RT:	Biological techniques			Imaging phantoms
		Biomedical electronics			Motion artifacts
		Biomedical measurement			Neuroimaging
		Biomedical			Radiographic image
microelectromechanical systems			enhancement		
					Radiology
					Ultrasonography
		Collimators			Whole body imaging
		Electrocardiography			
		Electroencephalography			
		Endomicroscopy			
		Insulin pumps			
		Medical control			
systems					
		Medical robotics			
		Molecular biophysics			
		Nanosensors			
		Needles			
		Orthotics			
		Prosthetics			
		Sensory aids			
		Speech synthesis			
		Surgery			
	ZigBee				
	NT:	Assistive technology			
					Data visualization
					Isosurfaces
					Medical diagnosis
					Molecular biophysics



# 2019 IEEE Thesaurus

communication systems	Picture archiving and Radiation imaging Tomography Ultrasonic imaging	Electrooculography Electrophysiology Photoplethysmography Reproducibility of
imaging	NT: Angiocardiology Angiography Biomedical optical Cardiography DICOM Elastography Encephalography Mammography Medical diagnostic	results Sensitivity and specificity
imaging	Molecular imaging Phantoms Photoacoustic imaging	<i>Biomedical measurements</i> USE: Biomedical measurement
<b>Biomedical informatics</b>	BT: Biomedical computing Informatics RT: Bioinformatics	<b>Biomedical microelectromechanical systems</b> UF: Bio-MEMs BT: Micromechanical devices RT: Biomedical equipment
<i>Biomedical infrared imaging</i>	USE: Biomedical optical	<b>Biomedical monitoring</b> BT: Biomedical measurement RT: Biomedical engineering Phonocardiography NT: Nanomedicine
<i>Biomedical instruments</i>	USE: Biomedical measurement	<i>Biomedical MRI</i> USE: Magnetic resonance imaging
<b>Biomedical materials</b>	BT: Materials RT: Biological materials Diamond-like carbon Molecular biophysics NT: Bioceramics Biomembranes	<b>Biomedical optical imaging</b> UF: Biomedical infrared imaging BT: Biomedical imaging RT: Biomedical engineering Biomedical image processing Endomicroscopy Endoscopes Infrared imaging Optical communication equipment Optical devices
<b>Biomedical measurement</b>	UF: Biomedical instruments Biomedical	<b>Biomedical signal processing</b> BT: Biomedical engineering RT: Biomedical computing Neurophysiology Time-frequency analysis NT: Biomedical image processing
measurements	BT: Measurement RT: Anthropometry Biomedical electrodes Biomedical equipment Biosensors Pulse oximetry NT: Biomarkers Biomedical monitoring Electroencephalography Electromyography	<b>Biomedical telemetry</b> UF: Biotelemetry



# 2019 IEEE Thesaurus

communication	BT: Biomedical	Biomimicry
	Biomedical equipment	Bionics
	Telemetry	BT: Microprocessors
		RT: Biologically inspired
<b>Biomedical transducers</b>		engineering
BT: Biomedical equipment		NT: Biomimetic materials
Transducers		<i>Biomimicry</i>
<i>Biomedical ultrasonics</i>		USE: Biomimetics
USE: Biomedical acoustics		<i>Biomolecular electronics</i>
<i>Biomedical X-ray imaging</i>		USE: Molecular electronics
USE: Biomedical imaging		<i>Biomolecules</i>
<b>Biomembranes</b>		USE: Molecular biophysics
UF: Biological membranes		<b>Bionanotechnology</b>
Membranes		UF: Bio-nanotechnology
BT: Biomedical materials		BT: Engineering in
RT: Biological cells		medicine and biology
<i>Biometric systems</i>		Nanotechnology
USE: Biometrics (access		<i>Bionics</i>
control)		USE: Biomimetics
<b>Biometrics (access control)</b>		<b>Biophotonics</b>
UF: Biometric systems		BT: Biology
BT: Identification of		Photonics
persons		<b>Biophysics</b>
RT: Access control		BT: Biology
Algorithms		Physics
Automation		RT: Computational
Handwriting		biophysics
recognition		NT: Aerospace biophysics
Information technology		Biomagnetics
Security		Cellular biophysics
NT: Speaker recognition		Molecular biophysics
Face recognition		<b>Biopsy</b>
Fingerprint		BT: Medical tests
recognition		<b>Bioreactors</b>
Gait recognition		BT: Chemical reactors
Iris recognition		RT: Biochemistry
Palmprint recognition		<b>Biorthogonal modulation</b>
<b>Biomimetic materials</b>		BT: Wavelet transforms
BT: Biomimetics		<b>Biosensors</b>
Smart materials		UF: Biological sensors
<i>Biomimetic microelectronics</i>		BT: Chemical and
USE: Biomimetics		biological sensors
<b>Biomimetics</b>		RT: Biomedical measurement
UF: Biomimetic		
microelectronics		



# 2019 IEEE Thesaurus

## Biosphere

BT: Environmental factors  
Geoscience

## Biotechnology

BT: Biomedical engineering  
RT: Genetic engineering

## Biotelemetry

USE: Biomedical telemetry

## Bioterrorism

BT: Engineering in  
medicine and biology  
Terrorism

## Bipartite graph

BT: Graph theory

## Biped locomotion

USE: Legged locomotion

## Bipolar integrated circuits

BT: Bipolar transistor  
circuits  
RT: Bipolar transistors

## Bipolar transistor circuits

BT: Circuits  
RT: Parameter extraction  
NT: BiCMOS integrated  
circuits  
Bipolar integrated  
circuits

## Bipolar transistors

BT: Power semiconductor  
switches  
RT: Bipolar integrated  
circuits  
Proton radiation  
effects  
Semiconductor  
epitaxial layers  
Transistors  
NT: Insulated gate bipolar  
transistors  
Kirk field collapse  
effect

## Birds

BT: Animals  
RT: Beak

## Birefringence

BT: Optics  
RT: Photorefractive effect  
Photorefractive

## materials

Refractive index  
Thermooptic effects

## Birth disorders

BT: Amniocentesis

## Bismuth

UF: Bi  
BT: Metals  
RT: Bismuth compounds

## Bismuth compounds

UF: BSCCO  
BT: Compounds  
RT: Alloying  
Bismuth

## BIST

USE: Built-in self-test

## Bistability (optical)

USE: Optical bistability

## Bistable circuits

UF: Bi-stable circuits  
BT: Circuits  
NT: Latches

## Bistable multivibrator

USE: Pulse circuits

## Bistatic radar

BT: Radar

## Bit allocation

USE: Bit rate

## Bit error rate

UF: BER  
BER analysis  
BER performance  
BERT  
Bit error rate test  
BT: Error analysis

## Bit error rate test

USE: Bit error rate



# 2019 IEEE Thesaurus

## *Bit interleaved coded*

USE: Interleaved codes

## **Bit rate**

UF: Bit allocation  
Bitrate  
BT: Timing  
RT: Communication system

## signaling

Computer networks  
Signal processing

## *Bit-interleaved coded*

USE: Interleaved codes

## **Bitcoin**

BT: Cryptocurrency  
RT: Blockchain  
Cryptography  
Finance  
Online banking

## *Bitrate*

USE: Bit rate

## *Bitumen*

USE: Asphalt

## *Black Lead*

USE: Graphite

## *BlackBerry*

USE: Handheld computers

## *Blacklist*

USE: Blacklisting

## **Blacklisting**

UF: Blacklist  
BT: Access control  
RT: Computer security  
Countermeasures

## (computer)

Whitelists

## **Bladder**

BT: Urogenital system

## **Blades**

UF: Vanes  
BT: Mechanical products  
RT: Agricultural machinery  
Cutting tools  
Fans

Impellers  
Propellers  
Turbomachinery

## **Blanking**

BT: Manufacturing systems  
RT: Metal products  
Metals  
Sheet metal processing

## **Blast furnaces**

BT: Furnaces  
RT: Smelting

## **Bleaching**

BT: Materials processing  
RT: Manufacturing systems  
Paper making  
Process control  
Textile technology

## *Bleeding*

USE: Hemorrhaging

## *Blind channel estimation*

USE: Blind equalizers

## *Blind equalisers*

USE: Blind equalizers

## **Blind equalizers**

UF: Blind channel  
estimation  
Blind equalisers  
BT: Equalizers

## *Blind signal separation*

USE: Blind source  
separation

## **Blind source separation**

UF: Blind signal  
separation  
BT: Source separation  
RT: Adaptive signal  
detection

Array signal

processing

Independent component

analysis

Signal analysis  
Signal detection

## **Blindness**



# 2019 IEEE Thesaurus

BT:	Medical conditions	RT:	Electronic mail
RT:	Visual prosthesis		Internet
			Social network
<b>Blob detection</b>		services	
BT:	Computer vision		
	Image processing	<b>Blood</b>	
RT:	Feature extraction	BT:	Blood vessels
		NT:	Blood platelets
<i>Block chain</i>			Coagulation
USE:	Blockchain		Red blood cells
			White blood cells
<b>Block codes</b>		<i>Blood clots</i>	
UF:	Block coding	USE:	Coagulation
BT:	Channel coding		
RT:	Mobile communication	<b>Blood flow</b>	
NT:	Linear codes	BT:	Blood pressure
<i>Block coding</i>		RT:	Bioimpedance
USE:	Block codes	NT:	Hemodynamics
<i>Block signaling</i>		<b>Blood platelets</b>	
USE:	Block signalling	BT:	Blood
		RT:	Coagulation
<b>Block signalling</b>		<b>Blood pressure</b>	
UF:	Block signaling	UF:	Arterial pressure
	Signaling block	BT:	Blood vessels
systems		NT:	Blood flow
	Signalling block		Blood pressure
systems		measurement	
BT:	Control systems		Blood pressure
	Railway communication	variability	
RT:	Collision avoidance	<b>Blood pressure measurement</b>	
	Rail transportation	BT:	Blood pressure
<b>Blockchain</b>		<b>Blood pressure variability</b>	
UF:	Block chain	BT:	Blood pressure
BT:	Computer applications	<b>Blood vessels</b>	
RT:	Authentication	BT:	Cardiovascular system
	Bitcoin	NT:	Arteries
	Computer security		Blood
	Content management		Blood pressure
	Cryptocurrency		Veins
	Cryptography	<b>Bluetooth</b>	
	Data collection	BT:	Personal area networks
	Directed acyclic graph		Radio communication
	Distributed ledger	RT:	Communication
	Proof of work	equipment	
<i>Blogging</i>			Digital communication
USE:	Blogs		IEEE 802.11 Standard
			IEEE 802.11g Standard
<b>Blogs</b>			
UF:	Blogging		
BT:	Information retrieval		



# 2019 IEEE Thesaurus

cellular systems	IEEE 802.11n Standard	<b>Boilers</b>	BT:	Heating systems
	IEEE 802.15 Standard		RT:	Heat recovery
	Land mobile radio			Steam engines
communication	Land mobile radio	<b>Bolometers</b>		Turbines
	Protocols			Waste heat
	Spread spectrum			
<i>BNCT</i>	Wireless LAN	measurement	BT:	Radiation detectors
	Wireless communication		RT:	Infrared detectors
	ZigBee			Temperature
therapy	USE:	<i>Bolts</i>	USE:	Fasteners
	Neutron capture			
<b>BNSC</b>	UF:	<b>Boltzmann distribution</b>	BT:	Statistics
	British National Space		NT:	Lattice Boltzmann
	Centre			methods
<i>Boat building industry</i>	BT:	<b>Boltzmann equation</b>	UF:	Boltzmann transport
	USE:		BT:	Equations
	Shipbuilding industry			
<b>Boats</b>	UF:	<i>Boltzmann transport equation</i>	USE:	Boltzmann equation
	Barges			
	Yachts			
<i>Body area networking</i>	BT:	<i>Bomb</i>	USE:	Weapons
	Marine vehicles			
<i>Body area networks</i>	USE:	<b>Bonding</b>	BT:	Bonding processes
	Body area networks		RT:	Manufacturing
			NT:	Materials processing
<b>Body regions</b>	UF:	<b>Bonding forces</b>	BT:	Adhesives
	Body area networking			
	Personal area networks			
networks	BT:	<b>Bonding processes</b>	BT:	Fabrication
	Anatomy		RT:	Joining processes
	Abdomen		NT:	Soldering
networks	Back	<b>Bone density</b>		Welding
	Breast		UF:	Bonding
	Extremities		BT:	Diffusion bonding
networks	Head			Wafer bonding
	Neck			
	Pelvis			
networks	Perineum			
	Thorax			
	Torso			
networks	Viscera			





# 2019 IEEE Thesaurus

RT: Density measurement

**Bone diseases**

BT: Diseases

NT: Osteoarthritis

Osteoporosis

*Bone mineral density*

USE: Bone density

**Bone tissue**

BT: Biological tissues

RT: Bones

NT: Cancellous bone

Cortical bone

**Bones**

BT: Skeleton

RT: Bone tissue

Skull

NT: Bone density

Pelvic bones

*Bonuses*

USE: Incentive schemes

**Book reviews**

BT: IEEE indexing

**Boolean algebra**

BT: Algebra

RT: Logic

Logic gates

Set theory

NT: Boolean functions

**Boolean functions**

BT: Boolean algebra

RT: Fault trees

NT: Logic functions

**Boosting**

BT: Machine learning

Supervised learning

**Bootling**

BT: Operating systems

**Boring**

BT: Machining

RT: Drilling

Milling

Turning

**Boron**

BT: Chemical elements

Metals

RT: Fertilizers

NT: Boron alloys

**Boron alloys**

BT: Boron

RT: Magnetic materials

*Boron neutron capture therapy*

USE: Neutron capture

therapy

**Bot (Internet)**

UF: WWW robot

Web robot

BT: Computer applications

Internet

World Wide Web

RT: Crawlers

**Botnet**

BT: Interconnected systems

Internet

Software agents

RT: Computer crime

Distributed denial-of-

service attack

Robots

**Bottling**

BT: Packaging

RT: Beverage industry

Glass products

Packaging machines

Plastic products

**Boundary conditions**

BT: Boundary value

problems

NT: Upper bound

**Boundary element methods**

BT: Partial differential

equations

RT: Integral equations

Method of moments

**Boundary value problems**

BT: Mathematics

RT: Partial differential

equations

NT: Boundary conditions



# 2019 IEEE Thesaurus

<b>Bovine</b>	BT:	Animals		Encephalography
	NT:	Cows	sensors	Head
				Intracranial pressure
<i>Box Jenkins models</i>				Magnetoencephalography
	USE:	Autoregressive		Soma
processes				Synapses
			NT:	White matter
<i>BPF</i>				Amygdala
	USE:	Band-pass filters		Basal ganglia
				Brain cells
<i>BPR</i>				Brain injuries
	USE:	Business process re-		Brain modeling
engineering				Brain ventricles
				Brainstem
<i>BPSK</i>				Cerebellum
	USE:	Binary phase shift		Cerebral cortex
keying				Cerebrum
				Corpus callosum
<i>Brachial</i>				Forebrain
	USE:	Brachytherapy		Frontal lobe
				Hindbrain
<b>Brachytherapy</b>				Hypothalamus
	UF:	Brachial		Limbic system
	BT:	Medical treatment		Midbrain
	RT:	Radiation effects		Neural activity
				Neural implants
<b>Bragg gratings</b>				Neurodynamics
	UF:	Fiber Bragg gratings		Neurophysiology
		Fiber-Bragg gratings		Neuropsychology
	BT:	Filters		Neurotechnology
		Optical devices		Occipital Lobe
	RT:	Diffraction		Parietal lobe
		Diffraction gratings		Primary motor cortex
		Laser beams		Sleep
		Light deflectors		Temporal lobe
		Optical beams		Thalamus
		Optical transmitters		Ventricle system
		Temperature sensors		Virtual artifact
		Wavelength division	<b>Brain cells</b>	
multiplexing			BT:	Brain
	NT:	Fiber gratings		
			<i>Brain computer interfaces</i>	
<b>Brain</b>			USE:	Brain-computer
	BT:	Nervous system	interfaces	
	RT:	Bioelectric phenomena		
		Cerebrospinal fluid	<i>Brain implants</i>	
		Cognition	USE:	Neural implants
		Cognitive informatics		
		Cognitive science	<b>Brain injuries</b>	
imaging		Diffusion tensor	BT:	Brain
		Electroencephalography		Injuries



# 2019 IEEE Thesaurus

## *Brain interfaces*

USE: Brain-computer interfaces

## *Brain machine interfaces*

USE: Brain-computer interfaces

## **Brain mapping**

BT: Nervous system

NT: Neuroimaging

## **Brain modeling**

UF: Brain modelling

BT: Brain Modeling

## *Brain modelling*

USE: Brain modeling

## *Brain plasticity*

USE: Neuroplasticity

## *Brain stem*

USE: Brainstem

## *Brain stem implants*

USE: Brainstem implants

## **Brain stimulation**

BT: Medical treatment

## **Brain ventricles**

BT: Brain

## *Brain-computer interaction*

USE: Brain-computer interfaces

## **Brain-computer interfaces**

UF: Brain computer interfaces  
Brain interfaces  
Brain machine

interfaces

Brain-computer

interaction

Brain-computer-

interfaces

Brain-machine

interfaces

Mind-machine

interfaces

BT: User interfaces

RT: Neural engineering

## *Brain-computer-interfaces*

USE: Brain-computer interfaces

## *Brain-machine interfaces*

USE: Brain-computer interfaces

## *BrainLobe*

USE: Frontal lobe

## **Brainstem**

UF: Brain stem

BT: Brain

## **Brainstem implants**

UF: Brain stem implants

BT: Implants

## **Brakes**

BT: Control systems  
Mechanical products

RT: Automotive components

## **Brand management**

BT: Marketing management

RT: Market research

Product development

## **Brazing**

BT: Soldering

RT: Welding

## **Breadboard**

UF: Plugboard  
Solderless breadboard

BT: Electronic circuits  
Prototypes

## *Breakdown*

USE: Electric breakdown

## **Breakdown voltage**

BT: Voltage

RT: Current

Diodes

Insulators

## **Breast**

BT: Body regions

NT: Breast biopsy

Breast cancer



# 2019 IEEE Thesaurus

	Breast tissue		Transportation
	Breast tumors		
<b>Breast biopsy</b>		<b>Brightness</b>	
BT:	Breast	BT:	Optics
		NT:	Brightness temperature
<b>Breast cancer</b>		<b>Brightness temperature</b>	
UF:	Breast-cancer	BT:	Brightness
BT:	Breast		
	Cancer	<b>Brillouin scattering</b>	
<b>Breast neoplasms</b>		BT:	Scattering
UF:	Mammary neoplasms	<b>Bring your own device</b>	
BT:	Neoplasms	UF:	BYOD
<b>Breast tissue</b>		BT:	Information technology
UF:	Breast tissues	RT:	Mobile computing
BT:	Biological tissues		Office automation
	Breast		Personnel
			Security
			Smart phones
<i>Breast tissues</i>		<i>British National Space Centre</i>	
USE:	Breast tissue	USE:	BNSC
<i>Breast tumor</i>		<b>Broadband amplifiers</b>	
USE:	Breast tumors	UF:	Wideband amplifiers
<b>Breast tumors</b>		BT:	Amplifiers
UF:	Breast tumor		Broadband
	Breast tumour		communication
	Breast tumours	<b>Broadband antennas</b>	
BT:	Breast	UF:	Wideband antennas
	Tumors	BT:	Antennas
<i>Breast tumour</i>		RT:	Antenna arrays
USE:	Breast tumors		Microstrip
<i>Breast tumours</i>			Microwave propagation
USE:	Breast tumors		UHF propagation
<i>Breast-cancer</i>		NT:	Ultra wideband
USE:	Breast cancer	antennas	
<b>Bremsstrahlung</b>			Vivaldi antennas
BT:	Electromagnetic	<b>Broadband communication</b>	
radiation		UF:	Broadband networks
<b>Bridge circuits</b>		BT:	Communication systems
BT:	Circuits	RT:	Asynchronous transfer
RT:	Rectifiers	mode	
<b>Bridges</b>			Cable TV
BT:	Structural shapes		Frequency division
RT:	Civil engineering	multiaccess	
	Structural engineering		IEEE 802.16 Standard
			IPTV
			Multimedia
		communication	



# 2019 IEEE Thesaurus

communication	Optical fiber	UF:	Fractional brownian
communication	Ultra wideband	BT:	Random processes
	Video on demand	RT:	Diffusion processes
NT:	B-ISDN	<b>Browsers</b>	
	Broadband amplifiers	UF:	Google Chrome
<i>Broadband ISDN</i>			Web browsers
USE:	B-ISDN	BT:	Computer interfaces
		RT:	User interfaces
<i>Broadband networks</i>		<b>Brushes</b>	
USE:	Broadband	BT:	Contacts
communication		RT:	Rotating machines
<b>Broadcast technology</b>		<b>Brushless DC motors</b>	
NT:	Broadcasting	UF:	Brushless direct
<b>Broadcasting</b>		current motors	
UF:	Broadcasts	BT:	Brushless motors
BT:	Broadcast technology		DC motors
RT:	Entertainment industry	<i>Brushless direct current motors</i>	
NT:	Digital audio	USE:	Brushless DC motors
broadcasting		<b>Brushless machines</b>	
broadcasting	Digital multimedia	BT:	Electric machines
broadcasting	Digital video	<b>Brushless motors</b>	
	Motion pictures	BT:	Motors
	Radio broadcasting	NT:	Brushless DC motors
	Satellite broadcasting	<i>BSCCO</i>	
	Web TV	USE:	Bismuth compounds
<i>Broadcasts</i>		<b>Buck converters</b>	
USE:	Broadcasting	BT:	DC-DC power converters
<b>Bromine</b>		<i>Buckeyballs</i>	
BT:	Chemical elements	USE:	Fullerenes
NT:	Bromine compounds	<i>Buckminsterfullerene</i>	
<b>Bromine compounds</b>		USE:	Fullerenes
UF:	Organobromine	<i>Buckyballs</i>	
compounds		USE:	Fullerenes
BT:	Bromine	<i>Buckytubes</i>	
	Chemical compounds	USE:	Fullerenes
RT:	Flame retardants	<b>Buffer layers</b>	
<i>Bronchi</i>		BT:	Thin films
USE:	Respiratory system	RT:	Diffusion processes
<b>Bronchoscopy</b>			Semiconductor films
BT:	Medical diagnosis		Semiconductor growth
<b>Brownian motion</b>			



# 2019 IEEE Thesaurus

<b>Buffer overflows</b>			Space heating
BT:	Computer crashes	NT:	Wiring
			Building automation
<b>Buffer storage</b>			Elevators
BT:	Memory		Facilities management
RT:	Data handling		
	Telecommunication		<i>Building-integrated photovoltaics</i>
buffers		USE:	Building integrated
NT:	Computer buffers		photovoltaics
<i>Bugs</i>		<b>Buildings</b>	
USE:	Computer bugs	UF:	Space habitats
		BT:	Construction
		RT:	Air conditioning
<b>Building automation</b>			Architecture
BT:	Automation		Civil engineering
	Building services		Construction industry
RT:	Construction industry		Elevators
			Escalators
<b>Building integrated photovoltaics</b>			Industrial power
UF:	Building-integrated		
photovoltaics		systems	Lighting
	Roof mounted		Modular construction
photovoltaics			Prefabricated
	Roof mounted solar	construction	
cell arrays			Smart cities
BT:	Photovoltaic systems		Space cooling
RT:	Building services		Vents
	Solar power generation	NT:	Building materials
			Building services
<b>Building materials</b>			Flexible structures
BT:	Buildings		Intelligent structures
	Materials		Smart buildings
RT:	Aggregates		Smart homes
	Construction		
	Construction industry		
	Prefabricated	<b>Built-in self-test</b>	
construction		UF:	BIST
	Structural beams		Self-testing
NT:	Asphalt	BT:	Testing
	Concrete	RT:	Circuit testing
	Floors		Design for testability
	Mortar		
	Tiles	<b>Bulk acoustic wave devices</b>	
	Windows	BT:	Acoustic devices
		RT:	Film bulk acoustic
<b>Building services</b>			resonators
BT:	Buildings		
RT:	Access control	<b>Bulk storage</b>	
	Air conditioning	BT:	Material storage
	Building integrated	RT:	Containers
photovoltaics			
	Furnaces	<b>Bundle adjustment</b>	
	Lighting	BT:	Three-dimensional
			displays



# 2019 IEEE Thesaurus

<b>Buoyancy</b>		Manufacturing
BT: Fluid dynamics		Productivity
RT: Fluids		Service computing
Physics	NT: Business data	
	processing	
<b>Buried object detection</b>		Business intelligence
UF: Buried objects		Disruptive innovation
Underground object		Entrepreneurship
detection		Industrial relations
	Underground objects	Management
BT: Object detection		Operations research
RT: Geophysical		Organizations
measurements		
	Ground penetrating	<b>Business communication</b>
radar		BT: Organizational aspects
NT: Landmine detection		RT: Best practices
<i>Buried objects</i>		<b>Business continuity</b>
USE: Buried object		BT: Management
detection		RT: Security
		System recovery
		Venture capital
<b>Burnishing</b>		
BT: Surface finishing		<b>Business data processing</b>
RT: Machining		BT: Business
		Data processing
<b>Burst switching</b>		RT: Information processing
BT: Packet switching		
NT: Optical burst		<b>Business intelligence</b>
switching		UF: BI
		BT: Business
<i>Bushings</i>		Data analysis
USE: Insulators		RT: Competitive
		intelligence
<b>Business</b>		Data mining
UF: Commerce		Strategic planning
Trade		
BT: Engineering management		<i>Business organisation</i>
RT: Bankruptcy		USE: Organizational aspects
Business process		
integration		<i>Business organization</i>
	Business process	USE: Organizational aspects
management		
	Commercial law	<b>Business process integration</b>
	Consortia	BT: Enterprise resource
	Contracts	planning
	Employment	
	Enterprise resource	RT: Process planning
planning		Business
	Finance	Resource management
	Industrial	Supply chain
communication		management
	Industries	Systems engineering
	International trade	and theory



# 2019 IEEE Thesaurus

<b>Business process management</b>	UF: C sharp languages
BT: Management	BT: C languages
RT: Process planning	RT: Object oriented programming
RT: Business	
Resource management	
Supply chain	
management	<b>C++ languages</b>
	BT: C languages
and theory	<b>C-band</b>
NT: Task analysis	BT: Microwave bands
<b>Business process re-engineering</b>	<i>Ca</i>
UF: BPR	USE: Calcium
BT: Management	
RT: Corporate acquisitions	<b>Cable insulation</b>
Organizational aspects	BT: Insulation
Total quality	RT: Cables
management	Oil filled cables
WS-BPEL	NT: Power cable insulation
<i>Business writing</i>	<b>Cable shielding</b>
USE: Writing	BT: Electromagnetic shielding
<b>Butler matrices</b>	RT: Cables
UF: Butler matrix	
BT: Antenna arrays	<i>Cable splicing</i>
RT: Antennas	USE: Splicing
IEEE 802.11 Standard	
Phase shifters	<b>Cable TV</b>
Wireless LAN	BT: TV
<i>Butler matrix</i>	RT: Broadband communication
USE: Butler matrices	Image communication
<i>Butter</i>	<b>Cables</b>
USE: Dairy products	BT: Transmission lines
<b>Buttocks</b>	RT: Cable insulation
BT: Extremities	Cable shielding
<i>BYOD</i>	Conductors
USE: Bring your own device	Fault location
<b>C languages</b>	Winches
BT: Computer languages	Wiring
RT: Object oriented programming	NT: Coaxial cables
NT: C# languages	Communication cables
C++ languages	Mechanical cables
<i>C sharp Languages</i>	Optical fiber cables
USE: C# languages	Power cables
<b>C# languages</b>	Underwater cables
	<i>Cables (mechanical)</i>
	USE: Mechanical cables
	<b>Cache memory</b>
	BT: Memory





# 2019 IEEE Thesaurus

NT:	Cache storage		
<b>Cache storage</b>		<b>Calcium compounds</b>	
BT:	Cache memory	UF:	Calcium carbonate
RT:	Computer buffers		Calcium phosphate
		BT:	Calcium
<i>CAD</i>		<i>Calcium phosphate</i>	
USE:	Design automation	USE:	Calcium compounds
<b>Cadaver</b>		<b>Calculators</b>	
UF:	Corpse	BT:	Computers
BT:	Pathological processes	RT:	Digital arithmetic
		NT:	Difference engines
<b>CAD/CAM</b>		<b>Calculus</b>	
BT:	Computer aided	BT:	Mathematics
manufacturing	Design automation	NT:	Differential equations
	Computer integrated		Integral equations
manufacturing	Integrated		Level set
manufacturing systems	Rapid prototyping	<b>Calibration</b>	
	Virtual manufacturing	UF:	Intercalibration
		BT:	Measurement techniques
<b>Cadmium</b>		<b>Californium</b>	
BT:	Metals	BT:	Chemical elements
NT:	Cadmium compounds		
<b>Cadmium compounds</b>		<b>Call admission control</b>	
BT:	Cadmium	BT:	Telecommunication
			congestion control
<i>CAE</i>		<b>Call conference</b>	
USE:	Computer aided	BT:	Collaborative tools
engineering			
<i>Caesium</i>		<i>Callosal commissure</i>	
USE:	Cesium	USE:	Corpus callosum
<i>CAI</i>		<b>Calorimetry</b>	
USE:	Computer aided	BT:	Measurement
instruction		RT:	Energy measurement
			Thermal variables
<b>Calcination</b>		measurement	
BT:	Heat treatment	<i>CAM</i>	
RT:	Kilns	USE:	Computer aided
			manufacturing
<b>Calcium</b>		<b>CAMAC</b>	
UF:	Ca	UF:	Computer automated
BT:	Metals	measurement and control	
RT:	Alloying	BT:	Control systems
NT:	Calcium compounds	RT:	Data buses
			Data communication
<i>Calcium carbonate</i>			Data processing
USE:	Calcium compounds		



# 2019 IEEE Thesaurus

	Nuclear measurements		Prostate cancer
			Skin cancer
<i>Cambelts</i>			
USE:	Belts	<b>Cancer detection</b>	
		BT:	Medical tests
<i>Camcorders</i>			
USE:	Video equipment	<b>Cancer drugs</b>	
		BT:	Drugs
<b>Cameras</b>		<b>Canning</b>	
BT:	Imaging	BT:	Packaging
RT:	Digital photography	RT:	Containers
	Image capture		Material storage
	Image sensors		Materials handling
	Motion pictures		Materials processing
	Photography		
NT:	Digital cameras		
	Smart cameras	<i>Cantilever beams</i>	
	Webcams	USE:	Structural beams
<b>Cams</b>		<b>Capability engineering</b>	
BT:	Machine components	BT:	Systems engineering
RT:	Engines		and theory
	Mechanical power		
transmission		<b>Capability maturity model</b>	
NT:	Camshafts	BT:	Software engineering
		RT:	Software performance
<b>Camshafts</b>			Software reusability
BT:	Cams		
	Shafts	<b>Capability-based security</b>	
RT:	Automotive components	BT:	Security
	Belts	RT:	Access control
	Engines		
<b>Cancellous bone</b>		<b>Capacitance</b>	
BT:	Bone tissue	BT:	Electric variables
RT:	Osteoporosis	RT:	Capacitance
		measurement	
<b>Cancer</b>			Capacitance-voltage
UF:	Malignancy		characteristics
	Malignant		Capacitive transducers
BT:	Diseases		Capacitors
RT:	Biomedical		Supercapacitors
applications of	radiation		Transmission line
	Chemotherapy	theory	
	Medical diagnostic	NT:	Parasitic capacitance
imaging			Quantum capacitance
	Oncological surgery		
	Oncology	<b>Capacitance measurement</b>	
	Single photon emission	BT:	Electric variables
computed tomography		measurement	
	Tumors	RT:	Capacitance
NT:	Breast cancer		Capacitors
	Cervical cancer		Dielectric measurement
	Metastasis		Supercapacitors



# 2019 IEEE Thesaurus

## Capacitance-voltage characteristics

BT: Electric variables  
RT: Capacitance  
Voltage

## Capacitive sensors

UF: Strain based sensors  
Strain sensors  
BT: Mechanical sensors

## Capacitive transducers

BT: Transducers  
RT: Capacitance  
Position control  
Sensors

## Capacitor testing

USE: Capacitors

## Capacitors

UF: Capacitor testing  
Electric condensers  
BT: Dielectric devices  
Electronic components  
Voltage multipliers  
RT: Capacitance  
Capacitance

## measurement

Dielectric constant  
Electrets  
MOS capacitors  
Q-factor  
Switched capacitor

## networks

NT: Power capacitors  
Varactors

## Capacity planning

BT: Production planning  
RT: Supply chain

## management

NT: Storage management

## Capital cost reduction

USE: Costing

## CAPTCHAs

BT: Symbols  
RT: Access protocols  
Authentication

## Carbinol

USE: Methanol

## CarboFullerene

USE: Fullerenes

## Carbon

BT: Chemical elements  
RT: Carbon compounds  
Low-carbon economy  
Organic compounds  
NT: Carbon nanotubes  
Diamond  
Fullerenes  
Graphene  
Graphite

## Carbon capture and storage

BT: Carbon dioxide

## Carbon compounds

BT: Organic compounds  
RT: Carbon  
NT: Carbon dioxide  
Carbon emissions  
Carbon monoxide

## Carbon dioxide

BT: Carbon compounds  
RT: Carbon tax  
NT: Carbon capture and

## storage

## Carbon emissions

BT: Carbon compounds  
Gases  
RT: Global warming  
Greenhouse effect  
Methane  
Pollution control

## Carbon monoxide

BT: Carbon compounds

## Carbon nanotube

USE: Carbon nanotubes

## Carbon nanotube FETs

USE: CNTFETs

## Carbon nanotube field effect transistors

USE: CNTFETs

## Carbon nanotube field-effect transistors

USE: CNTFETs



# 2019 IEEE Thesaurus

## Carbon nanotubes

UF: Carbon nanotube  
Carbon-nanotube  
Single-wall carbon

## nanotubes

BT: Carbon  
Nanotubes  
RT: CNTFETs

## Carbon tax

BT: Environmental  
economics  
RT: Carbon dioxide

## Carbon-nanotube

USE: Carbon nanotubes

## Carbon-nanotube FETs

USE: CNTFETs

## Carbon-nanotube field effect transistors

USE: CNTFETs

## Carbon-nanotube field-effect transistors

USE: CNTFETs

## Cardiac arrest

UF: Cardiopulmonary arrest  
Heart arrest  
Heart attack

BT: Cardiovascular  
diseases

## Cardiac disease

BT: Cardiovascular  
diseases

## Cardiac tissue

BT: Biological tissues  
Cardiology

## Cardiography

BT: Biomedical imaging  
RT: Cardiology  
Sputter etching  
NT: Echocardiography  
Electrocardiography  
Phonocardiography

## Cardiology

BT: Medical specialties

RT: Cardiography  
Defibrillation  
Heart  
Pacemakers  
Phonocardiography  
NT: Cardiac tissue

## Cardiopulmonary arrest

USE: Cardiac arrest

## Cardiovascular diseases

BT: Diseases  
NT: Cardiac arrest  
Cardiac disease

## Cardiovascular system

BT: Anatomy  
NT: Baroreflex  
Blood vessels  
Heart

## Career development

BT: Education  
NT: Continuing education  
Jobs listings  
Mentoring

## Careers

USE: Engineering profession

## Cargo handling

USE: Freight handling

## Carotid arteries

UF: Carotoid arteries  
BT: Arteries

## Carotoid arteries

USE: Carotid arteries

## Carrier confinement

BT: Charge carrier  
processes

## Carrier density

USE: Charge carrier density

## Carrier lifetime

USE: Charge carrier  
lifetime

## Carrier processes

USE: Charge carrier  
processes



# 2019 IEEE Thesaurus

*Carrier sense multiaccess*  
USE: Multiaccess  
communication

*Cars*  
USE: Automobiles

**Cartilage**  
BT: Musculoskeletal system

*Cascade Lasers*  
USE: Quantum cascade lasers

**Cascading style sheets**  
BT: Style sheet languages  
RT: Markup languages

**Casimir effect**  
UF: Casimir energy  
Casimir force  
BT: Electric fields  
Nanotechnology  
RT: Atomic force  
microscopy  
Elementary particle  
vacuum  
Vacuum systems

*Casimir energy*  
USE: Casimir effect

*Casimir force*  
USE: Casimir effect

**Cast iron**  
BT: Iron  
RT: Casting  
Production materials

*Castellations*  
USE: Flip chip solder  
joints

**Casting**  
BT: Materials processing  
RT: Cast iron  
Foundries  
NT: Die casting  
Tape casting

*Catalytic converters*  
USE: Exhaust systems

*Catalytic convertors*  
USE: Exhaust systems

**Cataracts**  
BT: Eyes  
Medical conditions  
RT: Aging

**Catheterization**  
BT: Medical services  
RT: Catheters

**Catheters**  
BT: Biomedical equipment  
RT: Catheterization  
Surgery

**Cathode ray tubes**  
UF: CRT  
BT: Displays  
Electron devices  
RT: Flyback transformers

*Cathode-ray oscilloscopes*  
USE: Oscilloscopes

**Cathodes**  
UF: Photocathodes  
BT: Electrodes  
RT: Electron emission  
Electron tubes

**Cats**  
BT: Animals

*Cattle*  
USE: Cows

**Cause effect analysis**  
UF: Fishbone diagrams  
Ishikawa diagrams  
BT: Process planning  
RT: Expert systems  
Failure analysis  
Fault diagnosis  
Pareto analysis  
Testing

**Cavity perturbation methods**  
BT: Perturbation methods  
RT: Cavity resonators

**Cavity resonators**  
BT: Resonators



# 2019 IEEE Thesaurus

RT: Cavity perturbation  
methods  
Klystrons  
Microcavities  
Resonance  
NT: Laser cavity  
resonators

CCD

USE: Charge coupled devices

## CCD image sensors

BT: Image sensors  
RT: Digital photography

## CD recording

UF: Compact disk  
BT: Optical recording  
RT: Laser applications  
NT: CD-ROMs

CD-ROM

USE: CD-ROMs

## CD-ROM reviews

BT: IEEE indexing

## CD-ROMs

UF: CD-ROM  
BT: CD recording  
RT: Electronic publishing  
Information systems

CDMA

USE: Multiaccess  
communication

*Cell biology*

USE: Biological cells

*Cell clones*

USE: Cloning

*Cell phones*

USE: Cellular phones

## Cell signaling

UF: Cell signaling  
BT: Biological cells  
RT: Biochemistry  
Biomechanics  
Mechanobiology

## Cells (biology)

BT: Biological cells  
NT: Extracellular  
Ganglia  
Glial cells  
Membrane potentials  
Progenitor cells

## Cellular biophysics

BT: Biophysics  
RT: Molecular biophysics  
Nanomedicine

*Cellular land mobile radio*

USE: Land mobile radio  
cellular systems

## Cellular manufacturing

BT: Manufacturing systems  
RT: Flexible manufacturing  
systems  
Production control

## Cellular networks

BT: Land mobile radio  
cellular systems  
RT: Device-to-device  
communication  
Handover  
NT: Femtocell networks  
Macrocell networks  
Microcell networks  
Ultra-dense networks

## Cellular neural networks

BT: Neural networks

## Cellular phones

UF: Cell phones  
BT: Telephone equipment

*Cellular radio*

USE: Land mobile radio  
cellular systems

## Cement industry

BT: Manufacturing  
industries

## Censorship

BT: Law  
RT: Consumer protection  
Government policies  
Law enforcement  
Legal factors



# 2019 IEEE Thesaurus

## Central air conditioning

UF: Central air-conditioning  
BT: Air conditioning

## Central air-conditioning

USE: Central air conditioning

## Central nervous system

BT: Nervous system  
RT: Hypothalamus  
NT: Grey matter  
Midbrain  
White matter

## Central office

BT: Communication networks

## Central Processing Unit

UF: CPU  
BT: Electronic circuits  
RT: Hardware acceleration  
NT: VLIW

## Centralized control

UF: Integrated control  
BT: Control systems

## Cepstral analysis

BT: Acoustics  
RT: Music information retrieval  
Speech analysis  
Speech recognition  
NT: Cepstrum  
Mel frequency cepstral coefficient

## Cepstrum

BT: Cepstral analysis  
RT: Fourier transforms

## Ceramic glazes

BT: Glazes

## Ceramic products

BT: Manufactured products  
RT: Ceramics  
Glass products  
Insulators  
Porcelain  
Tiles

## Ceramics

UF: Glass ceramics  
BT: Insulation  
Materials  
RT: Aluminum oxide  
Ceramic products  
Ceramics industry  
Cermets  
Dielectric materials  
Diffusion bonding  
Electrets  
Firing  
Glass  
Glass products  
Glazes  
High-temperature

## superconductors

Magnesium oxide  
Powders  
Tape casting  
Tiles  
NT: Bioceramics  
Porcelain

## Ceramics industry

BT: Manufacturing industries  
RT: Bioceramics  
Ceramics  
Porcelain

## Cerebellum

BT: Brain

## Cerebral cortex

BT: Brain

## Cerebrospinal fluid

BT: Fluids and secretions  
Spinal cord  
RT: Brain

## Cerebrum

BT: Brain

## Cerenkov Lasers

USE: Free electron lasers

## Cerium

BT: Chemical elements

## Cermet

BT: Composite materials



# 2019 IEEE Thesaurus

RT: Ceramics Metallic materials	UF: Channel state estimation
<b>Certification</b>	Channel-state estimation
BT: Training RT: Conformance testing	BT: Communication channels RT: Equalizers Land mobile radio Land mobile radio
<b>Cervical cancer</b>	cellular systems
BT: Cancer	Multipath channels Signal detection Spread spectrum
<b>Cesium</b>	communication
UF: Caesium BT: Chemical elements	<b>Channel hot electron injection</b>
<i>CFD</i>	UF: Channel hot-electron injection
USE: Computational fluid dynamics	BT: Hot carrier injection
<i>CGM</i>	<i>Channel hot-electron injection</i>
USE: Computer generated music	USE: Channel hot electron injection
<b>Chalcogenides</b>	<b>Channel models</b>
BT: Chemical compounds	BT: Communication channels
<b>Change detection algorithms</b>	<b>Channel rate control</b>
BT: Algorithms	BT: Rate distortion theory
<b>Channel allocation</b>	<b>Channel spacing</b>
UF: Bandwidth allocation BT: Communication channels NT: Spectral efficiency	BT: Communication channels RT: Optical fiber applications
<b>Channel bank filters</b>	Rate distortion theory
BT: Filters	<i>Channel state estimation</i>
<b>Channel capacity</b>	USE: Channel estimation
BT: Communication channels RT: Quantum communication	<b>Channel state information</b>
<b>Channel coding</b>	BT: Communication channels
BT: Encoding Information theory RT: Communication channels Convolutional codes Rate distortion theory Space-time codes NT: Block codes Combined source- channel coding Turbo codes	<i>Channel-state estimation</i> USE: Channel estimation
<b>Channel estimation</b>	<b>Chaos</b>
	BT: Nonlinear systems RT: Bifurcation Econophysics Fractals Nonlinear circuits Nonlinear dynamical systems
	Pattern formation Predator prey systems





# 2019 IEEE Thesaurus

	Random media	Excitons
NT:	Chaotic communication	Space charge
	Complexity theory	
	Spatiotemporal	<i>Charge carrier trapping</i>
phenomena		USE: Charge carrier
		processes
<b>Chaotic communication</b>		<b>Charge carriers</b>
BT:	Chaos	BT: Elementary particles
RT:	Cryptography	RT: Conductivity
	Synchronization	Impact ionization
	Time series analysis	Semiconductivity
		Semiconductor
<b>Character generation</b>		materials
BT:	Graphics	NT: Charge carrier density
RT:	Computer graphics	Charge carrier
	Displays	
	Printing	lifetime
		mobility
<b>Character recognition</b>		processes
UF:	Print readers	Charge carrier
BT:	Pattern recognition	Hot carriers
RT:	Text recognition	
<b>Characteristic mode analysis</b>		<b>Charge coupled devices</b>
BT:	Electromagnetic	UF: CCD
analysis		Charge injection
		devices
<b>Charge carrier density</b>		Charge transfer
UF:	Carrier density	devices
BT:	Charge carriers	Charge-injection
		devices
<b>Charge carrier lifetime</b>		Charge-transfer
UF:	Carrier lifetime	devices
BT:	Charge carriers	BT: MIS devices
<b>Charge carrier mobility</b>		<i>Charge injection devices</i>
BT:	Charge carriers	USE: Charge coupled devices
<b>Charge carrier processes</b>		<b>Charge measurement</b>
UF:	Carrier processes	BT: Electrostatic
	Charge carrier	measurements
trapping		RT: Pulsed electroacoustic
	Electron carriers	methods
	Hole carriers	NT: Battery charge
	Semiconductor charge	measurement
carriers		
BT:	Charge carriers	<b>Charge pumps</b>
RT:	Diffusion processes	UF: Charge-pumping
	Semiconductor	BT: Circuits
impurities		RT: Voltage multipliers
NT:	Carrier confinement	
	Charge transfer	<b>Charge transfer</b>
	Electron mobility	BT: Charge carrier
	Electron traps	processes



# 2019 IEEE Thesaurus

<i>Charge transfer devices</i>		Drugs
USE: Charge coupled devices		Fractionation
<b>Charge-coupled image sensors</b>		NT: Activation analysis
BT: Image sensors		Chemical processes
Optoelectronic devices		Chemicals
		Electronic noses
		pH measurement
<i>Charge-injection devices</i>	<b>Chemical and biological sensors</b>	
USE: Charge coupled devices	BT: Sensors	
	NT: Biosensors	
<i>Charge-pumping</i>	Gas detectors	
USE: Charge pumps		
<i>Charge-transfer devices</i>	<b>Chemical compounds</b>	
USE: Charge coupled devices	BT: Chemistry	
	NT: Anti-freeze	
<i>Charged device model</i>	Bromine compounds	
USE: Electrostatic	Chalcogenides	
discharges	Ethanol	
	Methanol	
<i>Charging devices</i>	Radiotracer	
USE: Battery chargers	<b>Chemical elements</b>	
<b>Charging stations</b>	BT: Chemicals	
BT: Power supplies	Materials, elements,	
RT: Battery chargers	and compounds	
Battery powered	NT: Actinium	
vehicles	Aluminum	
	Americium	
	Antimony	
	Arsenic	
	Astatine	
vehicles	Berkelium	
	Beryllium	
	Boron	
	Bromine	
	Californium	
electric vehicles	Carbon	
	Cerium	
<i>CHCP</i>	Cesium	
USE: Trigeneration	Chlorine	
	Curium	
<b>Chebyshev approximation</b>	Darmstadtium	
BT: Approximation methods	Dysprosium	
RT: Discrete cosine	Europium	
transforms	Fluorine	
	Francium	
<b>Checkpointing</b>	Gadolinium	
BT: System recovery	Hafnium	
	Helium	
<i>Cheese</i>	Holmium	
USE: Dairy products	Hydrogen	
	Iodine	
<b>Chemical analysis</b>	Iridium	
BT: Chemistry		
Materials science and		
technology		
RT: Chemical technology		



# 2019 IEEE Thesaurus

Isotopes		Hazardous materials
Krypton		Toxicology
Lutetium	NT:	Toxic chemicals
Mercury (metals)		
Molybdenum	<b>Chemical industry</b>	
Neon	BT:	Industries
Neptunium	RT:	Chemical engineering
Nitrogen		Chemical reactors
Osmium		Chemical technology
Oxygen		Electrochemical
Phosphorus	processes	
Plutonium		Petrochemicals
Polonium		Petroleum industry
Potassium		Pipelines
Praseodymium		Plastic products
Promethium		Plastics industry
Protactinium		Rubber industry
Radium		
Radon	<b>Chemical lasers</b>	
Rhenium	BT:	Lasers
Rhodium	RT:	Gas lasers
Roentgenium	NT:	Chemical oxygen iodine
Rubidium	lasers	
Ruthenium		
Scandium	<i>Chemical mechanical planarisation</i>	
Selenium	USE:	Planarization
Sodium		
Sulfur	<i>Chemical mechanical planarization</i>	
Tantalum	USE:	Planarization
Technetium		
Tellurium	<b>Chemical oxygen iodine lasers</b>	
Terbium	BT:	Chemical lasers
Thallium		
Thorium	<b>Chemical processes</b>	
Thulium	BT:	Chemical analysis
Titanium	NT:	Leaching
Uranium		Molecular sieves
Vanadium		Osmosis
Ytterbium		Oxidation
Yttrium		Reverse osmosis
Zirconium		Solvents
		Thermolysis
		Water splitting
<b>Chemical engineering</b>		
BT:	Engineering - general	
RT:	Chemical industry	
	Chemical products	
	Chemical technology	
	Process design	
<b>Chemical hazards</b>		
BT:	Hazards	
RT:	Biohazards	
	Contamination	
	Explosions	
	<b>Chemical products</b>	
	BT:	Manufactured products
	RT:	Chemical engineering
		Chemistry
		Glass products
		Plastic products
		Production materials
	NT:	Fats
		Inhibitors
		Lacquers



# 2019 IEEE Thesaurus

	Mortar		NT: Atmospheric pressure
	Paints	chemical vapor deposition	
	Petrochemicals		Atomic layer
	Petroleum	deposition	
	Pharmaceuticals		MOCVD
	Plastics		Pulsed laser
	Propellants	deposition	
<b>Chemical reactors</b>		<b>Chemicals</b>	
UF:	CSTR	BT:	Chemical analysis
BT:	Chemical technology	NT:	Chemical elements
RT:	Chemical industry		
	Crystallizers	<b>Chemistry</b>	
	Process control	BT:	Science - general
	Water splitting	RT:	Chemical products
NT:	Bioreactors		Chemical technology
	Continuous-stirred		Drugs
tank reactor			Petrochemicals
	Ignition		Pharmaceutical
<b>Chemical sensors</b>		technology	
BT:	Chemical technology		Pharmaceuticals
RT:	Detectors		Pickling
			Plastic products
<b>Chemical technology</b>		NT:	Astrochemistry
BT:	Industry applications		Biochemistry
RT:	Chemical analysis		Chemical analysis
	Chemical engineering		Chemical compounds
	Chemical industry		Geochemistry
	Chemistry		Inorganic chemicals
	Decontamination		Interstellar chemistry
	Refining		Organic chemicals
NT:	Chemical reactors		Photochemistry
	Chemical sensors	<b>Chemotherapy</b>	
	Crystallizers	BT:	Medical treatment
	Distillation equipment	RT:	Cancer
	Fluidization		Drugs
	Pharmaceutical		Medical services
technology			Oncology
	Vitrification		Patient monitoring
<b>Chemical transducers</b>		<i>Child</i>	
BT:	Transducers	USE:	Pediatrics
RT:	Gas detectors		
<b>Chemical vapor deposition</b>		<i>Children</i>	
UF:	CVD	USE:	Pediatrics
	Vapour deposition		
BT:	Plasma materials	<i>Chip design</i>	
processing		USE:	Chip scale packaging
RT:	Coatings	<i>Chip development</i>	
	Epitaxial layers	USE:	Chip scale packaging
	Films	<i>Chip fabrication</i>	



# 2019 IEEE Thesaurus

USE: Chip scale packaging	<b>Chromatic dispersion</b> BT: Dispersion
<b>Chip scale packaging</b> UF: CSP Chip design Chip development Chip fabrication Chip-making process BT: Electronics packaging RT: Integrated circuit	<b>Chrome plating</b> BT: Plating RT: Coatings
packaging	<b>Chromium</b> UF: Cr BT: Metals NT: Chromium alloys
<i>Chip-making process</i> USE: Chip scale packaging	<b>Chromium alloys</b> BT: Chromium
<b>Chirp</b> BT: Signal processing	<b>Chromosome mapping</b> BT: Biological cells
<b>Chirp modulation</b> UF: Linear frequency modulation BT: Modulation RT: Sonar Spread spectrum communication Spread spectrum radar	<i>Chromosomes</i> USE: Biological cells
<b>Chlorine</b> BT: Chemical elements NT: Chlorine compounds	<b>Chronobiology</b> UF: Biological clocks BT: Biological processes
<b>Chlorine compounds</b> UF: Chlorine dioxide Chloroform Hydrogen chloride Sodium chloride BT: Chlorine	<i>CIM</i> USE: Common Information Model (computing) AND Common Information Model (electricity) AND Computer integrated manufacturing
<i>Chlorine dioxide</i> USE: Chlorine compounds	<i>Cinema</i> USE: Motion pictures
<i>Chloroform</i> USE: Chlorine compounds	<b>Cinematography</b> BT: Photography RT: Motion pictures Object tracking
<i>Chokes</i> USE: Inductors	<b>Ciphers</b> UF: Cyphers BT: Cryptography RT: Algorithms Codes Encryption
<b>Choppers (circuits)</b> BT: Switching circuits RT: Power conversion	<b>Circadian rhythm</b> UF: Circadian rhythms BT: Biological processes
<i>CHP</i> USE: Cogeneration	<i>Circadian rhythms</i> USE: Circadian rhythm



# 2019 IEEE Thesaurus

## Circuit analysis

BT: Circuits  
RT: Frequency-domain

analysis

SPICE  
Sensitivity  
Tolerance analysis  
Yield estimation

NT: Circuit analysis

computing

Coupled mode analysis  
Nonlinear network

analysis

## Circuit analysis computing

BT: Circuit analysis

## Circuit boards

USE: Printed circuits

## Circuit breakers

BT: Switchgear  
RT: Interrupters  
Power system

protection

Protection  
Switching circuits

## Circuit CAD

USE: Design automation

## Circuit complexity

USE: Complexity theory

## Circuit design

USE: Circuit synthesis

## Circuit design (CAD)

USE: Design automation

## Circuit design (Logic)

USE: Logic design

## Circuit faults

BT: Circuits  
NT: Electrical fault

detection

## Circuit feedback

USE: Feedback circuits

## Circuit layout CAD

USE: Design automation

## Circuit noise

BT: Circuits  
RT: Transmission lines  
NT: Thermal noise

## Circuit optimisation

USE: Circuit optimization

## Circuit optimization

UF: Circuit optimisation  
Circuit performance  
Circuit tuning  
BT: Optimization methods  
RT: Tolerance analysis

## Circuit performance

USE: Circuit optimization

## Circuit simulation

BT: Circuits  
RT: Design automation  
Semiconductor process

modeling

## Circuit stability

BT: Stability  
RT: Grounding  
Jitter

## Circuit subsystems

BT: Solid state circuits  
RT: Circuits and systems

## Circuit synthesis

UF: Circuit design  
BT: Circuits  
RT: Control system

synthesis

Logic design  
Solid state circuit

design

NT: High level synthesis  
Integrated circuit

synthesis

## Circuit testing

BT: Testing  
RT: Built-in self-test  
NT: Integrated circuit

measurements

## Circuit theory

BT: Solid state circuits



# 2019 IEEE Thesaurus

<i>Circuit tolerance analysis</i>			Linear circuits
USE:	Tolerance analysis		Logic arrays
<b>Circuit topology</b>			Logic circuits
BT:	Digital circuits		MOSFET circuits
RT:	Graph theory		Magnetic circuits
	Tree graphs		Microprocessors
			Microwave circuits
			Millimeter wave
<i>Circuit tuning</i>		circuits	Millimeter wave
USE:	Circuit optimization	integrated circuits	
			Monolithic integrated
<b>Circuits</b>		circuits	
BT:	Circuits and systems		Multiplying circuits
RT:	Flow graphs		Nonlinear circuits
	Impedance matching		Passive circuits
	Oscillators		Phase shifters
	Phase transformers		Power dissipation
	Poles and zeros		Power integrated
	Scattering parameters	circuits	
NT:	Active circuits		Printed circuits
	Adders		Programmable circuits
	Analog circuits		Programmable logic
	Application specific	arrays	
integrated circuits	Asynchronous circuits	devices	Programmable logic
	Bipolar transistor		Pulse circuits
circuits			RLC circuits
	Bistable circuits		Radiation detector
	Bridge circuits	circuits	
	Charge pumps		Rail to rail operation
	Circuit analysis		Rectifiers
	Circuit faults		Sampled data circuits
	Circuit noise		Sequential circuits
	Circuit simulation		Silicon-on-insulator
	Circuit synthesis		Submillimeter wave
	Coprocessors	circuits	
	Counting circuits		Summing circuits
	Coupling circuits		Switched circuits
	Digital circuits		Switching circuits
	Digital signal		Thick film circuits
processors			Thin film circuits
	Distributed parameter		Thyristor circuits
circuits			Time varying circuits
	Driver circuits		Trigger circuits
	Electronic circuits		UHF circuits
	Equivalent circuits		UHF integrated
	Feedback	circuits	
	Hybrid integrated		Ultra large scale
circuits		integration	
	Integrated circuits		VHF circuits
	Isolators		Very large scale
	Large scale	integration	
integration			Voltage multipliers



# 2019 IEEE Thesaurus

integration	Wafer scale	UF:	Geotechnical structures
<b>Circuits and systems</b>		BT:	Engineering - general
RT:	Circuit subsystems	RT:	Bridges
	Formal verification		Buildings
	Solid state circuits		Construction
NT:	Circuits		Energy resources
	Contacts		Environmental factors
	Filtering		Power systems
	Integrated circuit		Road transportation
technology			Roads
	Logic devices	NT:	Transmission lines
	Oscillators		Railway engineering
	Single electron		Structural engineering
devices		<i>Cladistics</i>	
	Tunable circuits and	USE:	Phylogeny
devices		<i>Clamping</i>	
<i>Circular polarisation</i>		USE:	Clamps
USE:	Polarization	<b>Clamps</b>	
<i>Circular polarization</i>		UF:	Clamping
USE:	Polarization	BT:	Production equipment
<b>Circulators</b>		RT:	Machine tools
BT:	Ferrite devices		Machining
	Microwave technology	<b>Classification algorithms</b>	
RT:	Electromagnetic	BT:	Algorithms
coupling		<b>Classification tree analysis</b>	
	Waveguide components	BT:	Decision trees
<b>Circulatory system</b>		RT:	Formal concept
UF:	Vascular system	analysis	
BT:	Anatomy	<b>Cleaning</b>	
<b>Citation analysis</b>		BT:	Materials handling
UF:	Citation studies	RT:	Air cleaners
BT:	Bibliometrics		Refining
<i>Citation studies</i>		NT:	Purification
USE:	Citation analysis		Surface cleaning
<i>Cities and towns</i>		<i>Client server model</i>	
USE:	Urban areas	USE:	Client-server systems
<i>City</i>		<i>Client server systems</i>	
USE:	Urban areas	USE:	Client-server systems
<i>City planning</i>		<i>Client-server model</i>	
USE:	Urban planning	USE:	Client-server systems
<b>Civil engineering</b>		<b>Client-server systems</b>	
		UF:	Client server model
			Client server systems





# 2019 IEEE Thesaurus

	Client-server model		Watches
	Clientserver systems		
BT:	Distributed computing	<i>Clone</i>	USE: Cloning
	Software architecture		
RT:	Dew computing	<i>Clones</i>	USE: Cloning
	Unified modeling		
language			
NT:	Middleware		
	Servers	<b>Cloning</b>	UF: Cell clones
<i>Clientserver systems</i>			Clone
USE:	Client-server systems		Clones
			Human cloning
<i>Climate</i>			Molecular clones
USE:	Meteorology		Reproductive cloning
		BT:	Biomedical engineering
<b>Climbing robots</b>		RT:	DNA
BT:	Mobile robots		
		<i>Closed form solution</i>	
<i>Clinical analysis</i>		USE:	Closed-form solutions
USE:	Clinical diagnosis		
		<b>Closed loop systems</b>	
<b>Clinical diagnosis</b>		UF:	Closed-loop systems
UF:	Clinical analysis	BT:	Control systems
	Clinical engineering	RT:	H infinity control
	Clinical information		
BT:	Medical services	<i>Closed-form expression</i>	
RT:	Point of care	USE:	Closed-form solutions
NT:	Clinical neuroscience		
		<b>Closed-form solutions</b>	
<i>Clinical engineering</i>		UF:	Closed form solution
USE:	Clinical diagnosis		Closed-form expression
		BT:	Mathematics
<i>Clinical equipment</i>			
USE:	Biomedical equipment	<i>Closed-Loop systems</i>	
		USE:	Closed loop systems
<i>Clinical information</i>			
USE:	Clinical diagnosis	<b>Clothing</b>	
		UF:	Garments
<b>Clinical neuroscience</b>		BT:	Consumer products
UF:	Cloud security	RT:	Clothing industry
BT:	Clinical diagnosis		Fabrics
	Neuroscience		Wool
		NT:	Footwear
<b>Clinical trials</b>			Protective clothing
BT:	Medical treatment		
		<b>Clothing industry</b>	
<i>Clock synchronization</i>		UF:	Garment industry
USE:	Synchronization	BT:	Manufacturing
		industries	
<b>Clocks</b>		RT:	Clothing
BT:	Time measurement		Footwear
RT:	Timing		Footwear industry
NT:	Atomic clocks		Protective clothing



# 2019 IEEE Thesaurus

	Textile industry	workstations	Network of
<i>Clotting</i>			Workstation clusters
USE:	Coagulation	BT:	Distributed computing
		RT:	Distributed processing
<b>Cloud computing</b>			Message systems
BT:	Internet		Parallel processing
RT:	Big Data applications		Peer-to-peer computing
	Dew computing		Resource management
	Edge computing		Workstations
	Internet of Things		
	Network function	<b>Clustering algorithms</b>	
virtualization		BT:	Algorithms
	Service computing	<b>Clustering methods</b>	
	Software as a service	BT:	Pattern recognition
	Software defined	NT:	Pattern clustering
networking			
	Web services	<b>Clutter</b>	
NT:	Cloud computing	BT:	Interference
security		RT:	Echo interference
	Cloud gaming		
	Elastic computing	<i>CMM</i>	
	Platform as a service	USE:	Coordinate measuring
<b>Cloud computing security</b>		machines	
UF:	Cloud security	<b>CMOS analog integrated circuits</b>	
BT:	Cloud computing	UF:	Analog CMOS integrated
	Computer security	circuits	
<b>Cloud gaming</b>			Analogue CMOS
UF:	Gaming on demand	integrated circuits	
BT:	Cloud computing		CMOS analogue
	Games	integrated circuits	
RT:	Online services	BT:	Analog integrated
<i>Cloud security</i>		circuits	
USE:	Clinical neuroscience		CMOS integrated
AND		circuits	
	Cloud computing	<i>CMOS analogue integrated circuits</i>	
security		USE:	CMOS analog integrated
		circuits	
<i>Cloud-dew architecture</i>		<b>CMOS digital integrated circuits</b>	
USE:	Dew computing	BT:	CMOS integrated
<i>Cloud-dew computing</i>		circuits	
USE:	Dew computing	NT:	CMOS logic circuits
<b>Clouds</b>		<b>CMOS image sensors</b>	
BT:	Terrestrial atmosphere	BT:	Image sensors
<b>Cluster computing</b>		<b>CMOS integrated circuits</b>	
UF:	Apache hadoop	BT:	Integrated circuits
	Apache spark	RT:	CMOSFETs



# 2019 IEEE Thesaurus

NT: CMOS analog integrated circuits

CMOS digital integrated circuits

CMOS logic circuits  
CMOS memory circuits  
Transconductors

## CMOS logic circuits

BT: CMOS digital integrated circuits

CMOS integrated circuits

RT: Application specific integrated circuits

Power dissipation

## CMOS memory circuits

UF: CMOS memory integrated circuits

BT: CMOS integrated circuits

RT: Memory SRAM chips

## CMOS memory integrated circuits

USE: CMOS memory circuits

## CMOS process

BT: CMOS technology

## CMOS technology

BT: Integrated circuit technology

RT: MOSFET  
Microcontrollers  
Microprocessors  
Transistors

NT: CMOS process  
Silicon on sapphire

## CMOSFET circuits

BT: MOSFET circuits

RT: Rail to rail operation

## CMOSFET logic devices

BT: CMOSFETs  
RT: MISFETs  
MOSFET  
P-i-n diodes

## CMOSFETs

BT: MOSFET

RT: CMOS integrated circuits

Semiconductor-insulator interfaces

NT: CMOSFET logic devices

## CNC

USE: Computer numerical control

## CNFETs

USE: CNTFETs

## CNTFETs

UF: CNFETs  
Carbon nanotube FETs  
Carbon nanotube field

effect transistors

Carbon nanotube field-effect transistors

Carbon-nanotube FETs  
Carbon-nanotube field

effect transistors

Carbon-nanotube field-effect transistors

BT: Field effect transistors

RT: Carbon nanotubes  
Quantum capacitance

## Co-channel interference

USE: Interchannel interference

## Coagulate

USE: Coagulation

## Coagulation

UF: Blood clots  
Clotting  
Coagulate  
BT: Biological processes  
Blood  
RT: Blood platelets

## Coal

BT: Fuels  
RT: Coal gas  
Coal mining

## Coal gas

UF: Coal gasification  
Illumination gas  
Town gas



# 2019 IEEE Thesaurus

BT:	Gases	NT:	Cobalt alloys
RT:	Coal		
	Fuels		
<i>Coal gasification</i>		<b>Cobalt alloys</b>	
USE:	Coal gas	BT:	Cobalt
		RT:	Alloying
<b>Coal industry</b>		<i>Cochannel interference</i>	
BT:	Industries	USE:	Interchannel
RT:	Coal mining	interference	
<b>Coal mining</b>		<b>Cochlear implants</b>	
BT:	Mining industry	BT:	Implants
RT:	Coal	RT:	Ear
	Coal industry		
<i>Coal tar</i>		<i>Code division multiaccess</i>	
USE:	Fuel processing	USE:	Multiaccess
industries		communication	
<b>Coatings</b>		<i>Code division multiple access</i>	
BT:	Materials processing	USE:	Multiaccess
RT:	Chemical vapor	communication	
deposition			
	Chrome plating	<i>Code division multiplexed</i>	
	Corrosion	USE:	Code division
	Films	multiplexing	
	Magnetic multilayers	<b>Code division multiplexing</b>	
	Painting	UF:	Code division
	Spraying	multiplexed	
	Sputtering		OCDM
NT:	Dip coating		Optical code division
	Epitaxial layers	multiplexing	
	Glazes	BT:	Communication
	Lacquers	switching	
	Paints		Multiplexing
	Powders	RT:	Codes
			Land mobile radio
<b>Coaxial cables</b>		cellular systems	
BT:	Cables		Multicarrier code
RT:	Electromagnetic	division multiple access	
waveguides		applications	Optical fiber
	Transmission lines		Software radio
NT:	Coaxial components		Spread spectrum
	Hybrid fiber coaxial	communication	
cables			
<b>Coaxial components</b>		<b>Code refractoring</b>	
BT:	Coaxial cables	UF:	Refractoring
		BT:	Encoding
<b>Cobalt</b>		RT:	Information theory
BT:	Metals		Software engineering
RT:	Alloying		
	Magnets	<i>Code-division multiple access</i>	



# 2019 IEEE Thesaurus

USE: Multiaccess  
communication

*Code-division multiple-access*

USE: Multiaccess  
communication

## Codecs

UF: Coder-decoders  
BT: Communication  
equipment  
RT: Decoding  
Encoding  
NT: Speech codecs  
Video codecs

*Coder-decoders*

USE: Codecs

## Codes

UF: Parity check  
BT: Information theory  
RT: Ciphers  
Code division  
multiplexing  
Cryptography  
Decoding  
Encoding  
Error correction  
Redundancy  
Sequences  
Vector quantization  
NT: Binary codes  
Convolutional codes  
Cyclic redundancy  
check codes  
Error correction codes  
Parity check codes  
Product codes  
Space-time codes  
Zero correlation zone

*Coding*

USE: Encoding

*Coding theory*

USE: Information theory

## Coercive force

UF: Coercivity  
BT: Magnetic forces

*Coercivity*

USE: Coercive force

*Cogen*

USE: Cogeneration

## Cogeneration

UF: CHP  
Cogen  
Combined heat and  
power  
BT: Heating systems  
Power generation  
RT: Industrial power  
systems  
Trigeneration  
Waste heat

*Cogging*

USE: Forging

## Cognition

UF: Reasoning  
BT: Behavioral sciences  
RT: Brain  
Cognitive systems  
Psychology  
NT: Activity recognition  
Cognitive neuroscience  
Cognitive processes  
Self-aware

*Cognitive computing*

USE: Cognitive systems

## Cognitive informatics

BT: Cybernetics  
Informatics  
RT: Brain

## Cognitive neuroscience

BT: Cognition  
Neuroscience

## Cognitive processes

BT: Cognition

## Cognitive radar

BT: Adaptive systems  
Radar

## Cognitive radio

UF: Cognitive radio  
network  
BT: Wireless communication



# 2019 IEEE Thesaurus

## *Cognitive radio network*

USE: Cognitive radio

## **Cognitive robotics**

BT: Robots

RT: Autonomous robots

## **Cognitive science**

UF: Mental models

BT: Cybernetics

RT: Brain

Computational and  
artificial intelligence  
Human factors  
Inference mechanisms  
Logic  
Psychology  
Uncertainty  
NT: Problem-solving

## **Cognitive systems**

UF: Cognitive computing  
Reasoning

BT: Artificial  
intelligence

Learning systems  
RT: Adaptive control  
Affective computing  
Automata  
Cognition  
Cybernetics  
Machine learning

## **Coherence**

UF: Coherent detection

BT: Electromagnetic

scattering  
RT: Interference

## *Coherent detection*

USE: Coherence

## **Coilguns**

BT: Electromagnetic  
launching

## **Coils**

UF: Electric coils

BT: Electronic components

RT: Electromagnets  
Generators  
Inductance  
Inductors  
Magnetic circuits

## Motors

Rotating machines

Transformers

Windings

NT: Superconducting coils

## **Cold plates**

BT: Cooling

## **Collaboration**

BT: Professional

communication

RT: Collective

intelligence

Cyber-physical systems

Information sharing

Interoperability

Wikipedia

NT: Collaborative tools

Discussion forums

Teamwork

Virtual groups

## **Collaborative intelligence**

BT: Collaborative work

Multi-agent systems

RT: Distributed management

Intelligent systems

## *Collaborative learning*

USE: Collaborative work

## *Collaborative networking*

USE: Collaborative work

## *Collaborative problem solving*

USE: Collaborative work

## **Collaborative software**

BT: Collaborative tools

RT: Communication system  
software

## **Collaborative tools**

BT: Collaboration

NT: Call conference

Collaborative software

Videoconferences

## **Collaborative work**

UF: Collaborative learning

Collaborative

networking



# 2019 IEEE Thesaurus

solving	Collaborative problem	Linear accelerators
	Cooperative work	Single photon emission
	Groupware	computed tomography
BT:	Distributed computing	X-ray applications
RT:	Communication	X-rays
effectiveness	Multimedia computing	<b>Collision avoidance</b>
	Professional	UF: Collision detection
communication	Collaborative	Obstacle avoidance
NT:	Cooperative	Sense and avoid
intelligence	Crowdsourcing	BT: Motion control
	Social computing	RT: Advanced driver
communication		assistance systems
		Block signalling
		Lane departure warning
<i>Collective bargaining</i>		systems
USE:	Industrial relations	<i>Collision detection</i>
		USE: Collision avoidance
<b>Collective intelligence</b>		<b>Collision mitigation</b>
BT:	Decision making	BT: Motion control
	Intelligent systems	
RT:	Collaboration	<i>Collision theory</i>
	Crowdsourcing	USE: Kinetic theory
	Sociology	
<i>Colleges</i>		<b>Colloidal crystals</b>
USE:	Educational	BT: Crystals
institutions		RT: Crystallizers
<b>Colliding beam accelerators</b>		<b>Colloidal lithography</b>
BT:	Colliding beam devices	BT: Lithography
	Particle accelerators	Nanopatterning
RT:	Klystrons	RT: Biomedical engineering
	Particle beams	Nanobioscience
	Synchrotrons	Nanotopography
		Polymers
<b>Colliding beam devices</b>		Surface treatment
BT:	Nuclear and plasma	Tissue engineering
sciences		
RT:	Particle accelerators	<b>Colloidal nanocrystals</b>
NT:	Colliding beam	BT: Nanocrystals
accelerators		Optical materials
	Muon colliders	
<b>Collimators</b>		<b>Colon</b>
UF:	Multileaf collimators	BT: Digestive system
BT:	Optical devices	NT: Colonic polyps
RT:	Biomedical	
applications of radiation		<b>Colonic polyps</b>
	Biomedical equipment	BT: Colon
	Dosimetry	Tumors
	Gamma-rays	<b>Colonography</b>
		BT: Medical diagnosis



# 2019 IEEE Thesaurus

<b>Colonoscopy</b>	USE: Agricultural machinery
BT: Medical tests	<i>Combined heat and power</i>
NT: Virtual colonoscopy	USE: Cogeneration
<b>Color</b>	<i>Combined heat, cooling and power</i>
BT: Optics	USE: Trigeneration
RT: Electrochromism	<i>Combined heat, cooling, and power</i>
Imaging	USE: Trigeneration
Photochromism	<i>Combined source channel coding</i>
NT: Pigmentation	USE: Combined source-channel coding
<i>Color blindness</i>	<b>Combined source-channel coding</b>
USE: Vision defects	UF: Combined source channel coding
<i>Color center lasers</i>	BT: Channel coding
USE: Solid lasers	<b>Combustion</b>
<b>Color TV</b>	BT: Oxidation
BT: TV	RT: Exhaust gases
<b>Colored noise</b>	NT: Plasma-assisted combustion
UF: Coloured noise	<b>Command and control systems</b>
BT: Noise	UF: Military command and control
<b>Colossal magnetoresistance</b>	BT: Aerospace and electronic systems
BT: Magnetoresistance	RT: Military communication
<i>Coloured noise</i>	<b>Command languages</b>
USE: Colored noise	BT: Computer languages
<b>Combinational circuits</b>	<i>Commerce</i>
UF: Combinational logic circuits	USE: Business
BT: Logic circuits	<b>Commercial law</b>
<i>Combinational Logic circuits</i>	BT: Law
USE: Combinational circuits	RT: Bankruptcy
<b>Combinatorial mathematics</b>	Business
BT: Mathematics	Consumer products
NT: Graph theory	Consumer protection
Steiner trees	Economics
<i>Combinatorial software testing</i>	<i>Commercial power systems</i>
USE: Combinatorial testing	USE: Industrial power systems
<b>Combinatorial testing</b>	<b>Commercialization</b>
UF: Combinatorial software testing	BT: Engineering management
BT: Software testing	
RT: Design for testability	
<i>Combine harvesters</i>	





# 2019 IEEE Thesaurus

## Common Information Model (computing)

UF: CIM  
BT: Analytical models  
Information management  
RT: DMTF Standards  
Information exchange

information

Channel models  
Channel spacing  
Channel state  
Gaussian channels  
Multipath channels  
Multiuser channels  
Partial response

## Common Information Model (electricity)

UF: CIM  
BT: Information management  
Power transmission  
RT: IEC Standards  
Information exchange  
Interoperability  
Open systems  
Unified modeling

channels

Throughput  
Time-varying channels

language

## Communicable disease

USE: Infectious diseases

Communication complexity

USE: Complexity theory

## Communication effectiveness

BT: Professional

communication

RT: Collaborative work  
Cooperative

communication

## Communication aids

BT: Professional

communication

RT: Assistive technology  
Auditory displays

## Communication engineering education

BT: Engineering education

## Communication cables

UF: Underground

communication cables

BT: Cables  
RT: Fault location  
Wire

## Communication equipment

BT: Communications

technology

RT: Bluetooth  
Communication systems  
Multiplexing equipment  
Satellite ground

stations

NT: Auditory displays

## Communication cables (optical)

USE: Optical fiber cables

Codecs  
Modems  
On board unit  
Optical communication

## Communication channels

UF: Air interface  
Telecom channels  
Telecommunication

equipment

equipment

Radio communication

channels

BT: Information theory  
RT: Channel coding  
Communication systems  
IEEE 802.11e Standard  
IEEE 802.11n Standard  
Multicarrier code

Receivers  
Repeaters  
Speech codecs  
TV equipment  
Telephone equipment  
Transceivers  
Transmitters  
Transponders  
Video codecs  
Video equipment  
Vocoders

division multiple access

OFDM

Synapses

NT: Channel allocation  
Channel capacity  
Channel estimation

## Communication industry



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# 2019 IEEE Thesaurus

BT: Industries	NT: Code division
RT: Communication systems	multiplexing
<i>Communication network reliability</i>	Electronic switching
USE: Telecommunication	Frame relay
network reliability	Handover
	Multiprotocol label
<b>Communication networks</b>	switching
UF: PSTN	Packet switching
Public switched	
telephone network	<b>Communication symbols</b>
BT: Communication systems	BT: Professional
RT: Network security	communication
NT: Central office	RT: Pragmatics
Cyberspace	Semiotics
Industrial	Syntactics
communication	NT: Semiotics
Radio access	
technologies	<b>Communication system control</b>
Relay networks	BT: Communication systems
(telecommunications)	RT: Control systems
	NT: Telecommunication
<i>Communication protocols</i>	control
USE: Protocols	
<i>Communication satellites</i>	<b>Communication system operations and management</b>
USE: Satellite	BT: Management
communication	RT: Communication system
	signaling
<b>Communication standards</b>	Communication systems
UF: Telecommunication	
standards	<i>Communication system privacy</i>
BT: Standards categories	USE: Communication system
RT: Communication systems	security
FDDI	
IEC	<b>Communication system security</b>
ISO	UF: Communication system
ISO Standards	privacy
Radio spectrum	Telecommunication
management	security
NT: Long Term Evolution	Wireless security
Near field	BT: Communication systems
communication	RT: Access control
SONET	Cryptography
Synchronous digital	Data security
hierarchy	Electronic warfare
Universal Serial Bus	Privacy
	NT: Denial-of-service
<b>Communication switching</b>	attack
BT: Communications	Radio communication
technology	countermeasures
RT: IEEE 802.3 Standard	
Switching systems	<b>Communication system signaling</b>
	UF: Signaling systems



# 2019 IEEE Thesaurus

	Telecom signaling		Communication system
	Telecom system	security	
signaling			Communication system
	Telecommunication	signaling	
signalling			Communication system
BT:	Communication systems	software	
RT:	Bit rate		Communication system
	Communication system	traffic	
operations and management			Communication system
	Handover	traffic control	
NT:	Received signal		Computer networks
strength indicator			Cross layer design
			Data buses
			Data communication
			Device-to-device
<b>Communication system software</b>			
BT:	Communication systems	communication	
RT:	Collaborative software		Digital communication
NT:	Streaming media		FDDI
			Facsimile
<b>Communication system traffic</b>			IP networks
UF:	Mice flows		ISDN
BT:	Communication systems		Indoor communication
RT:	Telecommunication		Internet
traffic			Local area networks
			Low latency
<b>Communication system traffic control</b>			
BT:	Communication systems	communication	
			MIMO communication
<b>Communication systems</b>			MISO communication
BT:	Communications		Machine-to-machine
technology		communications	
RT:	Antennas and		Magnetic communication
propagation			Metropolitan area
	Communication channels	networks	
	Communication		Microwave
equipment		communication	
	Communication industry		Military communication
	Communication		Mobile communication
standards			Molecular
	Communication system	communication	
operations and management			Multiaccess
	Digital systems	communication	
	Huffman coding		Multicast
	Information theory	communication	
	Office automation		Multimedia
	Telecontrol equipment	communication	
	Traffic control		NOMA
NT:	ARPANET	(telecommunication)	Nanocommunication
	Biomedical		Narrowband
communication			Optical fiber
	Broadband	communication	
communication			Personal communication
	Communication networks	networks	
	Communication system		Protocols
control			



# 2019 IEEE Thesaurus

	Quality of experience		Image communication
	Quality of service		Information and
	Quantum communication	communication technology	
	Radio communication		Message systems
	Regional area networks		Modulation
	Routing		Multiplexing
	SIMO communication		Network topology
	SISO communication		Presence network
communication	Satellite	agents	
	Satellite ground		TV
stations			UHF technology
	Spatial diversity	technology	Ultra wideband
communication	Submillimeter wave		VHF devices
	Subscriber loops	<b>Commutation</b>	
	Switching systems	BT:	Motors
hierarchy	Synchronous digital	<b>Commutators</b>	
	Telecommunications	BT:	DC motors
	Teleconferencing		
	Telegraphy	<i>Compact disk</i>	
	Telephony	USE:	CD recording
	Teleprinting		
	Teletext	<b>Compaction</b>	
	Token networks	BT:	Waste reduction
	UHF communication	RT:	Materials handling
communication	Underwater		
	Vehicle-to-everything	<b>Companies</b>	
	Videophone systems	BT:	Organizations
	Videotex		
	Visual communication	<b>Company reports</b>	
	Wide area networks	BT:	Publishing
	Wideband	RT:	Competitive
	Wireless communication	intelligence	
	Wireless mesh networks		Management
networks	Wireless sensor		Management accounting
		<b>Compass</b>	
<i>Communications computing</i>		UF:	Compasses
USE: Telecommunication		BT:	Instruments
computing		RT:	Magnetic fields
			Navigation
<b>Communications technology</b>		<i>Compasses</i>	
RT: Antennas and		USE: Compass	
propagation			
NT: Communication		<b>Competitive intelligence</b>	
equipment	Communication	BT:	Information management
		RT:	Business intelligence
switching	Communication systems		Company reports
	Couplers		Decision support
	High-speed electronics	systems	
			Knowledge management



# 2019 IEEE Thesaurus

Market research	USE: Component architectures
<i>Compilers (program)</i>	
USE: Program processors	<b>Components, packaging, and manufacturing technology</b>
<b>Complex networks</b>	NT: Component architectures
BT: Network topology	Electronic components
RT: System dynamics	Electronic equipment
System of systems	manufacture
<b>Complex systems</b>	Electronics packaging
BT: Systems engineering	Environmentally
and theory	friendly manufacturing techniques
RT: Biologically inspired	Integrated circuit
engineering	manufacture
management	Integrated circuit
Configuration	packaging
Large-scale systems	packaging
<i>Complexity</i>	Semiconductor device
USE: Complexity theory	Thermal management of electronics
<i>Complexity constrained detection</i>	<b>Composite materials</b>
USE: Maximum likelihood detection	BT: Materials
	NT: Cermet
<b>Complexity theory</b>	<i>Composite media</i>
UF: Circuit complexity	USE: Nonhomogeneous media
Communication	
complexity	<i>Composite systems</i>
Complexity	USE: Interconnected systems
BT: Chaos	
RT: Computation theory	<b>Compounds</b>
Econophysics	BT: Materials, elements, and compounds
NT: Computational	NT: Bismuth compounds
complexity	Gallium compounds
NP-complete problem	Indium compounds
NP-hard problem	Inorganic compounds
<i>Compliance testing</i>	Lead compounds
USE: Conformance testing	Organic compounds
	Silicon compounds
<i>Compliant mechanisms</i>	
USE: Manufacturing processes	<b>Compressed sensing</b>
	UF: Compressive sensing
<b>Component architectures</b>	BT: Sampling methods
UF: Component-based systems	
BT: Components, packaging, and manufacturing technology	<b>Compression algorithms</b>
	BT: Algorithms
<i>Component-based systems</i>	<b>Compression molding</b>
	UF: Compression moulding
	BT: Production
	RT: Injection molding



# 2019 IEEE Thesaurus

<i>Compression moulding</i>	RT: Bioinformatics
USE: Compression molding	Biology
	Computational
<i>Compressive sensing</i>	neuroscience
USE: Compressed sensing	Synthetic biology
	NT: Computational
<b>Compressive stress</b>	biochemistry
BT: Stress	Computational
	biophysics
<b>Compressors</b>	Computational systems
BT: Electric machines	biology
RT: Air conditioning	<b>Computational biophysics</b>
Pumps	BT: Computational biology
Turbines	RT: Bioinformatics
Turbomachinery	Biophysics
<i>Computation complexity</i>	<b>Computational complexity</b>
USE: Computational	UF: Computation complexity
complexity	BT: Complexity theory
	Computation theory
<b>Computation theory</b>	RT: Algorithmic efficiency
BT: Computational	NT: Time complexity
intelligence	
RT: Complexity theory	<i>Computational cultural dynamics</i>
NT: Computational	USE: Computational cultural
complexity	modeling
Concurrent computing	
Greedy algorithms	<b>Computational cultural modeling</b>
Support vector	UF: Computational cultural
machines	dynamics
	Computational social
<b>Computational and artificial</b>	and behavioral modeling
<b>intelligence</b>	BT: Computational modeling
RT: Cognitive science	
Digital systems	<b>Computational efficiency</b>
NT: Artificial	BT: Mathematics
intelligence	
Autonomous mental	<i>Computational electrodynamics</i>
Computational	USE: Computational
	electromagnetics
Logic	<b>Computational electromagnetics</b>
Machine intelligence	UF: Computational
Neural networks	electrodynamics
	BT: Electromagnetic
<b>Computational biochemistry</b>	analysis
BT: Computational biology	RT: Computer applications
RT: Biochemistry	Electromagnetic field
Bioinformatics	theory
	Electromagnetic fields
<b>Computational biology</b>	Finite difference
BT: Engineering in	methods
medicine and biology	Monte Carlo methods



# 2019 IEEE Thesaurus

Stochastic processes		RT:	Neuroscience
<b>Computational fluid dynamics</b>			Computational biology
UF:	CFD		Nervous system
BT:	Fluid dynamics	<i>Computational science</i>	
RT:	Isosurfaces	USE:	Scientific computing
<b>Computational geometry</b>		<i>Computational social and behavioral modeling</i>	
BT:	Geometry	USE:	Computational cultural modeling
RT:	Computer graphics		
	Layered manufacturing		
	Surface fitting		
NT:	Fractals	<b>Computational systems biology</b>	
<b>Computational intelligence</b>		BT:	Computational biology
BT:	Computational and artificial intelligence	<i>Computed microtomography</i>	
RT:	Artificial intelligence	USE:	Computed tomography
	Synapses	<b>Computed tomography</b>	
NT:	Computation theory	UF:	CT scan
	Evolutionary computation		Computed microtomography
	Fuzzy systems		Computerised axial tomography
	Genetic algorithms		Computerised tomography
<i>Computational life sciences</i>			Computerized axial tomography
USE:	Computational modeling		Computerized tomography
AND	Life sciences		Computerized tomography
<b>Computational linguistics</b>		BT:	Tomography
BT:	Systems, man, and cybernetics	RT:	Biomedical applications of radiation
RT:	Context modeling	NT:	Single photon emission computed tomography
NT:	Sentiment analysis	<b>Computer aided analysis</b>	
<b>Computational modeling</b>		BT:	Computer applications
UF:	Computational life sciences	RT:	Digital simulation
	Life sciences		Geophysics computing
computing	ZINDO		Independent component analysis
	Modeling		Simulation
RT:	Neuroinformatics	<i>Computer aided design</i>	
	Time complexity	USE:	Design automation
NT:	Agent-based modeling	<b>Computer aided diagnosis</b>	
	Computational cultural modeling	UF:	Computer assisted diagnosis
<b>Computational neuroscience</b>			Computer-aided diagnosis
UF:	Theoretical neuroscience		Computer-assisted diagnosis
BT:	Computer science		



# 2019 IEEE Thesaurus

BT: Medical diagnosis	BT: Computers and information processing
<b>Computer aided engineering</b>	RT: Biomedical computing
UF: CAE	Computational
BT: Computer applications	electromagnetics
	Computerized
<b>Computer aided instruction</b>	monitoring
UF: CAI	Edge computing
Computer aided	Electrical engineering
learning	computing
Computer-aided	systems
instruction	systems
Computer-aided	Information technology
learning	Learning management
Teaching machines	Middleware
BT: Computer applications	Mobile agents
Educational technology	Software agents
RT: Authoring systems	Software packages
Continuing education	Application
Courseware	NT: virtualization
Education courses	Big Data applications
Electronic learning	Blockchain
Matlab	Bot (Internet)
NT: Learning management	Computer aided
systems	analysis
<i>Computer aided Learning</i>	engineering
USE: Computer aided	instruction
instruction	music
<b>Computer aided manufacturing</b>	manufacturing
UF: CAM	computing
BT: Industrial electronics	instrumentation
Manufacturing	systems
automation	Green computing
RT: Computer integrated	High energy physics
manufacturing	computing
Integrated	Knowledge management
manufacturing systems	Mathematics computing
NT: CAD/CAM	Medical information
Silicon compiler	
<b>Computer aided software engineering</b>	
BT: Software engineering	Military computing
RT: Programming	Mobile applications
environments	Physics computing
Software tools	Power engineering
<i>Computer animation</i>	computing
USE: Animation	computing
<b>Computer applications</b>	Power system analysis
UF: Volunteer computing	Publishing
	Scientific computing
	Telecommunication
	computing





# 2019 IEEE Thesaurus

- Virtual enterprises
- Virtual manufacturing
- Web sites
- World Wide Web

## Computer architecture

UF:	Architecture
(computer)	
BT:	Computers and
information processing	
RT:	Microprogramming
NT:	Accelerator
architectures	
	Data structures
	Dynamic voltage
scaling	
	Memory architecture
	Memory management
	Multiprocessor
interconnection	
	Parallel architectures
	Reconfigurable
architectures	

## Computer arithmetic

USE: Digital arithmetic

Computer assisted diagnosis

USE: Computer aided diagnosis

Computer automated measurement and control

USE: CAMAC

## Computer buffers

BT: Buffer storage  
RT: Cache storage

## Computer bugs

UF: Bugs  
BT: Computer crashes

## Computer buses

USE: Data buses

Computer control

USE: Digital control

## Computer crashes

```
BT:      Computer errors
NT:      Buffer overflows
         Computer bugs
```

## Computer crime

UF:	Cyber crime
	Cyber-crime
	Cybercrime
	DDoS attack
	DoS attack
	Hacking
	Piracy (software)
	Software piracy
BT:	Computer security
RT:	Botnet
	Computer viruses
	Computer worms
	Control system

security

Data security  
Digital rights

management

Distributed denial-of-

service attack

Privacy-invasive

software

Unsolicited electronic

mail

NT: Counterfeiting  
Cyber terrorism  
Cyberattack  
SQL injection

## Computer displays

BT:	Displays
RT:	Computer graphics
	Computer peripherals
	Workstations
NT:	Mesh generation
	Touch sensitive

screens

Computer documentation

USE: Documentation

## Computer engineering education

USE: Computer science  
education

## Computer errors

BT: Computer performance  
NT: Computer crashes

## Computer generated music

UF:	CGM
	Computer music
BT:	Computer applications
	Music



# 2019 IEEE Thesaurus

## Computer graphics

BT: Graphics  
RT: Animation  
Art  
Character generation  
Computational geometry  
Computer displays  
Computer peripherals  
Curve fitting  
Fractals  
Graphics processing

units

Image generation  
Mesh generation  
Modeling  
Multimedia computing  
Ray tracing  
Simulation  
Surface fitting  
Visual effects  
Workstations  
NT: Data visualization  
Rendering (computer

graphics)

Shadow mapping  
Sprites (computer)  
Video sequences  
Virtual reality  
Visualization  
X3D

## Computer hacking

UF: Hacker  
Hacks  
BT: Computer security  
RT: Footprinting

## Computer hardware

USE: Hardware

## Computer industry

UF: DP industry  
BT: Industries  
RT: Computers and

information processing

## Computer integrated manufacturing

UF: CIM  
BT: Computer applications  
Manufacturing

automation

RT: Agile manufacturing  
CAD/CAM

manufacturing

Computer aided

Virtual manufacturing

## Computer interfaces

UF: Docking stations  
BT: Computers and  
information processing  
RT: Computer peripherals  
Data buses  
Interface management  
User interfaces  
NT: Application

programming interfaces

Browsers  
Computer ports  
Field buses  
Firewire  
Haptic interfaces  
Hypertext systems  
Input devices  
Interface phenomena  
Interface states  
Musical instrument

digital interfaces

System buses

## Computer languages

UF: Programming languages  
BT: Formal languages  
RT: Data structures  
Natural languages  
Software  
NT: Architecture

description languages

C languages  
Command languages  
Database languages  
Hardware design

languages

High level languages  
Markup languages  
Python  
Specification

languages

Style sheet languages  
Systems Modeling

Language

Visual BASIC  
WS-BPEL

## Computer mediated communication

UF: Computer-mediated  
communication



# 2019 IEEE Thesaurus

BT:	Social network		Internetworking
services			LAN interconnection
			Middleware
Computer music			Multiprocessing
USE:	Computer generated	systems	
music AND			Multiprocessor
	Music	interconnection	
			Open systems
Computer network management			Personal area networks
BT:	Computer networks		Radial basis function
RT:	Bandwidth	networks	
	Computer security		TCPIP
	Data security		Web sites
	Software defined	NT:	Ad hoc networks
networking			Computer network
	Traffic control	management	
NT:	Computer network		Content distribution
reliability		networks	
	Disruption tolerant		Cyberspace
networking			Diffserv networks
	Management information		Domain Name System
base			Ethernet
	Middleboxes		Google
	Network address		Heterogeneous networks
translation			IP networks
	Network synthesis		Internet
			Intserv networks
Computer network reliability			Metropolitan area
BT:	Computer network	networks	
management			Multiprocessor
	Network topology	interconnection	networks
			Network function
Computer networks		virtualization	
UF:	Mice flows		Network security
BT:	Communication systems		Network servers
	Computers and		Next generation
information processing		networking	
RT:	Bit rate		Overlay networks
	Computer ports		Peer-to-peer computing
	Cyber terrorism		Software defined
	Cyber warfare	networking	
	Data communication		Storage area networks
	Delay estimation		Token networks
	Distributed computing		Unicast
	File servers		Virtual private
	Firewalls (computing)	networks	
	Frame relay		Wide area networks
	Hypercubes		Wireless access points
	IEEE 802.11 Standard		
	IEEE 802.11g Standard	Computer numerical control	
	IEEE 802.11n Standard		
	IEEE 802.16 Standard	UF:	CNC
	IEEE 802.3 Standard		NC machines
	IPTV	BT:	Manufacturing
		automation	



# 2019 IEEE Thesaurus

RT: Digital control Industrial control		<b>Computer science education</b>
<i>Computer operating systems</i>		UF: Computer engineering education
USE: Operating systems		BT: Engineering education
<b>Computer performance</b>		<b>Computer security</b>
BT: Computers and information processing		BT: Computers and information processing
NT: Computer errors Hardware acceleration Performance loss		RT: Security Access control Blacklisting Blockchain Computer network
<b>Computer peripherals</b>		management
UF: Computer terminals Peripheral equipment		Cryptography Data protection Data security Eavesdropping Footprinting Operating systems Privacy Privacy-invasive
BT: Computers and information processing		software
RT: Computer displays Computer graphics Computer interfaces Device drivers Firewire Flash memories User interfaces		NT: Trust management Application security Authentication Cloud computing
NT: Disk drives Keyboards Modems Printers		security
<i>Computer pipeline processing</i>		Computer crime Computer hacking Countermeasures
USE: Pipeline processing		(computer)
<b>Computer ports</b>		Cross-site scripting Cyber espionage Cyber warfare Cyberattack Data integrity Denial-of-service
BT: Computer interfaces		
RT: Computer networks Hardware Information exchange		
<i>Computer programming profession</i>		attack
USE: Programming profession		Firewalls (computing) Honey pot (computing) Identity management
<b>Computer science</b>		systems
BT: Computers and information processing		Internet security Mobile security Password Penetration testing Permission Phishing Proof of work
RT: Function approximation Logic Software		
NT: Computational neuroscience		
Formal languages Network theory		
(graphs)		<b>Computer simulation</b>
Programming		BT: Simulation



# 2019 IEEE Thesaurus

RT:	EMTP	USE:	Computer aided instruction
<i>Computer software</i>			
USE:	Software		<i>Computer-assisted diagnosis</i>
		USE:	Computer aided diagnosis
<i>Computer terminals</i>			
USE:	Computer peripherals		<i>Computer-mediated communication</i>
<b>Computer viruses</b>		USE:	Computer mediated communication
UF:	Viruses (computer)		
BT:	Malware		<i>Computerised axial tomography</i>
RT:	Anti-virus software	USE:	Computed tomography
	Computer crime		
	Computer worms		<i>Computerised instrumentation</i>
<b>Computer vision</b>		USE:	Computerized instrumentation
BT:	Robots		
RT:	Activity recognition		<i>Computerised monitoring</i>
	Distributed vision	USE:	Computerized monitoring
networks			
	Gaze tracking		<i>Computerised tomography</i>
	Image capture	USE:	Computed tomography
	Indoor navigation		
	Pattern recognition		<i>Computerized axial tomography</i>
	Pose estimation	USE:	Computed tomography
NT:	Active appearance		
model			
	Blob detection		<b>Computerized instrumentation</b>
	Corner detection	UF:	Computerised instrumentation
	Face detection	BT:	Instrumentation and measurement
	Feature detection		
	Interest point		<b>Computerized monitoring</b>
detection		UF:	Computerised monitoring
	Smart cameras	BT:	Monitoring
	Visual odometry	RT:	Computer applications
<b>Computer worms</b>			
UF:	Worms (computer)		<i>Computerized tomography</i>
BT:	Malware	USE:	Computed tomography
RT:	Computer crime		
	Computer viruses		<b>Computers</b>
<i>Computer-aided design</i>		UF:	Computing technology
USE:	Design automation	BT:	Computers and information processing
<i>Computer-aided diagnosis</i>		RT:	Cyberspace
USE:	Computer aided diagnosis	NT:	Analog computers
			Calculators
<i>Computer-aided instruction</i>			Digital computers
USE:	Computer aided instruction		Microcomputers
			Parallel machines
<i>Computer-aided Learning</i>			Supercomputers



# 2019 IEEE Thesaurus

	Tablet computers		Software engineering
	Wearable computers		System recovery
			Time sharing computer
<b>Computers and information processing</b>		systems	
RT:	Associative processing		Virtual machine
	Biology computing	monitors	
	Computer industry	<i>Computing technology</i>	
	Data processing	USE:	Computers
	Electronic learning		
	Home computing	<b>Concatenated codes</b>	
	Information systems	BT:	Programming
	Logic circuits		
	Multimedia computing	<b>Concrete</b>	
	Multiprocessing	BT:	Building materials
systems		RT:	Pressure vessels
NT:	Approximate computing		
	Computer applications	<i>Concurrency</i>	
	Computer architecture	USE:	Concurrent computing
	Computer interfaces		
	Computer networks	<b>Concurrency control</b>	
	Computer performance	BT:	Computers and
	Computer peripherals	information processing	
	Computer science	RT:	Distributed computing
	Computer security		Distributed databases
	Computers		Multiprocessing
	Concurrency control	systems	
	DNA computing		Parallel processing
	Data systems		Protocols
	Database machines		Synchronization
	Digital systems	NT:	Processor scheduling
	Distributed computing		
	File servers	<b>Concurrent computing</b>	
	Hardware	UF:	Concurrency
	High performance	BT:	Computation theory
computing		RT:	Granular computing
	Image processing		Model checking
	Memory		
	Mobile computing	<b>Concurrent engineering</b>	
	Molecular computing	BT:	Engineering - general
	Multitasking	RT:	Product design
	Open systems		Project management
	Optical computing		Quality function
	Parallel processing	deployment	
	Pattern recognition		Research and
	Pervasive computing	development management	
	Petascale computing		Time to market
	Platform		Virtual manufacturing
virtualization			
	Probabilistic		
computing		<b>Condition monitoring</b>	
	Probability computing	BT:	Preventive maintenance
	Quantum computing		
	Real-time systems	<i>Conditions of employment</i>	
	Software	USE:	Employee welfare



# 2019 IEEE Thesaurus

<i>Conducting bodies</i>		lines	Power transmission
USE:	Conductors		Proximity effects
<b>Conducting materials</b>			Skin effect
BT:	Materials		Thermal noise
RT:	Conductivity	power	Three-phase electric
	Conductors		Wire
	Semiconductor		Wireless power
materials		transmission	Wiring
NT:	Electrolytes		
<b>Conductive adhesives</b>		<b>Conference management</b>	
BT:	Adhesives	BT:	Management
<b>Conductive films</b>		<b>Conferences</b>	
BT:	Films	UF:	Meetings (technical)
NT:	Anisotropic conductive		Symposia
films			Workshops
		BT:	Meetings
<b>Conductivity</b>		<b>Configuration management</b>	
UF:	Electric conductivity	BT:	Systems engineering
	Electrical	and theory	
conductivity		RT:	Complex systems
	Resistivity		Maintenance
BT:	Electric variables	engineering	
RT:	Charge carriers		System analysis and
	Conducting materials	design	
	Conductivity		
measurement		<b>Conformal mapping</b>	
	Grain boundaries	BT:	Mathematics
	Impact ionization	RT:	Coplanar waveguides
	Transmission line		Wave functions
theory			Waveguide components
NT:	Photoconductivity		Waveguide theory
	Semiconductivity		
	Transconductance		
<b>Conductivity measurement</b>		<b>Conformance testing</b>	
UF:	Resistivity	UF:	Compliance testing
measurement			Conformity assessment
BT:	Electric variables	BT:	Type testing
measurement		RT:	Testing
RT:	Conductivity		Accreditation
			Certification
<b>Conductors</b>			Quality of service
UF:	Conducting bodies		Standards
BT:	Electric machines		Surveillance
RT:	Cables	<b>Conformity assessment</b>	
	Conducting materials	USE:	Conformance testing
	Core loss		
	Power cables	<b>Connected cars</b>	
	Power distribution	USE:	Connected vehicles
lines			



# 2019 IEEE Thesaurus

## Connected vehicles

UF: Connected cars  
BT: Vehicles  
RT: Intelligent vehicles

## Connecting

USE: Joining processes

## Connective tissue

BT: Biological tissues

## Connectors

BT: Electronic components  
NT: Plugs  
Sockets

## Consensus algorithm

BT: Algorithm design and theory

## Consortia

BT: Engineering management  
RT: Business

## Constellation diagram

UF: Signal constellation  
BT: Digital modulation

## Constraint handling

UF: Constraint programming  
BT: Logic programming

## Constraint optimization

BT: Design optimization  
RT: Electronics packaging

## Constraint programming

USE: Constraint handling

## Constraint theory

BT: Integer linear programming

## Construction

UF: Erection  
BT: Industries  
RT: Building materials  
Civil engineering  
Construction industry  
Structural engineering  
NT: Buildings  
Green buildings  
Modular construction

## Prefabricated

construction

## Construction industry

BT: Industries  
RT: Building automation  
Building materials  
Buildings  
Construction  
Floors  
Mortar  
Shipbuilding industry  
Smart cities  
NT: Prefabricated construction

## Consumer behavior

UF: Consumer behaviour  
BT: Behavioral sciences  
RT: Consumer products  
Customer profiles  
Customer relationship management  
Market opportunities

## Consumer behaviour

USE: Consumer behavior

## Consumer electronics

UF: Kindle  
RT: Consumer products  
Digital systems  
Firewire  
Microcomputers  
Video equipment  
NT: Ambient intelligence  
Audio systems  
Home automation  
Home computing  
Low-power electronics  
Microwave ovens  
Multimedia systems

## Consumer products

BT: Manufactured products  
RT: Commercial law  
Consumer behavior  
Consumer electronics  
Domestic safety  
Electrical products  
Food industry  
Food manufacturing  
Food products  
Footwear industry





# 2019 IEEE Thesaurus

	Market research		RT: Chemical hazards
	Plastic products		Decontamination
	Product liability		Hazards
	Product safety		Impurities
	Watches		Microfiltration
NT:	Clothing		Pollution
	Games		Quality control
	Home appliances		Radiation protection
	Microwave ovens	NT:	Surface contamination
<b>Consumer protection</b>		<i>Content addressable memory</i>	
BT:	Law	USE:	Associative memory
	Product safety		
engineering		<b>Content addressable storage</b>	
RT:	Censorship	BT:	Memory
	Commercial law	RT:	Content-based
	Customer relationship	retrieval	
management		<i>Content based retrieval</i>	
	Quality assurance	USE:	Content-based
<i>Consumer-generated media</i>		retrieval	
USE:	User-generated content	<i>Content delivery networks</i>	
<b>Contact resistance</b>		USE:	Content distribution
BT:	Contacts	networks	
<b>Contactors</b>		<b>Content distribution networks</b>	
BT:	Switches	UF:	Content delivery
		networks	
<b>Contacts</b>		BT:	Computer networks
BT:	Circuits and systems	<b>Content management</b>	
RT:	Semiconductor devices	BT:	Electronic publishing
NT:	Brushes	Management	
	Contact resistance	RT:	Blockchain
	Ohmic contacts	Document handling	
		MPEG 7 Standard	
<b>Containers</b>		Multimedia computing	
BT:	Material storage	Publish subscribe	
	Materials handling		
equipment		systems	
RT:	Bulk storage	Semantic Web	
	Canning	Web design	
	Filling	Web sites	
	Fuel storage		
	Loading	<b>Content-based retrieval</b>	
	Measurement	UF:	Content based
	Pallets	retrieval	
	Production	BT:	Information retrieval
	Stacking	RT:	Content addressable
NT:	Freight containers	storage	
<b>Contamination</b>		<b>Context</b>	
BT:	Materials science and	BT:	Professional
technology		communication	



# 2019 IEEE Thesaurus

RT: Pragmatics	RT: Computer aided instruction
<i>Context aware*</i>	Engineering education
USE: Context-aware services	Management training
	Training
<b>Context awareness</b>	
BT: Artificial intelligence	<b>Continuing professional development</b>
RT: Intelligent control	UF: Life long learning
Intelligent systems	BT: Human resource management
Knowledge acquisition	RT: Qualifications
Learning systems	Training
Pervasive computing	
Semantic search	<b>Continuous improvement</b>
	UF: Kaizen
<b>Context modeling</b>	BT: Total quality management
BT: Modeling	RT: Production management
RT: Computational linguistics	Quality awards
<i>Context-aware applications</i>	<b>Continuous phase modulation</b>
USE: Context-aware services	BT: Phase modulation
<i>Context-aware computing</i>	<b>Continuous production</b>
USE: Context-aware services	BT: Flow production systems
	Production control
<b>Context-aware services</b>	RT: Process control
UF: Context aware*	Production management
Context-aware applications	
Context-aware computing	
BT: Ubiquitous computing	<i>Continuous systems</i>
	USE: Continuous time systems
<b>Continents</b>	<i>Continuous time models</i>
BT: Geoscience	USE: Continuous time systems
NT: Africa	
Asia	<b>Continuous time systems</b>
Australia	UF: Continuous systems
Europe	Continuous time models
North America	BT: Time factors
South America	
<b>Contingency management</b>	<b>Continuous wavelet transforms</b>
BT: Management	BT: Wavelet transforms
NT: Crisis management	
Disaster management	<b>Continuous-stirred tank reactor</b>
Mission critical	BT: Chemical reactors
systems	
	<i>Continuously variable transmission</i>
<b>Continuing education</b>	USE: Mechanical power transmission
UF: Further education	
BT: Career development	
Educational programs	<b>Contract law</b>



# 2019 IEEE Thesaurus

BT: Law	<b>Control equipment</b>	BT: Control systems
RT: Contracts		RT: Manipulators
RT: Employment law		RT: Mechatronics
<b>Contract management</b>		NT: Robots
BT: Contracts		NT: Actuators
RT: Management		NT: Fasteners
RT: Risk management		NT: Microcontrollers
<b>Contracts</b>		NT: Regulators
BT: Management		NT: Remote control
RT: Business		NT: Servosystems
RT: Contract law		NT: Switches
RT: Procurement		NT: Switchgear
RT: Proposals		NT: Telecontrol equipment
NT: Contract management		NT: Thermostats
NT: Forward contracts	<b>Control nonlinearities</b>	
NT: Licenses	BT: Control theory	
NT: Smart contracts	RT: Nonlinear control	
NT: Subcontracting	<b>systems</b>	
<b>Control charts</b>	NT: Backstepping	
UF: Cusum charts	NT: Feedback linearization	
UF: Shewhart charts	<b>Control system analysis</b>	
BT: Production management	BT: System analysis and	
RT: Control systems	design	
RT: Quality management	RT: Piecewise linear	
<b>Control design</b>	techniques	
BT: Control systems	NT: State-space methods	
RT: Feedback	<b>Control system security</b>	
RT: Lyapunov methods	BT: Control engineering	
<b>Control engineering</b>	RT: Security	
BT: Control systems	RT: Computer crime	
RT: Control engineering	RT: Control systems	
education	RT: Cyber-physical systems	
NT: Predictive control	RT: Industrial control	
NT: Control system	RT: National security	
security	RT: Power system control	
<b>Control engineering computing</b>	RT: Safety	
BT: Computer applications	<b>Control system synthesis</b>	
RT: Control engineering	UF: Control systems	
education	synthesis	
NT: Hardware-in-the loop	BT: Control systems	
simulation	RT: Circuit synthesis	
<b>Control engineering education</b>	RT: Hardware-in-the loop	
BT: Engineering education	simulation	
RT: Control engineering	Linearization	
RT: Control engineering	techniques	
computing	techniques	
	<b>Control systems</b>	



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control	RT:	Actuators		Control equipment
		Adaptive control		Control system
security		Air traffic control	synthesis	
		Communication system		Controllability
techniques		Control charts		Cruise control
		Control system		Decentralized control
		Cybernetics		Delay systems
		Discrete-event systems		Digital control
		Discrete-time systems		Fault tolerant control
		Estimation		Feedback
		Flexible structures		Feedback linearization
		Force control		Fluid flow control
		Game theory		Fluidics
		H infinity control		Gaze tracking
		Interconnected systems	control systems	Homeostasis
		Inventory control		Linear feedback
		Legged locomotion	control	Magnetic variables
		Linear systems		Mechanical variables
		Linearization	control	
		MIMO communication	systems	Medical control
		Manipulators		Moisture control
		Microcontrollers		Motion compensation
		Microsensors		Networked control
		Mobile robots	systems	
		Neuromodulation		Nonlinear control
		Nonlinear systems	systems	
		Parameter estimation		Open loop systems
		Poles and zeros		Optical control
		Real-time systems		Optimal control
		Robots		PD control
		Robustness		PI control
		Sensitivity		Pneumatic systems
		Stability		Positive train control
		State estimation		Pressure control
		Stochastic systems		Proportional control
		Switched systems		Radio control
		Target tracking		Robot control
		Time-varying systems		SCADA systems
		Transfer functions		Sensorless control
		Uncertain systems		Sliding mode control
control	NT:	Automatic control		Supervisory control
		Automatic generation		Thermal variables
		Bidirectional control	control	
		Block signalling		Traffic control
		Brakes		
		CAMAC	Control systems synthesis	
		Centralized control	USE:	Control system
		Closed loop systems	synthesis	
		Control design	Control theory	
		Control engineering	BT:	Cybernetics



# 2019 IEEE Thesaurus

RT:	Dynamics	BT:	Mathematics
NT:	Feedback circuits		
	Control nonlinearities	<i>Convex optimization</i>	
control	Iterative learning	USE:	Convex functions
	Observability	<b>Convolution</b>	
<b>Controllability</b>		BT:	Signal processing
BT:	Control systems	RT:	Deconvolution
			Numerical analysis
<b>Convection</b>		NT:	Convolvers
UF:	Mixed convection	<b>Convolutional codes</b>	
	Rayleigh-Benard	UF:	Trellis codes
convection		BT:	Codes
BT:	Heat transfer	RT:	Channel coding
			Digital multimedia
<b>Convergence</b>		broadcasting	
BT:	Mathematics		Error correction
			Error correction codes
<b>Convergence of numerical methods</b>			Radio communication
BT:	Numerical analysis		Satellite
		communication	
<b>Converters</b>			Telecommunications
UF:	Convertors		
	Switching convertors	<b>Convolutional neural networks</b>	
BT:	Power electronics	BT:	Artificial neural
RT:	Data conversion	networks	
	Pulse width modulation	RT:	Generative adversarial
	Pulse width modulation	networks	
inverters			Machine learning
	Space vector pulse		
width modulation		<b>Convolvers</b>	
NT:	AC-AC converters	BT:	Convolution
	DC-AC power converters		
	Digital-to-frequency	<b>Coolants</b>	
converters		UF:	Antifreeze materials
	Frequency conversion	BT:	Cooling
	Modular multilevel	RT:	Space cooling
converters		NT:	Refrigerants
	Power conversion		
	Pulse width modulation	<b>Cooling</b>	
converters		BT:	Temperature control
	Resonant converters	RT:	Electronics cooling
	Static power		Electronics packaging
converters			HVAC
	Voltage-source		Heat pipes
converters			Thermal engineering
	Wavelength converters		Water pumps
<i>Convertors</i>		NT:	Air conditioning
USE:	Converters		Cold plates
			Coolants
			Heat sinks
<b>Convex functions</b>			Immersion cooling
UF:	Convex optimization		Liquid cooling





# 2019 IEEE Thesaurus

	Motion detection	RT:	Corrosion Galvanizing Materials preparation Materials processing
<b>Corona</b>	BT: Electric breakdown RT: Partial discharges		
<b>Coronary arteriosclerosis</b>	BT: Arteriosclerosis	<b>Corrugated surfaces</b>	BT: Rough surfaces Surfaces
<b>Corporate acquisitions</b>	UF: Mergers BT: Organizational aspects RT: Business process re-engineering	<b>Cortical bone</b>	BT: Bone tissue
<i>Corpse</i>	USE: Cadaver	<i>Cortical plasticity</i>	USE: Neuroplasticity
<i>Corpus amygdaloideum</i>	USE: Amygdala	<i>Cosmic gamma ray bursts</i>	USE: Gamma-ray bursts
<b>Corpus callosum</b>	UF: Callosal commissure BT: Brain	<b>Cosmic rays</b>	BT: Extraterrestrial phenomena RT: Electrons Elementary particles Mesons Neutrons Protons
<b>Correlation</b>	BT: Statistics RT: Correlation	<b>Cost accounting</b>	UF: Valuation BT: Costing Management accounting RT: Costs Economics Profitability
coefficient	NT: Autocorrelation		
<b>Correlation coefficient</b>	BT: Statistics RT: Correlation Regression analysis	<i>Cost analysis</i>	USE: Cost benefit analysis
<b>Correlators</b>	BT: Electromagnetic radiation RT: Signal detection Signal processing	<b>Cost benefit analysis</b>	UF: Cost analysis Cost-benefit analysis BT: Costs RT: Functional point analysis
<b>Corrosion</b>	BT: Surfaces RT: Coatings Corrosion inhibitors Galvanizing Grain boundaries Magnetic flux leakage Passivation	<b>Cost function</b>	BT: Optimization
<b>Corrosion inhibitors</b>	BT: Inhibitors Materials	<i>Cost of living index</i>	USE: Economic indicators
		<i>Cost-benefit analysis</i>	USE: Cost benefit analysis



# 2019 IEEE Thesaurus

<i>Cost-of-living index</i>					Radiation detector
USE:	Economic indicators			circuits	
<b>Costing</b>				<i>Coupled circuits</i>	
UF:	Capital cost reduction			USE:	Coupling circuits
	Operating cost				
reduction				<b>Coupled mode analysis</b>	
BT:	Financial management			BT:	Circuit analysis
NT:	Cost accounting			RT:	Multiconductor
				transmission lines	
<b>Costs</b>				<b>Couplers</b>	
BT:	Economics			BT:	Communications
RT:	Cost accounting			technology	
	Econometrics			RT:	Apertures
	Exchange rates				Coupling circuits
NT:	Cost benefit analysis				Electromagnetic
<b>Cotton</b>				coupling	
BT:	Agricultural products			NT:	Directional couplers
	Textiles				
RT:	Natural fibers			<i>Coupling (process)</i>	
	Textile fibers			USE:	Joining processes
	Textile industry				
	Weaving			<b>Coupling circuits</b>	
<i>Counseling</i>				UF:	Coupled circuits
USE:	Employee welfare			BT:	Circuits
				RT:	Couplers
<i>Counselling</i>				<b>Couplings</b>	
USE:	Employee welfare			UF:	Linkages
				BT:	Mechanical products
<i>Counterfeit goods</i>				RT:	Fasteners
USE:	Counterfeiting AND				Joining processes
	Manufactured products				Machine components
					Shafts
<b>Counterfeiting</b>				<b>Course correction</b>	
UF:	Counterfeit goods			UF:	Course-correction
BT:	Computer crime			BT:	Navigation
				RT:	Aircraft navigation
<b>Countermeasures (computer)</b>					Path planning
BT:	Computer security				
	Data protection			<i>Course-correction</i>	
RT:	Access control			USE:	Course correction
	Anti-virus software				
	Blacklisting			<b>Courseware</b>	
	Firewalls (computing)			BT:	Educational technology
	Whitelists			RT:	Authoring systems
<i>Counters</i>					Computer aided
USE:	Radiation detectors			instruction	
					Software
<b>Counting circuits</b>				<b>Covariance matrices</b>	
BT:	Circuits			UF:	Covariance matrix
RT:	Logic circuits				





# 2019 IEEE Thesaurus

	BT:	Statistics		USE:	Cyclic redundancy check codes
<i>Covariance matrix</i>	USE:	Covariance matrices	<b>Creativity</b>	BT:	Innovation management
<b>Cows</b>	UF:	Cattle	<b>Credit cards</b>	UF:	American Express Mastercard Visa gold
	BT:	Bovine		BT:	Financial management
<i>CPU</i>	USE:	Central Processing Unit	<b>Creep</b>	BT:	Material properties
<i>CPW</i>	USE:	Coplanar waveguides	<b>Criminal law</b>	BT:	Law
<i>Cr</i>	USE:	Chromium	<b>Crimping</b>	BT:	Joining processes
<i>Cramer Rao bound</i>	USE:	Cramer-Rao bounds	<b>Crisis management</b>	BT:	Contingency management
<i>Cramer Rao bounds</i>	USE:	Cramer-Rao bounds	<b>Critical current density</b>	BT:	Critical current density (superconductivity)
<b>Cramer-Rao bounds</b>	UF:	Cramer Rao bound Cramer Rao bounds Cramer-Rao inequality Information inequality		RT:	Silicon compounds Superconducting materials
	BT:	Estimation theory			Thermal factors
<i>Cramer-Rao inequality</i>	USE:	Cramer-Rao bounds	<b>Critical current density (superconductivity)</b>	BT:	Superconductivity
<b>Cranes</b>	BT:	Lifting equipment		RT:	Magnetic fields
<b>Cranial</b>	BT:	Nervous system		NT:	Critical current density
	NT:	Cranial pressure	<b>Critical infrastructure</b>	UF:	Critical national infrastructure
<b>Cranial pressure</b>	BT:	Cranial		BT:	Public infrastructure
	NT:	Intracranial system	<i>Critical national infrastructure</i>	USE:	Critical infrastructure
<b>Cranium</b>	BT:	Head	<b>Crops</b>	BT:	Agricultural products Vegetation
<b>Crawlers</b>	BT:	Web search		RT:	Fertilizers Greenhouses Irrigation
	RT:	Bot (Internet)			
<i>CRC codes</i>					



# 2019 IEEE Thesaurus

Water storage	RT: Collective
Yield estimation	intelligence
<i>Cross cultural communication</i>	Distributed processing
USE: Cross-cultural	Mobile computing
communication	Outsourcing
	Social computing
	Social network
<b>Cross layer design</b>	services
BT: Communication systems	NT: Product development
RT: Ad hoc networks	
IEEE 802.16 Standard	<i>CRT</i>
Land mobile radio	USE: Cathode ray tubes
cellular systems	
Military communication	<b>Cruise control</b>
Radio communication	BT: Control systems
	Electromechanical
<i>Cross platform virtualization</i>	systems
USE: Application	RT: Velocity control
virtualization	
<i>Cross reality</i>	<b>Cryobiology</b>
USE: X reality	BT: Biology
	Temperature
	measurement
<b>Cross-cultural communication</b>	<b>Cryogenic electronics</b>
UF: Cross cultural	BT: Industrial electronics
communication	RT: Cryogenics
BT: Global communication	Superconducting
RT: Cultural differences	
<i>Cross-platform virtualization</i>	devices
USE: Application	Superconducting
virtualization	materials
<b>Cross-site scripting</b>	<b>Cryogenics</b>
UF: XSS	UF: Cryonics
BT: Computer security	BT: Industry applications
	Temperature
	measurement
<b>Crosstalk</b>	RT: Cryogenic electronics
UF: Crosstalk noise	
BT: Interference	<i>Cryonics</i>
RT: Electromagnetic	USE: Cryogenics
interference	
Interchannel	<b>Cryotherapy</b>
interference	BT: Medical treatment
Transmission line	Temperature
theory	measurement
<i>Crosstalk noise</i>	<i>Crypto currency</i>
USE: Crosstalk	USE: Cryptocurrency
<b>Crowdsourcing</b>	
BT: Collaborative work	<b>Cryptocurrency</b>
Internet	UF: Crypto currency
	BT: Cryptography
	Currencies



# 2019 IEEE Thesaurus

RT:	Blockchain	Semiconductor growth
	Digital systems	
	Distributed ledger	<b>Crystal microstructure</b>
	Finance	BT: Crystals
	Online banking	RT: Microstructure
NT:	Bitcoin	
<i>Cryptographic</i>		<b>Crystalline materials</b>
USE:	Cryptography	BT: Materials
		NT: Martensite
<i>Cryptographic accelerators</i>		Nanocrystals
USE:	Hardware acceleration	Superlattices
<b>Cryptographic hash function</b>		<i>Crystallisation</i>
BT:	Cryptography	USE: Crystallization
	Hash functions	
<b>Cryptographic protocols</b>		<i>Crystallisers</i>
BT:	Protocols	USE: Crystallizers
<b>Cryptography</b>		<b>Crystallization</b>
UF:	Cryptographic	UF: Crystallisation
BT:	Data security	BT: Crystallography
	Security	NT: Crystal growth
RT:	Bitcoin	
	Blockchain	<b>Crystallizers</b>
	Chaotic communication	UF: Crystallisers
	Codes	BT: Chemical technology
	Communication system	RT: Chemical reactors
security		Colloidal crystals
	Computer security	Crystallography
	Data handling	Crystals
	Encoding	<b>Crystallography</b>
	Hash functions	BT: Crystals
	Message authentication	RT: Crystallizers
	Privacy	Diffraction
	Random sequences	X-ray detectors
	Steganography	NT: Crystallization
	Trust management	
NT:	Ciphers	<b>Crystals</b>
	Cryptocurrency	BT: Materials
	Cryptographic hash	RT: Crystallizers
function		Epitaxial growth
	Encryption	Materials science and
	Public key	
	Quantum cryptography	technology
	Random number	epitaxial growth
generation		Phonons
	Side-channel attacks	Piezoelectric
	Zero knowledge proof	materials
<b>Crystal growth</b>		materials
BT:	Crystallization	
RT:	Epitaxial growth	Solids
		NT: Colloidal crystals
		Crystal microstructure



# 2019 IEEE Thesaurus

		Crystallography				Current transformers
		Grain boundaries		NT:		Bioimpedance
		Grain size				Current slump
		Liquid crystals				Dark current
		Quartz crystals				Fault currents
<i>CSMA</i>						Leakage currents
	USE:	Multiaccess				Persistent currents
communication						Short-circuit currents
						Threshold current
<i>CSP</i>				<b>Current control</b>		
	USE:	Chip scale packaging		UF:		Current regulation
				BT:		Electric variables
<i>CSTR</i>				control		
	USE:	Chemical reactors		RT:		Current
						Current measurement
<i>CT scan</i>						Regulators
	USE:	Computed tomography				Switches
						Switchgear
<i>Cu</i>				NT:		Electric current
	USE:	Copper		control		
						Electrical ballasts
<b>CubeSat</b>						
	BT:	Small satellites		<i>Current crowding</i>		
				USE:		Proximity effects
<b>Cultural differences</b>				<b>Current density</b>		
	BT:	Social implications of		BT:		Current measurement
technology				RT:		Density measurement
	RT:	Cross-cultural				Particle measurements
communication				NT:		Skin effect
		Digital divide		<b>Current distribution</b>		
		Memetics		BT:		Current measurement
		Social intelligence		RT:		Antenna theory
<b>Curing</b>				<b>Current limiters</b>		
	BT:	Materials processing		BT:		Power electronics
	RT:	Heat treatment		RT:		Current
		Kilns				Current measurement
<b>Curium</b>				NT:		Fault current limiters
	BT:	Chemical elements				
<b>Currencies</b>				<b>Current measurement</b>		
	BT:	Finance		UF:		Electric current
	NT:	Cryptocurrency		measurement		
<b>Current</b>				BT:		Electric variables
	UF:	Electric current		measurement		
	BT:	Electric variables		RT:		Ammeters
	RT:	Breakdown voltage				Current
		Current control				Current control
		Current limiters				Current limiters
		Current measurement		NT:		Current density
		Current supplies				Current distribution



# 2019 IEEE Thesaurus

<i>Current measurement (water)</i>	BT:	Customer relationship management
USE: Sea measurements	RT:	Consumer behavior Market opportunities
<i>Current mode circuits</i>		
USE: Current-mode circuits		
<i>Current regulation</i>		
USE: Current control		
<b>Current slump</b>		
BT: Current		
<b>Current supplies</b>		
BT: Power supplies		
RT: Current		
<b>Current transformers</b>		
BT: Transformers		
RT: Current		
<i>Current voltage characteristics</i>		
USE: Current-voltage characteristics AND		
Electric variables		
<b>Current-mode circuits</b>		
UF: Current mode circuits		
BT: Integrated circuits		
<b>Current-voltage characteristics</b>		
UF: Current voltage characteristics		
BT: Electric variables		
<b>Curriculum development</b>		
BT: Education courses		
RT: Educational programs		
STEM		
<b>Curve fitting</b>		
BT: Approximation methods		
Visualization		
RT: Computer graphics		
Interpolation		
Least squares		
approximation		
Splines (mathematics)		
Surface fitting		
<i>Custom integrated circuits</i>		
USE: Application specific integrated circuits		
<b>Customer profiles</b>		
	BT:	Customer relationship management
	RT:	Consumer behavior Market opportunities
		<b>Customer relationship management</b>
	BT:	Management
	RT:	Consumer behavior Consumer protection Management information systems
		Public relations Quality management Supply chain
	NT:	Customer profiles Customer satisfaction Customer services Market research Stakeholders
		<b>Customer satisfaction</b>
	BT:	Customer relationship management
	RT:	Customer services Market research Product customization Quality management Quality of experience Quality of service
	NT:	Quality of experience Quality of service
		<b>Customer services</b>
	BT:	Customer relationship management
	RT:	Customer satisfaction
		<i>Cusum charts</i>
	USE:	Control charts
		<b>Cutoff frequency</b>
	BT:	Integrated circuit modeling
		<i>Cutting fluids</i>
	USE:	Lubricants
		<b>Cutting tools</b>
	BT:	Production equipment
	RT:	Blades Dies Machine tools Metalworking machines Milling machines
	NT:	Metal cutting tools



# 2019 IEEE Thesaurus

	Water jet cutting		Control system
<i>CVD</i>		security	Embedded systems
USE:	Chemical vapor		Human computer
deposition		interaction	
<i>Cyber attack</i>			Internet of Things
USE:	Cyberattack		Operating systems
<i>Cyber attacks</i>			Smart cities
USE:	Cyberattack		Smart grids
		networks	Wireless sensor
<i>Cyber crime</i>		<i>Cyber-space</i>	
USE:	Computer crime	USE:	Cyberspace
<i>Cyber eavesdropping</i>		<b>Cyberattack</b>	
USE:	Eavesdropping	UF:	Cyber attack
<b>Cyber espionage</b>			Cyber attacks
UF:	Cyber spying	BT:	Computer crime
	Cyberespionage		Computer security
	Cyberspying	RT:	Cyber warfare
BT:	Computer security		Cyberethics
	Information security	<b>Cybercare</b>	
RT:	Malware	BT:	Biomedical equipment
	Trojan horses		Medical services
<i>Cyber ethics</i>		<i>Cybercrime</i>	
USE:	Cyberethics	USE:	Computer crime
<i>Cyber spying</i>		<i>Cybereavesdropping</i>	
USE:	Cyber espionage	USE:	Eavesdropping
<b>Cyber terrorism</b>		<i>Cyberespionage</i>	
UF:	Cyberterrorism	USE:	Cyber espionage
BT:	Computer crime	<b>Cyberethics</b>	
	Terrorism	UF:	Cyber ethics
RT:	Computer networks	BT:	Ethics
<b>Cyber warfare</b>		RT:	Behavioral sciences
UF:	Cyberwarfare		Cyberattack
BT:	Computer security		Intellectual property
RT:	Computer networks		Privacy
	Cyberattack		Social implications of
	National security	technology	
<i>Cyber-crime</i>		<b>Cybernetics</b>	
USE:	Computer crime	UF:	Biocybernetics
<b>Cyber-physical systems</b>		BT:	Systems, man, and
UF:	Cyberphysical systems	cybernetics	
BT:	System of systems	RT:	Automata
RT:	Collaboration		Cognitive systems
			Control systems
			Cyberspace



# 2019 IEEE Thesaurus

	Econometrics	Noise
	Ergonomics	NT: Cyclic redundancy
	Information theory	check codes
	Learning systems	
	Man-machine systems	<b>Cyclic redundancy check codes</b>
	Neural networks	UF: CRC codes
	Radial basis function	BT: Codes
networks		Cyclic redundancy
	Robots	check
NT:	Adaptive systems	RT: Decoding
	Cognitive informatics	Error analysis
	Cognitive science	Error correction
	Control theory	
	Decision theory	<b>Cyclones</b>
	Econophysics	UF: Polar cyclones
	Emergent phenomena	BT: Geoscience
	Intelligent control	NT: Hurricanes
	Linear feedback	Tropical cyclones
control systems		
<i>Cyberphysical systems</i>		<i>Cyclonic storms</i>
USE:	Cyber-physical systems	USE: Tropical cyclones
<b>Cyberspace</b>		<b>Cyclotrons</b>
UF:	Cyber-space	BT: Particle accelerators
BT:	Communication networks	
	Computer networks	<i>Cyphers</i>
RT:	Computers	USE: Ciphers
	Cybernetics	
	Electromagnetics	<b>D-HEMTs</b>
	Internet	UF: Depletion mode HEMTs
	Telematics	Depletion-mode HEMTs
	Virtual reality	BT: HEMTs
	World Wide Web	
<i>Cyberspying</i>		<i>D/A</i>
USE:	Cyber espionage	USE: Digital-analog
<i>Cyberterrorism</i>		conversion
USE:	Cyber terrorism	<i>D/A conversion</i>
		USE: Digital-analog
<i>Cyberwarfare</i>		conversion
USE:	Cyber warfare	<i>D/A converters</i>
		USE: Digital-analog
<i>Cyborgs</i>		conversion
USE:	Man-machine systems	<i>D2D</i>
		USE: Device-to-device
<b>Cyclic redundancy check</b>		communication
BT:	Mathematics	
RT:	Algorithms	<b>Dairy products</b>
	Data communication	UF: Butter
	Error analysis	Cheese
	Error correction	Milk
	Information theory	BT: Agricultural products



# 2019 IEEE Thesaurus

	Food products	RT:	Analog-digital
	Agriculture	conversion	
<b>Damascene integration</b>			Data handling
BT:	Electronic equipment		Data processing
manufacture		instrumentation	High energy physics
RT:	Very large scale	computing	
integration		Measurement	
		NT:	Fastbus
			User-generated content
<i>Dampers</i>			
USE:	Shock absorbers	<b>Data aggregation</b>	
		BT:	Data collection
<b>Damping</b>		RT:	Data assimilation
BT:	Mechanical factors		Data handling
RT:	Hysteresis		Data integration
	Impedance		Database systems
	Oscillators		Information management
	Propagation		
	Shock absorbers	<b>Data analysis</b>	
	Stability	UF:	Data analytics
	Transfer functions	BT:	Data processing
	Transient response	RT:	Big Data applications
	Vibration control		Data collection
	Vibrations		Data mining
			Formal concept
<b>Dams</b>		analysis	
BT:	Environmental		Text categorization
management		NT:	Business intelligence
RT:	Hydroelectric power		Data science
generation			Itemsets
	Reservoirs		Training data
	Water storage		
<i>DAQ</i>		<i>Data analytics</i>	
USE:	Data acquisition	USE:	Data analysis
<b>Dark current</b>		<b>Data assimilation</b>	
BT:	Current	BT:	Data handling
		RT:	Data aggregation
<b>Dark energy</b>			Meteorology
BT:	Physics	<b>Data breach</b>	
		UF:	Data spill
<b>Dark states</b>		BT:	Information security
BT:	Laser applications	RT:	Data security
<b>Darmstadtium</b>		<b>Data buses</b>	
BT:	Chemical elements	UF:	Computer buses
		BT:	Communication systems
<i>DARPANET</i>			Data communication
USE:	ARPANET	RT:	CAMAC
			Computer interfaces
<b>Data acquisition</b>			Fastbus
UF:	DAQ		IEEE 1394 Standard
BT:	Data systems	NT:	Backplanes





# 2019 IEEE Thesaurus

<b>Data center power</b>			Data buses
BT:	Data centers		Data transfer
	Power systems	buffers	Telecommunication
<b>Data centers</b>			Telemetry
UF:	Data centres		Teleprinting
BT:	Data systems	communication	Visible light
NT:	Data center power		
<i>Data centres</i>		<b>Data compression</b>	
USE:	Data centers	BT:	Data systems
		RT:	Encoding
<b>Data collection</b>			Entropy coding
BT:	Data processing		Fourier series
RT:	Blockchain		Quantization (signal)
	Data analysis		Rate-distortion
	Information processing		Streaming media
NT:	Big Data		Transcoding
	Data aggregation	NT:	Video compression
			Adaptive coding
<b>Data communication</b>			Audio compression
UF:	Data transmission		Huffman coding
BT:	Communication systems		Source coding
RT:	Ad hoc networks		Test data compression
	B-ISDN		Transform coding
	CAMAC		
	Computer networks	<i>Data confidentiality</i>	
	Cyclic redundancy	USE:	Data privacy
check		<b>Data conversion</b>	
	Data dissemination	BT:	Data systems
	Data security	RT:	Converters
	Digital communication	NT:	Analog-digital
	Distributed computing	conversion	
	Extranets		Digital-analog
	Fastbus	conversion	
	File servers		
	Firewire	<b>Data dissemination</b>	
	IEEE 1394 Standard	BT:	Data handling
	ISDN		Information sharing
	Modems	RT:	Data communication
	Multiprocessor		Data integration
interconnection			Mobile computing
	Office automation	<b>Data encapsulation</b>	
	Packet loss	BT:	Data handling
	Personal area networks		
	TCPIP	<b>Data engineering</b>	
	Telecontrol equipment	BT:	Data systems
	Teletext		
	Videotex	<b>Data envelopment analysis</b>	
NT:	Asynchronous	BT:	Linear programming
communication			
	Asynchronous transfer	<b>Data flow computing</b>	
mode			



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systems	BT: Multiprocessing	<b>Data mining</b>	BT: Pattern recognition
<i>Data flow graphs</i>	USE: Flow graphs	intelligence	RT: Artificial
<i>Data freshness</i>	USE: Data integrity		Big Data
<i>Data fusion</i>	USE: Data integration	methods	Business intelligence
<b>Data gloves</b>	BT: Haptic interfaces	NT: Anomaly detection	Data analysis
<b>Data handling</b>	UF: Electronic data		Data visualization
interchange	BT: Data systems	<b>Data models</b>	Knowledge discovery
	RT: Big Data	BT: Modeling	Nearest neighbor
	RT: Buffer storage	RT: Database systems	
	Cryptography		Semantic Web
	Data acquisition	NT: Metadata	Semantic technology
	Data aggregation		
	Data processing	<b>Data preprocessing</b>	
	Data security	BT: Data processing	
	Encoding		
planning	Enterprise resource	<b>Data privacy</b>	
Protection Regulation	General Data	UF: Data confidentiality	
NT: Data assimilation		Privacy preserving	
Data dissemination		data mining	
Data encapsulation		BT: Data mining	
Data integrity		RT: Privacy	
Document handling		NT: Data protection	
Merging		Differential privacy	
Sorting			
<b>Data integration</b>		<b>Data processing</b>	
UF: Data fusion		BT: Data systems	
BT: Data processing		RT: CAMAC	
RT: Data aggregation		Computers and	
Data dissemination		information processing	
		Data acquisition	
		Data handling	
		Database systems	
		Enterprise resource	
<b>Data integrity</b>		planning	
UF: Data freshness		Fastbus	
Data quality		Signal processing	
BT: Computer security		Smart cards	
Data handling		Technology management	
RT: Digital preservation		NT: Associative processing	
Quality assurance		Business data	
Quality control		processing	



# 2019 IEEE Thesaurus

	Data analysis		
	Data collection		<i>Data storage</i>
	Data integration	USE:	Memory
	Data preprocessing		
	Data transfer		<b>Data storage systems</b>
	Information exchange	BT:	Data systems
	Spreadsheet programs	RT:	Big Data
	Text processing		Storage area networks
	Virtual enterprises	NT:	Triples (Data structure)
<b>Data protection</b>			
	BT: Data privacy		
	RT: Computer security		<b>Data structures</b>
	Data security	BT:	Computer architecture
	Differential privacy	RT:	Computer languages
	Information security		Database systems
	Privacy		File systems
	NT: Countermeasures		NoSQL databases
(computer)	General Data	NT:	Arrays
Protection Regulation			Binary decision diagrams
			Null value
			Octrees
<i>Data quality</i>			Persistent identifiers
USE:	Data integrity		Table lookup
			Tree data structures
<b>Data science</b>			
	BT: Data analysis		<b>Data systems</b>
	RT: Knowledge discovery	BT:	Computers and information processing
	Neuroinformatics		Information systems
		RT:	Big Data applications
<b>Data security</b>		NT:	Data acquisition
	UF: Security of data		Data centers
	System privacy		Data compression
management			Data conversion
	BT: Security		Data engineering
	RT: Communication system		Data handling
security			Data processing
	Computer crime		Data storage systems
	Computer network		Data warehouses
management			
	Computer security		<b>Data transfer</b>
	Data breach	BT:	Data communication
	Data communication		Data processing
	Data handling	RT:	Packet switching
	Data protection	NT:	Handover
	Privacy		
	Virtual private		<i>Data transmission</i>
networks			USE: Data communication
	NT: Cryptography		
	Message authentication		<i>Data visualisation</i>
	Tokenization		USE: Data visualization
<i>Data spill</i>			
USE:	Data breach		<b>Data visualization</b>



# 2019 IEEE Thesaurus

UF:	Data visualisation		Object oriented
BT:	Computer graphics	databases	
	User interfaces		Query processing
RT:	Biomedical imaging		
	Data mining	Databases	
	Modeling	BT:	Professional
NT:	Isosurfaces	communication	
		NT:	Database systems
<b>Data warehouses</b>			Deductive databases
BT:	Data systems		Distributed databases
RT:	NoSQL databases		Image databases
			Multimedia databases
			Object oriented
<b>Database languages</b>			
UF:	Query languages	databases	
BT:	Computer languages		Relational databases
RT:	Database systems		Spatial databases
NT:	Structured Query		Transaction databases
Language			Visual databases
<b>Database machines</b>		<b>Daylighting</b>	
BT:	Computers and	BT:	Lighting
information processing			
RT:	Database systems	<i>DBR</i>	
	Information systems	USE:	Distributed Bragg
		reflectors	
<i>Database management systems</i>		<i>DBS</i>	
USE:	Database systems	USE:	Satellite broadcasting
<b>Database systems</b>			
UF:	Database management	<b>DC generators</b>	
systems		UF:	Direct current
	Technical data	generators	
management		BT:	DC machines
BT:	Databases		Generators
	Information systems	RT:	Pulse width modulation
RT:	Data aggregation		Rotating machines
	Data models		
	Data processing	<b>DC machines</b>	
	Data structures	UF:	Direct current
	Database languages	machines	
	Database machines	BT:	Electric machines
	File systems	RT:	Pulse width modulation
	Hypertext systems		Sensorless control
architecture	Information	NT:	DC generators
			DC motors
	Linked data		Homopolar machines
	Triples (Data	<b>DC motors</b>	
structure)		UF:	Direct current motors
NT:	Audio databases	BT:	DC machines
	Deductive databases		Motors
	Image databases	RT:	Pulse width modulation
	Indexes		Pulse width modulation
	Multimedia databases		
	NoSQL databases	inverters	



# 2019 IEEE Thesaurus

width modulation  
 Space vector pulse  
 NT: Brushless DC motors  
 Commutators

**DC-AC power converters**  
 UF: DC-AC power convertors  
 BT: Converters  
 Power conversion

*DC-AC power convertors*  
 USE: DC-AC power converters

*DC-DC converters*  
 USE: DC-DC power converters

*DC-DC power conversion*  
 USE: DC-DC power converters

**DC-DC power converters**  
 UF: DC-DC converters  
 DC-DC power conversion  
 DC-DC power convertors  
 BT: Power conversion  
 RT: Machine vector control  
 Pulse width modulation

inverters  
 NT: Buck converters

*DC-DC power convertors*  
 USE: DC-DC power converters

*DCT*  
 USE: Discrete cosine  
 transforms

*DDoS*  
 USE: Distributed denial-of-  
 service attack

*DDoS attack*  
 USE: Computer crime

*DDSM*  
 USE: Delta-sigma modulation

*De broglie hypothesis*  
 USE: Matter waves

*De Broglie methods*  
 USE: Matter waves

*De-noising*  
 USE: Noise reduction

**Dead reckoning**  
 BT: Navigation

*DeadLocks (computers)*  
 USE: System recovery

**Deafness**  
 BT: Medical conditions  
 RT: Sign language

**Death**  
 BT: Pathological processes  
 NT: Asphyxia

**Debugging**  
 BT: System recovery

**Deburring**  
 BT: Surface finishing  
 RT: Drilling  
 Machining  
 Polishing machines

*Decarbonisation*  
 USE: Low-carbon economy

*Decarbonised economy*  
 USE: Low-carbon economy

*Decarbonization*  
 USE: Low-carbon economy

*Decarbonized economy*  
 USE: Low-carbon economy

*Decentralised control*  
 USE: Decentralized control

**Decentralized control**  
 UF: Decentralised control  
 Distributed control  
 Distributed generation  
 Distributed modeling  
 BT: Control systems  
 RT: Flexible structures  
 NT: Distributed parameter  
 systems

**Decision analysis**  
 BT: Decision making  
 Information analysis

**Decision feedback equalizers**



# 2019 IEEE Thesaurus

	BT:	Equalizers		Codes
				Cyclic redundancy
<b>Decision making</b>			check codes	
	BT:	Management		Demodulation
	RT:	Decision support		Parity check codes
systems		Expert systems		Product codes
		Planning		Signal processing
		Risk analysis		Space-time codes
		Signal detection		Speech codecs
		Stakeholders		Video codecs
		Strategic planning	NT:	Maximum likelihood
		TOPSIS	decoding	
	NT:	Analytic hierarchy	<b>Decontamination</b>	
process		Collective	BT:	Materials handling
			RT:	Chemical technology
intelligence		Decision analysis		Contamination
		Distributed decision		Environmental
making		Game theory	monitoring	
		Pattern classification		Pollution control
		Persuasive systems		Purification
		Trust management	<b>Deconvolution</b>	
<b>Decision support systems</b>			BT:	Inverse problems
	BT:	Artificial	RT:	Convolution
intelligence				Integral equations
	RT:	Competitive		Numerical analysis
intelligence				Signal processing
		Decision making		Signal restoration
		Knowledge based	<b>Decorrelation</b>	
systems			BT:	Signal processing
<b>Decision theory</b>			<b>Dedicated short range communication</b>	
	BT:	Cybernetics	UF:	DSRC
	NT:	Decision trees	BT:	Wireless communication
		TOPSIS	RT:	Intelligent vehicles
				On board unit
<b>Decision trees</b>				Vehicular ad hoc
	UF:	Tree searching	networks	
	BT:	Decision theory	<b>Deductive databases</b>	
	NT:	Classification tree	UF:	Intelligent databases
analysis			BT:	Database systems
		Regression tree		Databases
analysis			RT:	Knowledge based
<i>Decoder</i>			systems	
	USE:	Decoding	<i>Deep etching</i>	
<b>Decoding</b>			USE:	Etching
	UF:	Decoder	<b>Deep learning</b>	
	BT:	Information theory	UF:	Deep structured
	RT:	Codecs	learning	



# 2019 IEEE Thesaurus

	Hierarchical learning		Distortion
BT:	Machine learning		Phase distortion
		NT:	Propagation delay
<b>Deep level transient spectroscopy materials</b>		<b>Delay estimation</b>	
BT:	Semiconductor	BT:	Delays
	Spectroscopy	RT:	Computer networks
			Multiaccess
<i>Deep structured Learning</i>		communication	Speech processing
USE:	Deep learning		
<b>Deep-space communications</b>		<b>Delay lines</b>	
BT:	Space communications	BT:	Delay systems
RT:	Telemetry	RT:	Delay effects
<i>Defence industry</i>		<i>Delay Lock Loops</i>	
USE:	Defense industry	USE:	Tracking loops
<b>Defense industry</b>		<b>Delay systems</b>	
UF:	Defence industry	BT:	Control systems
BT:	Industries	RT:	Delay effects
RT:	Military equipment		Telerobotics
	Weapons	NT:	Added delay
			Delay lines
<b>Defibrillation</b>		<b>Delays</b>	
BT:	Medical treatment	BT:	Timing
RT:	Cardiology	NT:	Delay estimation
	Fibrillation		
<i>Definitions</i>		<b>Delta modulation</b>	
USE:	Terminology	BT:	Analog-digital
<b>Deformable models</b>		conversion	Digital signal
BT:	Modeling	processing	
		NT:	Delta-sigma modulation
<i>Deformation</i>			Sigma-delta modulation
USE:	Strain	<i>Delta sigma</i>	
<b>Degenerative diseases</b>		USE:	Sigma-delta modulation
BT:	Diseases	<i>Delta sigma modulators</i>	
<b>Degradation</b>		USE:	Delta-sigma modulation
BT:	Materials science and	<b>Delta-sigma modulation</b>	
technology		UF:	DDSM
<b>Delamination</b>			Delta sigma modulators
BT:	Materials testing	BT:	Delta modulation
<b>Delay effects</b>		<i>Demagnetisation</i>	
UF:	Time delay	USE:	Demagnetization
BT:	Electromagnetic	<b>Demagnetization</b>	
analysis		UF:	Demagnetisation
RT:	Delay lines	BT:	Magnetics
	Delay systems		



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<b>Demand forecasting</b>	RT: Proof of work
BT: Forecasting	NT: Distributed denial-of-
RT: Production planning	service attack
<b>Demand response</b>	<i>Denoising</i>
BT: Power demand	USE: Noise reduction
<b>Demand-side management</b>	<b>Density estimation robust algorithm</b>
BT: Energy management	UF: DER
RT: Power system planning	BT: Algorithms
Vehicle-to-grid	<i>Density function</i>
<b>Dementia</b>	USE: Density functional
BT: Diseases	theory
NT: Alzheimer's disease	<i>Density function theory</i>
<b>Demodulation</b>	USE: Density functional
UF: Demodulators	theory
BT: Modulation	<b>Density functional theory</b>
RT: Amplitude modulation	UF: Density function
Decoding	Density function
Detectors	theory
Frequency modulation	Density-function
Mixers	BT: Quantum mechanics
Modems	<b>Density measurement</b>
Phase modulation	BT: Measurement
Pulse modulation	RT: Bone density
Receivers	Current density
Signal detection	Pressure gauges
<i>Demodulators</i>	NT: Hydrometers
USE: Demodulation	<i>Density-function</i>
<b>Demography</b>	USE: Density functional
BT: Social factors	theory
<b>Demultiplexing</b>	<i>Dental</i>
BT: Multiplexing	USE: Dentistry
RT: Arrayed waveguide	<b>Dentistry</b>
gratings	UF: Dental
<b>Dendrites (neurons)</b>	BT: Medical treatment
UF: Dendrons	<b>Dependability management</b>
BT: Neurons	BT: Management
<i>Dendrons</i>	RT: Reliability
USE: Dendrites (neurons)	Safety management
<b>Denial-of-service attack</b>	<i>Depletion mode HEMTs</i>
UF: DoS attack	USE: D-HEMTs
BT: Communication system	<i>Depletion-mode HEMTs</i>
security	USE: D-HEMTs
Computer security	





# 2019 IEEE Thesaurus

<i>Deployable structures</i>	USE: Flexible structures	NT: Design tools	
<i>DER</i>	USE: Density estimation	<b>Design for disassembly</b>	
robust algorithm		BT: Design methodology	
		RT: Pollution	
		Process design	
		Product design	
		Waste reduction	
<i>Derailments</i>		<b>Design for experiments</b>	
USE: Railway accidents		BT: Design methodology	
<b>Dermatology</b>		<i>Design for manufacturability</i>	
BT: Medical specialties		USE: Design for manufacture	
<b>Dermis</b>		<b>Design for manufacture</b>	
BT: Skin		UF: Design for	
<b>Desalination</b>		manufacturability	
BT: Water conservation		BT: Design methodology	
Water resources		RT: Design tools	
RT: Reverse osmosis			
<b>Description logic</b>		<b>Design for quality</b>	
BT: Knowledge		BT: Design methodology	
representation		RT: Process design	
	Ontologies	Product design	
		Quality assurance	
		Quality control	
<i>Design</i>		Quality management	
USE: Design methodology		Total quality	
		management	
<b>Design automation</b>		<b>Design for testability</b>	
UF: CAD		UF: Design-for-test	
Circuit CAD		Design-for-testing	
Circuit design (CAD)		BT: Design methodology	
Circuit layout CAD		RT: Built-in self-test	
Computer aided design		Combinatorial testing	
Computer-aided design		Logic design	
BT: Electronic design		Logic testing	
automation and methodology			
RT: Automatic test pattern		<b>Design methodology</b>	
generation		UF: Design	
	Circuit simulation	BT: Electronic design	
	Design tools	automation and methodology	
	Hardware design	RT: Ergonomics	
languages		Industrial engineering	
	Laser sintering	Logic design	
	SPICE	Optical design	
NT: CAD/CAM		techniques	
Logic design		Rapid prototyping	
PSCAD		System analysis and	
<b>Design engineering</b>		design	
BT: Engineering - general		NT: Design for disassembly	
RT: Design optimization		Design for experiments	



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	Design for manufacture	BT:	Algorithms
	Design for quality		
	Design for testability	<b>Detectors</b>	
	Design standards	BT:	Sensor systems and applications
	Design tools	RT:	Chemical sensors
	Graphics		Demodulation
	Green design		Nonlinear filters
	Integrated design		Readout electronics
	Process design	NT:	Envelope detectors
	Product design		Semiconductor
	Prototypes		
	Technical drawing	detectors	
	Time to market		
	User centered design	<b>Deuterium</b>	
	Virtual prototyping	BT:	Hydrogen
<b>Design optimization</b>		<i>Device chargers</i>	
	BT: Optimization methods	USE:	Battery chargers
	RT: Design engineering		
	NT: Constraint	<b>Device drivers</b>	
optimization		BT:	Input-output programs
		RT:	Computer peripherals
<b>Design standards</b>		<b>Device-to-device communication</b>	
	BT: Design methodology	UF:	D2D
<b>Design tools</b>		BT:	Communication systems
	BT: Design engineering	RT:	Base stations
	Design methodology		Cellular networks
	RT: Design automation		
	Design for manufacture	<b>Dew computing</b>	
	Instruments	UF:	Cloud-dew architecture
	Media		Cloud-dew computing
	Product design		Dew servers
	Visualization	BT:	Distributed processing
			Software architecture
<i>Design-for-test</i>		RT:	Client-server systems
	USE: Design for testability		Cloud computing
			Edge computing
<i>Design-for-testing</i>		<i>Dew servers</i>	
	USE: Design for testability	USE:	Dew computing
<b>Desktop publishing</b>		<i>DFA</i>	
	BT: Electronic publishing	USE:	Doped fiber amplifiers
	Publishing		
	RT: Document handling		
	Office automation	<i>DFIG</i>	
	Page description	USE:	Doubly fed induction generators
languages			
	Text processing	<i>DFT</i>	
<i>Detection (signal)</i>		USE:	Discrete Fourier transforms
	USE: Signal detection		
<b>Detection algorithms</b>		<i>DGPS</i>	



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USE: Global Positioning  
System

## DH-HEMTs

UF: Double heterojunction  
HEMTs  
BT: HEMTs

## DHBTs

USE: Double heterojunction  
bipolar transistors

## Diabetes

UF: Diabetic  
BT: Medical conditions  
RT: Insulin pumps

## Diabetic

USE: Diabetes

## Diacs

USE: Thyristors

## Diagnosis (medical)

USE: Medical diagnosis

## Diagnostic expert systems

BT: Expert systems  
RT: Failure analysis  
Fault diagnosis

## Diagnostic radiography

BT: Radiography  
RT: Attenuation  
Magnetic resonance

## imaging

Medical diagnosis  
X-ray detection

## Diakoptics

BT: System analysis and  
design

## Diamagnetic materials

BT: Magnetic materials

## Diamond

UF: Diamonds  
BT: Carbon

## Diamond carbon

USE: Diamond-like carbon

## Diamond like carbon

USE: Diamond-like carbon

## Diamond-like carbon

UF: Diamond carbon  
Diamond like carbon  
Hard amorphous carbon  
BT: Amorphous materials  
RT: Biomedical materials  
Thin films  
Tissue engineering

## Diamonds

USE: Diamond

## DICOM

UF: Digital Imaging and  
Communications in Medicine  
BT: Biomedical imaging  
Digital communication

## Dictionaries

BT: Information services  
Terminology  
Writing

## Dictionary Learning

USE: Machine learning

## Die attach

USE: Microassembly

## Die bonding

USE: Microassembly

## Die casting

BT: Casting  
RT: Automobile manufacture  
Dies  
Materials handling  
Melt processing  
Metals

## Dielectric barrier discharges

USE: Discharges (electric)

## Dielectric breakdown

UF: Dielectric strength  
Voltage breakdown  
BT: Electric breakdown  
RT: Dielectric measurement  
Insulation  
Lightning  
NT: Arc discharges  
Discharges (electric)



# 2019 IEEE Thesaurus

discharges	Electrostatic	BT:	Dielectric measurement
	Flashover	RT:	Dielectric losses
	Glow discharges		
	Partial discharges	<b>Dielectric losses</b>	
	Surface discharges	UF:	Dielectric loss
	Vacuum breakdown	BT:	Dielectrics
		RT:	Dielectric loss
<b>Dielectric constant</b>		measurement	
BT:	Dielectrics		Insulation
RT:	Capacitors		
	Permittivity	<b>Dielectric materials</b>	
NT:	High-k gate	UF:	Antiferroelectric
dielectrics		materials	
			Paraelectric materials
<b>Dielectric devices</b>		BT:	Materials
BT:	Dielectrics	RT:	Ceramics
RT:	Dielectric materials		Dielectric devices
	Dielectric resonator		Dielectric thin films
antennas			Electrohydrodynamics
	Electrets		Electrokinetics
NT:	Capacitors		Ferroelectric
	Ferroelectric devices	materials	
	Piezoelectric devices		Glass
	Pyroelectric devices		Insulation
<b>Dielectric elastomer actuators</b>			Loaded waveguides
BT:	Actuators		Permittivity
NT:	Dielectric elastomers	NT:	Plastic insulation
			Dielectric films
<b>Dielectric elastomers</b>			Dielectric liquids
UF:	Smart elastomers		Electrets
BT:	Dielectric elastomer		Epoxy resins
actuators		materials	High-k dielectric
RT:	Smart materials		Piezoelectric
		materials	
<i>Dielectric electroactive polymer actuators</i>		<b>Dielectric measurement</b>	
USE:	Actuators	UF:	Dielectric
		measurements	
<b>Dielectric films</b>		BT:	Electric variables
BT:	Dielectric materials	measurement	
	Films	RT:	Capacitance
RT:	Planarization	measurement	
	Thick films		Dielectric breakdown
	Thin films		Electromagnetic
NT:	Dielectric thin films	measurements	
	Piezoelectric films	NT:	Dielectric loss
		measurement	
<b>Dielectric liquids</b>			Permittivity
UF:	Liquid insulation	measurement	
BT:	Dielectric materials		
		<i>Dielectric measurements</i>	
<b>Dielectric loss measurement</b>		USE:	Dielectric measurement



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## *Dielectric properties*

USE: Dielectrics

## **Dielectric resonator antennas**

BT: Antennas  
RT: Dielectric devices  
Resonance

## *Dielectric strength*

USE: Dielectric breakdown

## *Dielectric substrate*

USE: Dielectric substrates

## **Dielectric substrates**

UF: Dielectric substrate  
BT: Dielectrics

## **Dielectric thin films**

BT: Dielectric films  
RT: Dielectric materials  
Polymer films  
Semiconductor films

## **Dielectrics**

UF: Dielectric properties  
Electrical insulation  
BT: Dielectrics and  
electrical insulation  
NT: Dielectric constant  
Dielectric devices  
Dielectric losses  
Dielectric substrates  
Dielectrophoresis  
Electrohydrodynamics  
Electrokinetics  
Electrostriction

## **Dielectrics and electrical insulation**

NT: Dielectrics  
Electric breakdown  
Insulation

## **Dielectrophoresis**

BT: Dielectrics

## *Dielectric loss*

USE: Dielectric losses

## **Dies**

UF: Dies (machine tools)  
BT: Machine tools  
RT: Cutting tools  
Die casting

## Presses

## *Dies (machine tools)*

USE: Dies

## **Diesel engines**

BT: Internal combustion  
engines  
RT: Automotive engineering

## **Difference engines**

BT: Calculators

## **Difference equations**

BT: Equations  
RT: Discrete-time systems  
Numerical analysis  
Piecewise linear

## techniques

## **Differential algebraic equations**

BT: Differential equations

## **Differential amplifiers**

BT: Amplifiers

## **Differential equations**

BT: Calculus  
RT: Higher order  
statistics  
equations  
Integrodifferential  
Numerical analysis  
Predator prey systems  
Stability analysis  
Time invariant systems  
NT: Differential algebraic  
equations  
Navier-Stokes  
equations  
Partial differential  
equations  
Transfer functions

## *Differential gears*

USE: Gears

## *Differential GPS*

USE: Global Positioning  
System

## **Differential phase shift keying**

UF: DPKS



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shift keying	Differential phase-	BT:	Semiconductor device
BT:	Phase modulation	manufacture	
<i>Differential phase-shift keying</i>		RT:	Brownian motion
USE:	Differential phase		Buffer layers
shift keying		processes	Charge carrier
<b>Differential privacy</b>			Image denoising
BT:	Data privacy		Image processing
	Statistics	NT:	Stochastic processes
RT:	Data protection		Electromigration
	Information security	<b>Diffusion tensor imaging</b>	
	Privacy	UF:	DT-MRI
<b>Differential quadrature phase shift keying</b>			DTI
BT:	Quadrature phase shift		Diffusion tensor
keying		magnetic resonance imaging	
		BT:	Magnetic resonance
<i>Differentiated services networks</i>		imaging	
USE:	Diffserv networks	RT:	Brain
<b>Diffraction</b>		<i>Diffusion tensor magnetic resonance imaging</i>	
UF:	Wave diffraction	USE:	Diffusion tensor
BT:	Interference	imaging	
RT:	Bragg gratings	<b>Digestive system</b>	
	Crystallography	BT:	Anatomy
	Fourier transforms	RT:	Endomicroscopy
	X-ray detection	NT:	Colon
<b>Diffraction gratings</b>			Esophagus
BT:	Optical diffraction		Gallbladder
RT:	Bragg gratings		Gastrointestinal tract
<i>DiffServ</i>			Intestines
USE:	Diffserv networks		Liver
<b>Diffserv networks</b>			Mouth
UF:	DiffServ		Pancreas
	Differentiated		Pharynx
services networks			Stomach
BT:	Computer networks		Tongue
	Distributed computing	<i>Digital age</i>	
RT:	Internet	USE:	Information age
	Multimedia	<b>Digital alloys</b>	
communication		BT:	Metals
<b>Diffusion bonding</b>		<b>Digital arithmetic</b>	
BT:	Bonding processes	UF:	Computer arithmetic
RT:	Ceramics	BT:	Arithmetic
<b>Diffusion processes</b>		RT:	Calculators
			Coprocessors
		<b>Digital art</b>	
		BT:	Art



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<b>Digital audio broadcasting</b>			Digital audio
UF:	Digital audio	broadcasting	Digital images
broadcasts			Digital multimedia
	Podcast	broadcasting	Digital video
BT:	Broadcasting	broadcasting	ISDN
	Digital communication		Passband
RT:	Audio systems		Portable media players
	Portable media players		SONET
NT:	Digital Radio Mondiale		Spread spectrum
	Digital audio players		
<i>Digital audio broadcasts</i>		communication	
USE:	Digital audio	<b>Digital computers</b>	
broadcasting		BT:	Computers
<b>Digital audio players</b>		RT:	Digital circuits
UF:	MP3		Digital systems
BT:	Digital audio		Digital-analog
broadcasting		conversion	Parallel processing
<i>Digital camera</i>			Programming
USE:	Digital cameras		Turing machines
<b>Digital cameras</b>		NT:	Mainframes
UF:	Digital camera	<b>Digital control</b>	
BT:	Cameras	UF:	Computer control
RT:	Digital photography	BT:	Control systems
<b>Digital circuits</b>		RT:	Computer numerical
BT:	Circuits	control	
RT:	Digital computers	NT:	Programmable control
	Logic circuits	<i>Digital currency</i>	
	Pulse circuits	USE:	Online banking
	Switching circuits	<b>Digital divide</b>	
NT:	Circuit topology	BT:	Sociology
	Digital integrated	RT:	Cultural differences
circuits			Economics
<b>Digital communication</b>			Ethical aspects
UF:	Digital radio		Gender issues
BT:	Communication systems		Social factors
RT:	Bluetooth		Social implications of
	Data communication	technology	
	Digital recording	<i>Digital elevation modeling</i>	
	Musical instrument	USE:	Digital elevation
digital interfaces	Synchronous digital	models	
hierarchy		<b>Digital elevation models</b>	
	TCPIP	UF:	Digital elevation
	Teleprinting	modeling	Digital terrain model
NT:	Baseband		
	DICOM		
	DSL		



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modeling	Digital terrain	BT:	Modulation
	Digital terrain models	NT:	Constellation diagram
BT:	Modeling		Partial response
	Terrain mapping	signaling	
<i>Digital factories</i>		<b>Digital multimedia broadcasting</b>	
USE:	Virtual manufacturing	UF:	DMB
			Digital multimedia
<b>Digital filters</b>		broadcasts	
BT:	Filters	BT:	Broadcasting
RT:	Frequency response		Digital communication
	Line enhancers	RT:	Convolutional codes
	Optical resonators		Digital TV
	Transversal filters		Land mobile radio
NT:	Finite impulse	cellular systems	
response filters			MPEG 4 Standard
			MPEG 7 Standard
			MPEG standards
			Multimedia
<b>Digital forensics</b>		communication	
BT:	Forensics		Radio broadcasting
			Video on demand
<i>Digital image</i>			
USE:	Digital images	<i>Digital multimedia broadcasts</i>	
		USE:	Digital multimedia
<b>Digital images</b>		broadcasting	
UF:	Digital image		
	Digital imaging	<b>Digital photography</b>	
BT:	Digital communication	BT:	Photography
NT:	Pixel	RT:	CCD image sensors
			Cameras
<i>Digital imaging</i>			Digital cameras
USE:	Digital images		Transform coding
<i>Digital Imaging and Communications in Medicine</i>		<b>Digital preservation</b>	
USE:	DICOM	BT:	Digital systems
			Information management
		RT:	Data integrity
<b>Digital integrated circuits</b>			
BT:	Digital circuits	<b>Digital printing</b>	
	Integrated circuits	BT:	Printing
RT:	Adders	RT:	Publishing
	Logic circuits		
	Multiplying circuits		
		<i>Digital publishing</i>	
<b>Digital magnetic recording</b>		USE:	Electronic publishing
BT:	Magnetic recording		
		<i>Digital radio</i>	
<b>Digital microfluidic biochips</b>		USE:	Digital communication
BT:	Biochips		
		<b>Digital Radio Mondiale</b>	
<i>Digital micromirror devices</i>		BT:	Digital audio
USE:	Micromirrors	broadcasting	
<b>Digital modulation</b>		<b>Digital recording</b>	





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BT: Recording		
RT: Digital communication		<i>Digital subscriber lines</i>
Digital systems		USE: DSL
<b>Digital relays</b>		<i>Digital subscriber Loops</i>
BT: Relays		USE: DSL
<b>Digital rights management</b>		<b>Digital systems</b>
BT: Intellectual property		BT: Computers and
RT: Computer crime		information processing
Software protection		RT: Communication systems
		Computational and
<i>Digital sequences</i>		artificial intelligence
USE: Sequences		Consumer electronics
		Cryptocurrency
<b>Digital signal processing</b>		Digital computers
UF: DSP		Digital recording
BT: Signal processing		Persistent identifiers
RT: Aerospace and		Personal communication
electronic systems		networks
Digital TV		NT: Digital preservation
Fast Fourier		Digital storage
transforms		ISDN
OFDM		Internet
NT: Delta modulation		Local area networks
Digital signal		Metropolitan area
processing chips		networks
		Token networks
<b>Digital signal processing chips</b>		Virtual artifact
BT: Digital signal		
processing		<i>Digital terrain model</i>
		USE: Digital elevation
<b>Digital signal processors</b>		models
BT: Circuits		<i>Digital terrain modeling</i>
RT: Signal processing		USE: Digital elevation
		models
<b>Digital signatures</b>		<i>Digital terrain models</i>
BT: Security		USE: Digital elevation
RT: Message authentication		models
Message systems		
<b>Digital simulation</b>		<i>Digital to analog conversion</i>
BT: Simulation		USE: Digital-analog
RT: Computer aided		conversion
analysis		<i>Digital to analog converters</i>
Modeling		USE: Digital-analog
Power system analysis		conversion
computing		
NT: Discrete event		<b>Digital TV</b>
simulation		BT: TV
		RT: Digital multimedia
<b>Digital storage</b>		broadcasting
BT: Digital systems		
Storage management		



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processing	Digital signal	USE:	Digital-analog conversion
	HbbTV Standards		
NT:	HDTV		<i>Digital-analogue conversion</i>
	IPTV	USE:	Digital-analog conversion
<i>Digital versatile discs</i>			
USE:	DVD		<i>Digital-analogue converters</i>
<b>Digital video broadcasting</b>		USE:	Digital-analog conversion
UF:	Digital video		
broadcasts		<b>Digital-controlled oscillators</b>	
BT:	Broadcasting	BT:	Oscillators
	Digital communication		
<i>Digital video broadcasts</i>		<i>Digital-to-analog conversion</i>	
USE:	Digital video	USE:	Digital-analog conversion
broadcasting			<i>Digital-to-analog converters</i>
<i>Digital video discs</i>		USE:	Digital-analog conversion
USE:	DVD		
<i>Digital watermarking</i>		<b>Digital-to-frequency converters</b>	
USE:	Watermarking	BT:	Converters
<i>Digital-analog</i>			
USE:	Digital-analog conversion	<i>Dike</i>	
		USE:	Levee
<b>Digital-analog conversion</b>		<i>DIL</i>	
UF:	D/A	USE:	Electronics packaging
	D/A conversion		
	D/A converters	<i>Dimension reduction</i>	
	Digital to analog	USE:	Dimensionality reduction
conversion			
	Digital to analog	<b>Dimensionality reduction</b>	
converters		UF:	Dimension reduction
	Digital-analog	BT:	Information retrieval
converters	Digital-analog		Machine learning
	Digital-analogue		Statistics
conversion		<b>Dinosaurs</b>	
converters	Digital-analogue	BT:	Animals
	Digital-to-analog	<b>Diode lasers</b>	
conversion		UF:	Laser diodes
converters	Digital-to-analog	BT:	Diodes
			Lasers
BT:	Data conversion	<b>Diodes</b>	
RT:	Digital computers	BT:	Electronic components
	Interpolation	RT:	Voltage multipliers
<i>Digital-analog converters</i>			Breakdown voltage
			Optical transmitters



# 2019 IEEE Thesaurus

	NT:	Semiconductor diodes Diode lasers		BT:	Graph theory
				RT:	Blockchain
<i>DIP</i>			<i>Direction of arrival</i>		
	USE:	Electronics packaging		USE:	Direction-of-arrival estimation
<b>Dip coating</b>			<i>Direction of arrival estimation</i>		
	BT:	Coatings		USE:	Direction-of-arrival estimation
<b>Dipole antennas</b>			<i>Direction-finding</i>		
	BT:	Antennas		USE:	Navigation
<i>Direct broadcast satellites</i>			<b>Direction-of-arrival estimation</b>		
	USE:	Satellite broadcasting		UF:	Bearing estimation
<i>Direct current generators</i>					DOA estimation
	USE:	DC generators			Direction of arrival
<i>Direct current machines</i>					Direction of arrival estimation
	USE:	DC machines			Estimation of the direction of arrival
<i>Direct current motors</i>				BT:	Parameter estimation
	USE:	DC motors		RT:	Array signal processing
<i>Direct sequence CDMA</i>					Position measurement
	USE:	Direct-sequence code-division multiple access			Spectral analysis
<i>Direct sequence code division multiple access</i>					Time of arrival estimation
	USE:	Direct-sequence code-division multiple access	<b>Directional antennas</b>		
<b>Direct sequence spread spectrum communication</b>				BT:	Antennas
	BT:	Radio spectrum management	<b>Directional couplers</b>		
	RT:	Bandwidth Modulation		BT:	Couplers
<i>Direct-sequence CDMA</i>				RT:	Hybrid junctions
	USE:	Direct-sequence code-division multiple access	<b>Directive antennas</b>		
<b>Direct-sequence code-division multiple access</b>				BT:	Antennas
	UF:	Direct sequence CDMA	<i>Disaster and recovery</i>		
		Direct sequence code division multiple access		USE:	Disaster management
		Direct-sequence CDMA	<b>Disaster management</b>		
	BT:	Multiaccess communication		UF:	Disaster and recovery
<b>Directed acyclic graph</b>					Disaster planning
				BT:	Contingency management
			<i>Disaster planning</i>		
				USE:	Disaster management
			<b>Discharge lamps</b>		
				BT:	Lamps



# 2019 IEEE Thesaurus

NT: High intensity  
discharge lamps

## Discharges (electric)

UF: Dielectric barrier  
discharges  
Gas discharges  
Ozone generators  
Ozonizers  
BT: Dielectric breakdown  
RT: Electrostatic  
processes  
Gas discharge devices  
Gases  
Ionization  
Plasmas

## Discrete cosine transforms

UF: DCT  
BT: Discrete transforms  
RT: Chebyshev  
approximation

## Discrete element method

USE: Finite element  
analysis

## Discrete event simulation

BT: Digital simulation  
NT: Time warp simulation

## Discrete event systems

USE: Discrete-event systems

## Discrete Fourier transforms

UF: DFT  
BT: Fourier transforms  
RT: Signal processing

## Discrete Fournier transforms

USE: Discrete transforms

## Discrete time systems

USE: Discrete-time systems

## Discrete transforms

UF: Discrete Fournier  
transforms  
BT: Transforms  
NT: Discrete cosine  
transforms

## Discrete wavelet transforms

BT: Wavelet transforms

RT: Finite impulse  
response filters

## Discrete-event systems

UF: Discrete event systems  
BT: Signal analysis  
RT: Control systems  
Manufacturing  
Petri nets  
Production systems

## Discrete-time systems

UF: Discrete time systems  
BT: Time factors  
RT: Asymptotic stability  
Control systems  
Difference equations  
NT: Sampled data systems

## Discussion forums

BT: Collaboration

## Diseases

BT: Medical conditions  
RT: Medical diagnosis  
Metastasis  
NT: Acquired immune

## deficiency syndrome

Alcoholism  
Arteriosclerosis  
Arthritis  
Bacterial infections  
Bone diseases  
Cancer  
Cardiovascular

## diseases

Degenerative diseases  
Dementia  
Epilepsy  
Human immunodeficiency

## virus

Infectious diseases  
Influenza  
Multiple sclerosis  
Neurological diseases  
Parasitic diseases  
Parkinson's disease  
Pathogens  
Retinopathy

## Disk drives

BT: Computer peripherals  
RT: Disk recording



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# 2019 IEEE Thesaurus

recording	Perpendicular magnetic	<b>Display systems</b>	BT: Displays
<b>Disk recording</b>		<b>Displays</b>	
BT: Recording		BT: Optical devices	
RT: Disk drives		RT: Character generation	
<i>Disks (structures)</i>		Graphics	
USE: Structural discs		Thin film transistors	
<i>Dismissal (employment)</i>		User interfaces	
USE: Termination of		NT: Active matrix	
employment		technology	
<b>Dispatching</b>		Cathode ray tubes	
BT: Object oriented		Computer displays	
programming		Display systems	
RT: Materials handling		Flat panel displays	
<i>Dispersed power generation</i>		Head-mounted displays	
USE: Distributed power		Head-up displays	
generation		Liquid crystal devices	
<b>Dispersion</b>		Microdisplays	
UF: Dispersion effect		Readout electronics	
Dispersion measurement		Three-dimensional	
Dispersion relations			
Dispersive		displays	Two dimensional
BT: Signal processing		displays	
RT: Refractive index		<b>Disruption tolerant networking</b>	
NT: Chromatic dispersion		BT: Computer network	
Optical fiber		management	
dispersion		<b>Disruptive innovation</b>	
<i>Dispersion effect</i>		BT: Business	
USE: Dispersion		RT: Disruptive	
<i>Dispersion measurement</i>		technologies	
USE: Dispersion		Entrepreneurship	
<i>Dispersion relations</i>		Market opportunities	
USE: Dispersion		Technological	
<i>Dispersive</i>		innovation	
USE: Dispersion		<b>Disruptive technologies</b>	
<b>Displacement control</b>		BT: Technology	
BT: Mechanical variables		RT: Disruptive innovation	
control		Market opportunities	
<b>Displacement measurement</b>		Technological	
BT: Mechanical variables		innovation	
measurement		<i>Dissolved air flotation</i>	
		USE: Wastewater treatment	
		<b>Dissolved gas analysis</b>	
		BT: Fault diagnosis	
		<i>Distance</i>	
		USE: Distance measurement	



# 2019 IEEE Thesaurus

## Distance learning

BT: Learning (artificial intelligence)  
RT: Adaptive learning  
Mobile learning

NT: Total harmonic distortion

## *Distributed control*

USE: Decentralized control

## Distance measurement

UF: Distance  
Ranging  
BT: Measurement  
RT: Micrometers  
Position measurement  
NT: Euclidean distance

## Distributed algorithms

BT: Algorithms

## Distributed amplifiers

BT: Amplifiers

## *Distributed antennas*

USE: Antenna arrays

## *Distance relays*

USE: Protective relaying

## *Distillation columns*

USE: Distillation equipment

## Distributed Bragg reflectors

UF: DBR  
BT: Mirrors  
RT: Integrated optics  
Vertical cavity  
surface emitting lasers

## Distillation equipment

UF: Distillation columns  
BT: Chemical technology

## Distributed computing

BT: Computers and information processing  
RT: Computer networks  
Concurrency control  
Data communication  
Distributed ledger  
Local area networks  
Metropolitan area  
networks  
Mobile agents  
Multiprocessing  
systems  
Semantic Web  
Software agents  
Software architecture  
Client-server systems  
Cluster computing  
Collaborative work  
Diffserv networks  
Distributed databases  
Distributed information systems  
Internet  
Metacomputing  
Peer-to-peer computing

## Distortion

UF: Distortion information  
BT: Signal processing  
RT: Delay effects  
Distortion measurement  
Image restoration  
Interference  
Noise  
Rate distortion theory  
Signal restoration  
NT: Acoustic distortion  
Four-wave mixing  
Jitter  
Nonlinear distortion  
Phase distortion

## *Distortion information*

USE: Distortion

## Distortion measurement

UF: Acoustic distortion measurement  
Electric distortion measurement  
Optical distortion measurement  
BT: Measurement  
RT: Distortion  
Noise measurement

## Distributed databases

BT: Databases  
Distributed computing  
RT: Concurrency control  
Distributed ledger



# 2019 IEEE Thesaurus

NoSQL databases

## Distributed decision making

BT: Decision making

## Distributed denial-of-service attack

UF: DDoS

BT: Denial-of-service

attack

RT: Botnet

Computer crime

## Distributed feedback devices

UF: Distributed feedback

lasers

BT: Laser applications

RT: Feedback circuits

Optical feedback

## Distributed feedback lasers

USE: Distributed feedback

devices

## Distributed generation

USE: Decentralized control

AND

Distributed power

generation

## Distributed information systems

BT: Distributed computing

Information systems

NT: Distributed management

Publish-subscribe

## Distributed ledger

UF: DLT

Shared ledger

BT: Online banking

RT: Blockchain

Cryptocurrency

Distributed computing

Distributed databases

Peer-to-peer computing

## Distributed management

BT: Distributed

information systems

Management

RT: Collaborative

intelligence

## Distributed management task force

USE: DMTF

## Distributed modeling

USE: Decentralized control

## Distributed parameter circuits

UF: Nonuniform

transmission lines

Transmission line

circuits

BT: Circuits

RT: Microwave circuits

Millimeter wave

circuits

Transmission lines

## Distributed parameter systems

BT: Decentralized control

## Distributed power generation

UF: Dispersed power

generation

Distributed generation

Embedded power

generation

BT: Power generation

RT: Hybrid power systems

Microgrids

Vehicle-to-grid

## Distributed processing

UF: Volunteer computing

BT: System analysis and

design

RT: Cluster computing

Crowdsourcing

Software defined

networking

NT: Dew computing

Edge computing

Message passing

## Distributed vision networks

UF: Distributed vision

processing

BT: System analysis and

design

RT: Computer vision

Embedded computing

Smart cameras

Wireless sensor

networks

## Distributed vision processing



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# 2019 IEEE Thesaurus

USE: Distributed vision networks

## Distribution functions

BT: Statistical distributions

RT: Probability  
Probability density

function

## *Distribution of electric power*

USE: Power distribution

## Distribution strategy

BT: Marketing management

## Disturbance observers

BT: Observers

RT: Adaptive control  
Robust control

## *Diversity gain*

USE: Diversity methods

## Diversity methods

UF: Diversity gain

BT: Transmitters

RT: Fading channels  
Multipath channels  
Radio communication

## Diversity reception

BT: Signal resolution

RT: SIMO communication  
SISO communication  
Telecommunications

## Diversity schemes

BT: Telecommunication

network reliability

RT: Fading channels  
Interference

## *Diving equipment*

USE: Underwater equipment

## *DLT*

USE: Distributed ledger

## *DMB*

USE: Digital multimedia broadcasting

## DMTF

UF: Distributed management task force

BT: Standards organizations

## DMTF Standards

BT: Standards publications

RT: Common Information

Model (computing)

## DNA

BT: Genetics

RT: Biological cells

Biological information

theory

Cloning

DNA computing

Genetic communication

Molecular biophysics

NT: Genetic mutations

## DNA computing

BT: Computers and information processing

Nanobioscience

RT: DNA

Molecular computing

## *DOA estimation*

USE: Direction-of-arrival estimation

## *Docking stations*

USE: Computer interfaces

## *Doctor*

USE: Medical services

## Document delivery

BT: Information services

NT: Ask IEEE

## Document handling

BT: Data handling

Information management

RT: Content management

Desktop publishing

Information retrieval

Office automation

Publishing

Semantic Web

Text processing

NT: Document image

processing



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# 2019 IEEE Thesaurus

format	Portable document	Consumer products
		Electrical safety
		Occupational health
		Occupational safety
		Smoke detectors
<b>Document image processing</b>		
BT:	Document handling	
RT:	Portable document	
format		<b>Doped fiber amplifiers</b>
		UF: DFA
		BT: Optical amplifiers
<b>Documentation</b>		<b>Doping</b>
UF:	Computer documentation	BT: Materials preparation
	Software documentation	RT: Semiconductor device
BT:	Writing	doping
RT:	Engineering drawings	
	Manuals	Silicon devices
	Software	NT: Doping profiles
NT:	Point of care	
<i>DoD</i>		<b>Doping profiles</b>
USE:	US Department of	BT: Doping
Defense		RT: Optimization
		Thin film devices
<i>DoE</i>		
USE:	US Department of	<i>Doppler</i>
Energy		USE: Doppler effect
<b>Dogs</b>		<b>Doppler effect</b>
BT:	Animals	UF: Doppler
		BT: Waves
<b>Dolphins</b>		RT: Doppler measurement
BT:	Marine animals	Doppler radar
		NT: Doppler shift
<b>Domain Name System</b>		<b>Doppler measurement</b>
BT:	Computer networks	BT: Measurement
		RT: Doppler effect
<b>Domain specific languages</b>		Doppler radar
UF:	Domain-specific	Frequency measurement
languages		Motion measurement
BT:	Specification	Velocity measurement
languages		
<i>Domain-specific Languages</i>		<b>Doppler radar</b>
USE:	Domain specific	BT: Radar
languages		RT: Doppler effect
		Doppler measurement
<i>Domestic appliances</i>		<b>Doppler shift</b>
USE:	Home appliances	BT: Doppler effect
<i>Domestic induction appliances</i>		<i>DoS attack</i>
USE:	Home appliances	USE: Computer crime AND
		Denial-of-service
<b>Domestic safety</b>		attack
UF:	Safety in the home	<b>Dosimetry</b>
BT:	Safety	
RT:	Accidents	



# 2019 IEEE Thesaurus

UF: Radiation dosimetry  
BT: Measurement  
RT: Collimators  
Neutron capture  
therapy  
Phantoms  
Radiation detectors  
Radiation monitoring  
Radiation protection

*DOT*  
USE: US Department of  
Transportation

*Double gate FETs*  
USE: Double-gate FETs

**Double heterojunction bipolar transistors**  
UF: DHBTs  
BT: Heterojunction bipolar transistors

*Double heterojunction HEMTs*  
USE: DH-HEMTs

**Double-gate FETs**  
UF: Double gate FETs  
BT: Field effect transistors  
RT: Silicon-on-insulator

**Doubly fed induction generators**  
UF: DFIG  
BT: Induction generators  
RT: Wind turbines

**Downlink**  
BT: Satellite communication  
RT: Land mobile radio cellular systems

*DP industry*  
USE: Computer industry

*DPKS*  
USE: Differential phase shift keying

**Drag**  
BT: Fluid dynamics  
RT: Friction

**Drain avalanche hot carrier injection**  
UF: Drain avalanche hot-carrier injection  
BT: Hot carrier injection

*Drain avalanche hot-carrier injection*  
USE: Drain avalanche hot carrier injection

*DRAM*  
USE: DRAM chips

**DRAM chips**  
UF: DRAM  
BT: Random access memory

*Drift velocity*  
USE: Electron mobility

**Drilling**  
UF: Drilling (machining)  
BT: Machining  
RT: Boring  
Deburring  
Drilling machines  
Geoengineering  
Oil drilling

*Drilling (machining)*  
USE: Drilling

**Drilling machines**  
BT: Machine tools  
RT: Drilling

*Drilling oil*  
USE: Oil drilling

**Driver circuits**  
BT: Circuits  
RT: Power transistors

*Driver free automobiles*  
USE: Autonomous automobiles

*Driver free cars*  
USE: Autonomous automobiles

*Driver-free car*  
USE: Autonomous automobiles

*Driverless automobiles*  
USE: Autonomous automobiles



# 2019 IEEE Thesaurus

<i>Driverless cars</i>		USE:	Dedicated short range
	USE:	Autonomous automobiles	communication
<b>Drives</b>			<i>DT-MRI</i>
BT:	Machinery	USE:	Diffusion tensor
RT:	Mechanical power		imaging
transmission			<i>DTI</i>
	Sensorless control	USE:	Diffusion tensor
	Torque converters		imaging
NT:	Hydraulic drives		
	Motor drives		<b>Dual band</b>
	Variable speed drives	UF:	Dual-band
<b>Drones</b>			Dualband
BT:	Unmanned aerial	BT:	Mobile communication
vehicles		RT:	GSM
			Mobile handsets
			Roaming
<b>Drug delivery</b>			
UF:	Drug delivery systems		<i>Dual inline packaging</i>
BT:	Biomedical engineering	USE:	Electronics packaging
NT:	Targeted drug delivery		
<i>Drug delivery systems</i>			<i>Dual-band</i>
USE:	Drug delivery	USE:	Dual band
<b>Drugs</b>			<i>Dualband</i>
BT:	Pharmaceuticals	USE:	Dual band
RT:	Biochemistry		
	Chemical analysis		<b>Ducts</b>
	Chemistry	BT:	Structural shapes
	Chemotherapy	RT:	Air conditioning
	Molecular biomarkers		Vents
NT:	Antibiotics		<i>Dusty plasma</i>
	Antidepressants	USE:	Dusty plasmas
	Aspirin		
	Cancer drugs		<b>Dusty plasmas</b>
	Insulin	UF:	Dusty plasma
<b>Dry etching</b>		BT:	Plasma properties
BT:	Etching		
<b>DSL</b>			<b>DVD</b>
UF:	Digital subscriber	UF:	DVD-ROM
lines			Digital versatile
	Digital subscriber		
loops			Digital video discs
BT:	Digital communication	BT:	Video coding
		RT:	Video recording
<i>DSP</i>			<i>DVD-ROM</i>
USE:	Digital signal	USE:	DVD
processing			
<i>DSRC</i>			<i>Dynamic algorithms</i>
		USE:	Heuristic algorithms



# 2019 IEEE Thesaurus

<b>Dynamic compiler</b>	UF: Dyno
BT: Runtime	BT: Force measurement Meters
<b>Dynamic equilibrium</b>	Power measurement Torque measurement
BT: Measurement techniques	
NT: Steady-state	
<i>Dynamic program analysis</i>	<i>Dyno</i>
USE: Performance analysis	USE: Dynamometers
<b>Dynamic programming</b>	<b>Dysprosium</b>
BT: Algorithms	BT: Chemical elements
RT: Markov processes	NT: Dysprosium compounds
Neural networks	
Viterbi algorithm	<b>Dysprosium compounds</b>
	BT: Dysprosium
<b>Dynamic range</b>	<i>E health</i>
BT: Measurement	USE: Electronic healthcare
<b>Dynamic scheduling</b>	<i>E learning</i>
BT: Scheduling	USE: Electronic learning
<i>Dynamic service delivery</i>	<i>E-banking</i>
USE: Network resource management	USE: Online banking
<b>Dynamic spectrum access</b>	<i>E-books</i>
BT: Radio transceivers	USE: Electronic publishing
RT: Telecommunication	<i>E-commerce</i>
network topology	USE: Electronic commerce
Wireless communication	<i>E-currency</i>
<b>Dynamic voltage scaling</b>	USE: Online banking
UF: Self-dynamic voltage	<i>E-government</i>
scaling	USE: Electronic government
BT: Computer architecture Voltage	<i>E-health records</i>
<b>Dynamics</b>	USE: Electronic medical records
BT: Mechanical factors	<i>E-learning</i>
RT: Control theory	USE: Electronic learning
Force	
Friction	<i>E-mail</i>
Vibrations	USE: Electronic mail
NT: Aerodynamics	<i>E-publishing</i>
Elastodynamics	USE: Electronic publishing
Electrodynamics	
Hydrodynamics	<i>E-reader</i>
Magnetohydrodynamics	USE: Electronic publishing
<i>Dynamo</i>	<i>E-voting</i>
USE: Generators	
<b>Dynamometers</b>	



# 2019 IEEE Thesaurus

	USE:	Electronic voting			Seismology
<i>E-waste</i>			NT:		Earthquake engineering
	USE:	Electronic waste	<b>Eavesdropping</b>		
<b>Ear</b>			UF:		Cyber eavesdropping
	BT:	Head			Cybereavesdropping
		Sense organs	BT:		Privacy
	RT:	Cochlear implants	RT:		Computer security
<i>EAROM</i>			<i>ECC</i>		
	USE:	EPROM		USE:	Elliptic curve
<i>Earphones</i>			cryptography AND		Error correction codes
	USE:	Headphones	<i>ECCM</i>		
<b>Earth</b>				USE:	Electronic
	BT:	Geoscience	countermeasures		
		Planets	<i>ECG</i>		
	RT:	Geophysics		USE:	Electrocardiography
		Remote sensing	<i>Echo cancellation</i>		
		Soil		USE:	Echo cancellers
		Terrain factors	<b>Echo cancellers</b>		
		Terrain mapping		UF:	Echo cancellation
<i>Earth atmosphere</i>				BT:	Active noise reduction
	USE:	Terrestrial atmosphere	<b>Echo interference</b>		
<i>Earth observation system</i>				BT:	Interference
	USE:	Earth Observing System		RT:	Clutter
<b>Earth Observing System</b>					TV interference
	UF:	EOS	<b>Echocardiography</b>		
		Earth observation		UF:	ECHOEG
system				BT:	Cardiology
	BT:	Artificial satellites	<i>ECHOEG</i>		
		Observers		USE:	Echocardiography
	NT:	Global Earth	<i>ECM</i>		
Observation System of Systems				USE:	Electronic
<i>Earth science</i>			countermeasures		
	USE:	Geoscience	<i>Eco design</i>		
<i>earthing</i>				USE:	Ecodesign
	USE:	Grounding	<i>Eco-design</i>		
<b>Earthquake engineering</b>				USE:	Ecodesign
	UF:	Seismic retrofitting	<b>Ecodesign</b>		
	BT:	Earthquakes		UF:	Eco design
	RT:	Seismology			Eco-design
<b>Earthquakes</b>				BT:	Green design
	BT:	Geoscience			
	RT:	Seismic waves			



# 2019 IEEE Thesaurus

	RT:	Energy conservation Environmental factors		Econometrics Economic indicators Electronic commerce Environmental
<b>Ecology</b>				
	BT:	Environmental factors	economics	Exchange rates Fuel economy International trade Macroeconomics Microeconomics Monopoly Oligopoly Power generation
<i>Ecommerce</i>				
	USE:	Electronic commerce		Profitability Sharing economy Stock markets Supply and demand Trade agreements Venture capital Virtual enterprises
<b>Econometrics</b>				
	BT:	Economics		
	RT:	Costs Cybernetics Mathematics Profitability Regression analysis Statistics	economics	
	NT:	Economic forecasting		
<b>Economic forecasting</b>				
	BT:	Econometrics Forecasting		
	RT:	Economic indicators	<b>Economies of scale</b>	
			BT:	Microeconomics
			RT:	Industrial economics
<b>Economic indicators</b>			<b>Econophysics</b>	
	UF:	Cost of living index Cost-of-living index GDP GNP Gross domestic product Gross national product Harmonised index of		
consumer prices				
		Harmonized index of		
consumer prices				
		Index of production Interest rates RPI Retail price index	systems	
	BT:	Economics	considerations	Philosophical Science - general
	RT:	Economic forecasting Exchange rates		
	NT:	Share prices	<b>Ecosystems</b>	
			BT:	Environmental factors
			RT:	Low-carbon economy
			NT:	Wetlands
<b>Economics</b>				
	BT:	Engineering management	<i>EDA</i>	
	RT:	Bankruptcy Commercial law Cost accounting Digital divide Econophysics Finance Planning	USE:	Electronic design automation and methodology
			<i>Eddy current losses</i>	
			USE:	Eddy currents
	NT:	Costs	<b>Eddy current testing</b>	
			BT:	Eddy currents



# 2019 IEEE Thesaurus

analysis	RT: Finite element	Resources	Open Educational
<b>Eddy currents</b>		<b>Educational institutions</b>	
UF: Eddy current losses		UF: Colleges	
BT: Electromagnetic		Schools	
induction		Universities	
RT: Magnetic losses		BT: Education	
NT: Eddy current testing			
<i>EDFA</i>		<b>Educational programs</b>	
USE: Erbium-doped fiber		BT: Education	
amplifiers		RT: Curriculum development	
		Education courses	
<b>Edge computing</b>		NT: Accreditation	
UF: Fog computing		Continuing education	
BT: Application		Pre-college	
virtualization		engineering	
RT: Distributed processing		STEM	
Cloud computing		Scholarships	
Computer applications		Self-study courses	
Dew computing		Seminars	
Mobile computing		Tutorials	
Wireless sensor			
networks		<b>Educational robots</b>	
<i>Edge detection</i>		BT: Robots	
USE: Image edge detection		RT: Engineering education	
<i>EDTV</i>		<b>Educational technology</b>	
USE: HDTV		UF: Audio-visual	
<b>Education</b>		instructional aids	
UF: Inverted classroom		Instructional aids	
Reverse teaching		Programmed instruction	
Teaching		BT: Education	
RT: Personnel		RT: Audio-visual systems	
NT: Adaptive learning		Visualization	
Career development		NT: Computer aided	
Education courses		instruction	
Educational		Courseware	
institutions		Electronic learning	
Educational programs			
Educational technology		<i>EEG</i>	
Engineering education		USE: Electroencephalography	
Training		<i>EEPROM</i>	
		USE: EPROM	
<b>Education courses</b>		<b>Effective mass</b>	
BT: Education		BT: Energy states	
RT: Computer aided		<i>EEFF</i>	
instruction		USE: Field-flow	
Educational programs		fractionation	
STEM			
NT: Curriculum development		<b>Effluents</b>	



# 2019 IEEE Thesaurus

BT: Waste materials	<b>Elastodynamics</b>
RT: Flue gases	BT: Dynamics
Industrial waste	RT: Seismic waves
Waste disposal	Vibrations
Waste management	
Water pollution	<b>Elastography</b>
	BT: Biomedical imaging
<i>Ehealth</i>	
USE: Electronic healthcare	<b>Elbow</b>
	BT: Extremities
<i>Eigenfunctions</i>	<i>Elderly</i>
USE: Eigenvalues and	USE: Senior citizens
eigenfunctions	
<i>Eigenfunctions and eigenvalues</i>	<i>Elearning</i>
USE: Eigenvalues and	USE: Electronic learning
eigenfunctions	
<i>Eigenplaces</i>	<b>Electrets</b>
USE: Eigenvalues and	BT: Dielectric materials
eigenfunctions	RT: Capacitors
	Ceramics
	Dielectric devices
<i>Eigenvalues</i>	
USE: Eigenvalues and	<i>Electric admittance</i>
eigenfunctions	USE: Admittance
<b>Eigenvalues and eigenfunctions</b>	<i>Electric ballast</i>
UF: Eigenfunctions	USE: Electronic ballasts
Eigenfunctions and	
eigenvalues	<b>Electric breakdown</b>
Eigenplaces	UF: Breakdown
Eigenvalues	BT: Dielectrics and
BT: Mathematics	electrical insulation
RT: Functional analysis	RT: Aging
Linear algebra	Fault currents
Vectors	NT: Avalanche breakdown
	Corona
<i>EKG</i>	Dielectric breakdown
USE: Electrocardiography	Sparks
<b>Elastic computing</b>	<i>Electric characteristics</i>
BT: Cloud computing	USE: Electric variables
Resource management	
<i>Elastic optical networks</i>	<i>Electric coils</i>
USE: Optical fiber networks	USE: Coils
<b>Elastic recovery</b>	<i>Electric condensers</i>
BT: Materials testing	USE: Capacitors
<b>Elasticity</b>	<i>Electric conductivity</i>
BT: Material properties	USE: Conductivity
RT: Strain	<i>Electric current</i>
	USE: Current





# 2019 IEEE Thesaurus

## Electric current control

BT: Current control  
RT: Power control  
Power transmission  
Voltage control  
NT: Power factor

correction

Shunts (electrical)

## Electric current measurement

USE: Current measurement

## Electric distortion measurement

USE: Distortion measurement

## Electric fences

BT: Electric machines

## Electric field

USE: Electric fields

## Electric fields

UF: Electric field  
BT: Electromagnetic fields  
RT: Electrohydrodynamics  
Electrokinetics  
Electrostatic analysis  
Electrostatic

processes

Maxwell equations  
Synchrotrons

NT: Acoustoelectric

effects

Casimir effect  
Nonuniform electric

fields

## Electric generators

BT: Generators  
RT: Nanogenerators

## Electric heating

USE: Resistance heating

## Electric impedance

USE: Impedance

## Electric machines

BT: Machinery  
RT: Windings  
NT: AC machines  
Alternators  
Brushless machines

Compressors  
Conductors  
DC machines  
Electric fences  
Generators  
Permanent magnet

machines

Rotating machines  
Rotors  
Stators  
Washing machines

## Electric motors

BT: Motors  
NT: Planar motors

## Electric potential

BT: Electric variables

## Electric power

USE: Power electronics AND  
Power systems

## Electric resistance

UF: Electrical resistivity  
BT: Resistance

## Electric sensing devices

BT: Sensor systems and  
applications

## Electric shock

UF: Shock  
BT: Bioelectric phenomena  
RT: Accidents  
Electrical accidents  
Grounding  
Occupational health  
Occupational safety  
Safety

## Electric stimulation therapy

USE: Electrical stimulation

## Electric utilities

USE: Electricity supply  
industry AND  
Power industry

## Electric variables

UF: Current voltage  
characteristics  
Electric  
characteristics



# 2019 IEEE Thesaurus

characteristics	Electrical	Phase measurement
BT: measurement	Instrumentation and	Pulse measurements
RT: control	Electric variables	Transducers
measurement	Electric variables	NT: Admittance measurement
NT: characteristics	Frequency	Ammeters
Admittance	Capacitance	Attenuation
Capacitance-voltage	Capacitance	Capacitance
Conductivity	Conductivity	Conductivity
Current	Current-voltage	Current measurement
Current-voltage	Electric potential	Dielectric measurement
Gain	Gain	Electrical resistance
Impedance	Impedance matching	Electrostatic
Impedance matching	Inductance	Energy measurement
Inductance	Permittivity	Impedance measurement
Permittivity	Piezoresistance	Inductance measurement
Piezoresistance	Q-factor	Partial discharge
Q-factor	Resistance	Phasor measurement
Resistance	Voltage	Power measurement
Voltage	Wiring	Q measurement
Wiring		Transmission line
		Voltage measurement
<b>Electric variables control</b>		
BT: energy	Power engineering and	<b>Electric vehicle charging</b>
RT: characteristics	Electric variables	UF: EV charging
Frequency control	Frequency control	BT: Battery chargers
Phase control	Phase control	Electric vehicles
Regulators	Regulators	
NT: Current control	Current control	<b>Electric vehicles</b>
Gain control	Gain control	BT: Land vehicles
Power control	Power control	RT: Charging stations
Power system control	Power system control	NT: Battery powered
Reactive power control	Reactive power control	vehicles
Voltage control	Voltage control	charging
		Electric vehicle
<b>Electric variables measurement</b>		Fuel cell vehicles
BT: Measurement	Measurement	Hybrid electric
RT: Electric variables	Electric variables	Solar powered vehicles
Electromagnetic	Electromagnetic	Vehicle-to-grid
measurements	Frequency measurement	
	Gain measurement	<b>Electrical accidents</b>
	Integrated circuit	BT: Accidents
measurements	Noise measurement	RT: Bioelectric phenomena
	Oscilloscopes	Electric shock
		Electrical safety



# 2019 IEEE Thesaurus

## *Electrical appliances*

USE: Electrical products

industry

Electricity supply

Electronics industry

## *Electrical ballast*

USE: Electronic ballasts

## **Electrical fault detection**

BT: Circuit faults

## **Electrical ballasts**

BT: Current control

Lighting

RT: High intensity

discharge lamps

Inductors

Resistors

## *Electrical insulation*

USE: Dielectrics

## **Electrical products**

UF: Electrical appliances

BT: Electrical products

industry

Manufactured products

RT: Consumer products

NT: Washing machines

## *Electrical brain stimulation*

USE: Electrical stimulation

## **Electrical capacitance tomography**

BT: Tomography

## **Electrical products industry**

BT: Manufacturing

industries

RT: Electrical equipment

industry

Electronics industry

NT: Electrical products

## *Electrical characteristics*

USE: Electric variables

## *Electrical conductivity*

USE: Conductivity

## *Electrical double layer capacitors*

USE: Supercapacitors

## **Electrical resistance measurement**

UF: Ohmmeters

BT: Electric variables

measurement

RT: Resistance

## **Electrical engineering**

BT: Engineering - general

RT: Engineering profession

Research and

development

NT: Electrical engineering

computing

## *Electrical resistivity*

USE: Electric resistance

## **Electrical engineering computing**

BT: Electrical engineering

RT: Computer applications

## **Electrical safety**

BT: Power system

protection

RT: Domestic safety

Electrical accidents

Islanding

Partial discharge

## **Electrical engineering education**

BT: Engineering education

NT: Electronics

engineering education

measurement

NT: Fault protection

Grounding

## **Electrical engineering industry**

BT: Industries

## **Electrical stimulation**

UF: Electric stimulation

therapy

Electrical brain

stimulation

Microelectronic

## **Electrical equipment industry**

BT: Power industry

RT: Electrical products

industry

stimulation



# 2019 IEEE Thesaurus

stimulation  
BT: Spinal cord  
Medical treatment  
*Electrically alterable read only memory*  
USE: EPROM

*Electrically erasable programmable read only memory*  
USE: EPROM

**Electricity**  
BT: Science - general  
NT: Photoelectricity  
Piezoelectricity  
Pyroelectricity  
Thermoelectricity  
Triboelectricity

*Electricity grids*  
USE: Power grids

*Electricity market*  
USE: Electricity supply  
industry

*Electricity markets*  
USE: Power markets

**Electricity supply industry**  
UF: Electric utilities  
Electricity market  
Power supply industry  
BT: Power industry  
RT: Electrical equipment  
industry

Power demand  
Power distribution  
Power quality  
Power system faults  
Power system planning  
Power system

restoration  
Public infrastructure  
NT: Electricity supply  
industry deregulation

**Electricity supply industry deregulation**  
UF: Electricity supply  
industry liberalisation  
Electricity supply  
industry liberalization

Electricity supply  
industry privatisation  
Electricity supply  
industry privatization  
BT: Electricity supply  
industry  
Power generation  
economics  
RT: Power system economics  
NT: Power markets

*Electricity supply industry liberalisation*  
USE: Electricity supply  
industry deregulation

*Electricity supply industry liberalization*  
USE: Electricity supply  
industry deregulation

*Electricity supply industry privatisation*  
USE: Electricity supply  
industry deregulation

*Electricity supply industry privatization*  
USE: Electricity supply  
industry deregulation

*Electricity trading*  
USE: Power markets

*Electro hydraulics*  
USE: Electrohydraulics

*Electro oculography*  
USE: Electrooculography

*Electro-chromic devices*  
USE: Electrochromic devices

*Electro-fluid dynamics*  
USE: Electrohydrodynamics

*Electro-oculography*  
USE: Electrooculography

*Electro-optic deflectors*  
USE: Electrooptic  
deflectors

*Electro-optic devices*



# 2019 IEEE Thesaurus

USE: Electrooptic devices	<b>Electrochemical machining</b>
<i>Electro-optic effects</i>	UF: Electrolytic machining
USE: Electrooptic effects	BT: Machining
	RT: Micromachining
<i>Electro-optic modulators</i>	<b>Electrochemical processes</b>
USE: Electrooptic modulators	UF: Electrolysis
	BT: Industry applications
	RT: Chemical industry
<b>Electro-osmosis</b>	Electrochemical devices
BT: Osmosis	Electrochemical impedance spectroscopy
<i>Electroacoustic devices</i>	Electrolytes
USE: Acoustoelectric devices	
	<b>Electrochromic devices</b>
<i>Electroacoustic effects</i>	UF: Electro-chromic devices
USE: Acoustoelectric effects	BT: Electrooptic devices
	RT: Electrochromism
<i>Electroactive polymer actuators</i>	<b>Electrochromism</b>
USE: Actuators	BT: Electrooptic effects
<i>Electroactive polymers</i>	RT: Color
USE: Polymers	Electrochromic devices
<i>Electrobiolology</i>	<b>Electrodeless lamps</b>
USE: Bioelectric phenomena	BT: Lamps
<b>Electrocardiography</b>	<b>Electrodes</b>
UF: ECG	BT: Electronic components
EKG	RT: Air gaps
BT: Cardiography	Electron emission
RT: Biomedical equipment	Electron tubes
	Metal-insulator structures
<b>Electrochemical devices</b>	Spark gaps
BT: Industry applications	NT: Anodes
RT: Electrochemical processes	Cathodes
Power engineering and energy	Microelectrodes
Synapses	
NT: Amperometric sensors	<b>Electrodynamics</b>
Batteries	BT: Dynamics
Battery management	Waves
	RT: Electromagnetic fields
systems	Electron beams
Fuel cells	Electron optics
Supercapacitors	Electron tubes
	Ion beams
<b>Electrochemical impedance spectroscopy</b>	Particle beam optics
BT: Spectroscopy	NT: Electromagnetic wave
RT: Electrochemical processes	polarization

## Electroencephalography



# 2019 IEEE Thesaurus

UF:	EEG	BT:	Conducting materials
BT:	Biomedical measurement	RT:	Electrochemical
RT:	Bioelectric phenomena	processes	Supercapacitors
	Biomedical equipment		
	Brain		
	Electrooculography		<i>Electrolytic machining</i>
	Medical diagnosis	USE:	Electrochemical
		machining	
<i>Electrofluid dynamics</i>			
USE:	Electrohydrodynamics		
<b>Electrohydraulics</b>		<b>Electromagnetic analysis</b>	
UF:	Electro hydraulics	BT:	Electromagnetics
BT:	Hydraulic systems	RT:	Electrostatic analysis
RT:	Fluid flow		Magnetic analysis
	Liquids		Mie scattering
	Magnetohydrodynamics	NT:	Air gaps
			Characteristic mode
<b>Electrohydrodynamics</b>		analysis	
UF:	Electro-fluid dynamics		Computational
	Electrofluid dynamics	electromagnetics	
	Electrostrictive		Delay effects
hydrodynamics			Electromagnetic fields
BT:	Dielectrics		Electromagnetic forces
	Hydrodynamics		Electromagnetic
RT:	Dielectric materials	refraction	
	Electric fields		Permeability
	Electrokinetics		Spark gaps
			Time-domain analysis
<b>Electrokinetics</b>		<i>Electromagnetic beams</i>	
BT:	Dielectrics	USE:	Beams
RT:	Dielectric materials		
	Electric fields	<b>Electromagnetic compatibility</b>	
	Electrohydrodynamics	UF:	EMC
		BT:	Electromagnetic
<b>Electroluminescence</b>		compatibility and interference	
BT:	Luminescence	NT:	Immunity testing
RT:	Electrooptic effects		Reverberation chambers
	Organic light emitting		
diodes		<b>Electromagnetic compatibility and interference</b>	
NT:	Electroluminescent	RT:	Electromagnetic
devices		interference	
			Open area test sites
<b>Electroluminescent devices</b>			TEM cells
BT:	Electroluminescence	NT:	Electromagnetic
	Light sources	compatibility	
	Luminescent devices		Electromagnetics
RT:	Electrooptic devices		Interference
<i>Electrolysis</i>		<b>Electromagnetic coupling</b>	
USE:	Electrochemical	BT:	Electromagnetics
processes		RT:	Circulators
			Couplers
<b>Electrolytes</b>			



# 2019 IEEE Thesaurus

induction	Electromagnetic	<b>Electromagnetic forces</b>	
		BT:	Electromagnetic
shielding	Electromagnetic	analysis	
NT:	Mutual coupling	RT:	Electromagnetic
	Optical coupling	launching	
			Magnetic forces
			Mie scattering
<b>Electromagnetic devices</b>		<i>Electromagnetic guns</i>	
BT:	Electromagnetics	USE:	Electromagnetic
RT:	Magnetic gears	launching	
NT:	Baluns		
<b>Electromagnetic diffraction</b>		<b>Electromagnetic heating</b>	
BT:	Electromagnetic	UF:	Microwave heating
propagation		BT:	Heating systems
RT:	Electromagnetic fields	RT:	Hyperthermia
NT:	Optical diffraction		Induction heating
	Physical theory of		
diffraction		<b>Electromagnetic induction</b>	
	X-ray diffraction	UF:	Induction
		(electromagnetic)	
<b>Electromagnetic field theory</b>		BT:	Electromagnetics
BT:	Electromagnetic fields	RT:	Electromagnetic
RT:	Computational	coupling	
electromagnetics			Geomagnetism
	Optical fiber theory		Magnetic communication
		NT:	Eddy currents
			Inductive power
<b>Electromagnetic fields</b>		transmission	
BT:	Electromagnetic		
analysis		<b>Electromagnetic interference</b>	
RT:	Computational	UF:	EMI
electromagnetics			Electromagnetic noise
	Electrodynamics		RF interference
	Electromagnetic		Radio interference
diffraction		BT:	Interference
propagation	Electromagnetic	RT:	Crosstalk
	Electromagnetic		Electromagnetic
radiation		compatibility and interference	
	Electromagnetic		Environmental factors
reflection			Immunity testing
	Electromagnetic		Noise
refraction			Open area test sites
	Electromagnetic		TEM cells
scattering		NT:	Radiofrequency
	Magnetic fields	interference	
	Mie scattering		Specific absorption
NT:	Electric fields	rate	
	Electromagnetic field		
theory		<b>Electromagnetic launching</b>	
	Electromagnetic	UF:	Electromagnetic guns
spectrum			Electromagnetic
	Windings	propulsion	



# 2019 IEEE Thesaurus

Launching		<i>Electromagnetic noise</i>
(electromagnetic)		USE: Electromagnetic
BT: Propulsion		interference
RT: Electromagnetic forces		
Electrothermal		
launching		<b>Electromagnetic propagation</b>
NT: Coilguns		UF: Electromagnetic wave
Railguns		propagation
		BT: Antennas and
<b>Electromagnetic measurements</b>		propagation
BT: Measurement		RT: Propagation
RT: Anechoic chambers		Electromagnetic fields
Antenna measurements		Electromagnetic
Dielectric measurement		transients
Electric variables		Electromagnetic
measurement		waveguides
		Magnetostatic waves
		Mie scattering
		Waves
		NT: Electromagnetic
NT: Electromagnetic		diffraction
modeling		Electromagnetic
		propagation in absorbing media
		Electromagnetic
		reflection
		Microwave propagation
measurements		Millimeter wave
		propagation
		Optical propagation
		Propagation constant
		Propagation losses
		Radio propagation
		Radiowave propagation
		Submillimeter wave
measurements		
<b>Electromagnetic metamaterials</b>		
BT: Electromagnetics		
Metamaterials		
RT: Optical metamaterials		
Photonics		
NT: Terahertz		
metamaterials		
<i>Electromagnetic model</i>		
USE: Electromagnetic		
modeling		
<b>Electromagnetic modeling</b>		
UF: Electromagnetic model		
Electromagnetic		
modelling		
BT: Electromagnetic		
measurements		
<i>Electromagnetic modelling</i>		
USE: Electromagnetic		
modeling		
		<i>Electromagnetic propagation in absorbing media</i>
		BT: Electromagnetic
		propagation
		<i>Electromagnetic propulsion</i>
		USE: Electromagnetic
		launching
		<i>Electromagnetic pulse</i>
		USE: EMP radiation effects
		<i>Electromagnetic pulse propagation</i>
		USE: Electromagnetic
		transients
		<i>Electromagnetic pulse scattering</i>





# 2019 IEEE Thesaurus

USE:	Electromagnetic	Mie scattering	
transients		Optical scattering	
		Polarization	
<b>Electromagnetic radiation</b>		Radar scattering	
BT:	Electromagnetics	Raman scattering	
RT:	Electromagnetic fields	Rayleigh scattering	
	Electromagnetic wave		
polarization		<b>Electromagnetic shielding</b>	
	Terahertz radiation	BT:	Electromagnetics
	Waves	RT:	EMP radiation effects
	X-ray detection		Electromagnetic
	X-ray detectors	coupling	
	X-rays	NT:	Cable shielding
NT:	Bremsstrahlung		Magnetic shielding
	Correlators		
	Electromagnetic wave	<b>Electromagnetic spectrum</b>	
absorption		BT:	Electromagnetic fields
	Frequency		
	Gamma-rays	<i>Electromagnetic transient program</i>	
	Line-of-sight	USE:	EMTP
propagation			
<b>Electromagnetic radiative interference</b>		<b>Electromagnetic transients</b>	
BT:	Interference	UF:	Electromagnetic pulse
		propagation	Electromagnetic pulse
<b>Electromagnetic reflection</b>		scattering	
UF:	Electromagnetic wave	BT:	Electromagnetics
reflection		RT:	Electromagnetic
BT:	Electromagnetic	propagation	Electromagnetic
propagation		scattering	
	Reflection		Transient analysis
RT:	Electromagnetic fields	NT:	EMP radiation effects
	Electromagnetic		EMTDC
scattering			EMTP
	Reflectometry		Power system
NT:	Optical reflection	transients	Surges
<b>Electromagnetic refraction</b>			
BT:	Electromagnetic	<i>Electromagnetic transients DC</i>	
analysis		USE:	EMTDC
RT:	Electromagnetic fields		
<b>Electromagnetic scattering</b>		<i>Electromagnetic transients including DC</i>	
UF:	Electromagnetic wave	USE:	EMTDC
scattering		<b>Electromagnetic wave absorption</b>	
	Electromagnetic waves	BT:	Electromagnetic
BT:	Scattering	radiation	
RT:	Electromagnetic fields		
	Electromagnetic	<i>Electromagnetic wave attenuation</i>	
reflection		USE:	Attenuation
	Electromagnetic		
transients		<i>Electromagnetic wave polarisation</i>	
	Waves		
NT:	Coherence		



# 2019 IEEE Thesaurus

USE: Electromagnetic wave  
polarization

## Electromagnetic wave polarization

UF: Electromagnetic wave  
polarisation

BT: Electrodynamics

RT: Electromagnetic  
radiation

Photonic band gap

## Electromagnetic wave propagation

USE: Electromagnetic  
propagation

## Electromagnetic wave reflection

USE: Electromagnetic  
reflection

## Electromagnetic wave scattering

USE: Electromagnetic  
scattering

## Electromagnetic waveguides

BT: Transmission lines

RT: Coaxial cables

Coplanar waveguides

Electromagnetic

propagation

Helical antennas

Microwave devices

Microwave propagation

Optical fibers

Propagation

Waveguide

discontinuities

NT: Hollow waveguides

Loaded waveguides

Planar waveguides

Rectangular waveguides

Waveguide components

Waveguide lasers

Waveguide theory

## Electromagnetic waves

USE: Electromagnetic  
scattering

## Electromagnetics

BT: Electromagnetic  
compatibility and interference

RT: Cyberspace

Neuroradiology

NT: Electromagnetic  
analysis

Electromagnetic

coupling

Electromagnetic

devices

Electromagnetic

induction

Electromagnetic

metamaterials

Electromagnetic

radiation

Electromagnetic

shielding

Electromagnetic

transients

Proximity effects

## Electromagnets

BT: Magnets

RT: Coils

Magnetic confinement

Magnetic levitation

NT: Superconducting

magnets

## Electromechanical devices

BT: Electromechanical  
systems

NT: Armature

SAW filters

## Electromechanical sensors

BT: Sensors

NT: Microsensors

## Electromechanical systems

BT: Industry applications

NT: Cruise control

Electromechanical

devices

## Electromigration

BT: Diffusion processes

## Electromyography

UF: EMG

BT: Biomedical measurement

RT: Bioelectric phenomena

## Electron accelerators

BT: Particle accelerators

RT: Electron beams

Electron sources



# 2019 IEEE Thesaurus

## Electrons

### Electron beam applications

BT: Electron beams  
RT: Flyback transformers  
Scanning electron

microscopy

### Electron beam pumping

USE: Laser excitation

### Electron beams

BT: Particle beams  
RT: Electrodynamics  
Electron accelerators  
Electron emission  
Electron sources  
Electrons  
Flyback transformers  
Free electron lasers  
Gyrotrons  
Relativistic effects  
Transmission electron

microscopy

NT: Electron beam

applications

### Electron carriers

USE: Charge carrier

processes

### Electron devices

RT: Threshold current  
NT: Cathode ray tubes  
Electron guns  
Electron multipliers  
Electron tubes  
Mechatronics  
Microelectromechanical

systems

Microfluidics  
Micromechanical

devices

Photoelectricity  
Photovoltaic cells  
Quantum computing  
Quantum well devices  
Semiconductivity  
Semiconductor devices  
Single electron

devices

Thick film devices  
Thin film devices  
Tunneling

## Vacuum technology

### Electron emission

UF: Field electron  
emission

Secondary electron

emission

BT: Nuclear and plasma  
sciences

RT: Cathodes  
Electrodes  
Electron beams  
Electron guns  
Electron multipliers  
Electron sources  
Electron tubes  
Electrons  
Photoelectricity  
Thermionic emission  
Vacuum arcs  
Vacuum breakdown  
NT: Ballistic transport

### Electron guns

BT: Electron devices  
RT: Electron emission

### Electron microscopy

BT: Microscopy  
NT: Photoelectron

microscopy

Scanning electron

microscopy

Transmission electron

microscopy

### Electron mobility

UF: Drift velocity  
BT: Charge carrier  
processes  
RT: Plasma properties

### Electron multipliers

BT: Electron devices  
RT: Electron emission  
Electron tubes  
Photomultipliers

### Electron optics

BT: Optics  
Particle beam optics  
RT: Electrodynamics

### Electron paramagnetic resonance



# 2019 IEEE Thesaurus

UF:	Biological EPR	Unit	Central Processing
resonance	Electron spin		Multivibrators
BT:	Spectroscopy		Stripboard circuit
<b>Electron sources</b>		<b>Electronic commerce</b>	
BT:	Electrons	UF:	E-commerce
RT:	Electron accelerators		Ecommerce
	Electron beams	BT:	Economics
	Electron emission	RT:	Financial management
<i>Electron spin resonance</i>			Internet
USE:	Electron paramagnetic		Marketing management
resonance			Online banking
<b>Electron traps</b>		management	Supply chain
BT:	Charge carrier		Virtual enterprises
processes		<b>Electronic components</b>	
RT:	Leakage currents	BT:	Components, packaging,
	Reliability	and manufacturing technology	
<b>Electron tubes</b>		NT:	Capacitors
UF:	Thermionic valves		Coils
	Tubes		Connectors
	Vacuum tubes		Diodes
BT:	Electron devices		Electrodes
RT:	Anodes		Fuses
	Cathodes		Inductors
	Electrodes		Resistors
	Electrodynamics		Structural plates
	Electron emission		Switches
	Electron multipliers		Transducers
	Gettering	<i>Electronic counter-countermeasures</i>	
NT:	Field emitter arrays	USE:	Electronic
	Klystrons	countermeasures	
	Magnetrons	<b>Electronic countermeasures</b>	
	Thyratrons	UF:	ECCM
	Traveling wave tubes		ECM
<b>Electronic ballasts</b>			Electronic counter-
UF:	Ballasts	countermeasures	
	Electric ballast	BT:	Electronic warfare
	Electrical ballast	RT:	Jamming
BT:	Ballistic transport		Military communication
<i>Electronic banking</i>			Radar countermeasures
USE:	Online banking	countermeasures	Radio communication
<i>Electronic books</i>		communication	Spread spectrum
USE:	Electronic publishing		Spread spectrum radar
<b>Electronic circuits</b>			Weapons
BT:	Circuits	<i>Electronic currency</i>	
NT:	Breadboard	USE:	Online banking



# 2019 IEEE Thesaurus

<i>Electronic data interchange</i>			Ehealth
USE:	Data handling	BT:	Information processing
			Medical services
		RT:	Smart healthcare
<b>Electronic design automation and methodology</b>		<b>Electronic learning</b>	
UF:	EDA	UF:	E learning
NT:	Design automation		E-learning
	Design methodology		Elearning
		BT:	Educational technology
<b>Electronic equipment</b>			Learning (artificial
BT:	Electronics industry	intelligence)	
RT:	Electronic equipment	RT:	Computer aided
manufacture	Electronic equipment	instruction	Computers and
testing	Low-power electronics	information processing	Electronic mail
	Electronic voting		Internet
NT:			Learning management
systems	Microelectronics	systems	TV
	Organic electronics		Training
	Smart devices		Wide area networks
	Soft electronics	NT:	Mobile learning
<b>Electronic equipment manufacture</b>		<b>Electronic mail</b>	
BT:	Components, packaging,	UF:	E-mail
and manufacturing technology			Email
RT:	Electronic equipment		Mail (electronic)
	Electronics industry	BT:	Message systems
	Optical device	RT:	Blogs
fabrication			Electronic learning
NT:	Damascene integration		Office automation
	Micromachining		Postal services
	Radiation hardening		Social network
(electronics)	Semiconductor device	services	Voice mail
manufacture			Whitelists
<b>Electronic equipment testing</b>		NT:	Unified messaging
BT:	Testing		Unsolicited electronic
RT:	Electronic equipment	mail	
	TEM cells		
NT:	Immunity testing	<b>Electronic medical prescriptions</b>	
<b>Electronic government</b>		BT:	Medical treatment
UF:	E-government	RT:	Electronic medical
BT:	Government	records	
<i>Electronic health records</i>		<b>Electronic medical records</b>	
USE:	Electronic medical	UF:	E-health records
records			Electronic health
		records	
<b>Electronic healthcare</b>		BT:	Medical information
UF:	E health	systems	



# 2019 IEEE Thesaurus

RT: Electronic medical  
prescriptions  
Patient monitoring

## Electronic messaging

UF: Text messaging  
BT: Message systems  
NT: Instant messaging  
Unified messaging

## Electronic music

BT: Music  
NT: Synthesizers

## Electronic noses

BT: Chemical analysis  
RT: Intelligent sensors

## Electronic packaging thermal management

BT: Thermal management of  
electronics

## Electronic portfolios

USE: Portfolios

## Electronic publications

USE: IEEE online  
publications

## Electronic publishing

UF: Digital publishing  
E-books  
E-publishing  
E-reader  
Electronic books  
Epublishing  
Kindle  
BT: Publishing  
RT: CD-ROMs  
Multimedia systems  
NT: Content management  
Desktop publishing

## Electronic switching systems

BT: Communication  
switching  
Switching systems

## Electronic textiles

USE: Smart textiles

## Electronic visual prosthesis

USE: Visual prosthesis

## Electronic voting

UF: E-voting  
Online voting  
BT: Voting

## Electronic voting systems

BT: Electronic equipment  
NT: Optical scan voting  
systems

## Electronic warfare

BT: Aerospace and  
electronic systems  
RT: Communication system  
security  
Radio communication  
countermeasures  
Spread spectrum  
communication  
Spread spectrum radar  
NT: Electronic  
countermeasures  
Jamming  
Radar countermeasures

## Electronic waste

UF: E-waste  
WEEE  
Waste electrical and  
electronic equipment  
BT: Waste materials

## Electronics cooling

BT: Thermal management of  
electronics  
RT: Cooling

## Electronics engineering education

BT: Electrical engineering  
education

## Electronics industry

UF: Integrated circuits  
industry  
Semiconductor  
electronics industry  
Semiconductor industry  
BT: Manufacturing  
industries  
RT: Electrical equipment  
industry  
Electrical products  
industry



# 2019 IEEE Thesaurus

Electronic equipment  
manufacture  
Toy manufacturing  
industry  
NT: Electronic equipment

## Electronics packaging

UF: Ball grid arrays  
DIL  
DIP  
Dual inline packaging  
PGA  
Pin grid arrays  
QFP  
Quad flat packs  
BT: Components, packaging,  
and manufacturing technology  
RT: Constraint  
optimization  
Cooling  
Plastic packaging  
Printed circuits  
NT: Chip scale packaging

## Electrons

BT: Elementary particles  
RT: Beta rays  
Cosmic rays  
Electron accelerators  
Electron beams  
Electron emission  
Elementary particle  
exchange interactions  
Impact ionization  
Phonons  
Schrodinger equation  
NT: Electron sources  
Quantum wells  
Trions

## Electrooculography

UF: EOG  
Electro oculography  
Electro-oculography  
BT: Biomedical measurement  
Gaze tracking  
RT: Bioelectric phenomena  
Electroencephalography  
Eyes

## Electrooptic (EO) waveguides

USE: Electrooptical  
waveguides

## Electrooptic deflectors

UF: Electro-optic  
deflectors  
BT: Electrooptic devices

## Electrooptic devices

UF: Electro-optic devices  
BT: Lasers and  
electrooptics  
RT: Electroluminescent  
devices  
Electrooptic effects  
Liquid crystal devices  
Optical bistability  
Optoelectronic devices  
NT: Electrochromic devices  
Electrooptic  
deflectors  
Electrooptic  
modulators

## Electrooptic effects

UF: Electro-optic effects  
BT: Lasers and  
electrooptics  
RT: Electroluminescence  
Electrooptic devices  
Nonlinear optics  
NT: Electrochromism  
Kerr effect  
Optical bistability  
Stark effect

## Electrooptic modulators

UF: Electro-optic  
modulators  
Pockels readout  
optical modulator  
BT: Electrooptic devices  
Optical modulation  
RT: Integrated optics  
Intensity modulation  
Laser beams  
Microwave photonics  
Optical waveguides  
P-i-n diodes  
Phase modulation  
Quantum well devices

## Electrooptic waveguides

USE: Electrooptical  
waveguides

## Electrooptical waveguides



# 2019 IEEE Thesaurus

UF: E0 waveguides  
Electrooptic (E0)  
waveguides  
Electrooptic  
waveguides  
BT: Optical waveguides

## Electrophotography

UF: Xerography  
BT: Electrostatic  
processes  
Photoconducting  
devices  
RT: Gas discharge devices  
Photography

## Electrophotoluminescence

USE: Photoluminescence

## Electrophysiology

BT: Biomedical measurement  
RT: Biomedical electrodes

## Electrostatic actuation

USE: Electrostatic  
actuators

## Electrostatic actuators

UF: Electrostatic  
actuation  
BT: Actuators  
RT: Electrostatic devices

## Electrostatic analysis

BT: Electrostatic  
processes  
RT: Electric fields  
Electromagnetic  
analysis  
Electrostatic  
measurements

## Electrostatic charges

USE: Electrostatic  
discharges AND  
Electrostatics

## Electrostatic devices

BT: Industry applications  
RT: Electrostatic  
actuators  
Electrostatic  
processes

## Electrostatic discharges

UF: Charged device model  
ESD  
Electrostatic charges  
BT: Dielectric breakdown  
RT: Arc discharges  
Electrostatic  
interference

## Electrostatic induction

UF: Induction  
(electrostatic)  
BT: Electrostatic  
processes

## Electrostatic interference

BT: Interference  
RT: Electrostatic  
discharges  
NT: Immunity testing

## Electrostatic levitation

BT: Electrostatics  
Levitation

## Electrostatic measurements

BT: Electric variables  
measurement  
RT: Electrostatic analysis  
NT: Charge measurement

## Electrostatic precipitators

BT: Industry applications  
RT: Pollution control

## Electrostatic processes

BT: Industry applications  
RT: Discharges (electric)  
Electric fields  
Electrostatic devices  
Lightning  
NT: Aerosols  
Electrophotography  
Electrostatic analysis  
Electrostatic  
induction

Electrostatics  
Particle charging  
Particle production  
Space charge  
Surface charging  
Triboelectricity

## Electrostatic self assembly





# 2019 IEEE Thesaurus

USE: Electrostatic self-assembly

## Electrostatic self-assembly

UF: Electrostatic self-assembly

BT: Self-assembly

## Electrostatics

UF: Electrostatic charges

BT: Electrostatic

processes

RT: Poisson equations

NT: Electrostatic

levitation

## Electrostriction

BT: Dielectrics

RT: Mechanical factors

Piezoelectricity

*Electrostrictive hydrodynamics*

USE: Electrohydrodynamics

*Electrostrictive polymer actuators*

USE: Actuators

## Electrothermal effects

BT: Thermoelectricity

RT: Electrothermal

launching

NT: Proton effects

## Electrothermal launching

UF: Launching

(electrothermal)

BT: Propulsion

RT: Electromagnetic

launching

Electrothermal effects

## Elemental semiconductors

BT: Semiconductor

materials

RT: Silicon

## Elementary particle exchange interactions

BT: Elementary particles

RT: Electrons

Ions

Proton effects

Wave functions

## Elementary particle vacuum

UF: Instanton vacuum

QCD vacuum

Quantum vacuum

String vacuum

Superstring vacuum

Vacuum energy

BT: Elementary particles

RT: Casimir effect

## Elementary particles

UF: Particles (elementary)

BT: Nuclear and plasma

sciences

RT: Cosmic rays

High energy physics

instrumentation computing

Microwave photonics

Nuclear thermodynamics

Proton effects

NT: Charge carriers

Electrons

Elementary particle

exchange interactions

Elementary particle

vacuum

Ions

Mesons

Neutrino sources

Neutrons

Particle beams

Particle collisions

Phonons

Positrons

Protons

## Elevators

BT: Building services

RT: Buildings

## Ellipsoids

BT: Elliptic design

## Ellipsometry

BT: Optical variables

measurement

RT: Polarimetry

## Elliptic curve cryptography

UF: ECC

Elliptic curve

cryptosystems

BT: Public key

cryptography



# 2019 IEEE Thesaurus

<i>Elliptic curve cryptosystems</i>		Micromachining
USE: Elliptic curve cryptography		Sheet metal processing
		Watermarking
<b>Elliptic curves</b>		<b>Embryo</b>
BT: Geometry	BT: Embryonic structures	
<b>Elliptic design</b>	<b>Embryonic structures</b>	
UF: Elliptical design	BT: Anatomy	
BT: Geometry	NT: Embryo	
NT: Ellipsoids	Fetus	
<i>Elliptical design</i>	<i>EMC</i>	
USE: Elliptic design	USE: Electromagnetic compatibility	
<i>Email</i>	<b>Emergency lighting</b>	
USE: Electronic mail	BT: Lighting	
<b>Embedded computing</b>	RT: High intensity discharge lamps	
BT: Embedded systems	<i>Emergency management</i>	
RT: Distributed vision networks	USE: Emergency services	
<b>Embedded multicore processing</b>	<i>Emergency medical services</i>	
BT: Multicore processing	USE: Medical services	
<i>Embedded power generation</i>	<i>Emergency power generators</i>	
USE: Distributed power generation	USE: Standby generators	
<b>Embedded software</b>	<b>Emergency power supplies</b>	
BT: Software	UF: Standby power supplies	
<i>Embedded system</i>	BT: Power supplies	
USE: Embedded systems	RT: Batteries	
<b>Embedded systems</b>	Standby generators	
UF: Embedded system	Uninterruptible power systems	
BT: Operating systems	<i>Emergency response</i>	
RT: Cyber-physical systems	USE: Emergency services	
Hardware-in-the loop	<b>Emergency services</b>	
simulation	UF: Emergency management	
Microprocessors	Emergency response	
NT: Embedded computing	BT: Safety	
<b>Embolization</b>	RT: Accidents	
BT: Medical treatment	Fires	
Noninvasive treatment	Medical services	
<b>Embossing</b>	Rescue robots	
BT: Manufacturing	<b>Emergent phenomena</b>	
Production	BT: Cybernetics	
RT: Injection molding	<i>EMG</i>	



# 2019 IEEE Thesaurus

USE:	Electromyography		
<i>EMI</i>		<b>Employment</b>	
USE:	Electromagnetic	UF:	Workplace
interference		BT:	Human resource
		management	
		RT:	Business
<b>Emotion recognition</b>			Employment law
BT:	User interfaces		Engineering profession
RT:	Affective computing		Jobs listings
	Behavioral sciences		Personnel
	Emotional responses		Programming profession
	Image recognition	NT:	Employee rights
	Psychology		Termination of
	Sentiment analysis	employment	
	Speech recognition		
<b>Emotional responses</b>		<b>Employment law</b>	
BT:	Psychology	BT:	Law
RT:	Emotion recognition	RT:	Contract law
			Employment
<b>EMP radiation effects</b>		<b>EMTDC</b>	
UF:	Electromagnetic pulse	UF:	Electromagnetic
BT:	Electromagnetic	transients DC	
transients			Electromagnetic
RT:	Electromagnetic	transients including DC	
shielding		BT:	Electromagnetic
		transients	
<b>Empirical mode decomposition</b>			Geophysics
UF:	Hilbert?Huang		Software packages
transforms		<b>EMTP</b>	
BT:	Transforms	UF:	Electromagnetic
RT:	Signal processing	transient program	
		BT:	Electromagnetic
<b>Employee rights</b>		transients	
BT:	Employment	RT:	Computer simulation
<b>Employee welfare</b>			
UF:	Conditions of	<b>Emulation</b>	
employment		BT:	Modeling
	Counseling	RT:	Application
	Counselling	virtualization	
	Maternity benefits		Simulation
	Sick pay		
	Working conditions	<b>Encapsulation</b>	
BT:	Human resource	BT:	Packaging
management		RT:	Integrated circuit
RT:	Incentive schemes	packaging	
	Industrial psychology		Plastic packaging
	Occupational health	<b>Encephalography</b>	
	Occupational safety	BT:	Biomedical imaging
	Occupational stress	RT:	Brain
	Pensions		
	Psychology	<b>Encoding</b>	
	Remuneration		



# 2019 IEEE Thesaurus

UF:	Coding	Real-time systems
BT:	Information theory	
RT:	Codecs	
	Codes	
	Cryptography	
	Data compression	
	Data handling	
	Hash functions	
	Modulation	
	Modulation coding	
	Quantization (signal)	
	Semantic technology	
	Signal processing	
	Vector quantization	
NT:	Audio coding	
	Channel coding	
	Code refractoring	
	Entropy coding	
	Precoding	
	Source coding	
	Speech coding	
	Transcoding	
<b>Encryption</b>		
BT:	Cryptography	
RT:	Ciphers	
<b>Encyclopedias</b>		
BT:	Information services	
RT:	Wikipedia	
<b>End effectors</b>		
UF:	End-effectors	
BT:	Manipulators	
RT:	Grippers	
<i>End-effectors</i>		
USE:	End effectors	
<i>Endocrine glands</i>		
USE:	Glands	
<b>Endocrine system</b>		
BT:	Anatomy	
<b>Endomicroscopy</b>		
BT:	Endoscopes	
	Microscopy	
RT:	Biomedical equipment	
	Biomedical optical	
imaging		
	Digestive system	
	Medical robotics	
	Optical devices	
<b>Endoscopes</b>		
UF:	Endoscopy	
BT:	Biomedical equipment	
RT:	Biomedical optical	
imaging		
	Image sensors	
	Laser applications	
	Surgery	
NT:	Endomicroscopy	
<i>Endoscopy</i>		
USE:	Endoscopes	
<b>Energy</b>		
BT:	Power engineering and	
energy		
RT:	Thermal energy	
NT:	Energy barrier	
	Energy capture	
	Energy consumption	
	Energy conversion	
	Energy dissipation	
	Energy exchange	
	Energy harvesting	
	Energy management	
	Energy resources	
	Energy states	
	Energy storage	
<b>Energy barrier</b>		
BT:	Energy	
<b>Energy capture</b>		
BT:	Energy	
<b>Energy conservation</b>		
BT:	Energy management	
RT:	Ecodesign	
	Energy resources	
	Power demand	
	Waste heat	
NT:	Green computing	
	Potential energy	
	Renewable energy	
sources		
<b>Energy consumption</b>		
BT:	Energy	
<b>Energy conversion</b>		
BT:	Energy	
NT:	Atomic batteries	



# 2019 IEEE Thesaurus

Batteries  
Fuel cells  
Motors  
Photovoltaic cells  
Potential well  
Solar heating  
Thermoelectricity  
Waste heat

## Energy dissipation

BT: Energy

## Energy efficiency

UF: Energy efficient  
BT: Energy management  
RT: Energy informatics  
NT: Energy efficient

ethernet

## Energy efficient

USE: Energy efficiency

## Energy efficient ethernet

UF: EtherEEE  
BT: Energy efficiency  
Ethernet

## Energy exchange

UF: Energy transfer  
BT: Energy  
NT: Inductive charging

## Energy harvesting

UF: Energy scavenging  
Power harvesting  
BT: Energy  
NT: Nanogenerators

## Energy informatics

BT: Energy management  
Informatics  
RT: Energy efficiency  
Global warming  
Green design  
Information and

communication technology

Machine learning  
Smart cities  
Smart grids

## Energy levels

USE: Energy states

## Energy loss

BT: Energy measurement  
NT: Core loss

## Energy management

BT: Energy  
NT: Demand-side management  
Energy conservation  
Energy efficiency  
Energy informatics  
Load management  
Transactive energy

## Energy measurement

BT: Electric variables  
measurement  
RT: Calorimetry  
Enthalpy  
Watthour meters  
NT: Energy loss

## Energy resolution

BT: Nuclear imaging  
RT: Nuclear medicine  
Solid scintillation

detectors

## Energy resources

BT: Energy  
RT: Civil engineering  
Energy conservation  
Environmental

economics

Natural gas  
Power demand  
NT: Fuels  
Geothermal energy  
Nuclear fuels  
Solar energy  
Wave power  
Wind energy  
Wind farms

## Energy scavenging

USE: Energy harvesting

## Energy states

UF: Energy levels  
Levels, energy  
BT: Energy  
NT: Effective mass  
Orbital calculations  
Surface states

## Energy storage



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# 2019 IEEE Thesaurus

UF:	Energy storage systems	Optical engineering
	Stored energy	Precision engineering
BT:	Energy	Production engineering
RT:	Aging	Research and
	Battery powered	development
vehicles		Reverse engineering
	Fuel cell vehicles	Sanitary engineering
	Fuel storage	Standardization
	Hybrid electric	Thermal engineering
vehicles		
	Load management	<b>Engineering drawings</b>
	Material storage	BT: Graphics
	Pulsed power systems	RT: Documentation
	Solar powered vehicles	Technical drawing
NT:	Batteries	NT: Flowcharts
	Flywheels	
	Fuel cells	<b>Engineering education</b>
	Hydrogen storage	BT: Education
	Supercapacitors	RT: Continuing education
	Superconducting	Educational robots
magnetic energy storage		Laboratories
		Logic design
<i>Energy storage systems</i>		NT: Biomedical engineering
USE:	Energy storage	education
		Communication
<i>Energy transfer</i>		engineering education
USE:	Energy exchange	Computer science
		education
<b>Engine cylinders</b>		Control engineering
BT:	Machine components	education
RT:	Engines	Electrical engineering
	Gaskets	education
	Pistons	Engineering students
	Structural rings	Physics education
		Power engineering
<b>Engineering - general</b>		education
RT:	STEM	Student experiments
	Technology	Systems engineering
NT:	Acoustical engineering	education
	Agricultural	<i>Engineering geology</i>
engineering		USE: Geoengineering
	Biologically inspired	
engineering		<b>Engineering in medicine and biology</b>
	Chemical engineering	NT: Bioinformatics
	Civil engineering	Biology
	Concurrent engineering	Biomedical
	Design engineering	communication
	Electrical engineering	Biomedical computing
	Engineering profession	Biomedical engineering
	Environmental	Biomedical equipment
engineering		Biomedical imaging
	Maintenance	Bionanotechnology
engineering		Bioterrorism
	Mechanical engineering	



# 2019 IEEE Thesaurus

	Computational biology		Gaskets
	Genetic engineering		Machine components
	Medical services		Manifolds
	Medical specialties		Mechanical power
	Nuclear medicine	transmission	
	Synthetic biology		Oils
<b>Engineering management</b>			Pistons
NT:	Business		Propellers
	Commercialization		Propulsion
	Consortia		Rockets
	Economics		Torque converters
	Innovation management	NT:	Turbomachinery
	Legal factors		Heat engines
	Market research	engines	Internal combustion
	Planning		Jet engines
	Product development	<b>Enhanced magnetoresistance</b>	
	Project engineering	BT:	Magnetoresistance
	Research and	RT:	Nanocontacts
development management	Research initiatives	<i>Entangled states</i>	
	Software development	USE:	Quantum entanglement
management		<b>Enterprise resource planning</b>	
<b>Engineering profession</b>		BT:	Management
UF:	Careers	RT:	Business
BT:	Engineering - general		Data handling
RT:	Biographies		Data processing
	Electrical engineering		Software
	Employment		System integration
	Ethics		Venture capital
	Programming profession	NT:	Business process
	Research and	integration	
development	Research and	<b>Entertainment industry</b>	
development management		BT:	Industries
NT:	Professional aspects	RT:	Broadcasting
			Films
<b>Engineering students</b>			Games
UF:	Student engineers		Motion pictures
BT:	Engineering education		TV
<i>Engineering writing</i>		NT:	Sports
USE:	Writing	<b>Enthalpy</b>	
<b>Engines</b>		BT:	Thermodynamics
BT:	Industry applications	RT:	Energy measurement
RT:	Aircraft propulsion		Thermal management
	Automobile manufacture	<i>Entrepreneurial</i>	
	Cams	USE:	Entrepreneurship
	Camshafts	<b>Entrepreneurship</b>	
	Engine cylinders	UF:	Entrepreneurial
	Exhaust systems		
	Fuel pumps		



# 2019 IEEE Thesaurus

BT:	Business		Green computing
RT:	Disruptive innovation		Greenhouse effect
	Innovation management		Health and safety
			International
<b>Entropy</b>		collaboration	
BT:	Physics		Meteorology
RT:	Heating systems		Occupational health
	Nuclear thermodynamics		Ozonation
			Safety
<b>Entropy coding</b>		NT:	Biosphere
BT:	Encoding		Ecology
RT:	Data compression		Ecosystems
NT:	Huffman coding		Environmental
		economics	
<i>Entry, descent and landing</i>			Environmental
USE:	Aircraft navigation	monitoring	
			Global warming
<b>Envelope detectors</b>			Green manufacturing
BT:	Detectors		Green products
			Green transportation
<i>Environmental design</i>			Pollution
USE:	Green design		
		<b>Environmental management</b>	
<b>Environmental economics</b>		BT:	Industry applications
BT:	Economics	RT:	Environmental
	Environmental factors	economics	
RT:	Energy resources		Environmental
	Environmental	engineering	
management			Global warming
	Pollution		International
NT:	Carbon tax	collaboration	
			Low-carbon economy
<b>Environmental engineering</b>			Public infrastructure
BT:	Engineering - general		Sanitary engineering
RT:	Environmental factors	NT:	Biodegradation
	Environmental		Dams
management			Land use planning
	Resource management		Pest control
			Pollution control
<b>Environmental factors</b>			Recycling
UF:	Environmental problems		Renewable energy
BT:	Geoscience and remote	sources	
sensing			Sustainable
	Social implications of	development	
technology			Waste management
RT:	Acoustic noise		Water conservation
	Air quality		Water resources
	Civil engineering		
	Ecodesign	<b>Environmental monitoring</b>	
	Electromagnetic	BT:	Environmental factors
interference			Monitoring
	Environmental	RT:	Decontamination
engineering			Pollution control
	Green buildings		Pollution measurement





# 2019 IEEE Thesaurus

## *Environmental noise*

USE: Working environment  
noise

## *Environmental problems*

USE: Environmental factors

## **Environmentally friendly manufacturing techniques**

BT: Components, packaging,  
and manufacturing technology

## *Enzymatic fuel cells*

USE: Fuel cells

## *Enzymes*

USE: Biochemistry

## *EO waveguides*

USE: Electrooptical  
waveguides

## *EOG*

USE: Electrooculography

## *EOS*

USE: Earth Observing System

## *Epidermal*

USE: Epidermis

## **Epidermis**

UF: Epidermal  
BT: Skin

## **Epilepsy**

BT: Diseases

## **Epitaxial growth**

UF: Epitaxy  
BT: Thin films  
RT: Crystal growth  
Crystals  
Gallium  
Germanium  
Molecular beams  
Nanotechnology  
Photonics  
Semiconductor devices  
Semiconductor thin

films

Silicon  
Substrates

NT: Molecular beam  
epitaxial growth

## **Epitaxial layers**

BT: Coatings  
Films  
RT: Chemical vapor  
deposition  
Semiconductor growth  
Thin films  
NT: Superconducting  
epitaxial layers

## *Epitaxy*

USE: Epitaxial growth

## **EPON**

UF: Ethernet passive  
optical networks  
BT: Ethernet  
RT: Passive optical  
networks

## **Epoxy resins**

BT: Dielectric materials  
Plastics  
Resins

## **EPROM**

UF: EAROM  
EEPROM  
Electrically alterable  
read only memory  
Electrically erasable  
programmable read only memory  
Erasable programmable  
read only memory  
BT: PROM

## *Epublishing*

USE: Electronic publishing

## **Equal opportunities**

BT: Human resource  
management  
RT: Industrial relations  
Labor resources  
Personnel  
Recruitment  
NT: Gender equity  
Gender issues

## *Equalisers*

USE: Equalizers



# 2019 IEEE Thesaurus

## Equalizers

UF: Equalisers  
BT: Filters  
RT: Channel estimation  
Impedance matching  
Intersymbol

interference

NT: Adaptive equalizers  
Blind equalizers  
Decision feedback

equalizers

## Equations

BT: Mathematics  
NT: Boltzmann equation  
Difference equations  
Integrodifferential

equations

Maxwell equations  
Nonlinear equations  
Polynomials  
Riccati equations

## Equipment failure

BT: Failure analysis

## Equivalent circuits

BT: Circuits

*Er*

USE: Erbium

## *Er-doped fiber amplifier*

USE: Erbium-doped fiber  
amplifiers

## *Er-doped fiber Lasers*

USE: Erbium-doped fiber  
lasers

## *Erasable programmable read only memory*

USE: EPROM

## Erbium

UF: Er  
BT: Metals  
RT: Erbium-doped fiber

amplifiers

Lasers and

electrooptics

Optical amplifiers  
Optics

## Erbium-doped fiber amplifiers

UF: EDFA  
Er-doped fiber

amplifier

BT: Optical amplifiers  
RT: Erbium

## *Erbium-doped fiber Laser*

USE: Erbium-doped fiber  
lasers

## Erbium-doped fiber lasers

UF: Er-doped fiber lasers  
Erbium-doped fiber

laser

Erbiumdoped fiber

laser

BT: Fiber lasers

## *Erbiumdoped fiber Laser*

USE: Erbium-doped fiber  
lasers

## *Erection*

USE: Construction

## Ergonomics

UF: Human engineering  
Human factors

engineering

BT: Systems, man, and

cybernetics

RT: Anthropometry  
Behavioral sciences  
Cybernetics  
Design methodology  
Human factors  
Keyboards  
Man-machine systems  
Occupational health  
Working environment

noise

NT: Job design

## Error analysis

UF: Error estimation  
Error rate  
Error rates  
Error statistics

BT: Testing

RT: Cyclic redundancy

check

Cyclic redundancy

check codes



# 2019 IEEE Thesaurus

	Error correction	BT:	Probability
	Estimation		
methods	Mean square error	<i>Error rate</i>	
		USE:	Error analysis
	Measurement errors		
	Numerical analysis	<i>Error rates</i>	
	Roundoff errors	USE:	Error analysis
NT:	Bit error rate		
effects	Finite wordlength	<i>Error recovery (computers)</i>	
		USE:	System recovery
<b>Error compensation</b>		<i>Error statistics</i>	
BT:	Information theory	USE:	Error analysis
RT:	Error correction		
<i>Error correcting codes</i>		<i>Error-correcting codes</i>	
USE:	Error correction codes	USE:	Error correction codes
<b>Error correction</b>		<i>Error-correction codes</i>	
BT:	Signal processing	USE:	Error correction codes
RT:	Codes		
	Convolutional codes	<b>Error-free operations</b>	
	Cyclic redundancy	UF:	Error free operation
check		BT:	Testing
check codes	Cyclic redundancy	<i>Errorcorrection codes</i>	
		USE:	Error correction codes
	Error analysis		
	Error compensation	<b>Escalators</b>	
	Error correction codes	BT:	Transportation
	Linear codes	RT:	Buildings
	Power system faults		Mechanical products
	Product codes		
	Turbo codes	<i>ESD</i>	
NT:	Forward error	USE:	Electrostatic
correction		discharges	
<b>Error correction codes</b>		<b>Esophagus</b>	
UF:	ECC	BT:	Digestive system
	Error correcting codes		
	Error-correcting codes	<b>Estimation</b>	
	Error-correction codes	UF:	Signal estimation
	Errorcorrection codes	BT:	Mathematics
BT:	Codes	RT:	Control systems
RT:	Convolutional codes		Error analysis
	Error correction		Filtering theory
NT:	Reed-Solomon codes		Kalman filters
			Measurement
<i>Error estimation</i>		uncertainty	
USE:	Error analysis		Prediction methods
<i>Error free operation</i>			Prediction theory
USE:	Error-free operations		Reduced order systems
			Signal processing
<b>Error probability</b>			Spectral analysis
		NT:	Estimation error



# 2019 IEEE Thesaurus

	Estimation theory		Energy efficient
	Functional point	ethernet	
analysis			
	Life estimation	<i>Ethernet passive optical networks</i>	
	Maximum likelihood	USE: EPON	
estimation			
	Pose estimation	<b>Ethical aspects</b>	
	State estimation	BT: Social implications of	
	Yield estimation	technology	
		RT: Digital divide	
<b>Estimation error</b>		Ethics	
BT: Estimation		Genetic engineering	
		Legal factors	
<i>Estimation of the direction of arrival</i>		Management	
USE: Direction-of-arrival		Philosophical	
estimation		considerations	
<b>Estimation theory</b>		<b>Ethics</b>	
BT: Estimation		UF: Morals	
RT: Mean square error		BT: Social implications of	
methods		technology	
	Signal processing	RT: Engineering profession	
	Statistics	Ethical aspects	
NT: Cramer-Rao bounds		General Data	
	Maximum a posteriori	Protection Regulation	
estimation		NT: Cyberethics	
<i>Etalons</i>		<i>Ethyl alcohol</i>	
USE: Interferometers		USE: Ethanol	
<b>Etching</b>		<b>ETSI</b>	
UF: Deep etching		UF: European	
BT: Materials processing		Telecommunications Standards Institute	
	Surface treatment	BT: Standards	
RT: Fabrication		organizations	
	Micromachining		
NT: Dry etching		<b>ETSI Standards</b>	
	Wet etching	BT: Standards publications	
		NT: HbbTV Standards	
		SONET	
<b>Ethanol</b>		Synchronous digital	
UF: Ethyl alcohol			
	Grain alcohol	hierarchy	
BT: Chemical compounds			
NT: Alcoholic beverages		<b>Euclidean distance</b>	
		UF: Euclidean measurement	
<i>EtherEEE</i>		Euclidean metric	
USE: Energy efficient		BT: Distance measurement	
ethernet		Mathematics	
		NT: Hilbert space	
<b>Ethernet</b>			
BT: Computer networks		<i>Euclidean measurement</i>	
RT: IEEE 802.3 Standard		USE: Euclidean distance	
	Local area networks		
NT: EPON		<i>Euclidean metric</i>	





# 2019 IEEE Thesaurus

BT: User interfaces	BT: Human computer interaction
<i>Expectation-maximisation algorithms</i>	Man-machine systems
USE: Expectation-maximization algorithms	Virtual reality
	RT: Augmented reality
<b>Expectation-maximization algorithms</b>	<i>Extensible Markup Language</i>
UF: Expectation-maximisation algorithms	USE: XML
BT: Iterative methods	<b>External stimuli</b>
<b>Expert systems</b>	UF: PhysiStimuli
BT: Knowledge based systems	BT: Interactive systems
	Physiology
RT: Cause effect analysis	<b>Extinction coefficients</b>
Decision making	BT: Optics
Intelligent systems	NT: Extinction ratio
Knowledge acquisition	<b>Extinction ratio</b>
Knowledge	BT: Extinction coefficients
representation	
NT: Diagnostic expert systems	<i>Extra solar planets</i>
Medical expert systems	USE: Extrasolar planets
<b>Explosion protection</b>	<i>Extra-solar planets</i>
BT: Protection	USE: Extrasolar planets
Safety	
RT: Accident prevention	<b>Extracellular</b>
Flammability	BT: Cells (biology)
Hazards	
Military equipment	<b>Extranets</b>
<b>Explosions</b>	BT: Virtual private networks
BT: Hazards	RT: Data communication
RT: Accidents	Information systems
Chemical hazards	Internet
Flammability	Web sites
Hazardous areas	
Safety	<b>Extraordinary magnetoresistance</b>
Seismic waves	BT: Magnetoresistance
NT: Explosives	
<b>Explosives</b>	<b>Extrapolation</b>
BT: Explosions	BT: Approximation methods
	RT: Statistics
<b>Exponential distribution</b>	<b>Extrasolar planetary atmospheres</b>
BT: Probability distribution	BT: Extrasolar planets
<i>Extended definition TV</i>	<b>Extrasolar planetary mass</b>
USE: HDTV	BT: Extrasolar planets
<b>Extended reality</b>	<b>Extrasolar planets</b>
UF: HumanXR	UF: Exo planets



# 2019 IEEE Thesaurus

	Exo-planets	UF:	Goggles
	Exoplanets	BT:	Safety devices
	Extra solar planets	RT:	Occupational health
	Extra-solar planets		Occupational safety
	Super earths		Protective clothing
BT:	Astronomy		Safety
RT:	Extraterrestrial		
measurements	Extraterrestrial	<b>Eyebrows</b>	
		BT:	Hair
phenomena		<b>Eyelashes</b>	
NT:	Extrasolar planetary	BT:	Eyes
atmospheres	Extrasolar planetary		Hair
mass		<b>Eyelids</b>	
		BT:	Eyes
<b>Extraterrestrial measurements</b>		<b>Eyes</b>	
UF:	Planetary composition	BT:	Sense organs
	Space measurements	RT:	Electrooculography
BT:	Measurement		Gaze tracking
RT:	Astronomy		Optical coherence
	Extrasolar planets		
	Extraterrestrial	tomography	
phenomena	Interstellar chemistry	NT:	Cataracts
			Cornea
<b>Extraterrestrial phenomena</b>			Eyelashes
UF:	Space phenomena		Eyelids
BT:	Geophysics		Iris
RT:	Extrasolar planets		Retina
	Extraterrestrial		
measurements	Planets	<b>FAA</b>	
	Space technology	UF:	Federal Aviation
NT:	Cosmic rays	Administration	
	Solar radiation	BT:	US Government agencies
<b>Extreme ultraviolet lithography</b>		<b>Fabrication</b>	
UF:	EUV Lithography	UF:	Fabrication process
BT:	Lithography	BT:	Manufacturing
		RT:	Etching
			Materials processing
<b>Extremities</b>		NT:	Bonding processes
BT:	Body regions		Microfabrication
NT:	Arms		Optical device
	Buttocks	fabrication	
	Elbow		Soldering
	Fingers		Welding
	Foot	<i>Fabrication process</i>	
	Hip	USE:	Fabrication
	Knee	<b>Fabrics</b>	
	Leg	UF:	Knitted fabric
	Shoulder	composites	
	Thigh		

## Eye protection



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# 2019 IEEE Thesaurus

composites	Woven fabric	<i>Facial recognition</i>	
BT:	Textiles	USE:	Face recognition
RT:	Clothing		
	Weaving	<b>Facilities management</b>	
	Wool	BT:	Building services
<b>Fabry-Perot</b>			Management
BT:	Interferometry		Organizational aspects
NT:	Fabry-Perot	<b>Facsimile</b>	
interferometers		BT:	Communication systems
			Image communication
<b>Fabry-Perot interferometers</b>		<i>Factories</i>	
BT:	Fabry-Perot	USE:	Production facilities
<b>Face</b>		<i>Factory automation</i>	
BT:	Head	USE:	Manufacturing
RT:	Stomatognathic system	automation	
NT:	Facial muscles		
<b>Face detection</b>		<i>FACTS</i>	
BT:	Computer vision	USE:	Flexible AC
RT:	Facial animation	transmission systems	
NT:	Facial features		
<b>Face recognition</b>		<b>Fading channels</b>	
UF:	Facial recognition	BT:	Signal processing
BT:	Biometrics (access	RT:	Diversity methods
control)			Diversity schemes
	Identification of		Meteorological factors
persons			Multipath channels
	Pattern recognition	NT:	Radio propagation
RT:	Gaze tracking	fading channels	Frequency-selective
	Image recognition		Rayleigh channels
<b>Facebook</b>			Weibull fading
BT:	Social network	channels	
services		<b>Failure analysis</b>	
	Video sharing	UF:	Failure analytics
	Web sites		Failure mechanisms
<b>Facial animation</b>		BT:	Testing
BT:	Animation	RT:	Cause effect analysis
RT:	Face detection		Diagnostic expert
<i>Facial attributes</i>		systems	
USE:	Facial features		Fatigue
<b>Facial features</b>			Fault diagnosis
UF:	Facial attributes	methods	Fault trees
BT:	Face detection		Green's function
<b>Facial muscles</b>			Life estimation
BT:	Face	assessment	Quality control
			Reliability
			Remaining life





# 2019 IEEE Thesaurus

breakdown	NT:	Weibull distribution Equipment failure Semiconductor device	RT:	Belts Couplings Joining processes Welding
<i>Failure analytics</i>			<i>Fastening</i>	
	USE:	Failure analysis	USE:	Joining processes
<i>Failure mechanisms</i>			<b>Fatigue</b>	
	USE:	Failure analysis	BT:	Mechanical factors
<b>Fans</b>	BT:	Machinery Ventilation	RT:	Failure analysis Life estimation
	RT:	Air conditioning Blades Jet engines	<b>Fats</b>	
			BT:	Chemical products Food products
			RT:	Biological materials Lipidomics Oils
<b>Faraday effect</b>			<b>Fault current limiters</b>	
	UF:	Faraday rotation	BT:	Current limiters
	BT:	Magnetooptic effects	<b>Fault currents</b>	
	RT:	Gyromagnetism Gyrotropism	BT:	Current
<i>Faraday rotation</i>			RT:	Electric breakdown Grounding Leakage currents
	USE:	Faraday effect	NT:	Fault protection
<b>Fascia</b>			<b>Fault detection</b>	
	BT:	Musculoskeletal system	BT:	System analysis and design
<b>Fast Fourier transforms</b>			<b>Fault diagnosis</b>	
	BT:	Fourier transforms	BT:	Reliability
	RT:	Digital signal processing	RT:	Cause effect analysis Diagnostic expert systems
		Harmonic analysis		Failure analysis Maintenance
<b>Fast light</b>			engineering	Testing
	BT:	Light sources	NT:	Dissolved gas analysis Fault location
<b>Fastbus</b>			<b>Fault location</b>	
	BT:	Data acquisition	BT:	Fault diagnosis
	RT:	Data buses Data communication Data processing Nuclear measurements	RT:	Cables Communication cables Fault trees Insulation testing
<b>Fasteners</b>			<b>Fault protection</b>	
	UF:	Bolts Hinges Nuts (fasteners) Screws Zip fasteners		
	BT:	Control equipment Mechanical products		



# 2019 IEEE Thesaurus

BT:	Electrical safety Fault currents	<i>FDM</i>	USE:	Frequency division multiplexing
Fault tolerance		<i>FDMA</i>	USE:	Frequency division multiaccess
UF:	System resilience			
BT:	Reliability			
NT:	Fault tolerant control Redundancy	<i>FDTD</i>	USE:	Finite difference methods AND Time-domain analysis
Fault tolerant control				
BT:	Control systems Fault tolerance	<i>Fe</i>	USE:	Iron
Fault tolerant systems design	BT: System analysis and	Feathers	BT:	Animal structures
Fault trees		Feature detection	BT:	Computer vision Image processing
BT:	Risk analysis		RT:	Feature extraction Saliency detection
RT:	Boolean functions Failure analysis Fault location			
FBAR		Feature extraction	BT:	Image processing
USE:	Film bulk acoustic resonators		RT:	Blob detection Feature detection Image annotation Image edge detection Image recognition Independent component analysis
FBARs				Mixture models Pattern classification Pattern recognition Principal component analysis
USE:	Film bulk acoustic resonators			Saliency detection Signal processing Speech recognition
FBT		Federal Aviation Administration	USE:	FAA
USE:	Flyback transformers	Federal Communications Commission	USE:	FCC
FCC		Federated search		
UF:	Federal Communications Commission	Federated searching	USE:	Metasearch
BT:	US Government agencies			
FDA				
UF:	Food and Drug Administration			
BT:	US Government agencies			
FDDI				
UF:	Fiber distributed data interface			
BT:	Communication systems Optical fiber communication standards			
RT:	Communication Local area networks			



# 2019 IEEE Thesaurus

## Feedback

UF: Saturation detection  
 BT: Circuits  
 Control systems  
 RT: Control design  
 Positive train control  
 SIMO communication  
 Scrum (Software  
 development)  
 System dynamics  
 NT: Feedback circuits  
 Negative feedback  
 Neurofeedback

## Feedback amplifiers

UF: NFB  
 Negative feedback  
 amplifier  
 BT: Operational amplifiers

## Feedback circuits

UF: Circuit feedback  
 BT: Feedback  
 RT: Control theory  
 Distributed feedback  
 devices  
 Feedback  
 communications  
 NT: Output feedback

## Feedback communications

BT: Telecommunications  
 RT: Feedback circuits  
 NT: Automatic repeat  
 request  
 Feedback control  
 Feedback loop

## Feedback control

BT: Feedback  
 communications  
 NT: Windup

## Feedback linearization

BT: Control nonlinearities  
 Control systems

## Feedback loop

BT: Feedback  
 communications  
 NT: Negative feedback  
 loops

## Feedforward neural nets

USE: Feedforward neural  
 networks

## Feedforward neural networks

UF: Feedforward neural  
 nets  
 BT: Neural networks  
 RT: Artificial  
 intelligence  
 Pattern recognition  
 Self-organizing  
 feature maps  
 Support vector  
 machines  
 NT: Multilayer perceptrons

## Feedforward systems

BT: Intelligent control  
 RT: Forward error  
 correction  
 Open loop systems

## Feeds

BT: Antennas  
 NT: Antenna feeds

## FEM

USE: Finite element  
 analysis

## Femtocell networks

UF: Access point base  
 station  
 BT: Cellular networks  
 RT: Base stations

## Femtocells

BT: Base stations

## Ferrimagnetic films

BT: Ferrimagnetic  
 materials  
 Films  
 Magnetic films  
 Magnetic materials  
 NT: Ferrite films  
 Garnet films

## Ferrimagnetic materials

BT: Magnetic materials  
 NT: Ferrimagnetic films  
 Ferrite films  
 Ferrites



# 2019 IEEE Thesaurus

	Garnet films		<b>Ferromagnetic materials</b>
	Garnets	BT:	Magnetic materials
<b>Ferrite devices</b>			<b>Ferromagnetic resonance</b>
BT:	Magnetic devices	BT:	Magnetic resonance
RT:	Ferrites		
	Flyback transformers	<b>Ferroresonance</b>	
	Gyrators	BT:	Power engineering
NT:	Circulators		Resonance
		RT:	Magnetic resonance
<b>Ferrite films</b>			Nonlinear magnetics
BT:	Ferrimagnetic films		
	Ferrimagnetic	<i>Fertilisers</i>	
materials		USE:	Fertilizers
	Ferrites		
	Films	<b>Fertilizers</b>	
	Magnetic films	UF:	Fertilisers
	Magnetic materials	BT:	Agriculture
		RT:	Boron
<b>Ferrites</b>			Crops
BT:	Ferrimagnetic		
materials		<b>FET circuits</b>	
	Magnetic materials	BT:	Solid state circuits
RT:	Ferrite devices	RT:	Nuclear electronics
	Gyromagnetism		Operational amplifiers
NT:	Ferrite films	NT:	FET integrated
		circuits	
<b>Ferroelectric devices</b>			JFET circuits
BT:	Dielectric devices		MESFET circuits
RT:	Ferroelectric		MODFET circuits
materials			MOSFET circuits
		<b>FET integrated circuits</b>	
<b>Ferroelectric films</b>		BT:	FET circuits
BT:	Ferroelectric		Integrated circuits
materials		RT:	Field effect
RT:	Magnetic field induced	transistors	
strain		NT:	Field effect MMIC
			MESFET integrated
<b>Ferroelectric materials</b>		circuits	
BT:	Ultrasonics,		
ferroelectrics, and frequency control		<b>Fetal heart</b>	
RT:	Dielectric materials	BT:	Heart
	Ferroelectric devices		
	Magnetic field induced	<b>Fetal heart rate</b>	
strain		BT:	Heart rate
	Pyroelectricity		
NT:	Ferroelectric films	<i>FETs</i>	
	Relaxor ferroelectrics	USE:	Field effect
		transistors	
<b>Ferrofluid</b>		<b>Fetus</b>	
UF:	LiquiFerrofluid	BT:	Embryonic structures
BT:	Fluids		
	Magnetic materials		



# 2019 IEEE Thesaurus

*FFF*

USE: Field-flow  
fractionation

*Fiber Bragg gratings*

USE: Bragg gratings

*Fiber distributed data interface*

USE: FDDI

**Fiber gratings**

UF: Fibre gratings

BT: Bragg gratings

**Fiber lasers**

UF: Fibre lasers

BT: Ring lasers

NT: Erbium-doped fiber

lasers

High power fiber

lasers

**Fiber nonlinear optics**

BT: Fiber optics

Nonlinear optics

*Fiber optic sensors*

USE: Optical fiber sensors

**Fiber optics**

UF: Fibre optics

BT: Optics

NT: Fiber nonlinear optics

Optical fibers

**Fiber reinforced plastics**

UF: Fibre reinforced

plastics

BT: Plastics

RT: Plastic insulators

*Fiber-Bragg gratings*

USE: Bragg gratings

*Fiber-in-the-loop*

USE: Optical fiber

subscriber loops

*Fibers*

USE: Textile fibers

*Fibre gratings*

USE: Fiber gratings

*Fibre Lasers*

USE: Fiber lasers

*Fibre optic sensors*

USE: Optical fiber sensors

*Fibre optics*

USE: Fiber optics

*Fibre reinforced plastics*

USE: Fiber reinforced

plastics

**Fibrillation**

BT: Medical treatment

RT: Defibrillation

NT: Atrial fibrillation

**Fibroblasts**

BT: Biological cells

**Fiducial markers**

UF: Imagemarkers

BT: Image processing

RT: Microfabrication

Semiconductor device

manufacture

**Field buses**

UF: Instrumentation buses

BT: Computer interfaces

RT: Industrial control

Local area networks

**Field effect MMIC**

BT: FET integrated

circuits

**Field effect transistors**

UF: FETs

BT: Transistors

RT: FET integrated

circuits

Graphene devices

Semiconductor devices

NT: CNTFETs

Double-gate FETs

HEMTs

JFETs

MESFETs

MISFETs

MODFETs

MOSFET

MOSHFETs



# 2019 IEEE Thesaurus

OFETs	BT:	Fractionation	
Schottky gate field			
effect transistors		<i>Field-programmable gate arrays</i>	
TFETs	USE:	Field programmable	
Thin film transistors		gate arrays	
<i>Field electron emission</i>		<b>Filament lamps</b>	
USE:	Electron emission	BT:	Lamps
		RT:	Lighting
<b>Field emitter arrays</b>		<b>File servers</b>	
BT:	Electron tubes	BT:	Computers and
RT:	Vacuum technology	information processing	
<i>Field flow fractionation</i>		RT:	Computer networks
USE:	Field-flow		Data communication
fractionation			Local area networks
<i>Field ion emission</i>		<i>File sharing</i>	
USE:	Ion emission	USE:	Peer-to-peer computing
<i>Field multiplication</i>		<i>File system permissions</i>	
USE:	Galois fields	USE:	Permission
<b>Field programmable analog arrays</b>		<b>File systems</b>	
UF:	FPAAs	BT:	System software
	Field programmable	RT:	Audio databases
analogue arrays			Data structures
BT:	Analog integrated		Database systems
circuits			Information systems
	Programmable circuits		
RT:	Application specific	<b>Fill factor (solar cell)</b>	
integrated circuits		BT:	Photovoltaic systems
	Field programmable		
gate arrays		<b>Filler metals</b>	
	Space technology	BT:	Joining materials
		RT:	Metals
<i>Field programmable analogue arrays</i>		<b>Filling</b>	
USE:	Field programmable	BT:	Freight handling
analog arrays		RT:	Containers
			Loading
<b>Field programmable gate arrays</b>			Packaging
UF:	FPGA		
	Field-programmable	<b>Film bulk acoustic resonators</b>	
gate arrays		UF:	FBAR
BT:	Integrated circuits		FBARs
RT:	Field programmable	BT:	Acoustic devices
analog arrays			Thin film devices
	Reconfigurable devices	RT:	Bulk acoustic wave
<b>Field-flow fractionation</b>		devices	
UF:	EFFF		Land mobile radio
	FFF	cellular systems	
	Field flow		Mobile communication
fractionation			Radio communication



# 2019 IEEE Thesaurus

	Resonance	RT:	Estimation
	Telecommunications		Line enhancers
<b>Films</b>			Matched filters
	BT: Materials	detection	Maximum likelihood
	RT: Chemical vapor		Transversal filters
deposition		NT:	Image filtering
	Coatings	<b>Filters</b>	
	Entertainment industry	BT:	Filtering
	Sputtering		Signal processing
	NT: Conductive films	RT:	Passive filters
	Dielectric films		Signal to noise ratio
	Epitaxial layers	NT:	Active filters
	Ferrimagnetic films		Anisotropic
	Ferrite films		Bragg gratings
	Garnet films		Channel bank filters
	Magnetic films		Digital filters
	Optical films		Equalizers
	Piezoelectric films		Filtering theory
	Plastic films		Gabor filters
	Polymer films		Harmonic filters
	Semiconductor films		IIR filters
	Thick films		Kalman filters
	Thin films		Low pass filters
<i>Films (Motion pictures)</i>			Matched filters
USE: Motion pictures			Microstrip filters
<b>Filter banks</b>			Nonlinear filters
UF: Filterbank			Notch filters
BT: Band-pass filters			Particle filters
<i>Filter-theory</i>			Power filters
USE: Filtering theory			Resonator filters
<i>Filterbank</i>			Spatial filters
USE: Filter banks			Superconducting
<b>Filtering</b>		filters	Transversal filters
BT: Circuits and systems		<b>Filtration</b>	
RT: Noise cancellation		UF: Nanofiltration	
NT: Filters		BT: Materials science and	
Information filtering		technology	
		NT: Microfiltration	
<b>Filtering algorithms</b>		<b>Finance</b>	
UF: Loop-filtering		UF: Taxes	
algorithm		BT: Financial management	
		RT: Banking	
		Bitcoin	
		Business	
		Cryptocurrency	
		Economics	
		NT: Bankruptcy	
		Currencies	
<b>Filtering theory</b>			
UF: Filter-theory			
BT: Filters			



# 2019 IEEE Thesaurus

## Financial management

UF: Financial planning  
Money management  
BT: Management  
RT: Electronic commerce  
Profitability  
Public finance  
NT: Costing  
Credit cards  
Finance  
Insurance  
Investment  
Loans and mortgages  
Management accounting  
Mutual funds  
Pricing  
Venture capital

## Financial planning

USE: Financial management

## FinFETs

BT: MOSFET

## Fingerprint identification

USE: Fingerprint  
recognition

## Fingerprint images

USE: Image matching

## Fingerprint indexing

USE: Fingerprint  
recognition

## Fingerprint matching

USE: Fingerprint  
recognition

## Fingerprint modality

USE: Fingerprint  
recognition

## Fingerprint recognition

UF: Fingerprint  
identification  
Fingerprint indexing  
Fingerprint matching  
Fingerprint modality  
Fingerprint sensing  
Fingerprint sensors  
Fingerprint  
verification  
Fingerprinting

BT: Biometrics (access  
control)  
Identification of  
persons  
Pattern recognition  
RT: Image matching

## Fingerprint sensing

USE: Fingerprint  
recognition

## Fingerprint sensors

USE: Fingerprint  
recognition

## Fingerprint verification

USE: Fingerprint  
recognition

## Fingerprinting

USE: Fingerprint  
recognition

## Fingers

BT: Extremities  
NT: Thumb

## Finishing

BT: Surface treatment  
RT: Machining  
Materials processing  
Planing  
NT: Surface finishing

## Finite difference methods

UF: FDTD  
Finite difference time  
domain analysis  
Finite difference time  
domain methods  
Finite-difference  
methods  
Finite-difference  
time-domain methods  
BT: Mathematics  
Numerical analysis  
RT: Computational  
electromagnetics  
Perfectly matched  
layers  
Finite difference time domain analysis  
USE: Finite difference  
methods





# 2019 IEEE Thesaurus

## *Finite difference time domain methods*

USE: Finite difference methods

## **Finite element analysis**

UF: Discrete element method  
FEM  
Finite element methods  
Finite element

modeling

Finite element

modelling

Finite-element

analysis

Finite-element methods  
Finite-element

modeling

Finite-element

modelling

BT: Mathematics  
Numerical analysis  
RT: Eddy current testing  
Perfectly matched

layers

## *Finite element methods*

USE: Finite element analysis

## *Finite element modeling*

USE: Finite element analysis

## *Finite element modelling*

USE: Finite element analysis

## *Finite fields*

USE: Galois fields

## **Finite impulse response filters**

UF: FIR  
FIR filters  
BT: Digital filters  
RT: Discrete wavelet transforms  
Frequency response

## *Finite state machines*

USE: Automata

## **Finite volume methods**

UF: Finite-volume method  
BT: Numerical analysis  
RT: Navier-Stokes

equations

## **Finite wordlength effects**

UF: Overflow oscillations  
Truncation errors  
BT: Error analysis  
RT: Quantization (signal)  
NT: Roundoff errors

## *Finite-difference methods*

USE: Finite difference methods

## *Finite-difference time-domain methods*

USE: Finite difference methods

## *Finite-element analysis*

USE: Finite element analysis

## *Finite-element methods*

USE: Finite element analysis

## *Finite-element modeling*

USE: Finite element analysis

## *Finite-element modelling*

USE: Finite element analysis

## *Finite-volume method*

USE: Finite volume methods

## **Finline**

BT: Planar transmission lines

## *FIR*

USE: Finite impulse response filters

## *FIR filters*

USE: Finite impulse response filters

## **Fire extinguishers**

BT: Safety devices  
RT: Fire safety



# 2019 IEEE Thesaurus

<i>Fire retardants</i>		Kilns	
USE:	Flame retardants	<i>Firmware</i>	
<b>Fire safety</b>		USE:	Microprogramming
BT:	Safety	<b>Fish</b>	
RT:	Fire extinguishers	BT:	Organisms
<i>Fireproofing</i>		<i>Fishbone diagrams</i>	
USE:	Flame retardants	USE:	Cause effect analysis
<b>Fires</b>		<i>Fisheries</i>	
UF:	Flames	USE:	Aquaculture
	Wild fires	<b>Fission reactors</b>	
	Wildfires	UF:	Nuclear fission
BT:	Hazards		Nuclear reactors
RT:	Accidents	(fission)	
	Emergency services	BT:	Nuclear power
	Flammability	generation	
	Hazardous areas	RT:	Pressure vessels
	Safety		Radiation protection
	Smoke detectors	<b>Fitting</b>	
<b>Firewalls (computing)</b>		BT:	Assembly
BT:	Computer security	RT:	Assembly systems
RT:	Computer networks	<i>Fixed point arithmetic</i>	
	Countermeasures	USE:	Fixed-point arithmetic
(computer)		<b>Fixed-point arithmetic</b>	
	Hardware	UF:	Fixed point arithmetic
	Software	BT:	Arithmetic
<i>FireWire</i>		<b>Fixtures</b>	
USE:	Firewire	UF:	Fixturing
<b>Firewire</b>			Jigs
UF:	FireWire	BT:	Production equipment
BT:	Computer interfaces	RT:	Machine tools
RT:	Computer peripherals	<i>Fixturing</i>	
	Consumer electronics	USE:	Fixtures
	Data communication	<b>Flame retardants</b>	
	Home computing	UF:	Fire retardants
	IEEE 1394 Standard		Fireproofing
	Video signal	BT:	Retardants
processing		RT:	Bromine compounds
<b>Fireworks algorithm</b>			Flammability
BT:	Optimization methods		Materials preparation
RT:	Particle swarm	<i>Flames</i>	
optimization		USE:	Fires
<b>Firing</b>			
BT:	Materials preparation		
RT:	Ceramics		
	Heat treatment		



# 2019 IEEE Thesaurus

## Flammability

UF: Inflammability  
BT: Hazards  
RT: Explosion protection  
Explosions  
Fires  
Flame retardants  
Hazardous materials

## Flanges

BT: Mechanical products  
RT: Rails  
Structural plates  
Wheels

## Flash memories

UF: NAND flash  
BT: Memory  
RT: Automation  
Computer peripherals  
NT: Flash memory cells

## Flash memory cells

BT: Flash memories  
NT: Split gate flash

## memory cells

## Flashover

BT: Dielectric breakdown

## Flat panel displays

BT: Displays

## Flex

USE: Flexible printed circuits

## Flexible ac transmission systems

USE: Flexible AC transmission systems

## Flexible AC transmission systems

UF: FACTS  
Flexible ac transmission systems  
BT: Power transmission

## Flexible electronics

BT: Assembly systems  
RT: Graphene devices  
Soft electronics

## Flexible fuel vehicles

USE: Land vehicles

## Flexible manufacturing systems

BT: Manufacturing automation  
RT: Agile manufacturing  
Cellular manufacturing  
Computer applications

## Flexible printed circuits

UF: Flex  
BT: Printed circuits

## Flexible structures

UF: Deployable structures  
BT: Buildings  
Structural shapes  
RT: Control systems  
Decentralized control  
Mechanical variables

## control

Structural engineering

## Flickr

BT: Social network services

## Flight control

USE: Aerospace control

## Flight simulation

USE: Aerospace simulation

## Flip chip

USE: Flip-chip devices

## Flip chip solder joints

UF: Castellations  
BT: Soldering  
RT: Flip-chip devices

## Flip-chip

USE: Flip-chip devices

## Flip-chip devices

UF: Flip chip  
Flip-chip  
BT: Semiconductor device manufacture  
Semiconductor devices  
RT: Flip chip solder joints

Microassembly  
Microprocessor chips  
Microprocessors



# 2019 IEEE Thesaurus

<b>Flip-flops</b>	RT: System dynamics
BT: Pulse circuits	NT: Continuous production
RT: Logic circuits	
<i>FLL</i>	
USE: Frequency locked loops	
<i>Floating point arithmetic</i>	
USE: Floating-point arithmetic	
<b>Floating-point arithmetic</b>	
UF: Floating point arithmetic	
BT: Arithmetic	
<b>Floods</b>	
BT: Hazards	
Hydrology	
RT: Land use planning	
Rain	
Rivers	
Structural engineering	
<b>Floors</b>	
BT: Building materials	
RT: Construction industry	
Tiles	
<b>Floppy disks</b>	
BT: Magnetic memory	
<i>Flotation devices</i>	
USE: Underwater equipment	
<i>Flow</i>	
USE: Fluid flow	
<i>Flow batteries</i>	
USE: Batteries	
<b>Flow graphs</b>	
UF: Data flow graphs	
Signal flow graphs	
BT: Programmable control	
RT: Circuits	
<i>Flow meters</i>	
USE: Flowmeters	
<b>Flow production systems</b>	
UF: Sequential production	
BT: Manufacturing systems	
<b>Flowcharts</b>	
BT: Engineering drawings	
RT: Programming	
System analysis and design	
<b>Flowmeters</b>	
UF: Flow meters	
BT: Meters	
RT: Automatic meter reading	
Fluid flow	
Velocity measurement	
<b>Fluctuations</b>	
BT: Reliability	
<b>Flue gases</b>	
BT: Gases	
RT: Air pollution	
Effluents	
Exhaust gases	
<b>Fluid dynamics</b>	
BT: Fluid flow	
Fluids	
RT: Hydrodynamics	
Lattice Boltzmann	
methods	
NT: Buoyancy	
Computational fluid dynamics	
Drag	
Navier-Stokes	
equations	
Rheology	
<b>Fluid flow</b>	
UF: Flow	
Gas flow	
Liquid flow	
Smoothed particle hydrodynamics	
BT: Physics	
RT: Electrohydraulics	
Flowmeters	
Fluid flow measurement	
Fluidics	
Hydraulic systems	
Hydrodynamics	
Magnetohydrodynamics	





# 2019 IEEE Thesaurus

USE: Functional magnetic  
resonance imaging

## Focusing

BT: Imaging  
RT: Lenses

## Fog computing

USE: Edge computing

## Food and Drug Administration

USE: FDA

## Food industry

BT: Manufacturing  
industries  
RT: Beverage industry  
Consumer products  
Food preservation  
Food products  
Food technology  
Sugar industry  
Sugar refining  
NT: Food manufacturing

## Food manufacturing

BT: Food industry  
Manufacturing systems  
RT: Consumer products  
Food preservation  
Food products  
Food technology  
NT: Food packaging

## Food packaging

BT: Food manufacturing  
Packaging  
RT: Food products  
Food technology

## Food preservation

UF: Food preservatives  
BT: Food technology  
RT: Food industry  
Food manufacturing  
Food products

## Food preservatives

USE: Food preservation

## Food products

BT: Manufactured products  
Production  
RT: Agricultural products

Consumer products  
Food industry  
Food manufacturing  
Food packaging  
Food preservation  
Sugar industry  
Sugar refining  
Vegetable oils  
NT: Dairy products  
Fats  
Sugar

## Food technology

BT: Industry applications  
RT: Food industry  
Food manufacturing  
Food packaging  
Sugar refining  
NT: Food preservation

## Foot

BT: Extremities

## Football

USE: Sports

## Footprinting

BT: Information retrieval  
RT: Computer hacking  
Computer security  
Information security

## Footwear

UF: Shoes  
BT: Clothing  
RT: Clothing industry  
Footwear industry

## Footwear industry

UF: Shoe manufacture  
BT: Manufacturing  
industries  
RT: Clothing industry  
Consumer products  
Footwear

## Force

BT: Mechanical factors  
RT: Dynamics  
Force control  
Magnetic forces  
NT: Gravity

## Force control



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# 2019 IEEE Thesaurus

control	BT:	Mechanical variables	Resource management
			Vegetation
	RT:	Control systems	Vegetation mapping
		Force	Wood industry
		Robot control	
<b>Force feedback</b>			
	BT:	Haptic interfaces	
<b>Force measurement</b>			
measurement	BT:	Mechanical variables	
	RT:	Gravity	
		Pressure gauges	
	NT:	Dynamometers	
		Gravity measurement	
<b>Force sensors</b>			
	BT:	Sensors	
<b>Forebrain</b>			
	UF:	Prosencephalon	
	BT:	Brain	
	RT:	Hindbrain	
		Midbrain	
	NT:	Olfactory bulb	
<b>Forecast uncertainty</b>			
	BT:	Forecasting	
		Uncertainty	
<b>Forecasting</b>			
	BT:	Probability	
	RT:	Prediction methods	
	NT:	Demand forecasting	
		Economic forecasting	
		Forecast uncertainty	
		Technology forecasting	
<b>Forehead</b>			
	BT:	Head	
<i>Forensic photography</i>			
	USE:	Image forensics	
<b>Forensics</b>			
	BT:	Law	
	NT:	Digital forensics	
		Image forensics	
<b>Forestry</b>			
	BT:	Geoscience	
	RT:	Pulp and paper	
industry			
<b>Forgery</b>			
	UF:	Imposter signature	
generation			
	BT:	Handwriting	
recognition			
<b>Forging</b>			
	UF:	Cogging	
	BT:	Manufacturing systems	
<b>Formal concept analysis</b>			
	BT:	Mathematical analysis	
	RT:	Classification tree	
analysis			
		Data analysis	
		Knowledge	
representation			
		Unsupervised learning	
<b>Formal languages</b>			
	BT:	Computer science	
	NT:	Computer languages	
		Runtime library	
<i>Formal Logic</i>			
	USE:	Logic	
<b>Formal specifications</b>			
	BT:	Standardization	
	RT:	Service-oriented	
systems engineering			
<b>Formal verification</b>			
	BT:	Software engineering	
	RT:	Circuits and systems	
		Model checking	
<b>Forward contracts</b>			
	BT:	Contracts	
<b>Forward error correction</b>			
	BT:	Error correction	
	RT:	Feedforward systems	
<b>Fossil fuels</b>			
	BT:	Fuels	
	RT:	Air pollution	
	NT:	Natural gas	



# 2019 IEEE Thesaurus

## Foundries

BT: Production facilities  
RT: Casting  
Furnaces  
Heat treatment  
Materials processing

## Four wave mixing

USE: Four-wave mixing

## Four-wave mixing

UF: Four wave mixing  
BT: Distortion  
Optics

## Fourier series

BT: Mathematics  
RT: Data compression  
Signal processing  
Spectroscopy

## Fourier transform infrared spectra

USE: Fourier transform  
infrared spectroscopy

## Fourier transform infrared spectroscopy

UF: Fourier transform  
infrared spectra  
BT: Fourier transforms  
Spectroscopy

## Fourier transforms

BT: Transforms  
RT: Acoustics  
Cepstrum  
Diffraction  
Harmonic analysis  
Optics  
Partial differential

## equations

Probability  
Statistics  
Time-frequency

## analysis

NT: Discrete Fourier

## transforms

Fast Fourier

## transforms

Fourier transform

## infrared spectroscopy

## FPAA

USE: Field programmable

## analog arrays

## FPGA

USE: Field programmable  
gate arrays

## Fracking

USE: Fracking

## Fracking

UF: Fracking  
Hydraulic fracking  
BT: Hydrological  
techniques  
RT: Mining industry  
Natural gas

## Fractal antennas

BT: Antennas

## Fractal art

BT: Art

## Fractals

BT: Computational geometry  
RT: Antennas  
Chaos  
Computer graphics  
Econophysics

## Fractional brownian motion

USE: Brownian motion

## Fractional calculus

BT: Mathematical analysis

## Fractionation

BT: Separation processes  
RT: Chemical analysis  
Oils  
Petroleum industry  
NT: Field-flow

## fractionation

## Frame relay

BT: Communication

## switching

Packet switching  
RT: B-ISDN  
Computer networks  
ISDN  
Protocols  
Wide area networks

## Francium





# 2019 IEEE Thesaurus

BT: Chemical elements	RT: Electric variables
<b>Free electron lasers</b>	control
UF: Cerenkov lasers	Frequency locked loops
BT: Lasers	Mechanical variables
RT: Electron beams	control
Relativistic effects	Optical variables
Undulators	control
<i>Free trade</i>	Tuners
USE: Trade agreements	NT: Automatic frequency
<b>Free-space optical communication</b>	control
BT: Optical fiber	devices
communication	Tunable circuits and
<b>Freight containers</b>	Tuning
BT: Containers	<b>Frequency conversion</b>
RT: Freight handling	UF: Frequency division
Transportation	Frequency
<b>Freight handling</b>	multiplication
UF: Cargo handling	Harmonic generation
BT: Materials handling	BT: Converters
RT: Freight containers	RT: Image converters
Lifting equipment	Image intensifiers
Pulleys	NT: Mixers
Transmission line	Optical frequency
discontinuities	conversion
NT: Filling	<b>Frequency dependence</b>
Loading	UF: Frequency dependent
<b>Frequency</b>	BT: Frequency
BT: Electromagnetic	<i>Frequency dependent</i>
radiation	USE: Frequency dependence
RT: Band-pass filters	<b>Frequency diversity</b>
Electric variables	BT: Frequency
Transmission line	<i>Frequency division</i>
theory	USE: Frequency conversion
NT: Bandwidth	<b>Frequency division multiaccess</b>
Frequency dependence	UF: FDMA
Frequency diversity	BT: Multiaccess
Frequency	communication
synchronization	RT: Broadband
Resonant frequency	communication
<i>Frequency allocation</i>	<b>Frequency division multiplexing</b>
USE: Radio spectrum	UF: FDM
management	Frequency multiplexing
<b>Frequency control</b>	BT: Multiplexing
UF: Frequency regulation	<i>Frequency domain</i>
BT: Ultrasonics,	USE: Frequency-domain
ferroelectrics, and frequency control	analysis





# 2019 IEEE Thesaurus

NT: Time-frequency analysis	USE: Frequency selective surfaces
<i>Frequency-hop communication</i>	<i>FTTH</i>
USE: Spread spectrum communication	USE: Optical fiber subscriber loops
<b>Frequency-selective fading channels</b>	<i>Fuel additives</i>
BT: Fading channels	USE: Additives
<i>Frequency-shift modulation</i>	<b>Fuel cell vehicles</b>
USE: Frequency shift keying	BT: Electric vehicles
<i>Frequency-shift signaling</i>	RT: Energy storage
USE: Frequency shift keying	Fuel cells
<i>Fresnel integral</i>	Traction motors
USE: Fresnel reflection	Vehicle-to-grid
<i>Fresnel lenses</i>	<b>Fuel cells</b>
USE: Fresnel reflection	UF: Enzymatic fuel cells
<b>Fresnel reflection</b>	Microbial eletrolysis
UF: Fresnel integral	cells
Fresnel lenses	Microbial fuel cells
Fresnel zones	Solid oxide
BT: Reflection	electrolyzer cells
<i>Fresnel zones</i>	BT: Electrochemical devices
USE: Fresnel reflection	Energy conversion
<b>Friction</b>	Energy storage
BT: Mechanical factors	RT: Fuel cell vehicles
RT: Drag	Fuel storage
Dynamics	Power generation
Lubrication	<b>Fuel economy</b>
NT: Mechanical bearings	BT: Economics
<i>Friction stir processing</i>	Fuels
USE: Strain control	<b>Fuel processing industries</b>
<b>Frontal lobe</b>	UF: Coal tar
UF: BrainLobe	BT: Manufacturing industries
BT: Brain	RT: Fuel storage
<i>Froth flotation processes</i>	Fuels
USE: Manufacturing processes	Mining industry
<i>FSK</i>	Oil drilling
USE: Frequency shift keying	Oils
<i>FSS</i>	Petroleum
	Petroleum industry
	<b>Fuel pumps</b>
	BT: Pumps
	RT: Engines
	Fuels
	<b>Fuel storage</b>



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UF:	Fuel tanks		Frequency-domain
	Oil tanks	analysis	
BT:	Material storage		Inverse problems
RT:	Containers		Lyapunov methods
	Energy storage		Wave functions
	Fuel cells		
	Fuel processing	<i>Functional electrical stimulation</i>	
industries		USE:	Neuromuscular
	Fuels	stimulation	
<i>Fuel tanks</i>		<b>Functional magnetic resonance imaging</b>	
USE:	Fuel storage	UF:	fMRI
		BT:	Magnetic resonance
<b>Fuels</b>		imaging	
BT:	Energy resources	RT:	Biomedical image
	Manufactured products	processing	
RT:	Coal gas		
	Fuel processing	<b>Functional neuroimaging</b>	
industries		BT:	Neuroimaging
	Fuel pumps		
	Fuel storage	<b>Functional point analysis</b>	
	Methanol	BT:	Estimation
	Petrochemicals		Size measurement
	Waste materials	RT:	Cost benefit analysis
NT:	Biofuels		Software engineering
	Coal		
	Fossil fuels	<b>Functional programming</b>	
	Fuel economy	BT:	Programming
	Nuclear fuels	RT:	Python
	Petroleum		
<b>Fullerenes</b>		<b>Fungi</b>	
UF:	Buckeyballs	BT:	Organisms
	Buckminsterfullerene		
	Buckyballs	<b>Furnaces</b>	
	Buckytubes	BT:	Machinery
	CarboFullerene	RT:	Building services
	Fullerites		Foundries
BT:	Carbon		Gas appliances
			Heating systems
<i>Fullerites</i>		NT:	Blast furnaces
USE:	Fullerenes		Kilns
		<i>Further education</i>	
<b>Function approximation</b>		USE:	Continuing education
BT:	Approximation methods		
RT:	Computer science	<b>Fuses</b>	
<i>Function generators</i>		BT:	Electronic components
USE:	Signal generators	RT:	Interrupters
			Power system
<b>Functional analysis</b>		protection	
BT:	Mathematics		Protection
RT:	Eigenvalues and		Switchgear
eigenfunctions		<b>Fusion power generation</b>	



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sciences	BT: Nuclear and plasma	NT: Fuzzy cognitive maps Takagi-Sugeno model
generation	Nuclear power	<i>Fuzzy neural nets</i>
	RT: Fusion reactors Magnetic confinement	USE: Fuzzy neural networks
<b>Fusion reactor design</b>		<b>Fuzzy neural networks</b>
	BT: Fusion reactors	UF: Fuzzy neural nets Neuro fuzzy networks Neuro-fuzzy networks
<b>Fusion reactors</b>		BT: Fuzzy systems
(fusion)	UF: Nuclear reactors	<b>Fuzzy reasoning</b>
	Thermonuclear fusion	BT: Inference mechanisms
sciences	BT: Nuclear and plasma	RT: Fuzzy logic
generation	RT: Fusion power	<b>Fuzzy set theory</b>
	NT: Fusion reactor design Tokamaks	BT: Set theory
<i>Fusion splicing</i>		RT: Fuzzy sets Fuzzy systems Power system faults TOPSIS
	USE: Splicing	<b>Fuzzy sets</b>
<i>Futurism</i>		BT: Set theory
	USE: Technology forecasting	RT: Fuzzy control Fuzzy logic Fuzzy set theory Fuzzy systems Nonlinear dynamical
<i>Fuzz testing</i>		systems
	USE: Fuzzing	Uncertainty
<b>Fuzzing</b>		<b>Fuzzy systems</b>
	UF: Fuzz testing	BT: Computational
	BT: Software testing	intelligence
<b>Fuzzy cognitive maps</b>		RT: Fuzzy logic Fuzzy set theory Fuzzy sets Large-scale systems Takagi-Sugeno model
	BT: Fuzzy logic	NT: Fuzzy control Fuzzy neural networks Hybrid intelligent
<b>Fuzzy control</b>		systems
	BT: Fuzzy systems	<i>Ga</i>
	RT: Fuzzy logic	USE: Gallium
	Fuzzy sets	<i>GaAs</i>
	Takagi-Sugeno model	USE: Gallium arsenide
<i>Fuzzy inference</i>		<b>Gabor filters</b>
	USE: Fuzzy logic	BT: Filters
<b>Fuzzy logic</b>		
	UF: Fuzzy inference	
	BT: Logic	
	RT: Fuzzy control Fuzzy reasoning Fuzzy sets Fuzzy systems Possibility theory	



# 2019 IEEE Thesaurus

RT:	Image processing		
<b>Gadolinium</b>		<b>Gallium alloys</b>	
BT:	Chemical elements	BT:	Gallium
NT:	Gadolinium oxide	RT:	Alloying
			Wide band gap
<b>Gadolinium oxide</b>			semiconductors
BT:	Gadolinium	<b>Gallium arsenide</b>	
<b>Gain</b>		UF:	GaAs
BT:	Electric variables		Gallium-arsenide
			Gallium-arsenide
<b>Gain control</b>		(GaAs)	
UF:	Automatic gain control	BT:	Gallium compounds
BT:	Electric variables		Semiconductor
control			materials
<b>Gain measurement</b>		<b>Gallium compounds</b>	
BT:	Measurement	UF:	Gallium devices
RT:	Electric variables		Gallium materials
measurement		BT:	Compounds
	Refractive index	RT:	Alloying
<i>Gait assessment</i>			Gallium
USE:	Legged locomotion	NT:	Aluminum gallium
<i>Gait control</i>		nitride	
USE:	Legged locomotion		Gallium arsenide
			Gallium nitride
<i>Gait disorders</i>			Indium gallium
USE:	Legged locomotion	arsenide	
			Indium gallium nitride
<b>Gait recognition</b>		<i>Gallium devices</i>	
BT:	Biometrics (access	USE:	Gallium compounds
control)		<i>Gallium materials</i>	
<i>Galerkin method</i>		USE:	Gallium compounds
USE:	Method of moments	<b>Gallium nitride</b>	
		BT:	Gallium compounds
<b>Gallbladder</b>		<i>Gallium-arsenide</i>	
BT:	Digestive system	USE:	Gallium arsenide
<b>Gallium</b>		<i>Gallium-arsenide (GaAs)</i>	
UF:	Ga	USE:	Gallium arsenide
BT:	Metals		
	Semiconductor	<b>Galois fields</b>	
materials		UF:	Field multiplication
RT:	Epitaxial growth		Finite fields
	Gallium compounds	BT:	Abstract algebra
	Molecular beam	<i>Galvanising</i>	
epitaxial growth		USE:	Galvanizing
	Semiconductor thin		
films		<b>Galvanizing</b>	
NT:	Gallium alloys		



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UF:	Galvanising	<i>Gamma rays</i>	
BT:	Surface treatment	USE:	Gamma-rays
RT:	Corrosion		
	Corrosion inhibitors	<b>Gamma-ray bursts</b>	
	Protection	UF:	Cosmic gamma ray
<b>Game theory</b>		bursts	
BT:	Decision making		Gamma ray bursters
RT:	Control systems		Gamma ray bursts
	Games	BT:	Gamma-rays
	Minimax techniques	<b>Gamma-ray detection</b>	
	Oligopoly	UF:	Gamma ray detection
	Optimal control	BT:	Gamma-rays
	Predator prey systems	<b>Gamma-ray detectors</b>	
NT:	Nash equilibrium	UF:	Gamma radiation
<b>Games</b>		detectors	
UF:	Serious games		Gamma ray detectors
	Video games	BT:	Radiation detectors
	video-game	RT:	Astronomy
BT:	Consumer products		Biomedical
RT:	Entertainment industry	applications of radiation	
	Game theory		X-ray detectors
	Sports		X-ray imaging
NT:	Cloud gaming	<b>Gamma-ray effects</b>	
<i>Gaming on demand</i>		UF:	Gamma ray effects
USE:	Cloud gaming	BT:	Gamma-rays
			Radiation effects
<b>Gamma distribution</b>		<i>Gamma-ray imaging</i>	
BT:	Statistics	USE:	Nuclear imaging
RT:	Probability	<b>Gamma-rays</b>	
<i>Gamma phase iron</i>		UF:	Gamma rays
USE:	Austenite	BT:	Electromagnetic
<i>Gamma radiation detectors</i>		radiation	
USE:	Gamma-ray detectors		Nuclear and plasma
<i>Gamma ray bursters</i>		sciences	
USE:	Gamma-ray bursts	RT:	Collimators
			Nuclear medicine
<i>Gamma ray bursts</i>		NT:	Gamma-ray bursts
USE:	Gamma-ray bursts		Gamma-ray detection
			Gamma-ray effects
<i>Gamma ray detection</i>		<b>GAN</b>	
USE:	Gamma-ray detection	USE:	Generative adversarial
		networks	
<i>Gamma ray detectors</i>		<b>Ganglia</b>	
USE:	Gamma-ray detectors	UF:	Ganglion
		BT:	Cells (biology)
<i>Gamma ray effects</i>			Nervous system
USE:	Gamma-ray effects		



# 2019 IEEE Thesaurus

<i>Ganglion</i>	USE: Discharges (electric)
USE: Ganglia	
<i>Garbage collection (computers)</i>	<i>Gas flow</i>
USE: Memory management	USE: Fluid flow
<i>Garment industry</i>	<b>Gas industry</b>
USE: Clothing industry	BT: Industries
	RT: Petroleum industry
<i>Garments</i>	<i>Gas insulated switchgear</i>
USE: Clothing	USE: Gas insulation
<b>Garnet films</b>	<b>Gas insulated transmission lines</b>
BT: Ferrimagnetic films	UF: GITL
Ferrimagnetic	Gas-insulated lines
materials	Gas-insulated
Films	transmission
Garnets	BT: Power transmission
Magnetic films	lines
Magnetic materials	RT: Gas insulation
<b>Garnets</b>	<b>Gas insulation</b>
BT: Ferrimagnetic	UF: Gas insulated
materials	switchgear
Magnetic materials	BT: Insulation
NT: Garnet films	RT: Gas insulated
<b>Gas appliances</b>	transmission lines
BT: Home appliances	Gases
RT: Furnaces	NT: Sulfur hexafluoride
Space heating	
<b>Gas chromatography</b>	<b>Gas lasers</b>
BT: Measurement	UF: Atomic lasers
	Metal vapor lasers
<b>Gas detectors</b>	BT: Lasers
UF: Gas sensors	RT: Atom lasers
BT: Chemical and	Chemical lasers
biological sensors	Gases
RT: Chemical transducers	<i>Gas platforms</i>
NT: Amperometric sensors	USE: Offshore installations
<b>Gas discharge devices</b>	<i>Gas sensors</i>
BT: Nuclear and plasma	USE: Gas detectors
sciences	<i>Gas-insulated lines</i>
RT: Discharges (electric)	USE: Gas insulated
Electrophotography	transmission lines
Gases	<i>Gas-insulated transmission</i>
Lighting	USE: Gas insulated
Plasma devices	transmission lines
Thyratrons	
NT: Glow discharge devices	<b>Gases</b>
<i>Gas discharges</i>	BT: Fluids





# 2019 IEEE Thesaurus

RT:	Discharges (electric)		
	Gas discharge devices	<i>GATT</i>	
	Gas insulation	USE:	Trade agreements
	Gas lasers		
technology	Materials science and	<b>Gaussian approximation</b>	
	Natural gas	BT:	Gaussian distribution
NT:	Argon	<b>Gaussian channels</b>	
	Carbon emissions	BT:	Communication channels
	Coal gas	RT:	Intersymbol
	Exhaust gases	interference	
	Flue gases	NT:	AWGN channels
	Helium	<b>Gaussian distribution</b>	
	Hydrogen	UF:	Normal distribution
	Nitrogen	BT:	Statistical
	Oxygen	distributions	
	Syngas	NT:	Gaussian approximation
	Xenon		
<b>Gaskets</b>		<b>Gaussian mixture model</b>	
BT:	Seals	BT:	Gaussian processes
RT:	Engine cylinders		Statistics
	Engines		
	Pistons	<b>Gaussian noise</b>	
<i>Gasoline</i>		BT:	Noise
USE:	Petroleum	RT:	Additive white noise
			Image denoising
			Signal processing
<i>Gastroenterologists</i>			TV interference
USE:	Gastroenterology	NT:	AWGN
<b>Gastroenterology</b>		<b>Gaussian processes</b>	
UF:	Gastroenterologists	BT:	Stochastic processes
BT:	Medical specialties	RT:	Inference mechanisms
<i>Gastrointestinal</i>			Learning (artificial
USE:	Gastrointestinal tract	intelligence)	
		NT:	Prediction methods
<b>Gastrointestinal tract</b>			Gaussian mixture model
UF:	Gastrointestinal	<b>Gaze tracking</b>	
BT:	Digestive system	BT:	Control systems
			Human computer
<b>Gate drivers</b>		interaction	
BT:	Power electronics	RT:	Assistive technology
RT:	High power amplifiers		Computer vision
	MOSFET		Eyes
			Face recognition
<b>Gate leakage</b>			Motion measurement
BT:	Leakage currents		Position measurement
	Solid state circuits		User interfaces
	Tunneling		Video signal
<i>Gate Leakage current</i>		processing	
USE:	Leakage currents	NT:	Electrooculography



# 2019 IEEE Thesaurus

<i>GDP</i>		Ethics	
USE:	Economic indicators	Privacy	
<i>GDPR</i>		<i>Generation of electric power</i>	
USE:	General Data	USE:	Power generation
Protection Regulation		<i>Generation Y</i>	
<i>Ge Si</i>		USE:	Millennials
USE:	Germanium silicon	<b>Generative adversarial networks</b>	
alloys		UF:	GAN
<b>Gears</b>		BT:	Algorithm design and
UF:	Bevel gears	analysis	
	Differential gears	RT:	Artificial
	Helical gears	intelligence	
	Spur gears		Convolutional neural
	Worm gears	networks	
BT:	Machinery		Machine learning
	Mechanical products		Neural networks
RT:	Automotive components		Unsupervised learning
	Machine components	<b>Generators</b>	
	Machine tools	UF:	Dynamo
	Mechanical power	BT:	Electric machines
transmission			Rotating machines
	Mechanical splines	RT:	Coils
	Mechanical systems		Islanding
	Production equipment		Power generation
	Shafts	NT:	AC generators
	Torque converters		DC generators
NT:	Magnetic gears		Electric generators
			Standby generators
<b>Gender equity</b>		<b>Genetic algorithms</b>	
BT:	Equal opportunities	BT:	Algorithms
<b>Gender issues</b>			Computational
BT:	Equal opportunities	intelligence	
RT:	Digital divide	RT:	Job shop scheduling
<b>Gene expression</b>			Pareto optimization
BT:	Gene therapy		Search methods
<b>Gene therapy</b>		<b>Genetic communication</b>	
BT:	Genetics	BT:	Genetics
NT:	Gene expression		Information theory
<i>General agreement on tariffs and trade</i>		RT:	Biological information
USE:	Trade agreements	theory	
			Biomedical engineering
<b>General Data Protection Regulation</b>			DNA
UF:	GDPR	<b>Genetic engineering</b>	
BT:	Data protection	UF:	Genetically modified
	Government policies	crops	
	Legislation	BT:	Engineering in
RT:	Data handling	medicine and biology	



# 2019 IEEE Thesaurus

RT: Agriculture	<b>Geodesy</b>	BT: Geophysical
Biomedical engineering	measurements	RT: Position measurement
Biotechnology		Theodolites
Ethical aspects		NT: Level measurement
Genetics		
Molecular biophysics	<b>Geodynamics</b>	BT: Geophysics
Tissue engineering		
<b>Genetic expression</b>	<b>Geoengineering</b>	UF: Engineering geology
BT: Genetics		Geological engineering
<b>Genetic mutations</b>		Geotechnical
BT: DNA	engineering	BT: Geoscience
<b>Genetic programming</b>		RT: Drilling
BT: Genetics		Geology
<i>Genetically modified crops</i>		Geophysics
USE: Genetic engineering		Hydrological
<b>Genetics</b>	techniques	Mining industry
BT: Biology		
RT: Amniocentesis	<b>Geographic information systems</b>	UF: GIS
Genetic engineering		BT: Geoscience and remote
Memetics	sensing	Global communication
Molecular biophysics		Intelligent
NT: DNA	transportation systems	
Gene therapy	RT: Image databases	
Genetic communication	NT: Geospatial analysis	
Genetic expression	Gunshot detection	
Genetic programming		
Genomics	systems	
<i>Genomes</i>		
USE: Genomics	<b>Geography</b>	BT: Geoscience
<b>Genomics</b>		RT: Geospatial analysis
UF: Genomes		NT: Rural areas
BT: Genetics		Urban areas
Molecular biomarkers		
<i>Geo tagging</i>	<b>Geologic measurements</b>	BT: Measurement
USE: Location awareness		RT: Geology
<b>Geoacoustic inversion</b>		Geophysical
BT: Sea measurements	measurements	Hyperspectral sensors
<b>Geochemistry</b>		Remote sensing
UF: Hydrochemistry		Terrain mapping
BT: Chemistry		Theodolites
Geoscience	<i>Geological engineering</i>	
RT: Geophysics	USE: Geoengineering	
Salinity (geophysical)		



# 2019 IEEE Thesaurus

## Geology

BT: Geoscience  
RT: Geoengineering  
Geologic measurements  
Geophysics  
NT: Minerals  
Rocks

## Geomagnetic navigation

USE: Geomagnetism AND  
Navigation

## Geomagnetism

UF: Geomagnetic navigation  
Geomatics  
BT: Magnetic fields  
RT: Electromagnetic

## induction

## measurements

Geophysical

Geophysics  
Magnetosphere

## Geomatics

USE: Geomagnetism

## Geometrical optics

BT: Optics  
RT: Reflectivity  
NT: Ray tracing

## Geometry

BT: Mathematics  
RT: Layout  
Shape  
NT: Computational geometry  
Elliptic curves  
Elliptic design  
Information geometry  
Projective geometry  
Surface topography

## Geophysical image processing

BT: Geophysical  
measurement techniques  
Image processing

## Geophysical measurement techniques

BT: Geoscience and remote  
sensing  
RT: Laser radar  
Magneto electrical  
resistivity imaging technique  
Remote sensing

Theodolites  
Tomography  
Vegetation mapping  
Geophysical image

NT:  
processing

## Geophysical measurements

UF: Geophysical techniques  
BT: Geoscience and remote  
sensing

RT: Measurement  
Atmospheric  
measurements

Buried object  
detection

Geologic measurements  
Geomagnetism  
Geophysical signal  
processing

Geophysics  
Gravity measurement  
Pressure gauges  
Remote sensing  
Soil measurements  
Terrain mapping  
NT: Geodesy  
Sea measurements  
Seismic measurements

## Geophysical signal processing

BT: Geoscience and remote  
sensing  
RT: Signal processing  
Geophysical  
measurements

## Geophysical techniques

USE: Geophysical  
measurements

## Geophysics

BT: Geoscience  
Physics  
RT: Earth  
Geochemistry  
Geoengineering  
Geology  
Geomagnetism  
Geophysical  
measurements  
Hydrologic  
measurements  
Hydrological  
techniques



# 2019 IEEE Thesaurus

phenomena	NT:	Oceans Terrestrial atmosphere EMTDC Extraterrestrial	systems	Geoscience and remote sensing	NT:	Environmental factors Geographic information
		Geodynamics Geophysics computing Meteorology Moisture Seismology Surface waves Well logging				Geophysical measurement techniques Geophysical measurements Geophysical signal processing Geoscience Land surface temperature Photometry Radar Radiometry Remote sensing Terrain mapping Terrestrial atmosphere Vegetation mapping
analysis	BT:	Geophysics	techniques	sensing	RT:	Computer aided
	RT:	Computer aided				
techniques	UF:	Earth science	NT:	Geospatial analysis	BT:	Geographic information
	BT:	Geoscience and remote				
generation	RT:	Science - general Hydrological	USE:	Global Earth Observation System of Systems	RT:	Geography Software
	NT:	Antarctica Arctic Atmosphere Biosphere Continents Cyclones Earth Earthquakes Forestry Geochemistry Geoengineering Geography Geology Geophysics Ice Lakes Land surface Levee Meteorological factors Oceanography Oceans Rivers Sediments Soil Tornadoes Tsunami Volcanoes Wetlands				
generation	USE:	Global Earth Observation System of Systems	Geostationary communication satellites	USE:	Geostationary satellites	Geostationary satellites
generation	BT:	Satellites	USE:	Geoengineering	USE:	Civil engineering
generation	BT:	Energy resources	RT:	Geothermal power	RT:	Geothermal power



# 2019 IEEE Thesaurus

## Geothermal power generation

BT: Power generation  
RT: Geothermal energy

## Geriatrics

BT: Medical treatment  
RT: Assisted living  
Gerontology  
Senior citizens

## Germ warfare

USE: Biohazards

## Germanium

BT: Metals  
Semiconductor

## materials

RT: Epitaxial growth  
Semiconductor thin

## films

NT: Silicon germanium  
Germanium alloys

## Germanium alloys

BT: Germanium  
RT: Alloying  
NT: Germanium silicon

## alloys

## Germanium silicon alloys

UF: Ge Si  
BT: Germanium alloys  
Silicon alloys

## Germs

USE: Pathogens

## Gerontechnology

BT: Biomedical equipment  
Gerontology  
RT: Assistive technology

## Gerontology

BT: Medical specialties  
RT: Aging  
Alzheimer's disease  
Geriatrics  
Senior citizens  
NT: Gerontechnology

## Gesture recognition

BT: Pattern recognition  
NT: Sign language

## Gettering

UF: Getters  
BT: Vacuum systems  
RT: Electron tubes  
Integrated circuit

## manufacture

Semiconductor device

## manufacture

Vacuum technology

## Getters

USE: Gettering

## GHZ transverse electromagnetic cells

USE: TEM cells

## Giant magnetoresistance

BT: Magnetoresistance  
RT: Hard disks  
Magnetoresistive

## devices

Thin film devices

## Girders

USE: Structural beams

## GIS

USE: Geographic information  
systems

## GITL

USE: Gas insulated  
transmission lines

## Glands

UF: Endocrine glands  
Exocrine glands  
BT: Biological tissues  
NT: Mammary glands  
Pituitary gland  
Salivary glands  
Sebaceous glands  
Sweat glands

## Glass

BT: Amorphous materials  
Glass products  
RT: Ceramics  
Dielectric materials  
Glass industry  
Insulation  
Optical materials



# 2019 IEEE Thesaurus

<i>Glass bottles</i>	UF: GEOSS
USE: Glass products	BT: Earth Observing System
<i>Glass ceramics</i>	<i>Global groups</i>
USE: Ceramics	USE: Global communication
<i>Glass furnaces</i>	<i>Global markets</i>
USE: Glass manufacturing	USE: Globalization
<b>Glass industry</b>	<b>Global navigation satellite system</b>
BT: Manufacturing	UF: GNSS
industries	BT: Satellite navigation
RT: Glass	systems
Glass manufacturing	RT: Global Positioning
Glass products	System
<b>Glass manufacturing</b>	<i>Global Navigational Positioning System</i>
UF: Glass furnaces	USE: Global Positioning
BT: Manufacturing systems	System
RT: Glass industry	<b>Global Positioning System</b>
<b>Glass products</b>	UF: DGPS
UF: Glass bottles	Differential GPS
BT: Manufactured products	GPS
RT: Bottling	Global Navigational
Ceramic products	Positioning System
Ceramics	BT: Satellite navigation
Chemical products	systems
Glass industry	RT: Air transportation
Windows	Global navigation
NT: Glass	satellite system
<b>Glazes</b>	Indoor navigation
BT: Coatings	Land transportation
RT: Ceramics	Marine transportation
NT: Ceramic glazes	Military satellites
<b>Glial cells</b>	Road transportation
UF: Neuroglia	Satellite broadcasting
BT: Cells (biology)	Satellite
Nervous system	communication
<b>Global communication</b>	<i>Global System for Mobile Communications</i>
UF: Global groups	USE: GSM
Global teams	<i>Global teams</i>
BT: Professional	USE: Global communication
communication	<b>Global warming</b>
NT: Cross-cultural	BT: Environmental factors
communication	Temperature
Geographic information	measurement
systems	Terrestrial atmosphere
<b>Global Earth Observation System of Systems</b>	RT: Air pollution



# 2019 IEEE Thesaurus

measurements	Atmospheric	USE:	Eye protection
	Carbon emissions	<b>Gold</b>	
	Energy informatics	UF:	Au
management	Environmental	BT:	Metals
	Greenhouse effect	NT:	Gold alloys
	Land surface	<b>Gold alloys</b>	
temperature	Low-carbon economy	BT:	Gold
	Ocean temperature	RT:	Alloying
	Thermal pollution	<b>Goniometers</b>	
<i>Globalisation</i>		BT:	Meters
USE:	Globalization	<b>Google</b>	
<b>Globalization</b>		BT:	Computer networks
UF:	Global markets	RT:	Information retrieval
	Globalisation		Information services
BT:	Social implications of		Internet
technology			Online services
RT:	International	<i>Google Chrome</i>	
collaboration	International	USE:	Browsers
relations	International trade	<b>Government</b>	
	Trade agreements	BT:	Organizations
<i>Glossaries</i>		RT:	Governmental factors
USE:	Terminology		Macroeconomics
		NT:	Public finance
<b>Glow discharge devices</b>			Electronic government
BT:	Gas discharge devices		Government policies
RT:	Glow discharges		Legislation
	Light sources		Local government
			US Government
			Voting
<b>Glow discharges</b>		<i>Government borrowing</i>	
BT:	Dielectric breakdown	USE:	Public finance
RT:	Glow discharge devices	<i>Government expenditure</i>	
<i>Glucose</i>		USE:	Public finance
USE:	Sugar	<b>Government policies</b>	
<b>Glycomics</b>		BT:	Government
BT:	Molecular biomarkers	RT:	Censorship
			Public infrastructure
<i>GNP</i>		NT:	General Data
USE:	Economic indicators	Protection Regulation	
			Public policy
<i>GNSS</i>		<b>Governmental factors</b>	
USE:	Global navigation	BT:	Management
satellite system		RT:	Government
<i>Goggles</i>			Legal factors





# 2019 IEEE Thesaurus

	NT:	Social factors Public finance	BT:	Combinatorial mathematics
<i>GPR</i>			RT:	Mathematics
radar	USE:	Ground penetrating	optimization	Ant colony
<i>GPS</i>				Circuit topology
System	USE:	Global Positioning	NT:	Topology
<i>GPU</i>				Bipartite graph
units	USE:	Graphics processing		Directed acyclic graph
				Optimal matching
				Reachability analysis
				Shortest path problem
				Tree graphs
<b>Gradient methods</b>			<b>Graphene</b>	
BT:		Mathematics	BT:	Carbon
		Numerical analysis	NT:	Graphene devices
		Optimization methods	<b>Graphene devices</b>	
RT:		Level set	BT:	Graphene
		Search methods	RT:	Field effect
<i>Grain alcohol</i>			transistors	
USE:		Ethanol		Flexible electronics
				Molecular electronics
				Nanoelectronics
<b>Grain boundaries</b>			<i>Graphic user interfaces</i>	
BT:		Crystals	USE:	Graphical user
RT:		Conductivity	interfaces	
		Corrosion		
		Grain size	<b>Graphical models</b>	
		Thermal conductivity	BT:	Modeling
<b>Grain size</b>			<b>Graphical user interfaces</b>	
BT:		Crystals	UF:	GUI
RT:		Grain boundaries		Graphic user
<b>Grammar</b>			interfaces	
communication	BT:	Professional	BT:	Product development
		Writing		User interfaces
	RT:	Syntactics	NT:	Avatars
<b>Granular computing</b>			<b>Graphics</b>	
BT:		Programming	BT:	Design methodology
RT:		Concurrent computing	RT:	Displays
		Information processing		Technical drawing
			NT:	Animation
<b>Granular superconductors</b>				Art
BT:		Superconducting		Character generation
materials				Computer graphics
	RT:	High-temperature		Engineering drawings
superconductors				Layout
				Shape
				Symbols
<b>Graph theory</b>				Virtual reality



# 2019 IEEE Thesaurus

Visualization		Gray-scale	
<b>Graphics processing units</b>	UF:	GPU	Grayscale
		VPU	
	BT:	Program processors	Image processing
	RT:	Computer graphics	
		Hardware acceleration	
<b>Graphite</b>		<i>Grayscale</i>	
UF:	Black lead	USE:	Gray-scale
BT:	Carbon		
RT:	Lead		
<b>Grasping</b>		<b>Greedy algorithms</b>	
BT:	Haptic interfaces	BT:	Computation theory
<b>Gratings</b>		<b>Green buildings</b>	
UF:	Optical gratings	BT:	Construction
			Green products
		RT:	Environmental factors
BT:	Transient gratings		Green design
RT:	Periodic structures		
RT:	Optical devices		
<i>Gravimeter</i>		<b>Green cleaning</b>	
USE:	Gravity measurement	BT:	Green products
<i>Gravitational force</i>		<b>Green computing</b>	
USE:	Gravity	BT:	Computer applications
<i>Gravitometer</i>			Energy conservation
USE:	Gravity measurement		Green design
		RT:	Environmental factors
			Sustainable
<b>Gravity</b>		development	
UF:	Gravitational force	<b>Green design</b>	
BT:	Force	UF:	Environmental design
RT:	Acceleration		Sustainable design
	Force measurement	BT:	Design methodology
		RT:	Energy informatics
			Green buildings
		NT:	Ecodesign
			Green computing
<b>Gravity measurement</b>		<i>Green function</i>	
UF:	Gravimeter	USE:	Green's function
BT:	Gravitometer		
RT:	Force measurement		
RT:	Astrophysics		
	Geophysical		
measurements		<b>Green manufacturing</b>	
<i>Gray codes</i>		BT:	Environmental factors
USE:	Reflective binary		Manufacturing
codes		<b>Green products</b>	
<i>Gray matter</i>		BT:	Environmental factors
USE:	Grey matter	RT:	Biohazards
			Pollution
		NT:	Green buildings
			Green cleaning
		<b>Green transportation</b>	
		BT:	Environmental factors
			Transportation





# 2019 IEEE Thesaurus

## *Ground-penetrating radar*

USE: Ground penetrating radar

## **Grounding**

UF: earthing  
BT: Electrical safety  
RT: Circuit stability  
Electric shock  
Fault currents  
Power system

## protection

Protection

## **Group technology**

BT: Production  
RT: Product design  
Production control

## *Groupware*

USE: Collaborative work

## **GSM**

UF: Global System for Mobile Communications  
BT: Wireless communication  
RT: Dual band  
Roaming

## *GTEM cells*

USE: TEM cells

## *GUI*

USE: Graphical user interfaces

## *Guided electromagnetic wave propagation*

USE: Waveguide theory

## **Guidelines**

BT: Standardization  
RT: IEEE publishing  
ISO  
Publishing

## *Guideways (mechanical)*

USE: Mechanical guides

## **Gunn devices**

UF: Transferred electron devices  
BT: Semiconductor devices

## **Guns**

BT: Weapons

## **Gunshot detection systems**

BT: Geographic information systems  
Sensor systems

## *Gynaecology*

USE: Gynecology

## **Gynecology**

UF: Gynaecology  
BT: Medical specialties

## **Gyrators**

BT: Active circuits  
RT: Active inductors  
Ferrite devices

## *Gyroklystrons*

USE: Klystrons

## **Gyromagnetism**

BT: Magnetics  
RT: Faraday effect  
Ferrites  
Gyrotropism

## **Gyroscopes**

UF: Non-gyroscopes  
Nongyroscopes  
BT: Level control  
RT: Laser applications  
Ring lasers

## **Gyrotrons**

BT: Masers  
RT: Electron beams

## **Gyrotropism**

BT: Magneto optic effects  
RT: Faraday effect  
Gyromagnetism

## **H infinity control**

UF: H-infinity control  
BT: Optimization methods  
RT: Closed loop systems  
Control systems  
Intelligent control  
Optimal control

## *H-infinity control*



# 2019 IEEE Thesaurus

USE: H infinity control

*H2O*

USE: Water

*Hacker*

USE: Computer hacking

*Hacking*

USE: Computer crime

*Hacks*

USE: Computer hacking

*Haemorrhaging*

USE: Hemorrhaging

**Hafnium**

UF: Hf

BT: Chemical elements  
Metals

RT: Nuclear physics

NT: Hafnium compounds

**Hafnium compounds**

BT: Hafnium

RT: Alloying

NT: Hafnium oxide

**Hafnium oxide**

BT: Hafnium compounds

**Hair**

BT: Integumentary system

NT: Eyebrows  
Eyelashes  
Hair follicle

**Hair follicle**

BT: Hair

*Half-wave plates*

USE: Optical retarders

**Hall effect**

UF: Hall mobility

BT: Magnetoelectric

effects

RT: Hall effect devices

**Hall effect devices**

BT: Semiconductor devices

RT: Hall effect

*Hall mobility*

USE: Hall effect

**Ham radios**

BT: Radio communication  
equipment

**Hamming distance**

BT: Information theory

**Hamming weight**

BT: Information theory

*HAMR*

USE: Heat-assisted magnetic  
recording

**Hand tools**

BT: Tools

RT: Machine tools

**Handheld computers**

UF: BlackBerry  
Handheld devices  
Wireless handheld

devices

BT: Portable computers

NT: Personal digital

assistants

*Handheld devices*

USE: Handheld computers

*Handicapped aids*

USE: Assistive technology

**Handover**

BT: Communication  
switching

Data transfer  
Cellular networks  
Communication system

signaling

Satellite

communication

*Handsets*

USE: Telephone sets

**Handwriting recognition**

UF: Signature detection  
Signature verification  
Written character

recognition



# 2019 IEEE Thesaurus

Written characters  
Written-character

recognition  
BT: Identification of  
persons

Pattern recognition  
RT: Biometrics (access  
control)  
NT: Forgery

## Haptic interfaces

UF: Haptic systems  
Haptics  
BT: Computer interfaces  
RT: Modeling  
Touch sensitive

screens

NT: Data gloves  
Force feedback  
Grasping

*Haptic systems*

USE: Haptic interfaces

*Haptics*

USE: Haptic interfaces

*Hard amorphous carbon*

USE: Diamond-like carbon

*Hard disc drives*

USE: Hard disks

*Hard discs*

USE: Hard disks

*Hard disk drives*

USE: Hard disks

## Hard disks

UF: Hard disc drives  
Hard discs  
Hard disk drives  
Hard-disc drives  
Hard-disk drives  
BT: Magnetic memory  
RT: Giant

magnetoresistance

*Hard-disc drives*

USE: Hard disks

*Hard-disk drives*

USE: Hard disks

*Hardsuit*

USE: Wearable robots

## Hardware

UF: Computer hardware  
BT: Computers and  
information processing  
RT: Computer ports  
Firewalls (computing)  
NT: Hardware acceleration  
Input devices  
Open source hardware  
Reconfigurable devices  
Wireless access points

## Hardware acceleration

UF: 3D accelerators  
Accelerated computing  
Cryptographic

accelerators

BT: Computer performance  
Hardware  
RT: Central Processing

Unit

Graphics processing

units

*Hardware description languages*

USE: Hardware design

languages

## Hardware design languages

UF: HDL  
HDVL  
Hardware description

languages

IEEE 1364  
BT: Computer languages  
RT: Design automation

## Hardware-in-the loop simulation

UF: HIL simulation  
BT: Simulation  
RT: Aerospace control  
Control engineering

computing

Control system

synthesis

Embedded systems  
Real-time systems  
Testing  
Vehicle dynamics



# 2019 IEEE Thesaurus

## Harmonic analysis

UF: Harmonics  
BT: Mathematics  
Signal analysis  
RT: Fast Fourier

transforms

Fourier transforms  
Spectral analysis  
Wavelet transforms

## Harmonic distortion

BT: Nonlinear distortion  
RT: Power conversion

harmonics

NT: Harmonics suppression  
Total harmonic

distortion

## Harmonic filters

BT: Filters

## Harmonic generation

USE: Frequency conversion

## Harmonics

USE: Harmonic analysis

## Harmonics suppression

BT: Harmonic distortion

## Harmonised index of consumer prices

USE: Economic indicators

## Harmonized index of consumer prices

USE: Economic indicators

## Hash functions

BT: Algorithms  
RT: Cryptography  
Encoding  
NT: Cryptographic hash

function

## Hashtag

USE: Tagging AND  
Twitter

## Hazardous areas

BT: Hazards  
RT: Accidents  
Explosions  
Fires  
Hazardous materials  
Industrial accidents

Protection

Radioactive pollution

Radioactive waste

Safety

Surveillance

## Hazardous materials

UF: Hazmat  
BT: Hazards  
Materials  
RT: Chemical hazards  
Flammability  
Hazardous areas  
Radioactive waste  
Toxicology

## Hazards

BT: Safety  
RT: Contamination  
Explosion protection  
Occupational stress  
Pest control  
Rescue robots  
Working environment

noise

NT: Biohazards  
Chemical hazards  
Explosions  
Fires  
Flammability  
Floods  
Hazardous areas  
Hazardous materials  
Toxicology

## Hazmat

USE: Hazardous materials

## HbbTV Standards

BT: ETSI Standards  
RT: Digital TV  
TV

## HBT

USE: Heterojunction bipolar  
transistors

## HCCI engines

USE: Internal combustion  
engines

## HCI

USE: Human computer  
interaction



# 2019 IEEE Thesaurus

<i>HD</i>		UF:	Heads up displays
		BT:	Displays
	USE:		Human computer interaction
<i>HD video</i>			
	USE:		<b>Headphones</b>
		UF:	Earphones
			Head sets
			Headsets
		BT:	Audio systems
<i>HDL</i>			
	USE:		<i>Heads up displays</i>
			USE: Head-up displays
			<i>Headsets</i>
		USE:	Headphones
			<i>Health (occupational)</i>
		USE:	Occupational health
<i>HDTV</i>			
	UF:		ATV
			Advanced TV
			EDTV
			Extended definition TV
			High definition
			High-definition TV
			IDTV
			Improved definition TV
	BT:		Digital TV
	NT:		UHDTV
			<b>Health and safety</b>
		BT:	Safety
		RT:	Environmental factors
		NT:	Occupational health
			Occupational safety
<i>HDVL</i>			
	USE:		<i>Health care</i>
			USE: Medical services
			<b>Health information management</b>
		BT:	Medical services
<i>Head</i>			
	BT:		Body regions
	RT:		Auditory system
			Brain
			Visual systems
	NT:		Cranium
			Ear
			Face
			Forehead
			Lips
			Mouth
			Nose
			Scalp
			Skull
			<b>Health physics</b>
		USE:	Radiation monitoring
			<i>Healthcare</i>
		USE:	Medical services
			<i>Hearing</i>
		USE:	Auditory system
			<b>Hearing aids</b>
		BT:	Sensory aids
		RT:	Auditory system
			Speech enhancement
<i>Head sets</i>			
	USE:		<b>Heart</b>
			BT: Cardiovascular system
			RT: Cardiology
			NT: Fetal heart
			Heart rate
			Heart valves
			Heart ventricles
<i>Head-mounted displays</i>			
	UF:		Helmet mounted
			<b>displays</b>
	BT:		Displays
			Human computer interaction
<i>Head-up displays</i>			





# 2019 IEEE Thesaurus

## *Heart arrest*

USE: Cardiac arrest

## *Heart attack*

USE: Cardiac arrest

## **Heart beat**

UF: Heartbeat

BT: Heart rate

## **Heart rate**

UF: HR

BT: Heart

NT: Fetal heart rate

Heart beat

Heart rate detection

Heart rate interval

Heart rate measurement

Heart rate variability

## **Heart rate detection**

BT: Heart rate

## **Heart rate interval**

BT: Heart rate

## **Heart rate measurement**

BT: Heart rate

RT: Phonocardiography

## **Heart rate variability**

UF: HRV

BT: Heart rate

## **Heart valves**

BT: Heart

## **Heart ventricles**

BT: Heart

## *Heartbeat*

USE: Heart beat

## **Heat engines**

BT: Engines

NT: Steam engines

Stirling engines

## *Heat islands*

USE: Thermal pollution

## **Heat pipes**

BT: Heating systems

RT: Cooling

## Heat transfer

## **Heat pumps**

UF: Ground source heat pumps

BT: Pumps

RT: Refrigerants

## **Heat recovery**

UF: Industrial heat recovery

BT: Heating systems

RT: Boilers

Thermal engineering

## **Heat sinks**

UF: Heatsinks

BT: Cooling

## **Heat transfer**

BT: Thermal conductivity

RT: Heat pipes

NT: Convection

## **Heat treatment**

BT: Materials processing

RT: Curing

Firing

Foundries

Kilns

Smelting

Thermal factors

NT: Annealing

Calcination

## **Heat-assisted magnetic recording**

UF: HAMR

BT: Magnetic recording

## **Heating systems**

BT: Temperature control

RT: Entropy

Furnaces

HVAC

High-temperature

## techniques

Laser applications

Rapid thermal

## processing

NT: Thermal engineering

Boilers

Cogeneration

Electromagnetic

## heating



# 2019 IEEE Thesaurus

Heat pipes	BT:	Chemical elements
Heat recovery		Gases
Induction heating		
Infrared heating	<i>Helmet mounted displays</i>	
Resistance heating	USE:	Head-mounted displays
Solar heating		
Space heating	<b>Hemodynamics</b>	
Thermal energy	UF:	Hemorheology
Trigeneration	BT:	Blood flow
Water heating		
<i>Heating, ventilation, and air conditioning</i>	<i>Hemorheology</i>	
USE:	USE:	Hemodynamics
HVAC		
<i>Heatsinks</i>	<b>Hemorrhaging</b>	
USE:	UF:	Bleeding
Heat sinks		Haemorrhaging
	BT:	Medical conditions
<i>Hebb's methods</i>	<b>HEMTs</b>	
USE:	UF:	Heterostructure FETs
Hebbian theory		High electron mobility
<i>Hebb's rule</i>	transistors	
USE:		High electron-mobility
Hebbian theory	transistors	
<i>Hebbian learning</i>		High-electron mobility
USE:	transistors	
Hebbian theory		High-electron-mobility
<i>Hebbian principle</i>	transistors	
USE:	BT:	Field effect
Hebbian theory	transistors	
UF:	RT:	MODFETs
Hebb's methods	NT:	D-HEMTs
Hebb's rule		DH-HEMTs
Hebbian learning		PHEMTs
Hebbian principle		mHEMTs
BT:		
Artificial neural networks	<b>Hepatectomy</b>	
	BT:	Medical treatment
		Surgery
<b>Helical antennas</b>	<b>Hermetic seals</b>	
BT:	BT:	Seals
Antennas		
RT:		
Electromagnetic waveguides	<b>Hetero-nanocrystal memory</b>	
	BT:	Single electron memory
Telecommunications	<b>Heterogeneous networks</b>	
Transmission lines	BT:	Computer networks
VHF circuits		
Waveguide components	<b>Heterojunction bipolar transistors</b>	
<i>Helical gears</i>	UF:	HBT
USE:	BT:	Transistors
Gears	RT:	Heterojunctions
<b>Helicopters</b>		
BT:		
Aircraft		
<b>Helium</b>		



# 2019 IEEE Thesaurus

```

Integrated
optoelectronics
Semiconductor devices
NT: Double heterojunction
bipolar transistors

```

## Heterojunctions

BT:	Junctions
RT:	Heterojunction bipolar
transistors	

*Heterostructure FETs*  
USE: HEMTs AND  
MODFETs

## Heuristic algorithms

UF: Dynamic algorithms  
BT: Algorithms

HEV USE: Hybrid electric vehicles

```
HEVC
USE:      High efficiency video
coding
```

*Hf*                      USE:      Hafnium

HF radar  
USE: High frequency radar

*HFC*  
USE: Hybrid fiber coaxial  
cables

*Hg*                      USE:      Mercury (metals)

## Hidden Markov models

BT:	Modeling
RT:	Markov processes
	Pattern recognition

*Hierarchical Learning*  
USE: Deep learning

```

Hierarchical systems
      BT:      Systems engineering
and theory
      NT:      Multilevel systems

```

## High definition television

USE: HDTV

## High definition video

```
UF:      HD
        HD video
BT:      Video recording
NT:      Ultra-high definition
```

video

## High efficiency video coding

UF: HEVC  
High-efficiency video

```
BT:    Video coding
RT:    MPEG 4 Standard
```

High electron mobility transistors  
USE: HEMTs

High electron-mobility transistors  
USE: HEMTs

## High energy physics

```
UF:      Particle physics
BT:      Physics
```

# High energy physics instrumentation computing

BT: Computer applications  
Instrumentation and

measurement  
Nuclear and plasma  
sciences

RT: Data acquisition  
Elementary particles  
Nuclear electronics  
Particle measurements  
Particle tracking  
Position sensitive

particle detectors

- Proton effects
- Radiation effects
- Real-time systems
- Synchrotrons
- Linear particle

NT: Linear particle  
accelerator

## High frequency

BT: Radio frequency

## High frequency radar

UF: HF radar  
BT: Radar



# 2019 IEEE Thesaurus

## High intensity discharge lamps

BT: Discharge lamps  
RT: Arc discharges  
Electrical ballasts  
Emergency lighting  
Light sources  
Lighting  
Lighting control

USE: High-speed electronics

## *High speed integrated circuits*

USE: High-speed integrated circuits

## *High speed networking*

USE: High-speed networks

## *High K*

USE: High-k dielectric materials

## *High speed networks*

USE: High-speed networks

## High level languages

BT: Computer languages  
RT: Page description languages  
NT: Java  
Linux  
Parallel languages

## *High speed optical methods*

USE: High-speed optical techniques

## *High speed optical techniques*

USE: High-speed optical techniques

## High level synthesis

BT: Circuit synthesis  
RT: Programmable logic devices

## *High speed rail transportation*

USE: High-speed rail transportation

## *High speed techniques*

USE: High-speed electronics

## High performance computing

UF: HPC  
High-performance computing  
BT: Computers and information processing

## *High $T_c$ superconductors*

USE: High-temperature superconductors

## *High $T_c$ superconductors*

USE: High-temperature superconductors

## High power amplifiers

BT: Power amplifiers  
RT: Gate drivers

## *High temperature superconductors*

USE: High-temperature superconductors

## High power fiber lasers

UF: HPFL  
High-power fiber lasers  
BT: Fiber lasers

## *High voltage*

USE: High-voltage techniques

## High power microwave generation

UF: HPM generation  
High-power microwave generation  
BT: Microwave generation

## *High-definition TV*

USE: HDTV

## *High resolution imaging*

USE: High-resolution imaging

## *High-efficiency video coding*

USE: High efficiency video coding

## *High-electron mobility transistors*

USE: HEMTs

## *High speed electronics*

## *High-electron-mobility transistors*



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# 2019 IEEE Thesaurus

USE: HEMTs

*High-K*

USE: High-k dielectric materials

**High-k dielectric materials**

UF: High K  
High-K

BT: Dielectric materials

RT: Semiconductor materials

**High-k gate dielectrics**

BT: Dielectric constant  
Semiconductor device manufacture

*High-performance computing*

USE: High performance computing

*High-power fiber Lasers*

USE: High power fiber lasers

*High-power microwave generation*

USE: High power microwave generation

**High-resolution imaging**

UF: High resolution imaging

BT: Image resolution

**High-speed electronics**

UF: High speed electronics  
High speed techniques  
High-speed techniques

BT: Communications technology

NT: High-speed integrated circuits  
High-speed networks  
Ultrafast electronics

**High-speed integrated circuits**

UF: High speed integrated circuits

BT: High-speed electronics

RT: Integrated circuit technology  
Microcontrollers

*High-speed networking*

USE: High-speed networks

**High-speed networks**

UF: High speed networking  
High speed networks  
High-speed networking

BT: High-speed electronics

RT: Long Term Evolution

*High-speed optical methods*

USE: High-speed optical techniques

**High-speed optical techniques**

UF: High speed optical methods  
High speed optical techniques  
High-speed optical methods

BT: Optical design techniques

RT: Light fidelity

**High-speed rail transportation**

UF: High speed rail transportation

BT: Rail transportation

*High-speed techniques*

USE: High-speed electronics

*High-T<sub>c</sub> superconductors*

USE: High-temperature superconductors

*High-T<sub>c</sub> superconductors*

USE: High-temperature superconductors

*High-temperature effects*

USE: Thermal factors

**High-temperature superconductors**

UF: HTS  
High T<sub>c</sub> superconductors  
High T<sub>c</sub> superconductors  
High temperature superconductors  
High-T<sub>c</sub> superconductors



# 2019 IEEE Thesaurus

superconductors	High-Tc	Midbrain
temperature)	Superconductors (high	<i>Hinges</i>
BT:	Superconducting	USE: Fasteners
materials		<b>Hip</b>
RT:	Ceramics	BT: Extremities
	Granular	
superconductors	Persistent currents	<i>Hip joint replacements</i>
	Superconducting	USE: Prosthetics
devices	Superconducting films	<b>Hippocampus</b>
	Superconducting	BT: Temporal lobe
transition temperature		RT: Alzheimer's disease
	Surface impedance	
	Surface resistance	<b>Histograms</b>
NT:	Yttrium barium copper	BT: Statistics
oxide		<b>History</b>
<b>High-temperature techniques</b>		BT: Science - general
BT:	Industry applications	<i>HIV</i>
RT:	Heating systems	USE: Human immunodeficiency
NT:	Rapid thermal	virus
processing		<b>Hobbing machines</b>
<b>High-voltage techniques</b>		BT: Machining
UF:	High voltage	RT: Machine tools
BT:	Power engineering	
RT:	Power electronics	<i>Hockey</i>
	Pulsed power systems	USE: Sports
<b>Higher order statistics</b>		<i>Hoists</i>
BT:	Statistics	USE: Lifting equipment
RT:	Differential equations	
<i>Highways</i>		<i>Hole carriers</i>
USE:	Road transportation	USE: Charge carrier
<i>HIL simulation</i>		processes
USE:	Hardware-in-the loop	<b>Holey fibers</b>
simulation		UF: Holey fibres
		BT: Photonic crystal
<b>Hilbert space</b>		fibers
BT:	Euclidean distance	<i>Holey fibres</i>
<i>Hilbert?Huang transforms</i>		USE: Holey fibers
USE:	Empirical mode	<b>Hollow waveguides</b>
decomposition		BT: Electromagnetic
		waveguides
<b>Hindbrain</b>		NT: Liquid waveguides
UF:	Rhombencephalon	
BT:	Brain	<b>Holmium</b>
RT:	Forebrain	BT: Chemical elements



# 2019 IEEE Thesaurus

## Holographic optical components

BT: Optical devices  
RT: Holography

## Holography

BT: Imaging  
RT: Holographic optical

## components

Image reconstruction  
Laser applications  
Photorefractive

## materials

## Home appliances

UF: Appliances  
Domestic appliances  
Domestic induction

## appliances

Household appliances  
BT: Consumer products  
NT: Gas appliances  
Microwave ovens  
Ovens  
Refrigerators  
Washing machines

## Home automation

UF: Home networks  
BT: Consumer electronics  
RT: Automation  
Service robots  
NT: Portable media players  
Refrigerators  
Smart homes  
Washing machines

## Home computing

BT: Consumer electronics  
RT: Computers and

## information processing

Firewire  
Microcomputers

## Home networks

USE: Home automation

## Homeostasis

BT: Biology  
Control systems

## Homopolar machines

BT: DC machines

## Honey pot (computing)

BT: Computer security

## Honeycomb structures

BT: Structural shapes  
RT: Lightweight structures  
Sandwich structures  
Structural panels  
Thin wall structures

## Hopfield networks

USE: Hopfield neural  
networks

## Hopfield neural networks

UF: Hopfield networks  
BT: Recurrent neural  
networks

## Hormones

USE: Biochemistry

## Horn antennas

BT: Antennas

## Horses

BT: Animals

## Hoses

BT: Mechanical products  
RT: Automotive components  
Rubber products

## Hospitals

BT: Medical services  
Medical treatment  
RT: Biomedical engineering

## Hot carrier effects

BT: Hot carriers

## Hot carrier injection

UF: Hot-carrier injection  
BT: Hot carriers  
NT: Channel hot electron

## injection

Drain avalanche hot  
carrier injection  
Secondary generated  
hot electron injection  
Substrate hot electron  
injection

## Hot carriers



# 2019 IEEE Thesaurus

BT:	Charge carriers	UF:	HCI
RT:	Semiconductor devices		Human-centered
NT:	Hot carrier effects	computing	Human-computer
	Hot carrier injection	interaction	Human-computer
<i>Hot-carrier injection</i>		interfaces	User friendliness
USE:	Hot carrier injection		User interfaces
<i>Household appliances</i>		BT:	Adaptive learning
USE:	Home appliances	RT:	Cyber-physical systems
<i>HPC</i>			Human factors
USE:	High performance		Human-vehicle systems
computing		NT:	Man-machine systems
<i>HPFL</i>			Affective computing
USE:	High power fiber		Extended reality
lasers			Gaze tracking
<i>HPM generation</i>			Head-mounted displays
USE:	High power microwave		Head-up displays
generation			Telepresence
			Telexistence
<i>HR</i>		<i>Human disease markers</i>	
USE:	Heart rate	USE:	Biomarkers
<i>HRV</i>		<i>Human engineering</i>	
USE:	Heart rate variability	USE:	Ergonomics
<i>HTML</i>		<b>Human factors</b>	
BT:	Markup languages	UF:	Human factors
<i>HTS</i>		engineering	Stress (psychological)
USE:	High-temperature	BT:	Systems, man, and
superconductors		cybernetics	
<b>Huffman coding</b>		RT:	Aerospace biophysics
BT:	Data compression		Affective computing
	Entropy coding		Androids
RT:	Algorithms		Anthropometry
	Communication systems		Behavioral sciences
	Multimedia		Cognitive science
communication			Ergonomics
	Multimedia databases	interaction	Human computer
	Multimedia systems		Man-machine systems
	Symbols		Persuasive systems
<b>Human anatomy</b>			Problem-solving
BT:	Anatomy	(security)	Productivity
<i>Human cloning</i>			Social engineering
USE:	Cloning	NT:	Telerobotics
			Anthropomorphism
<b>Human computer interaction</b>		<i>Human factors engineering</i>	
		USE:	Ergonomics AND





# 2019 IEEE Thesaurus

## Human factors

### Human immunodeficiency virus

UF: HIV  
BT: Diseases

### Human resource management

BT: Management  
RT: Industrial psychology  
NT: Appraisal  
Continuing

### professional development

Employee welfare  
Employment  
Equal opportunities  
Incentive schemes  
Job specification  
Labor resources  
Multiskilling  
Personnel  
Recruitment  
Remuneration  
Retirement  
Termination of

### employment

Unemployment

### Human robot interaction

USE: Human-robot

### interaction

### Human voice

BT: Speech processing

### Human-centered computing

USE: Human computer

### interaction

### Human-computer interaction

USE: Human computer

### interaction

### Human-computer interfaces

USE: Human computer

### interaction

### Human-robot interaction

UF: Human robot  
BT: User interfaces  
RT: Wearable robots

### Human-vehicle interaction

USE: Human-vehicle systems

## Human-vehicle systems

UF: Human-vehicle  
interaction  
BT: User interfaces  
RT: Human computer  
interaction

## Humanitarian activities

UF: Humanitarian aid  
BT: IEEE Corporate

### activities

### Humanitarian aid

USE: Humanitarian  
activities

### Humanoid robotics

USE: Humanoid robots

## Humanoid robots

UF: Humanoid robotics  
Humanoids  
BT: Robots  
RT: Mobile robots

### Humanoids

USE: Humanoid robots

### HumanXR

USE: Extended reality

## Humidity

BT: Meteorology  
RT: Humidity control  
Humidity measurement  
Trees - insulation

## Humidity control

BT: Moisture control  
RT: Humidity

## Humidity measurement

BT: Moisture measurement  
RT: Humidity

## Hurricanes

BT: Cyclones

## HVAC

UF: Heating, ventilation,  
and air conditioning  
BT: Thermal variables  
control



# 2019 IEEE Thesaurus

RT: Air conditioning  
Cooling  
Heating systems  
Ventilation

## HVDC transmission

BT: Power transmission  
RT: Voltage-source

converters

## Hybrid automobiles

USE: Hybrid electric  
vehicles

## Hybrid cars

USE: Hybrid electric  
vehicles

## Hybrid electric vehicles

UF: HEV  
Hybrid automobiles  
Hybrid cars  
BT: Electric vehicles  
RT: Battery powered  
vehicles  
Charging stations  
Energy storage  
Internal combustion  
engines  
Traction motors  
Vehicle-to-grid  
NT: Plug-in hybrid  
electric vehicles

## Hybrid fiber coaxial cables

UF: HFC  
Hybrid fibre coaxial  
cables  
BT: Coaxial cables

## Hybrid fibre coaxial cables

USE: Hybrid fiber coaxial  
cables

## Hybrid integrated circuits

BT: Circuits  
Integrated circuits  
RT: Thick film circuits  
Thin film circuits

## Hybrid intelligent systems

BT: Fuzzy systems  
RT: Intelligent systems

## Hybrid junctions

BT: Junctions  
RT: Directional couplers

## Hybrid power systems

BT: Power systems  
RT: Distributed power  
generation  
Photovoltaic systems

## Hydraulic actuators

BT: Actuators  
RT: Hydraulic drives

## Hydraulic diameter

BT: Fluid flow  
NT: Microchannels

## Hydraulic drives

BT: Drives  
RT: Hydraulic actuators

## Hydraulic equipment

BT: Hydraulic systems  
RT: Water pumps  
NT: Valves

## Hydraulic fluids

UF: Hydraulic liquids  
Hydraulic oils  
BT: Fluids  
Hydraulic systems  
RT: Production materials

## Hydraulic fracking

USE: Fracking

## Hydraulic liquids

USE: Hydraulic fluids

## Hydraulic oils

USE: Hydraulic fluids

## Hydraulic systems

UF: Hydraulics  
BT: Machinery  
RT: Fluid flow  
Irrigation  
NT: Electrohydraulics  
Hydraulic equipment  
Hydraulic fluids

## Hydraulic turbines

BT: Turbines



# 2019 IEEE Thesaurus

RT: Hydroelectric power  
generation

## *Hydraulics*

USE: Hydraulic systems

## **Hydrocarbon reservoirs**

BT: Hydrocarbons

## **Hydrocarbons**

UF: Oil sands  
Oil shale  
BT: Organic chemicals  
Petroleum  
NT: Hydrocarbon reservoirs

## *Hydrochemistry*

USE: Geochemistry

## **Hydrodynamics**

UF: Smoothed particle  
hydrodynamics  
BT: Dynamics  
Mechanical factors  
RT: Fluid dynamics  
Fluid flow  
Microfluidics  
Water  
NT: Electrohydrodynamics  
Magnetohydrodynamics

## **Hydroelectric power generation**

UF: Hydroelectricity  
Hydropower  
Hydroelectric  
BT: Power generation  
RT: Dams  
Hydraulic turbines  
NT: Hydroelectric-thermal  
power generation  
Microhydro power  
Picohydro power

## **Hydroelectric-thermal power generation**

BT: Hydroelectric power  
generation

## *Hydroelectricity*

USE: Hydroelectric power  
generation

## **Hydrogen**

BT: Chemical elements  
Gases

RT: Water splitting  
NT: Deuterium

## *Hydrogen chloride*

USE: Chlorine compounds

## **Hydrogen fluoride**

BT: Fluorine compounds

## **Hydrogen storage**

BT: Energy storage

## **Hydrologic measurements**

BT: Hydrology  
RT: Fluid flow measurement  
Geophysics  
Hydrological

techniques

techniques

Oceanographic

Water

## **Hydrological techniques**

BT: Hydrology  
RT: Geoengineering  
Geophysics  
Geoscience  
Hydrologic

measurements

NT: Fracking

## **Hydrology**

BT: Fluid flow  
RT: Water  
Wetlands  
NT: Floods  
Hydrologic

measurements

techniques

Hydrological

Ocean waves

## *Hydromagnetics*

USE: Magnetohydrodynamics

## **Hydrometers**

BT: Density measurement

## *Hydrophones*

USE: Sonar equipment

## *Hydropower*

USE: Hydroelectric power  
generation



# 2019 IEEE Thesaurus

## Hypercubes

BT: Multiprocessor  
interconnection  
RT: Computer networks

## Hyperdermic needles

USE: Hypodermic needles

## HyperLinks

USE: Hypertext systems

## Hyperspectral imaging

BT: Hyperspectral sensors

## Hyperspectral sensors

BT: Remote sensing  
RT: Geologic measurements  
Military aircraft  
Military communication  
Military satellites  
Mining industry  
Submillimeter wave

## measurements

Wavelength measurement  
NT: Hyperspectral imaging

## Hypertension

BT: Medical conditions

## Hypertext systems

UF: Hyperlinks  
BT: Computer interfaces  
Information retrieval  
RT: Database systems

## Hyperthermia

BT: Medical conditions  
Medical treatment  
RT: Electromagnetic

## heating

## Hypervisors

USE: Virtual machine  
monitors

## Hypodermic needles

UF: Hyperdermic needles  
BT: Biomedical equipment

## Hypothalamus

BT: Brain  
RT: Central nervous system

## Hydroelectric

USE: Hydroelectric power  
generation

## Hysteresis

BT: Materials science and  
technology  
RT: Damping  
Magnetic hysteresis  
Magnetization  
processes  
Spin valves

## Hysteresis motors

BT: AC motors  
Motors  
Rotating machines  
Synchronous machines  
Synchronous motors

## I/O programs

USE: Input-output programs

## IC

USE: Integrated circuits

## IC packaging

USE: Integrated circuit  
packaging

## Ice

BT: Geoscience  
RT: Meteorology  
Snow  
NT: Ice shelf  
Ice surface  
Ice thickness  
Sea ice

## Ice shelf

BT: Ice

## Ice surface

BT: Ice

## Ice thickness

BT: Ice

## ICP

USE: Iterative closest  
point algorithm

## ICs

USE: Integrated circuits



# 2019 IEEE Thesaurus

## ICT

USE: Information and communication technology

## ID-based encryption

USE: Identity-based encryption

## Identification of persons

BT: Systems, man, and cybernetics  
RT: Access control  
Palmprint recognition  
Security  
NT: Biometrics (access control)  
Face recognition  
Fingerprint  
Handwriting  
Speaker recognition  
Speech recognition

## Identity management systems

BT: Computer security  
Information systems

## Identity-based cryptography

USE: Identity-based encryption

## Identity-based encryption

UF: ID-based encryption  
Identity-based cryptography  
BT: Public key cryptography

## IDTV

USE: HDTV

## IEC

UF: International electrotechnical commission  
BT: Standards organizations  
RT: Communication standards  
Standardization  
Standards  
NT: Moving Pictures  
Experts Group

## IEC publications

USE: IEC Standards

## IEC Standards

UF: IEC publications  
BT: Standards publications  
RT: Common Information

## Model (electricity)

NT: MPEG standards

## IEEE 1364

USE: Hardware design

## languages

## IEEE 1394 Standard

UF: P1394  
BT: IEEE Standards  
RT: Data buses  
Data communication  
Firewire  
Machine vision  
Video signal

## processing

## IEEE 802 LAN-MAN Standards

BT: IEEE Standards  
NT: IEEE 802.11 Standard  
IEEE 802.15 Standard  
IEEE 802.16 Standard  
IEEE 802.19 Standard  
IEEE 802.22 Standard  
IEEE 802.3 Standard

## IEEE 802.11 Standard

UF: 802.11  
P802.11  
WiGig  
BT: IEEE 802 LAN-MAN Standards  
RT: Bluetooth  
Butler matrices  
Computer networks  
MIMO communication  
Modulation  
Protocols  
Radio communication  
Wireless LAN  
Wireless access points  
Wireless communication  
Wireless fidelity  
NT: IEEE 802.11e Standard  
IEEE 802.11g Standard  
IEEE 802.11n Standard



# 2019 IEEE Thesaurus

## IEEE 802.11p Standard

### IEEE 802.11e Standard

UF: 802.11e  
BT: IEEE 802.11 Standard  
RT: Communication channels  
Protocols  
Quality assurance  
Quality control  
Quality of service  
Streaming media  
Wireless LAN

### IEEE 802.11g Standard

UF: 802.11g  
BT: IEEE 802.11 Standard  
RT: Bluetooth  
Computer networks  
Modulation  
Protocols  
Radio communication  
Wireless LAN

### IEEE 802.11n Standard

UF: 802.11n  
BT: IEEE 802.11 Standard  
RT: Antennas  
Bluetooth  
Communication channels  
Computer networks  
MIMO communication  
Modulation  
Protocols  
Radio communication  
Wireless LAN

### IEEE 802.11p Standard

BT: IEEE 802.11 Standard  
RT: Intelligent vehicles  
Wireless Access in

### Vehicular Environments

Wireless communication  
Wireless networks

### IEEE 802.15 Standard

UF: 802.15  
BT: IEEE 802 LAN-MAN  
Standards  
RT: Bluetooth  
Light fidelity  
Personal communication  
networks  
Radio communication  
Wireless LAN

## ZigBee

### IEEE 802.16 Standard

UF: 802.16  
BT: IEEE 802 LAN-MAN  
Standards  
RT: Broadband  
communication  
Computer networks  
Cross layer design  
Internet  
MIMO communication  
Metropolitan area  
networks  
Multimedia  
communication  
WiMAX

### IEEE 802.19 Standard

BT: IEEE 802 LAN-MAN  
Standards

### IEEE 802.22 Standard

BT: IEEE 802 LAN-MAN  
Standards  
RT: Regional area networks  
WRAN  
Wireless communication  
Wireless networks

### IEEE 802.3 Standard

UF: 802.3  
BT: IEEE 802 LAN-MAN  
Standards  
RT: Communication  
switching  
Computer networks  
Ethernet  
Local area networks  
Packet switching  
Switches  
Wide area networks

### IEEE activities

UF: Activities  
BT: IEEE organization  
RT: IEEE Boards  
NT: IEEE Awards activities  
IEEE Conference  
activities  
IEEE Corporate  
activities  
IEEE Educational  
activities



# 2019 IEEE Thesaurus

activities	IEEE Intersociety	IEEE catalogs	
	IEEE Local activities	BT:	IEEE products
Geographic activities	IEEE Member and	IEEE Center for the History of	
	IEEE Professional	Electrical Engineering	
activities	IEEE Standards	UF:	IEEE History Center
	IEEE Student	BT:	IEEE entities
activities	IEEE Technical	IEEE Chapter news	
activities	IEEE United States	BT:	IEEE news
activities	IEEE Volunteer	IEEE Chapters	
activities	IEEE publishing	BT:	IEEE entities
IEEE Associate Members		IEEE Collabratec	
BT:	IEEE members	BT:	IEEE products
IEEE audio tapes		IEEE Committees	
BT:	IEEE products	BT:	IEEE entities
IEEE Awards activities		IEEE Communities	
BT:	IEEE activities	BT:	IEEE entities
RT:	IEEE Educational	IEEE Computer Society Press	
activities	IEEE Fellows	BT:	IEEE entities
	IEEE Foundation	RT:	IEEE publishing
	IEEE Professional	IEEE Conference activities	
activities	IEEE Technical	BT:	IEEE activities
activities	IEEE United States	IEEE conference proceedings	
activities	NT:	BT:	IEEE publications
	IEEE Corporate awards	IEEE Constitution	
Agreement awards	IEEE Society awards	BT:	IEEE governance
	IEEE Standards awards	IEEE Corporate activities	
	IEEE Student awards	BT:	IEEE activities
	National Society	RT:	IEEE Professional
		activities	
IEEE Boards		IEEE staff	
BT:	IEEE entities	Legal factors	
RT:	IEEE activities	NT:	Humanitarian
IEEE books		activities	
BT:	IEEE publications	IEEE Corporate awards	
IEEE bylaws		BT:	IEEE Awards activities
BT:	IEEE governance	NT:	IEEE Medals
			IEEE Recognitions
			IEEE Technical Field
		awards	
		IEEE Corporate recognitions	
		BT:	IEEE Recognitions



# 2019 IEEE Thesaurus

<b>IEEE Councils</b>		IEEE policy and procedures
BT:	IEEE entities	IEEE staff
<b>IEEE directories</b>		<i>IEEE History Center</i>
BT:	IEEE publications	USE: IEEE Center for the History of Electrical Engineering
<b>IEEE Educational activities</b>		<b>IEEE indexing</b>
BT:	IEEE activities	BT: IEEE organization
RT:	IEEE Awards activities	NT: Awards
	IEEE Foundation	Book reviews
	IEEE Professional	CD-ROM reviews
activities		Interviews
		Obituaries
<b>IEEE educational products</b>		Software reviews
BT:	IEEE products	Special issues and sections
<i>IEEE employees</i>		Tutorials
USE:	IEEE staff	Video reviews
<b>IEEE entities</b>		<b>IEEE Intersociety activities</b>
BT:	IEEE organization	BT: IEEE activities
NT:	IEEE Boards	RT: IEEE Professional activities
	IEEE Center for the History of Electrical Engineering	
	IEEE Chapters	<b>IEEE journals</b>
	IEEE Committees	BT: IEEE publications
	IEEE Communities	
	IEEE Computer Society	<b>IEEE Life Members</b>
Press		BT: IEEE members
	IEEE Councils	<b>IEEE Local activities</b>
	IEEE Foundation	BT: IEEE activities
	IEEE Press	
	IEEE Regions	<b>IEEE magazines</b>
	IEEE Sections	BT: IEEE publications
	IEEE Societies	
<b>IEEE Fellows</b>		<b>IEEE Medals</b>
BT:	IEEE members	BT: IEEE Corporate awards
RT:	IEEE Awards activities	
<b>IEEE Foundation</b>		<b>IEEE Member and Geographic activities</b>
BT:	IEEE entities	BT: IEEE activities
RT:	IEEE Awards activities	
	IEEE Educational	<b>IEEE members</b>
activities		BT: IEEE organization
		RT: IEEE Volunteer
<b>IEEE governance</b>		activities
BT:	IEEE organization	NT: IEEE Associate Members
NT:	IEEE Constitution	IEEE Fellows
	IEEE bylaws	IEEE Life Members
	IEEE mission and vision	IEEE Senior Members
		IEEE Student Members





# 2019 IEEE Thesaurus

## IEEE merchandise

BT: IEEE products

## IEEE mission and vision

UF: Vision

BT: IEEE governance

## IEEE news

UF: Announcements

BT: IEEE organization

NT: IEEE Chapter news

IEEE Region news

IEEE Section news

IEEE Society news

## IEEE newsletters

BT: IEEE publications

## IEEE on-line publications

USE: IEEE online publications

## IEEE online publications

UF: Electronic publications

IEEE on-line publications

BT: IEEE publications

## IEEE organization

NT: IEEE activities

IEEE entities

IEEE governance

IEEE indexing

IEEE members

IEEE news

IEEE products

## IEEE policy and procedures

UF: IEEE procedures

BT: IEEE governance

## IEEE Press

BT: IEEE entities

RT: IEEE publishing

## IEEE Prize Paper awards

BT: IEEE Recognitions

## IEEE procedures

USE: IEEE policy and procedures

## IEEE products

BT: IEEE organization

NT: IEEE Collabratec

IEEE Xplore

IEEE audio tapes

IEEE catalogs

IEEE educational

products

IEEE merchandise

IEEE publications

## IEEE Professional activities

UF: Non-united-states activities

BT: IEEE activities

RT: IEEE Awards activities

IEEE Corporate

activities

IEEE Educational

activities

IEEE Intersociety

activities

IEEE Technical

activities

IEEE United States

activities

## IEEE publications

BT: IEEE products

NT: IEEE books

IEEE conference

proceedings

IEEE directories

IEEE journals

IEEE magazines

IEEE newsletters

IEEE online

publications

IEEE standards

publications

IEEE transactions

Notice of Violation

## IEEE publishing

BT: IEEE activities

RT: Guidelines

IEEE Computer Society

Press

IEEE Press

## IEEE Recognitions

BT: IEEE Corporate awards

NT: IEEE Corporate

recognitions



# 2019 IEEE Thesaurus

awards	IEEE Prize Paper	<b>IEEE Standards activities</b>
	IEEE Service awards	BT: IEEE activities
	IEEE Staff	RT: IEEE Standards
recognitions		<b>IEEE Standards Association</b>
<b>IEEE Region news</b>		BT: Standards
BT: IEEE news		organizations
RT: IEEE Regions		<b>IEEE Standards awards</b>
<b>IEEE Regions</b>		BT: IEEE Awards activities
BT: IEEE entities		<b>IEEE standards glossaries</b>
RT: IEEE Region news		BT: IEEE standards
<b>IEEE Section news</b>		publications
BT: IEEE news		<b>IEEE standards publications</b>
<b>IEEE Sections</b>		BT: IEEE publications
BT: IEEE entities		NT: IEEE standards
<b>IEEE Senior Members</b>		glossaries
BT: IEEE members		<b>IEEE Student activities</b>
<b>IEEE Service awards</b>		BT: IEEE activities
BT: IEEE Recognitions		RT: IEEE Student Members
<b>IEEE Societies</b>		<b>IEEE Student awards</b>
BT: IEEE entities		BT: IEEE Awards activities
<b>IEEE Society awards</b>		RT: IEEE Student Members
BT: IEEE Awards activities		<b>IEEE Student Members</b>
<b>IEEE Society news</b>		BT: IEEE members
BT: IEEE news		RT: IEEE Student
<b>IEEE staff</b>		activities
UF: IEEE employees		IEEE Student awards
BT: IEEE governance		<b>IEEE Technical activities</b>
RT: IEEE Corporate		BT: IEEE activities
activities		RT: IEEE Awards activities
<b>IEEE Staff recognitions</b>		IEEE Professional
BT: IEEE Recognitions		IEEE Volunteer
<b>IEEE Standards</b>		activities
BT: Standards publications		<b>IEEE Technical Field awards</b>
RT: ANSI Standards		BT: IEEE Corporate awards
IEEE Standards		<b>IEEE transactions</b>
activities		BT: IEEE publications
NT: AIEE Standards		<b>IEEE United States activities</b>
IEEE 1394 Standard		UF: US activities
IEEE 802 LAN-MAN		BT: IEEE activities
Standards		RT: IEEE Awards activities
IRE Standards		



# 2019 IEEE Thesaurus

activities	IEEE Professional	<i>IM</i>	USE: Instant messaging
<b>IEEE Volunteer activities</b>		<b>Image analysis</b>	
BT: IEEE activities		UF: Scene analysis	
RT: IEEE Technical		Scene classification	
activities		BT: Image processing	
IEEE members		RT: Image recognition	
		Machine vision	
<b>IEEE Xplore</b>		NT: Image classification	
BT: IEEE products		Image motion analysis	
RT: Information services		Image quality	
NT: IEL		Image sequence	
<i>IEEE/IEE Electronic Library</i>		analysis	
USE: IEL		Image texture analysis	
		Object detection	
		Subtraction techniques	
<b>IEL</b>		<b>Image annotation</b>	
UF: IEEE/IEE Electronic		UF: Image tagging	
Library		Linguistic indexing	
BT: IEEE Xplore		Video annotation	
<b>Ignition</b>		BT: Image processing	
BT: Chemical reactors		RT: Feature extraction	
Internal combustion		Image classification	
engines		Image retrieval	
		Learning (artificial	
	Nuclear physics	intelligence)	
	Plasma materials	Metadata	
processing		Video signal	
<b>II-VI semiconductor materials</b>		processing	
BT: Semiconductor		<b>Image capture</b>	
materials		BT: Image processing	
<b>III-V semiconductor materials</b>		RT: Cameras	
BT: Semiconductor		Computer vision	
materials		Image sensors	
RT: Aluminum gallium		Photography	
nitride			
<b>IIR filters</b>		<b>Image classification</b>	
UF: Infinite impulse		BT: Image analysis	
response filters		RT: Image annotation	
BT: Filters			
<i>Illumination</i>		<b>Image coding</b>	
USE: Lighting		UF: Image compression	
		BT: Image processing	
<i>Illumination control</i>		RT: Image communication	
USE: Lighting control		Image databases	
		Image storage	
<i>Illumination gas</i>		MPEG standards	
USE: Coal gas		Rate distortion theory	
		Transcoding	
		Vector quantization	
		Video codecs	



# 2019 IEEE Thesaurus

## Video coding

### Image color analysis

UF: Image colour analysis  
BT: Image processing  
RT: Image filtering

### *Image colour analysis*

USE: Image color analysis

### Image communication

UF: Image transmission  
BT: Communications  
technology  
RT: B-ISDN  
Cable TV  
ISDN  
Image coding  
Motion compensation  
TV  
Teleconferencing  
Videophone systems  
Visual communication  
NT: Facsimile  
Picture archiving and  
communication systems

### *Image compression*

USE: Image coding

### Image converters

BT: Imaging  
RT: Frequency conversion  
Image sensors  
NT: Image intensifiers

### Image databases

BT: Database systems  
Databases  
RT: Geographic information  
systems  
Image coding  
Image storage  
Video sequences  
NT: Image retrieval

### *Image de-noising*

USE: Image denoising

### *Image deblurring*

USE: Image restoration

### Image decomposition

BT: Image processing

### Image denoising

UF: Image de-noising  
BT: Image processing  
RT: Diffusion processes  
Gaussian noise  
Image enhancement  
Image filtering  
Image reconstruction  
Image resolution  
Image restoration

### *Image edge analysis*

USE: Image edge detection

### Image edge detection

UF: Edge detection  
Image edge analysis  
BT: Image recognition  
RT: Corner detection  
Feature extraction  
Image segmentation  
Thresholding (Imaging)

### Image enhancement

BT: Image processing  
RT: Image denoising  
Image intensifiers  
Image restoration

### Image filtering

BT: Filtering theory  
Image processing  
RT: Image color analysis  
Image denoising  
Image segmentation

### Image forensics

UF: Forensic photography  
BT: Forensics  
Photography  
RT: Image processing  
Law enforcement  
Visualization

### Image fusion

BT: Image processing

### Image generation

UF: Image synthesis  
BT: Image processing  
RT: Animation  
Computer graphics  
NT: Plasma displays



# 2019 IEEE Thesaurus

Visual effects			Feature extraction
Image intensifiers			Fiducial markers
BT:	Image converters	processing	Geophysical image
RT:	Frequency conversion		Gray-scale
	Image enhancement		Image analysis
	Image sensors		Image annotation
Image matching			Image capture
UF:	Appearance matching		Image coding
	Fingerprint images		Image color analysis
BT:	Pattern matching		Image decomposition
RT:	Fingerprint		Image denoising
recognition			Image enhancement
	Image recognition		Image filtering
	Object detection		Image fusion
	Object recognition		Image generation
	Stereo vision		Image recognition
Image motion analysis			Image reconstruction
BT:	Image analysis		Image registration
RT:	Object tracking		Image representation
	Robotics and		Image resolution
automation			Image restoration
NT:	Video tracking		Image sampling
Image object detection			Image segmentation
USE:	Object detection		Image segmentaton
Image object recognition		operations	Image sequences
USE:	Object recognition		Image texture
Image pattern recognition			Machine vision
USE:	Pattern recognition		Morphological
Image processing			Optical feedback
UF:	Picture processing		Saliency detection
BT:	Computers and	Image quality	Smart pixels
information processing		BT:	Spatial coherence
RT:	Authentication	RT:	Structure from motion
	Diffusion processes		Table lookup
	Gabor filters		
	Image forensics	Image recognition	
	Multidimensional	BT:	Image processing
signal processing		RT:	Emotion recognition
	Optical projectors		Face recognition
	Time-frequency		Feature extraction
analysis			Image analysis
	Video sequences		Image matching
	Vision sensors		Machine vision
NT:	Active shape model		Object recognition
	Blob detection	processing	Video signal
	Corner detection	NT:	Image edge detection
	Feature detection		



# 2019 IEEE Thesaurus

<b>Image reconstruction</b>			Image capture
BT:	Image processing		Image converters
RT:	Holography		Image intensifiers
	Image denoising		Night vision
	Inverse problems		Optical sensors
	Magnetic resonance		Photodetectors
imaging			Robot vision systems
	Pattern clustering	NT:	Active pixel sensors
	Tomography		CCD image sensors
			CMOS image sensors
<b>Image registration</b>			Charge-coupled image
BT:	Image processing	sensors	
			Infrared image sensors
<b>Image representation</b>			
BT:	Image processing	<b>Image sequence analysis</b>	
		BT:	Image analysis
<b>Image resolution</b>			
BT:	Image processing	<b>Image sequences</b>	
RT:	Image denoising	BT:	Image processing
	Visual communication		
NT:	High-resolution	<b>Image storage</b>	
imaging		BT:	Imaging
	Spatial resolution	RT:	Image coding
			Image databases
			Photography
			Video recording
<b>Image restoration</b>			
UF:	Image deblurring	<i>Image synthesis</i>	
BT:	Image processing	USE:	Image generation
RT:	Distortion		
	Image denoising	<i>Image tagging</i>	
	Image enhancement	USE:	Image annotation
<b>Image retrieval</b>			
BT:	Image databases	<b>Image texture</b>	
RT:	Image annotation	BT:	Image processing
<b>Image sampling</b>			
BT:	Image processing	<b>Image texture analysis</b>	
		BT:	Image analysis
<b>Image segmentation</b>			
BT:	Image processing	<i>Image transmission</i>	
RT:	Image edge detection	USE:	Image communication
	Image filtering		
	Mixture models	<i>Image watermarking</i>	
	Object tracking	USE:	Watermarking
<b>Image segmentaton</b>			
BT:	Image processing	<i>Imagimarkers</i>	
NT:	Thresholding (Imaging)	USE:	Fiducial markers
<b>Image sensors</b>		<b>Imaging</b>	
UF:	Sensors (image)	RT:	Color
BT:	Imaging		Motion pictures
RT:	Cameras		Radiometry
	Endoscopes		Remote sensing
			Robot vision systems



# 2019 IEEE Thesaurus

NT:	Biomedical imaging	Electromagnetic
	Cameras	interference
	Focusing	Open area test sites
	Ground penetrating	
radar		<i>Impact ionisation</i>
	Holography	USE: Impact ionization
	Image converters	
	Image sensors	<b>Impact ionization</b>
	Image storage	UF: Impact ionisation
	Infrared imaging	BT: Ionization
	Magnetic resonance	RT: Charge carriers
imaging		Conductivity
	Magneto electrical	Electrons
resistivity imaging technique		Insulators
	Microscopy	
	Microwave imaging	<b>Impedance</b>
	Multispectral imaging	UF: Electric impedance
	Nuclear imaging	BT: Electric variables
	Optical imaging	RT: Admittance
	Photography	Damping
	Radiation imaging	Impedance matching
	Radiography	Impedance measurement
	Stereo vision	
	Tomography	
<b>Imaging phantoms</b>		<b>Impedance matching</b>
BT: Biomedical image		BT: Electric variables
processing		RT: Circuits
		Equalizers
		Impedance
		NT: Baluns
<b>Immersion cooling</b>		
BT: Cooling		
<b>Immune system</b>		<b>Impedance measurement</b>
UF: Immune systems		UF: Impedance methods
BT: Anatomy		Impedance performance
RT: Biological control		BT: Electric variables
systems		measurement
	Biology	RT: Admittance measurement
	Microorganisms	Impedance
	NT: Artificial immune	Transmission line
systems		measurements
		<i>Impedance methods</i>
<i>Immune systems</i>		USE: Impedance measurement
USE: Immune system		
<b>Immunity testing</b>		<i>Impedance performance</i>
BT: Electromagnetic		USE: Impedance measurement
compatibility	Electronic equipment	
testing	Electrostatic	<b>Impellers</b>
interference		BT: Machine components
RT: Anechoic chambers		RT: Blades
		Propellers
		Pumps
		<i>Implantable biomedical devices</i>
		USE: Implants



# 2019 IEEE Thesaurus

<i>Implantable devices</i>	USE: Implants	NT: In vitro fertilization	
<i>Implantable electronics</i>	USE: Implants	<b>In vitro fertilization</b>	BT: In vitro
<b>Implants</b>	UF: Implantable biomedical devices	<b>In vivo</b>	BT: Medical services
	Implantable devices	<b>Incentive schemes</b>	UF: Bonuses
	Implantable electronics		Merit pay
	BT: Biomedical equipment		Performance related
	NT: Auditory implants	pay	Profit sharing schemes
	Brainstem implants		Human resource
	Cochlear implants	management	Remuneration
	Microelectronic		Appraisal
implants	Neural implants	RT: Employee welfare	Productivity
<i>Importance sampling</i>	USE: Monte Carlo methods	<b>Incineration</b>	UF: Afterburners
<i>Imposter signature generation</i>	USE: Forgery		Incinerators
<i>Improved definition TV</i>	USE: HDTV		Refuse incineration
<i>Impulse generation</i>	USE: Pulse generation	BT: Waste disposal	Waste incineration
<i>Impulse measurements</i>	USE: Pulse measurements	RT: Air pollution	Ash
<b>Impulse testing</b>	BT: Testing		Radioactive pollution
	RT: Frequency response		Radioactive waste
	Insulation testing		Radioactive waste
<b>Impurities</b>	BT: Materials science and technology	disposal	
	RT: Contamination	<b>Incinerators</b>	USE: Incineration
	NT: Semiconductor		
impurities		<b>Independent component analysis</b>	BT: Numerical analysis
<i>IMT-2000</i>	USE: 3G mobile communication		RT: Artificial intelligence
<b>In vitro</b>	BT: Medical services	separation	Blind source
		analysis	Computer aided
		analysis	Feature extraction
			Principal component
			Signal processing
		<i>Index of production</i>	USE: Economic indicators
		<b>Indexes</b>	





# 2019 IEEE Thesaurus

BT: Database systems  
 RT: Information retrieval  
       Information systems  
 NT: Indexing  
       Machine assisted  
 indexing  
       Spatial indexes

## Indexing

UF: Online indexing  
 BT: Indexes  
       Information analysis  
 RT: Keyword search  
       Machine assisted  
 indexing  
       Tagging

## Indirect liquid cooling

BT: Liquid cooling

## Indium

BT: Metals  
 RT: Indium compounds

## Indium compounds

BT: Compounds  
 RT: Alloying  
       Indium  
 NT: Indium gallium  
 arsenide  
       Indium tin oxide

## Indium gallium arsenide

UF: InGaAs  
 BT: Gallium compounds  
       Indium compounds  
       Semiconductor  
 materials

## Indium gallium nitride

BT: Gallium compounds

## Indium gallium zinc oxide

BT: Zinc oxide

## Indium phosphide

UF: InP  
 BT: Semiconductor  
 materials  
 RT: Phonons

## Indium tin oxide

BT: Indium compounds  
 RT: Optical materials

## Indoor air quality

BT: Air quality

## Indoor communication

BT: Communication systems  
 RT: Mobile communication  
       Optical fiber  
 communication  
       Optical modulation  
 NT: Indoor environment

## Indoor environment

BT: Indoor communication

## Indoor navigation

BT: Navigation  
 RT: Computer vision  
       Global Positioning  
 System  
       Land mobile radio  
       Path planning  
       Radio navigation

## Indoor radio

USE: Indoor radio  
 communication

## Indoor radio communication

UF: Indoor radio  
       Indoor radio  
 communications  
 BT: Radio communication

## Indoor radio communications

USE: Indoor radio  
 communication

## Inductance

BT: Electric variables  
 RT: Coils  
       Inductance measurement  
       Inductors  
       Transmission line  
 theory

## Inductance measurement

BT: Electric variables  
 measurement  
 RT: Inductance

## Induction (electromagnetic)

USE: Electromagnetic  
 induction



# 2019 IEEE Thesaurus

<i>Induction (electrostatic)</i>	BT:	Transducers	
USE: Electrostatic			
induction	<b>Inductors</b>		
	UF:	Chokes	
		Reactors	
<b>Induction generators</b>	BT:	Electronic components	
BT: AC generators	RT:	Coils	
Induction machines		Electrical ballasts	
NT: Doubly fed induction		Inductance	
generators		Inductive power	
	transmission		
<b>Induction heating</b>		Magnetic cores	
BT: Heating systems		Tunable circuits and	
RT: Electromagnetic	devices		
heating	NT:	Active inductors	
		Thick film inductors	
<b>Induction machines</b>		Thin film inductors	
BT: AC machines			
Rotating machines	<b>Industrial accidents</b>		
NT: Induction generators	BT:	Accidents	
Induction motors	RT:	Hazardous areas	
		Occupational safety	
<b>Induction motor drives</b>			
BT: Induction motors	<b>Industrial communication</b>		
	UF:	Organizational	
<b>Induction motors</b>	communication		
BT: AC motors	BT:	Communication networks	
Induction machines		Industrial engineering	
Motors	RT:	Business	
Rotating machines		Organizational aspects	
RT: Sensorless control			
NT: Induction motor drives	<b>Industrial control</b>		
	BT:	Industrial electronics	
	RT:	Assembly systems	
<b>Inductive charging</b>		Computer numerical	
UF: Wireless charging	control		
BT: Energy exchange		Control system	
Power supplies	security		
RT: Wireless communication			
		Field buses	
<i>Inductive energy transfer</i>		Industrial engineering	
USE: Inductive power		Industrial plants	
transmission		Manipulators	
		Manufacturing	
<b>Inductive power transmission</b>	automation		
UF: Inductive energy		Mobile robots	
transfer		Motor drives	
BT: Electromagnetic		Programmable control	
induction		Robots	
		NT: Process control	
Power transmission		Production control	
RT: Inductors			
Sensorless control	<i>Industrial democracy</i>		
Transformers	USE:	Industrial relations	
<b>Inductive transducers</b>			



# 2019 IEEE Thesaurus

## Industrial economics

UF: Manufacturing  
economics

BT: Production economics  
Microeconomics  
RT: Economies of scale  
Privatization

## Industrial electronics

NT: Assembly systems  
Computer aided

manufacturing

Cryogenic electronics  
Industrial control  
Integrated

manufacturing systems

Machine control  
Manufacturing

automation

Testing

## Industrial engineering

BT: Industry applications  
RT: Design methodology  
Industrial control  
Industrial plants  
Industrial training  
Precision engineering  
Production engineering  
Production management  
Research and

development

NT: Industrial  
communication

## Industrial facilities

BT: Production facilities  
RT: Industrial plants  
Manufacturing systems  
NT: Seaports

## Industrial heat recovery

USE: Heat recovery

## Industrial plants

UF: Plants (industrial)  
BT: Production facilities  
RT: Industrial control  
Industrial engineering  
Industrial facilities  
Industrial power

systems

Industries

Manufacturing

Paper mills

Production systems

## Industrial pollution

BT: Pollution  
RT: Air pollution  
Industrial waste  
Land pollution  
Radioactive pollution  
Thermal pollution  
Water pollution

## Industrial power systems

UF: Commercial power  
systems  
BT: Power systems  
RT: Buildings  
Cogeneration  
Industrial plants  
Power distribution

## Industrial psychology

BT: Psychology  
RT: Employee welfare  
Human resource

management

Productivity  
Psychometric testing

## Industrial relations

UF: Collective bargaining  
Industrial democracy  
Trade unions  
BT: Business  
RT: Equal opportunities

## Industrial training

BT: Training  
RT: Industrial engineering  
Multiskilling  
On the job training  
Vocational training

## Industrial waste

BT: Waste materials  
RT: Effluents  
Industrial pollution  
Slurries  
Waste heat  
Wastewater  
NT: Ash  
Slag

## Industries



# 2019 IEEE Thesaurus

BT:	Industry applications		High-temperature
RT:	Business	techniques	
	Industrial plants		Industrial engineering
NT:	Agriculture		Industries
	Architecture		Inspection
	Banking		Machinery
	Beverage industry		Manufacturing
	Chemical industry		Packaging
	Coal industry		Paper technology
	Communication industry		Production
	Computer industry		Safety
	Construction		Security
	Construction industry		Wine industry
	Defense industry		
	Electrical engineering		
industry			
	Entertainment industry		
	Gas industry		
	Information industry		
	Manufacturing		
industries			
	Metals industry		
	Mining industry		
	Natural gas industry		
	Petroleum industry		
	Power industry		
	Steel industry		
	Sugar industry		
	Textile technology		
	Toy industry		
	Transportation		
industry			
	Wood industry		
<b>Industry applications</b>			
NT:	Accident prevention		
	Chemical technology		
	Cryogenics		
	Electrochemical		
devices			
	Electrochemical		
processes			
	Electromechanical		
systems			
	Electrostatic devices		
	Electrostatic		
precipitators			
	Electrostatic		
processes			
	Engines		
	Environmental		
management			
	Food technology		
		<b>Inertial confinement</b>	
		BT:	Plasma confinement
		<b>Inertial navigation</b>	
		BT:	Navigation
		<i>Infant</i>	
		USE:	Pediatrics
		<i>Infants</i>	
		USE:	Pediatrics
		<b>Infectious diseases</b>	
		UF:	Communicable disease
			Transmissible disease
		BT:	Diseases
		<b>Inference algorithms</b>	
		BT:	Algorithms
		<b>Inference mechanisms</b>	
		UF:	Model-based reasoning
		BT:	Knowledge engineering
		RT:	Cognitive science
			Gaussian processes
			Learning systems
		NT:	Fuzzy reasoning
		<b>Infinite horizon</b>	
		BT:	Optimal control
		RT:	Markov processes
			Optimization methods
		<i>Infinite impulse response filters</i>	
		USE:	IIR filters
		<i>Inflammability</i>	
		USE:	Flammability
		<b>Influenza</b>	



# 2019 IEEE Thesaurus

BT:	Diseases		
	Viruses (medical)	<i>Information extraction</i>	
		USE:	Information retrieval
<b>Informatics</b>			
BT:	Information processing	<b>Information filtering</b>	
	Information systems	BT:	Filtering
NT:	Biomedical informatics		Information retrieval
	Cognitive informatics	NT:	Information filters
	Energy informatics		Recommender systems
	Neuroinformatics		
<b>Information age</b>		<b>Information filters</b>	
UF:	AOI	UF:	Web filters
	Age of information	BT:	Information filtering
	Digital age	RT:	Information retrieval
	New media age	NT:	Whitelists
BT:	Information technology	<b>Information geometry</b>	
<b>Information analysis</b>		BT:	Geometry
BT:	Professional	RT:	Probability
communication		<b>Information industry</b>	
RT:	Big Data applications	BT:	Industries
	Sentiment analysis		
NT:	Decision analysis	<i>Information inequality</i>	
	Indexing	USE:	Cramer-Rao bounds
<b>Information and communication technology</b>		<b>Information management</b>	
UF:	ICT	BT:	Information systems
BT:	Communications		Management
technology		RT:	Big Data
	Information technology		Data aggregation
RT:	Energy informatics		Information exchange
NT:	Ambient assisted		Information services
living			Knowledge management
		NT:	Common Information
<b>Information architecture</b>		Model (computing)	Common Information
BT:	Information systems	Model (electricity)	Competitive
RT:	Database systems	intelligence	Digital preservation
<b>Information entropy</b>			Document handling
BT:	Information theory		Information security
<b>Information exchange</b>			Information sharing
BT:	Data processing		Knowledge transfer
	Information processing	<b>Information processing</b>	
RT:	Common Information	BT:	Information systems
Model (computing)	Common Information	RT:	Big Data
			Business data
Model (electricity)	Computer ports	processing	Data collection
	Information management		Granular computing
	Information sharing		Information sharing
	Information systems		



# 2019 IEEE Thesaurus

	Software as a service		Search methods
	Spectral efficiency		Social network
	WS-BPEL	services	
NT:	Electronic healthcare		Tagging
	Informatics		Taxonomy
	Information exchange		Terminology
	Sonification		Video sharing
			Vocabulary
			Web sites
<b>Information rates</b>		<b>Information science</b>	
UF:	Throughput	BT:	Professional
(communication systems)		communication	
BT:	Information retrieval		
<b>Information representation</b>		<b>Information security</b>	
BT:	Information technology	BT:	Information management
RT:	Visual analytics		Security
		RT:	Data protection
<b>Information resources</b>			Differential privacy
BT:	Professional		Footprinting
communication			Internet security
RT:	Information retrieval	NT:	Cyber espionage
	Information systems		Data breach
			Intrusion detection
<b>Information retrieval</b>			Phishing
UF:	Information extraction		SQL injection
BT:	Professional		Social engineering
communication		(security)	
RT:	Abstracts		Trust management
	Big Data		
	Document handling	<b>Information services</b>	
	Google	BT:	Professional
	Indexes	communication	
	Information filters	RT:	Abstracts
	Information resources		Google
	Knowledge discovery		IEEE Xplore
	Persistent identifiers		Information management
	Portals	NT:	Ask IEEE
	Ranking (statistics)		Dictionaries
	Symbols		Document delivery
	Triples (Data		Encyclopedias
structure)			Libraries
NT:	Blogs		Teletext
	Content-based		Videotex
retrieval			Wikipedia
	Dimensionality	<b>Information sharing</b>	
reduction		BT:	Information management
	Footprinting	RT:	Collaboration
	Hypertext systems		Information exchange
	Information filtering		Information processing
	Information rates	NT:	Data dissemination
	Music information		
retrieval		<b>Information systems</b>	
	Online services		
	Search engines		



# 2019 IEEE Thesaurus

communication	BT: Professional	Information theory	UF: Coding theory
	RT: Big Data applications		Informationtheoretic
	CD-ROMs		RT: Bandwidth
information processing	Computers and		Code refractoring
	Database machines		Communication systems
	Extranets	check	Cybernetics
	File systems		Cyclic redundancy
	Indexes		Econophysics
	Information exchange		Modulation coding
	Information resources		Quantum communication
	Information technology		Statistics
	Management information		Teleportation
base			Viterbi algorithm
	Multimedia computing	NT: Audio coding	Biological information
	Office automation	theory	Channel coding
	Strategic planning		Codes
NT: Data systems			Communication channels
Database systems			Decoding
Distributed			Encoding
information systems			Error compensation
	Identity management		Genetic communication
systems			Hamming distance
	Informatics		Hamming weight
	Information		Information entropy
architecture			Mutual information
	Information management		Network coding
	Information processing		Rate distortion theory
	Management information		Rate-distortion
systems			Source coding
	Medical information		Speech coding
systems			
<b>Information technology</b>			
communication	BT: Professional	<i>Informationtheoretic</i>	USE: Information theory
	RT: Automation	<i>Infrared communication</i>	USE: Optical fiber
control)	Biometrics (access	communication	
	Computer applications	<b>Infrared detectors</b>	BT: Radiation detectors
	Information systems		RT: Bolometers
NT: Bring your own device			Infrared surveillance
Information age			Photodetectors
Information and			Superconducting
communication technology			
	Information	photodetectors	
representation		<b>Infrared heating</b>	BT: Heating systems
	Printing		NT: Greenhouse effect
	Semantic technology		
	Service computing		
	Telematics		
	Universal Serial Bus		



# 2019 IEEE Thesaurus

## Infrared image sensors

BT: Image sensors

## Infrared imaging

BT: Imaging

RT: Biomedical optical

imaging

Infrared surveillance

Optical imaging

Remote sensing

NT: Night vision

## Infrared lasers

USE: Lasers

## Infrared propagation

USE: Optical propagation

## Infrared sensors

BT: Sensors

## Infrared spectra

UF: IR Spectra

BT: Spectral analysis

RT: Spectroscopy

## Infrared surveillance

BT: Surveillance

RT: Infrared detectors

Infrared imaging

## InGaAs

USE: Indium gallium

arsenide

## Inhibitors

BT: Chemical products

Production materials

RT: Retardants

NT: Corrosion inhibitors

## Inhomogeneous media

USE: Nonhomogeneous media

## Injected beams

USE: Particle beam

injection

## Injection lasers

USE: Semiconductor lasers

## Injection locked oscillators

USE: Injection-locked

oscillators

## Injection locking

USE: Injection-locked  
oscillators

## Injection molding

UF: Injection moulding

Power injection

molding

Power injection

moulding

BT: Production

RT: Compression molding

Embossing

## Injection moulding

USE: Injection molding

## Injection-locked oscillators

UF: Injection locked

oscillators

Injection locking

BT: Oscillators

## Injuries

UF: Injury

BT: Medical conditions

NT: Brain injuries

Pain

Wounds

## Injury

USE: Injuries

## Ink

BT: Production materials

RT: Paints

Printing

NT: Ink jet printing

## Ink jet printing

UF: Ink-jet printers

Ink-jet printing

Inkjet printing

BT: Ink

Printing

RT: Three-dimensional

printing

## Ink-jet printers

USE: Ink jet printing

## Ink-jet printing

USE: Ink jet printing





# 2019 IEEE Thesaurus

<i>Inkjet printing</i>	BT: Modeling	
USE: Ink jet printing		
<i>Innovation</i>	<b>Input-output programs</b>	
USE: Technological	UF: I/O programs	
innovation	BT: Operating systems	
	RT: Program processors	
	NT: Device drivers	
<b>Innovation management</b>	<i>Insect control</i>	
BT: Engineering management	USE: Pest control	
Research and		
development management	<b>Insects</b>	
RT: Entrepreneurship	BT: Animals	
Technology management		
NT: Creativity	<b>Insertion loss</b>	
	BT: Propagation	
<b>Inorganic chemicals</b>	RT: Attenuation	
BT: Chemistry		
<b>Inorganic compounds</b>	<b>Inspection</b>	
BT: Compounds	BT: Industry applications	
RT: Metals	RT: Coordinate measuring	
Organic inorganic	machines	
hybrid materials	Maintenance	
<i>Inorganic LEDs</i>	engineering	
USE: Inorganic light	Testing	
emitting diodes	NT: Automatic optical	
	inspection	
<b>Inorganic light emitting diodes</b>	<b>Instant messaging</b>	
UF: Inorganic LEDs	UF: IM	
BT: Light emitting diodes	BT: Electronic messaging	
	Internet	
<b>Inorganic materials</b>	<i>Instanton vacuum</i>	
BT: Materials	USE: Elementary particle	
RT: Soft electronics	vacuum	
<i>Inorganic organic hybrid materials</i>	<i>Instruction repertory</i>	
USE: Organic inorganic	USE: Instruction sets	
hybrid materials		
<i>Inorganic-organic hybrid materials</i>	<b>Instruction sets</b>	
USE: Organic inorganic	UF: Instruction repertory	
hybrid materials	BT: Program processors	
<i>InP</i>	NT: Out of order	
USE: Indium phosphide	Prefetching	
	Reduced instruction	
<b>Input devices</b>	set computing	
BT: Computer interfaces	<i>Instructional aids</i>	
Hardware	USE: Educational technology	
<b>Input variables</b>	<b>Instrument transformers</b>	
UF: Variable selection	BT: Transformers	
	RT: Protective relaying	



# 2019 IEEE Thesaurus

NT:	Voltage transformers	Insulators
		Isolation technology
<b>Instrumentation and measurement</b>		Oil insulation
NT:	Computerized	Plastic insulation
instrumentation	Electric variables	<b>Insulation life</b>
	High energy physics	BT: Insulation testing
instrumentation	computing	RT: Aging
	Instruments	Insulation
	Measurement	Life estimation
	Monitoring	Partial discharge
	Pulse oximetry	measurement
	Testing	Trees - insulation
<i>Instrumentation buses</i>		<b>Insulation testing</b>
USE:	Field buses	BT: Insulator testing
		RT: Fault location
<b>Instruments</b>		Impulse testing
BT:	Instrumentation and	Insulation
measurement		Partial discharge
RT:	Design tools	measurement
	Measurement	Pulsed electroacoustic
NT:	Compass	methods
	Medical instruments	NT: Insulation life
	Meters	<b>Insulator testing</b>
	Microscopy	BT: Testing
	Network analyzers	RT: Insulators
	Oscilloscopes	Surface discharges
	Pressure gauges	NT: Insulation testing
	Probes	
	Telescopes	<b>Insulators</b>
	Theodolites	UF: Bushings
	Tuners	BT: Insulation
<b>Insulated gate bipolar transistors</b>		RT: Breakdown voltage
BT:	Bipolar transistors	Ceramic products
		Impact ionization
<b>Insulation</b>		Insulator testing
BT:	Dielectrics and	Polymer foams
electrical insulation		Temperature
RT:	Dielectric breakdown	distribution
	Dielectric losses	NT: Metal-insulator
	Dielectric materials	structures
	Glass	Plastic insulators
	Insulation life	Rubber
	Insulation testing	Topological insulators
	Oils	Trees - insulation
	Polymer foams	
	Power transformer	<b>Insulin</b>
insulation	Spark gaps	BT: Drugs
NT:	Cable insulation	<b>Insulin pumps</b>
	Ceramics	BT: Pumps
	Gas insulation	RT: Biomedical equipment



# 2019 IEEE Thesaurus

	Diabetes	NT: Surface-mount technology
<b>Insurance</b>		
BT:	Financial management	<b>Integrated circuit measurements</b>
		BT: Circuit testing
<b>Intake systems</b>		RT: Electric variables measurement
BT:	Machine components	
<b>Integer linear programming</b>		<i>Integrated circuit metallisation</i>
BT:	Programming	USE: Integrated circuit metallization
NT:	Constraint theory	
	Mixed integer linear programming	<b>Integrated circuit metallization</b>
<i>Integer programming</i>		UF: Integrated circuit metallisation
USE:	Linear programming	BT: Metallization
<b>Integral equations</b>		<b>Integrated circuit modeling</b>
UF:	Antiderivatives	UF: Integrated circuit modelling
BT:	Calculus	BT: Integrated circuits Modeling
RT:	Boundary element methods	NT: Cutoff frequency
	Deconvolution	
	Integrodifferential equations	<i>Integrated circuit modelling</i>
	Inverse problems	USE: Integrated circuit modeling
	Method of moments	
	Numerical analysis	<b>Integrated circuit noise</b>
NT:	Probability density function	BT: Integrated circuits
		RT: Semiconductor device noise
<i>Integrated circuit design</i>		
USE:	Integrated circuit synthesis	NT: Threshold voltage Optical noise
<b>Integrated circuit interconnections</b>		
BT:	Integrated circuits	<b>Integrated circuit packaging</b>
<b>Integrated circuit layout</b>		UF: IC packaging
BT:	Integrated circuit synthesis	BT: Components, packaging, and manufacturing technology
RT:	Layout	RT: Chip scale packaging
	Physical design	Encapsulation
	Printed circuits	Integrated circuits
		Plastic packaging
<b>Integrated circuit manufacture</b>		Semiconductor device packaging
BT:	Components, packaging, and manufacturing technology	NT: Multichip modules
RT:	Gettering	Plastic integrated circuit packaging
	Integrated circuits	
	Microassembly	<b>Integrated circuit reliability</b>
	Micromachining	BT: Reliability
	Silicon compiler	RT: Integrated circuit testing
		Thermal stability



# 2019 IEEE Thesaurus

<b>Integrated circuit synthesis</b>		Application specific
design	UF: Integrated circuit	integrated circuits
	BT: Circuit synthesis	CMOS integrated
	BT: Integrated circuits	circuits
layout	NT: Integrated circuit	Coprocessors
		Current-mode circuits
		Digital integrated
		circuits
<b>Integrated circuit technology</b>		FET integrated
	BT: Circuits and systems	circuits
	RT: High-speed integrated	gate arrays
circuits	NT: CMOS technology	Hybrid integrated
	Moore's Law	circuits
		interconnections
<b>Integrated circuit testing</b>		Integrated circuit
	BT: Testing	modeling
	RT: Integrated circuit	noise
reliability	NT: Integrated circuit	synthesis
yield	Logic testing	integration
		circuits
<b>Integrated circuit yield</b>		MESFET integrated
testing	BT: Integrated circuit	Microprocessors
		Microwave integrated
<b>Integrated circuits</b>		circuits
	UF: IC	Millimeter wave
	ICs	integrated circuits
	Microchips	Monolithic integrated
	BT: Circuits	circuits
	RT: Active inductors	circuits
	Integrated circuit	Photonic integrated
manufacture	Integrated circuit	Power integrated
packaging	Integrated	circuits
optoelectronics	Memory modules	integrated circuits
	Microelectronics	integrated circuits
	Neural network	integrated circuits
hardware	Planarization	Thick film circuits
	SPIICE	Thin film circuits
	Semiconductor devices	Three-dimensional
	Semiconductor memory	integrated circuits
	Silicon-on-insulator	Through-silicon vias
	NT: Analog integrated	UHF integrated
circuits	Analog-digital	circuits
integrated circuits		Ultra large scale
		integration
		Very high speed
		integrated circuits



# 2019 IEEE Thesaurus

integration Very large scale  
 integration Wafer scale  
*Integrated circuits industry*  
 USE: Electronics industry

*Integrated control*  
 USE: Centralized control

**Integrated design**  
 BT: Design methodology  
 Systems engineering  
 and theory

**Integrated manufacturing systems**  
 BT: Industrial electronics  
 Manufacturing systems  
 RT: CAD/CAM  
 Computer aided  
 manufacturing  
 System integration

**Integrated optics**  
 BT: Optics  
 RT: Arrayed waveguide  
 gratings  
 Distributed Bragg  
 reflectors  
 Electrooptic  
 modulators  
 Integrated  
 optoelectronics  
 Microoptics  
 Optical films  
 Optical waveguides  
 Synapses  
 Thermo-optical devices

**Integrated optoelectronics**  
 BT: Optoelectronic devices  
 RT: Heterojunction bipolar  
 transistors

Integrated circuits  
 Integrated optics  
 Liquid crystal on  
 silicon  
 Microoptics  
 Microwave photonics  
 Smart pixels

*Integrated services digital networks*  
 USE: ISDN

*Integrated services networks*  
 USE: Intserv networks

**Integrodifferential equations**  
 BT: Equations  
 RT: Differential equations  
 Integral equations

**Integumentary system**  
 BT: Anatomy  
 NT: Hair  
 Nails  
 Skin

*Intellectual capital*  
 USE: Knowledge management

**Intellectual property**  
 UF: IP rights  
 IPR  
 BT: Copyright protection  
 RT: Cyberethics  
 Notice of Violation  
 Patents  
 Software protection  
 NT: Digital rights  
 management

**Intelligent actuators**  
 UF: Smart actuators  
 BT: Actuators

**Intelligent agents**  
 BT: Software agents

**Intelligent control**  
 BT: Cybernetics  
 RT: Context awareness  
 H infinity control  
 Mechatronics  
 NT: Feedforward systems  
 Neurocontrollers

*Intelligent databases*  
 USE: Deductive databases

**Intelligent manufacturing systems**  
 BT: Manufacturing systems  
 Production systems  
 RT: Smart manufacturing

**Intelligent networks**



# 2019 IEEE Thesaurus

BT: Telecommunication  
network topology  
RT: Software defined  
networking

## Intelligent robots

BT: Intelligent systems  
Robots  
RT: Autonomous robots  
Robot vision systems

## Intelligent sensors

UF: Smart sensors  
BT: Sensors  
RT: Electronic noses  
Mechatronics

## Intelligent structures

UF: Smart structures  
BT: Buildings  
RT: Intelligent systems  
Structural engineering  
NT: Smart cities

## Intelligent systems

BT: Artificial  
intelligence  
RT: Ambient intelligence  
Automata  
Collaborative  
intelligence  
Context awareness  
Expert systems  
Hybrid intelligent  
systems  
Intelligent structures  
Knowledge based  
systems  
Mobile agents  
Software agents  
NT: Autonomous systems  
Collective  
intelligence  
Intelligent robots

## Intelligent transportation systems

RT: Smart transportation  
NT: Automated highways  
Autonomous automobiles  
Geographic information  
systems  
Intelligent vehicles  
Navigation  
Transportation

## Intelligent vehicles

BT: Intelligent  
transportation systems  
Vehicles  
RT: Advanced driver  
assistance systems  
Connected vehicles  
Dedicated short range  
communication  
IEEE 802.11p Standard  
Smart transportation  
Vehicle routing  
Vehicular automation  
Wireless Access in  
Vehicular Environments  
NT: Autonomous vehicles  
Unmanned vehicles  
Vehicle-to-everything

## Intensity modulation

BT: Optical modulation  
RT: Amplitude modulation  
Electrooptic  
modulators

## Interactive systems

BT: Man-machine systems  
RT: Authentication  
NT: External stimuli

## Intercalibration

USE: Calibration

## Interchannel interference

UF: Adjacent channel  
interference  
Co-channel  
interference  
Cochannel interference  
Intersystem  
interference  
BT: Interference  
RT: Crosstalk

## Interconnected systems

UF: Composite systems  
BT: System analysis and  
design  
RT: Control systems  
NT: Botnet

## Interconnection networks



# 2019 IEEE Thesaurus

USE: Multiprocessor  
interconnection

**Interest point detection**  
BT: Computer vision

*Interest rates*  
USE: Economic indicators

**Interface management**  
BT: Management  
Systems engineering  
and theory  
RT: Computer interfaces  
Network interfaces

**Interface phenomena**  
BT: Computer interfaces  
RT: Adsorption  
NT: Network interfaces

**Interface states**  
BT: Computer interfaces  
MOSFET  
RT: Silicon-on-insulator

**Interference**  
UF: Interference (signal)  
BT: Electromagnetic  
compatibility and interference  
RT: Coherence  
Distortion  
Diversity schemes  
Noise  
NT: Clutter  
Crosstalk  
Diffraction  
Echo interference  
Electromagnetic

interference  
Electromagnetic  
radiative interference  
Electrostatic  
interference  
Interchannel  
interference  
Interference  
cancellation  
Interference channels  
Interference  
constraints  
Interference  
elimination

Interference  
suppression  
Intersymbol  
interference  
Rain fading  
TV interference  
Terrain factors

*Interference (signal)*  
USE: Interference

**Interference cancellation**  
BT: Interference

**Interference channels**  
BT: Interference

**Interference constraints**  
BT: Interference

**Interference elimination**  
BT: Interference

**Interference suppression**  
BT: Interference

**Interferometers**  
UF: Etalons  
BT: Interferometry  
NT: Mach-Zehnder  
interferometers

**Interferometric lithography**  
BT: Lithography

**Interferometry**  
BT: Measurement  
RT: Micrometers  
Talbot effect  
NT: Fabry-Perot  
Interferometers  
Optical interferometry  
Phase shifting  
interferometry  
Radar interferometry  
Radio interferometry  
Sagnac interferometers

**Interleaved codes**  
UF: Bit interleaved coded  
Bit-interleaved coded  
BT: Modulation coding

**Intermetallic**



# 2019 IEEE Thesaurus

BT: Alloying	
<b>Intermodulation distortion</b>	<b>International Space Station</b>
BT: Nonlinear distortion	BT: Space stations
<b>Internal combustion engines</b>	<i>International standards organization</i>
UF: HCCI engines	USE: ISO
BT: Engines	<b>International System of Units</b>
RT: Automotive components	BT: Measurement units
Exhaust gases	<i>International Telecommunications Union</i>
Hybrid electric	USE: ITU
vehicles	<b>International trade</b>
NT: Diesel engines	UF: Trade (international)
Ignition	BT: Economics
<b>Internal stresses</b>	RT: Business
BT: Stress	Exchange rates
<b>International Atomic Time</b>	Globalization
UF: TAI	International
BT: Standards categories	collaboration
RT: Atomic clocks	Macroeconomics
<b>International collaboration</b>	Trade agreements
UF: Joint ventures	<b>Internet</b>
BT: Management	BT: Communication systems
RT: Environmental factors	Computer networks
Environmental	Digital systems
management	Distributed computing
Globalization	RT: ARPANET
International	Blogs
relations	Cyberspace
International trade	Diffserv networks
Research and	Electronic commerce
development	Electronic learning
Social factors	Extranets
Standards	Google
Trade agreements	IEEE 802.16 Standard
<i>International electrotechnical commission</i>	IP networks
USE: IEC	IPTV
<i>International organization for standardization</i>	Internetworking
USE: ISO	Intserv networks
<b>International relations</b>	Multicast protocols
BT: Social implications of	Multiprotocol label
technology	switching
RT: Globalization	Next generation
International	networking
collaboration	Online services
Social factors	Point-to-multipoint
	communications
	Routing protocols
	Smart TV
	Social network
	services





# 2019 IEEE Thesaurus

networks	Streaming media	<i>Internet Protocol networks</i>
	TCPIP	USE: IP networks
	Video sharing	<i>Internet protocol television</i>
	Virtual enterprises	USE: IPTV
	Virtual private	<b>Internet security</b>
	Web sites	BT: Computer security
NT:	Wikipedia	Internet
	Bot (Internet)	RT: Information security
	Botnet	<i>Internet services</i>
	Cloud computing	USE: Web and internet
	Crowdsourcing	services
	Instant messaging	<b>Internet telephony</b>
	Internet of Things	UF: IP telephony
	Internet security	VOIP
	Internet telephony	Voice over IP
	Internet topology	Voice over Internet
	Linked data	protocol
	Middleboxes	Voice-over-Internet
	Semantic Web	protocol
	Social computing	BT: Internet
	Web 2.0	RT: Point-to-multipoint
	Web services	communications
<i>Internet banking</i>		<b>Internet topology</b>
USE: Online banking		BT: Internet
<i>Internet neutrality</i>		<b>Internetworking</b>
USE: Network neutrality		BT: Telecommunication
<i>Internet of Everything</i>		computing
USE: Internet of Things		RT: Computer networks
<b>Internet of Things</b>		Internet
UF: IOT		Local area networks
BT: Internet	Internet of Everything	Metropolitan area
		networks
RT: Ambient intelligence	Bar codes	Open systems
	Cloud computing	Wide area networks
	Cyber-physical systems	NT: Interoperability
	Machine-to-machine	LAN interconnection
communications		<b>Interoperability</b>
	Middleware	UF: Service composability
	Object detection	BT: Internetworking
	Protocols	RT: Collaboration
	Radiofrequency	Common Information
identification		Model (electricity)
	Tagging	Open systems
	Virtual environments	<b>Interplanetary exploration</b>
	Watermarking	BT: Space exploration
	Wireless sensor	RT: Space missions
networks		



# 2019 IEEE Thesaurus

## *Interpolating*

USE: Interpolation

## **Interpolation**

UF: Interpolating  
BT: Approximation methods  
RT: Curve fitting  
Digital-analog

conversion

Radial basis function

networks

Statistics  
Surface fitting

## *Interpreters (program)*

USE: Program processors

## **Interrupters**

UF: Interruption  
BT: Switchgear  
RT: Circuit breakers  
Fuses

## *Interruption*

USE: Interrupters

## **Interstellar chemistry**

BT: Chemistry  
RT: Extraterrestrial

measurements

## **Intersymbol interference**

BT: Interference  
RT: AWGN channels  
Equalizers  
Gaussian channels

## *Intersystem interference*

USE: Interchannel

interference

## **Interviews**

BT: IEEE indexing

## **Intestines**

BT: Digestive system

## **Intracranial pressure sensors**

BT: Biomedical equipment  
Sensors  
RT: Brain  
Neural engineering

## **Intracranial system**

BT: Cranial pressure

## **Intrusion detection**

BT: Information security  
RT: Network function

virtualization

## **Intserv networks**

UF: Integrated services

networks

BT: Computer networks  
RT: Internet  
Multimedia

communication

## *Invasive software*

USE: Privacy-invasive  
software

## *Invention*

USE: Technological

innovation

## **Inventory control**

BT: Operations research  
RT: Control systems  
Production control  
Production management

## **Inventory management**

BT: Production management  
RT: Bar codes  
Production engineering  
NT: Bills of materials

## *Inverse distortion*

USE: Predistortion

## *Inverse method*

USE: Inverse problems

## *Inverse methods*

USE: Inverse problems

## *Inverse modeling*

USE: Inverse problems

## *Inverse problem*

USE: Inverse problems

## **Inverse problems**

UF: Inverse method  
Inverse methods



# 2019 IEEE Thesaurus

	Inverse modeling	BT:	Nuclear and plasma sciences
	Inverse problem	RT:	Ion beams
	Inverse scattering	NT:	Ion implantation
BT:	Modeling		
RT:	Functional analysis		
	Image reconstruction		
	Integral equations		
	Numerical analysis		
	Signal reconstruction		
NT:	Deconvolution		
<b>Ion beam effects</b>			
		BT:	Ion beams
		RT:	Aerospace safety
			Ion accelerators
			Ion emission
<b>Ion beams</b>			
		BT:	Particle beams
		RT:	Electrodynamics
			Ion accelerators
			Ion beam applications
			Ion emission
			Ion sources
			Ions
		NT:	Ion beam effects
<b>Ion emission</b>			
		UF:	Field ion emission
			Secondary ion emission
		BT:	Nuclear imaging
		RT:	Ion beam effects
			Ion beams
			Ion sources
			Ions
			Thermionic emission
<b>Ion implantation</b>			
		BT:	Ion beam applications
			Materials preparation
		RT:	Plasma sources
			Semiconductor device manufacture
		NT:	Plasma immersion ion implantation
<b>Ion optics</b>			
		USE:	Particle beam optics
<b>Ion radiation effects</b>			
		BT:	Radiation effects
		RT:	Ionizing radiation
			Proton radiation effects
<b>Ion sources</b>			
		BT:	Ions
			Nuclear physics
		RT:	Ion accelerators
			Ion beams



# 2019 IEEE Thesaurus

	Ion emission		<b>Ionosphere</b>	
	Plasma sources		BT: Terrestrial atmosphere	
			RT: Meteorology	
<i>Ionisation</i>			Plasmas	
USE:	Ionization			
<i>Ionisation chambers</i>		<b>Ions</b>		
USE:	Ionization chambers	BT: Elementary particles		
		RT: Alpha particles		
		Elementary particle		
<i>Ionising radiation</i>		exchange interactions		
USE:	Ionizing radiation	Ion accelerators		
		Ion beams		
<b>Ionization</b>		Ion emission		
UF:	Ionisation	Protons		
	Photoionisation	Storage rings		
	Photoionization	NT: Ion sources		
BT: Ions		Ionization		
RT: Discharges (electric)				
	Plasmas			
	Space radiation			
NT: Impact ionization				
	Ionization chambers			
	Ionizing radiation			
	Single event			
transients				
	Single event upsets			
<b>Ionization chambers</b>				
UF:	Ionisation chambers			
BT: Ionization				
RT: Ionizing radiation				
	Smoke detectors			
<b>Ionizing radiation</b>				
UF:	Ionising radiation			
BT: Ionization				
RT: Ion radiation effects				
	Ionization chambers			
	Radiation hardening			
(electronics)				
	Silicon radiation			
detectors				
<b>Ionizing radiation sensors</b>				
BT: Sensors				
NT: Position sensitive				
particle detectors				
	Radiation detectors			
	X-ray detectors			
<i>Ionomeric polymer-metal composite</i>				
<i>actuators</i>				
USE:	Actuators			



# 2019 IEEE Thesaurus

<i>IPR</i>				Crops
	USE:	Intellectual property		Hydraulic systems
				Water pumps
<b>IPTV</b>				
	UF:	Internet protocol	<i>Intran 5</i>	
television			USE:	Magnesium oxide
	BT:	Digital TV		
	RT:	Broadband	<b>Ischemic pain</b>	
communication			BT:	Pain
		Computer networks		
		IP networks	<b>ISDN</b>	
		Internet	UF:	Integrated services
		Local area networks	digital networks	
		Protocols	BT:	Communication systems
		Streaming media		Digital communication
				Digital systems
<i>IR Spectra</i>			RT:	Asynchronous transfer
USE:	Infrared spectra		mode	
<b>IRE Standards</b>				Data communication
BT:	IEEE Standards			Frame relay
				Image communication
<b>Iridium</b>				Multimedia
BT:	Chemical elements		communication	
			NT:	B-ISDN
<b>Iris</b>				
BT:	Eyes		<i>Ishikawa diagrams</i>	
			USE:	Cause effect analysis
<b>Iris recognition</b>			<b>Islanding</b>	
BT:	Biometrics (access		BT:	Power supplies
control)			RT:	Electrical safety
				Generators
<i>Irises</i>				
USE:	Waveguide		<b>ISO</b>	
discontinuities			UF:	International
<b>Iron</b>			organization for	standardization
UF:	Fe			International
BT:	Metals		standards organization	
NT:	Cast iron		BT:	Standards
	Iron alloys		organizations	
			RT:	Communication
			standards	
<b>Iron alloys</b>				Guidelines
BT:	Iron			ISO Standards
RT:	Alloying			Measurement standards
	Metallurgy			Software standards
NT:	Austenite			Standardization
				Standards
<i>Irradiation</i>			NT:	Moving Pictures
USE:	Radiation effects		Experts Group	
<b>Irrigation</b>			<i>ISO 9000</i>	
BT:	Agriculture		USE:	Quality management
RT:	Agricultural products			



# 2019 IEEE Thesaurus

## ISO Standards

BT: Standards publications  
RT: ANSI Standards  
Communication

## standards

ISO  
Quality management  
Software standards  
Standardization  
X3D  
NT: MPEG standards

## Isobaric

BT: Thermodynamics

## Isolation technology

BT: Insulation  
RT: Vibration control

## Isolators

BT: Circuits

## Isosurfaces

BT: Data visualization  
RT: Biomedical imaging  
Computational fluid

## dynamics

## Isothermal processes

BT: Thermodynamics

## Isotopes

BT: Chemical elements  
Nuclear physics  
RT: Radioactive materials

## Itemsets

BT: Data analysis  
Transaction databases

## Iterative algorithms

BT: Iterative methods  
NT: Belief propagation  
Iterative closest

## point algorithm

Sum product algorithm

## Iterative closest point algorithm

UF: ICP  
BT: Iterative algorithms

## Iterative decoding

BT: Parity check codes

## Iterative learning control

BT: Control theory  
Iterative methods  
RT: Adaptive control  
Learning systems  
Tracking

## Iterative methods

BT: Mathematics  
Numerical analysis  
NT: Expectation-  
maximization algorithms  
Iterative algorithms  
Iterative learning  
control

## ITU

UF: International  
Telecommunications Union  
BT: Standards  
organizations

## ITU Standards

BT: Standards publications  
RT: UHDTV

## Jacks

USE: Lifting equipment

## Jacobian matrices

UF: Jacobian matrix  
BT: Matrices

## Jacobian matrix

USE: Jacobian matrices

## Jamming

BT: Electronic warfare  
RT: Electronic  
countermeasures  
Radar clutter  
Radar countermeasures  
Radio communication  
countermeasures

## Java

BT: High level languages

## Jet engines

BT: Engines  
RT: Aircraft propulsion  
Exhaust gases  
Fans



# 2019 IEEE Thesaurus

## JFET circuits

BT: FET circuits  
NT: JFET integrated

circuits

## JFET integrated circuits

BT: JFET circuits  
RT: JFETs

## JFETs

UF: Junction FETs  
BT: Field effect  
transistors  
RT: JFET integrated  
circuits

## Jigs

USE: Fixtures

## Jitter

BT: Distortion  
RT: Circuit stability  
NT: Timing jitter

## Job design

BT: Ergonomics

## Job production systems

UF: Bespoke production  
BT: Manufacturing systems

## Job rotation

USE: Multiskilling

## Job shop scheduling

BT: Scheduling  
RT: Genetic algorithms

## Job specification

BT: Human resource  
management  
RT: Multiskilling  
Recruitment

## Jobs listings

BT: Career development  
RT: Employment

## Johnson Nyquist noise

USE: Thermal noise

## Joining materials

BT: Production materials  
RT: Joining processes

Soldering equipment

NT: Filler metals  
Sealing materials

## Joining processes

UF: Connecting  
Coupling (process)  
Fastening  
Linking  
BT: Manufacturing systems  
Materials processing  
RT: Couplings  
Fasteners  
Joining materials  
Plasma welding  
Soldering equipment  
NT: Bonding processes  
Crimping  
Soldering  
Splicing  
Welding

## Joint ventures

USE: International  
collaboration

## Joints

BT: Skeleton

## Josephson devices

USE: Superconducting  
devices

## Josephson effect

BT: Tunneling  
RT: Josephson junctions

## Josephson junctions

UF: Josephson logic  
Superconducting  
junction devices  
BT: Superconducting  
devices  
RT: Josephson effect

## Josephson logic

USE: Josephson junctions

## JPEG

USE: Transform coding

## JPEG2000

USE: Transform coding



# 2019 IEEE Thesaurus

## Judd-Ofelt theory

BT: Spectral analysis  
RT: Fluorescence  
Photoluminescence

USE: Continuous improvement

## Kalman filtering

USE: Kalman filters

## Junction detectors

USE: Semiconductor counters

## Kalman filters

UF: Kalman filtering  
BT: Filters  
RT: Estimation  
Nonlinear dynamical

## Junction FETs

USE: JFETs

systems

## Junction lasers

USE: Semiconductor lasers

Prediction methods  
Sensor fusion

## Junctionless nanowire transistors

BT: MOSFET  
Nanoelectronics  
RT: Nanowires  
Silicon-on-insulator

## Kaons

USE: Mesons

## Karhunen-Loeve transforms

BT: Transforms

## Junctions

BT: Semiconductor devices  
NT: Heterojunctions  
Hybrid junctions  
P-n junctions  
Waveguide junctions

## KBO

USE: Kuiper belt

## Kelvin

BT: Temperature  
measurement

## Junk e-mail

USE: Unsolicited electronic  
mail

## Kernel

BT: Mathematics  
Operating systems  
NT: Null space  
System kernels

## Junk email

USE: Unsolicited electronic  
mail

## Kerr effect

BT: Electrooptic effects  
RT: Magneto optic effects

## Jupiter

BT: Planets

## Key performance indicator

UF: KPI  
BT: Measurement  
Performance evaluation

## k neighbor methods

USE: Nearest neighbor  
methods

## Keyboards

BT: Computer peripherals  
RT: Ergonomics

## k neighbour methods

USE: Nearest neighbor  
methods

## K-band

BT: Microwave bands

## Keyways

BT: Plugs

## K-NN methods

USE: Nearest neighbor  
methods

## Keyword search

UF: Keyword searches  
Keyword searching  
BT: Search methods  
RT: Indexing

## Kaizen





# 2019 IEEE Thesaurus

<i>Keyword searches</i>	Potential energy
USE: Keyword search	Thermal energy
<i>Keyword searching</i>	<i>Kinetic molecular theory</i>
USE: Keyword search	USE: Kinetic theory
<b>Kidney</b>	<b>Kinetic theory</b>
BT: Urogenital system	UF: Collision theory
NT: Kidney stones	Kinetic molecular
	theory
	Kinetic-molecular
<b>Kidney stones</b>	theory
UF: Nephrolithiasis	Kinetics
Renal calculi	BT: Motion control
Urinary calculosis	Physics
BT: Kidney	NT: Kinetic energy
Medical conditions	
RT: Lithotripsy	<i>Kinetic-molecular theory</i>
	USE: Kinetic theory
<b>Kilns</b>	<i>Kinetics</i>
BT: Furnaces	USE: Kinetic theory
RT: Calcination	
Curing	<i>Kirchhoff approximation</i>
Firing	USE: Kirchhoff's Law
Heat treatment	
<i>Kindle</i>	<i>Kirchhoff current Law</i>
USE: Consumer electronics	USE: Kirchhoff's Law
AND	<i>Kirchhoff scattering</i>
	USE: Kirchhoff's Law
<i>Kinematic analysis</i>	<b>Kirchhoff's Law</b>
USE: Kinematics	UF: Kirchhoff
<i>Kinematic faults</i>	approximation
USE: Kinematics	Kirchhoff current law
	Kirchhoff scattering
<i>Kinematic model</i>	BT: Spectroscopy
USE: Kinematics	
<i>Kinematic noise</i>	<i>Kirk effect</i>
USE: Kinematics	USE: Kirk field collapse
	effect
<b>Kinematics</b>	<b>Kirk field collapse effect</b>
UF: Kinematic analysis	UF: Kirk effect
Kinematic faults	BT: Bipolar transistors
Kinematic model	
Kinematic noise	<b>Klystrons</b>
BT: Mechanical factors	UF: Gyroklystrons
NT: Motor coordination	BT: Electron tubes
	RT: Amplifiers
<b>Kinetic energy</b>	Cavity resonators
BT: Kinetic theory	Colliding beam
RT: Mechanical energy	accelerators



# 2019 IEEE Thesaurus

	Oscillators		Knowledge discovery
	Relativistic effects		Knowledge
		representation	
Knee			
	BT: Extremities	Knowledge management	
		UF: Intellectual capital	
<i>Knee joint replacements</i>		BT: Computer applications	
	USE: Prosthetics	Management	
		RT: Competitive	
<i>Knitted fabric composites</i>		intelligence	
	USE: Fabrics		Information management
			Knowledge discovery
Knowledge acquisition			Knowledge engineering
	BT: Knowledge engineering		Management information
	RT: Context awareness	systems	
	Econophysics		Semantic Web
	Expert systems	NT: Knowledge transfer	
	Knowledge based		
systems		Knowledge representation	
	Self-organizing	BT: Knowledge engineering	
feature maps		RT: Expert systems	
		Formal concept	
Knowledge based systems		analysis	
	UF: Knowledge systems		Knowledge based
	Knowledge-based	systems	
systems			Linked data
	Rule based systems		OWL
	BT: Artificial	NT: Description logic	
intelligence		Ontologies	
	RT: Decision support	Thesauri	
systems			
	Deductive databases	Knowledge systems	
	Intelligent systems	USE: Knowledge based	
	Knowledge acquisition	systems	
	Knowledge		
representation		Knowledge transfer	
	Linked data	BT: Information management	
	Software agents	Knowledge management	
	NT: Expert systems		
	Mobile agents	Knowledge-based systems	
Knowledge discovery		USE: Knowledge based	
	BT: Knowledge engineering	systems	
	RT: Data mining		
	Data science	Kohonen maps	
	Information retrieval	USE: Self-organizing	
	Knowledge management	feature maps	
Knowledge engineering		KPI	
	BT: Artificial	USE: Key performance	
intelligence		indicator	
	RT: Knowledge management	Krypton	
	NT: Inference mechanisms	BT: Chemical elements	
	Knowledge acquisition		



# 2019 IEEE Thesaurus

<b>Kuiper belt</b>		RT:	Engineering education
UF:	KBO		Research and
	Kuiper belt objects	development	
	Kuiper belts		Student experiments
BT:	Solar system	NT:	Remote laboratories
<i>Kuiper belt objects</i>		<i>Labour productivity</i>	
USE:	Kuiper belt	USE:	Productivity
<i>Kuiper belts</i>		<i>Labour resources</i>	
USE:	Kuiper belt	USE:	Labor resources
<b>L-band</b>		<i>Labour supply</i>	
BT:	Microwave bands	USE:	Labor resources
<b>Lab-on-a-chip</b>		<b>Lacquers</b>	
UF:	Lab-on-chip	BT:	Chemical products
BT:	System-on-chip		Coatings
			Materials
<i>Lab-on-chip</i>		RT:	Paints
USE:	Lab-on-a-chip		
<i>Label swapping</i>		<i>Lagrange duality</i>	
USE:	Multiprotocol label	USE:	Lagrangian functions
switching		<i>Lagrange functions</i>	
		USE:	Lagrangian functions
<b>Labeling</b>		<i>Lagrange relaxation</i>	
UF:	Labelling	USE:	Lagrangian functions
BT:	Packaging		
RT:	Applicators		
	Packaging machines		
<i>Labelling</i>		<b>Lagrangian functions</b>	
USE:	Labeling	UF:	Lagrange duality
			Lagrange functions
<i>Labor productivity</i>			Lagrange relaxation
USE:	Productivity	BT:	Quantum mechanics
<b>Labor resources</b>		<b>Lakes</b>	
UF:	Labor supply	BT:	Geoscience
	Labour resources	RT:	Reservoirs
	Labour supply		Rivers
	Manpower planning		Sediments
BT:	Human resource		Water
management			Water pollution
	Personnel		Water resources
RT:	Equal opportunities		Water storage
	Recruitment		Wetlands
<i>Labor supply</i>		<b>Laminates</b>	
USE:	Labor resources	BT:	Materials
		RT:	Lamination
<b>Laboratories</b>		<b>Lamination</b>	
BT:	Test facilities	BT:	Materials processing
		RT:	Laminates



# 2019 IEEE Thesaurus

<b>Lamps</b>	BT:	Lighting	NT:	Routing protocols
	RT:	Light sources		Software radio
		Lighting control	cellular systems	Land mobile radio
		Ultraviolet sources	<b>Land mobile radio cellular systems</b>	
	NT:	Discharge lamps	UF:	Cellular land mobile radio
<b>LAN</b>		Electrodeless lamps		Cellular radio
		Filament lamps		Land-mobile radio
		Fluorescent lamps	cellular systems	
		LED lamps	BT:	Land mobile radio
	USE:	Local area networks	RT:	3G mobile communication
<b>LAN emulation</b>				4G mobile communication
	UF:	Local area network		5G mobile communication
	BT:	Optical fiber networks		Bluetooth
				Channel estimation
				Code division
<b>LAN interconnection</b>	BT:	Internetworking	multiplexing	
	RT:	Computer networks		Cross layer design
		Local area networks	broadcasting	Digital multimedia
		Metropolitan area networks		Downlink
		Wide area networks	resonators	Film bulk acoustic
<b>Land mine detection</b>		Wireless LAN		Location awareness
	USE:	Landmine detection		Multiuser detection
			management	Network resource
				Personal communication
			networks	
<b>Land mines</b>	USE:	Landmine detection		Software radio
				Time division
			synchronous code division multiple access	
	BT:	Mobile communication	NT:	Cellular networks
	RT:	Radio communication		Paging systems
<b>Land mobile radio</b>		5G mobile communication		
		Ad hoc networks	<b>Land mobile radio equipment</b>	
		Bluetooth	UF:	Land-mobile radio equipment
		Channel estimation	BT:	Radio communication equipment
		Indoor navigation		Vehicular and wireless technologies
<b>Land mobile radio equipment</b>		Land mobile radio	RT:	Land mobile radio
		Location awareness		Telephone equipment
		Mobile antennas		Transceivers
		Mobile handsets	NT:	Mobile antennas
		Multiuser detection		
<b>Land pollution</b>		Personal area networks		
		Radio access networks		



# 2019 IEEE Thesaurus

BT:	Pollution	<i>Land-mobile radio</i>
RT:	Industrial pollution	USE: Land mobile radio
	Land use planning	
	Oil pollution	<i>Land-mobile radio cellular systems</i>
	Radioactive pollution	USE: Land mobile radio
NT:	Soil pollution	cellular systems
<b>Land surface</b>		<i>Land-mobile radio equipment</i>
BT:	Geoscience	USE: Land mobile radio
RT:	Land surface	equipment
temperature		
<b>Land surface temperature</b>		<b>Landmine detection</b>
UF:	Ground temperature	UF: Land mine detection
	Land temperature	Land mines
BT:	Geoscience and remote	Landmines
sensing		BT: Buried object
RT:	Global warming	detection
	Land surface	RT: Military equipment
	Ocean temperature	Radar imaging
	Remote sensing	Remote sensing
<i>Land temperature</i>		<i>Landmines</i>
USE: Land surface		USE: Landmine detection
temperature		
<b>Land transportation</b>		<b>Lane departure warning systems</b>
UF:	Ground transportation	BT: Road safety
	Planetary landers	Vehicle safety
BT:	Transportation	RT: Collision avoidance
RT:	Global Positioning	
System		<b>Lanthanum</b>
	Land vehicles	BT: Metals
NT:	Rail transportation	NT: Lanthanum compounds
	Road transportation	
<b>Land use planning</b>		<b>Lanthanum compounds</b>
BT:	Environmental	BT: Lanthanum
management		
RT:	Floods	<b>Laparoscopes</b>
	Land pollution	BT: Surgical instruments
	Reservoirs	RT: Minimally invasive
	Water storage	surgery
<b>Land vehicles</b>		<i>Laparoscopic surgery</i>
UF:	Flexible fuel vehicles	USE: Minimally invasive
	Ground vehicles	surgery
BT:	Vehicles	<b>Laplace equations</b>
RT:	Land transportation	UF: Inverse transforms
	Rail transportation	Laplace operator
NT:	Bicycles	Laplace transform
	Electric vehicles	Laplacian
	Road vehicles	BT: Mathematics
		<i>Laplace operator</i>
		USE: Laplace equations



# 2019 IEEE Thesaurus

## *Laplace transform*

USE: Laplace equations

## *Laplacian*

USE: Laplace equations

## **Lapping**

BT: Machining

RT: Surface finishing

## *Laptops*

USE: Microcomputers AND  
Portable computers

## **Large Hadron Collider**

UF: LHC

BT: Test facilities

RT: Particle accelerators

## **Large scale integration**

UF: LSI  
Large-scale

## *integration*

BT: Circuits  
Integrated circuits

NT: Ultra large scale

## *integration*

Very large scale

## *integration*

Wafer scale

## *integration*

## **Large screen displays**

UF: Large-screen displays

BT: TV equipment

## *Large-scale integration*

USE: Large scale

## *integration*

## **Large-scale systems**

BT: System analysis and

## *design*

RT: Complex systems  
Fuzzy systems

## *Large-screen displays*

USE: Large screen displays

## **Larynx**

UF: Voice tract

BT: Respiratory system

## **Laser ablation**

BT: Laser applications

## **Laser applications**

BT: Lasers

RT: CD recording

Endoscopes

Gyroscopes

Heating systems

Holography

Measurement by laser

## *beam*

Optical recording

Photoacoustic effects

Stereolithography

NT: Dark states

Distributed feedback

## *devices*

Laser ablation

Laser beam cutting

Laser fusion

Laser theory

Magneto optic recording

## **Laser beam cutting**

BT: Laser applications

## **Laser beams**

UF: Laser guide stars

BT: Beams

RT: Bragg gratings

Electrooptic

## *modulators*

Laser theory

Lasers

Optical beams

Optical vortices

Refractive index

Supercontinuum

## *generation*

Thermal lensing

## **Laser cavity resonators**

BT: Cavity resonators

RT: Optical resonators

Surface emitting

## *lasers*

## *Laser diodes*

USE: Diode lasers AND

Semiconductor lasers

## **Laser excitation**

UF: Electron beam pumping



# 2019 IEEE Thesaurus

	Excitation of lasers	<b>Laser stability</b>	
	Pumping of lasers	BT:	Lasers
BT:	Lasers	RT:	Stability analysis
NT:	Optical pumping		
<b>Laser feedback</b>		<b>Laser surgery</b>	
BT:	Laser noise	BT:	Surgery
<b>Laser fusion</b>		<b>Laser theory</b>	
BT:	Laser applications	UF:	Laser physics
			Laser science
<i>Laser guide stars</i>		BT:	Laser applications
USE:	Laser beams	RT:	Laser beams
			Lasers
<b>Laser mode locking</b>			Optical beams
BT:	Laser modes		Optical design
			Optics
<b>Laser modes</b>			Particle beams
BT:	Lasers		Quantum mechanics
NT:	Laser mode locking	<b>Laser transitions</b>	
		BT:	Lasers
<b>Laser noise</b>		<b>Laser tuning</b>	
BT:	Noise	BT:	Semiconductor lasers
	Optical signal		Tuning
processing		RT:	Optical tuning
RT:	Lasers and		
electrooptics		<b>Laser velocimetry</b>	
NT:	Laser feedback	BT:	Measurement by laser
<i>Laser physics</i>		beam	
USE:	Laser theory		
<b>Laser printers</b>		<b>Lasers</b>	
BT:	Printers	UF:	Infrared lasers
		BT:	Lasers and
<b>Laser radar</b>		electrooptics	
UF:	Lidar	RT:	Laser beams
	Optical radar		Laser theory
BT:	Radar		Light sources
RT:	Geophysical		Optical distortion
measurement techniques			Oscillators
	Optical scattering		Stereolithography
<i>Laser science</i>		diodes	
USE:	Laser theory		Threshold current
<b>Laser sintering</b>			Ultraviolet sources
UF:	Selective laser	NT:	Waveguide lasers
sintering			Atom lasers
BT:	Materials preparation		Chemical lasers
RT:	Design automation		Diode lasers
	Prototypes		Free electron lasers
	Stereolithography		Gas lasers
			Laser applications
			Laser excitation



# 2019 IEEE Thesaurus

	Laser modes		Commercial law
	Laser stability		Consumer protection
	Laser transitions		Contract law
	Power lasers		Criminal law
	Pump lasers		Employment law
	Quantum well lasers		Forensics
	Ring lasers		Law enforcement
	Semiconductor lasers		Patent law
	Solid lasers		Trademarks
	Surface emitting		
lasers		<b>Law enforcement</b>	
	X-ray lasers	UF:	Police
		BT:	Law
		RT:	Censorship
			Image forensics
			Legal factors
<b>Lasers and electrooptics</b>		<b>Layered manufacturing</b>	
RT:	Erbium	BT:	Manufacturing systems
	Laser noise	RT:	Computational geometry
NT:	Electrooptic devices		Stereolithography
	Electrooptic effects		
	Lasers		
	Optics		
	Optoelectronic devices		
	Photonics		
<b>Latches</b>		<b>Layered media</b>	
BT:	Bistable circuits	USE:	Nonhomogeneous media
<b>Lattice Boltzmann</b>		<b>Layout</b>	
USE:	Lattice Boltzmann	BT:	Graphics
methods		RT:	Art
			Geometry
			Integrated circuit
<b>Lattice Boltzmann methods</b>		layout	
UF:	Lattice Boltzmann		Wiring
BT:	Boltzmann distribution		
	Lattices		
RT:	Fluid dynamics	<b>LCD</b>	
		USE:	Liquid crystal
<b>Lattices</b>		displays	
UF:	Optical lattices	<b>LCDs</b>	
BT:	Mathematics	USE:	Liquid crystal
NT:	Lattice Boltzmann	displays	
methods			
<b>Launching (electromagnetic)</b>		<b>Lcos</b>	
USE:	Electromagnetic	USE:	Liquid crystal on
launching		silicon	
<b>Launching (electrothermal)</b>		<b>LDPA</b>	
USE:	Electrothermal	USE:	Log-periodic dipole
launching		antennas	
<b>Law</b>		<b>LDPC</b>	
UF:	Legal aspects	USE:	Parity check codes
BT:	Legal factors		
NT:	Censorship	<b>Ldpc codes</b>	
		USE:	Parity check codes





# 2019 IEEE Thesaurus

<b>Leaching</b>	BT: Chemical processes	BT: Artificial intelligence	RT: Gaussian processes
<b>Lead</b>	UF: Pb	NT: Distance learning	Image annotation
	BT: Metals	Electronic learning	Nearest neighbor
	RT: Graphite	methods	
	Lead compounds	<b>Learning automata</b>	
	NT: Lead isotopes	UF: Learning automaton	
<b>Lead acid batteries</b>		BT: Learning systems	
BT: Batteries		<i>Learning automaton</i>	
<b>Lead compounds</b>		USE: Learning automata	
BT: Compounds		<b>Learning management systems</b>	
RT: Lead		BT: Computer aided instruction	
<b>Lead isotopes</b>		RT: Learning systems	
BT: Lead		Computer applications	
<b>Lead time reduction</b>		Electronic learning	
BT: Production management		Management	
RT: Production planning		Training	
Project management		<i>Learning mechanisms</i>	
<b>Leak detection</b>		USE: Learning systems	
BT: Sensor systems and applications		<i>Learning methods</i>	
RT: Packaging		USE: Learning systems	
Testing		<b>Learning systems</b>	
Vacuum systems		UF: Learning mechanisms	
<b>Leakage currents</b>		Learning methods	
UF: Gate leakage current		Learning-based method	
BT: Current		BT: Artificial intelligence	
RT: Electron traps		RT: Adaptive systems	
Fault currents		Context awareness	
NT: Gate leakage		Cybernetics	
<b>Leaky wave antennas</b>		Inference mechanisms	
UF: Leaky-wave antennas		Iterative learning	
BT: Antennas		control	
<i>Leaky-wave antennas</i>		Mobile agents	
USE: Leaky wave antennas		Pattern recognition	
<b>Lean production</b>		Software agents	
BT: Manufacturing systems		White matter	
Production systems		NT: Backpropagation	
RT: Production management		Cognitive systems	
		Learning automata	
		Learning management	
<b>Learning (artificial intelligence)</b>		systems	
		learning	Semisupervised



# 2019 IEEE Thesaurus

Supervised learning	Ethical aspects
Unsupervised learning	Governmental factors
	IEEE Corporate
<i>Learning-based method</i>	activities
USE: Learning systems	NT: Law enforcement
	Copyright protection
<b>Least mean squares methods</b>	Law
BT: Least squares	Patents
approximation	Product liability
Mean square error	Software protection
methods	Trademarks
<b>Least squares approximation</b>	<b>Legged locomotion</b>
BT: Numerical analysis	UF: Biped locomotion
RT: Approximation methods	Gait assessment
Curve fitting	Gait control
Mean square error	Gait disorders
methods	Walking
Optimization	BT: Mobile robots
Recursive estimation	RT: Biological control
NT: Least mean squares	systems
methods	Control systems
	Motion control
<i>LED</i>	
USE: Light emitting diodes	<b>Legislation</b>
	BT: Government
<b>LED lamps</b>	NT: General Data
UF: AC light emitting	Protection Regulation
diode lamps	
AC-LED lamps	<b>Length measurement</b>
Light emitting diode	BT: Measurement
lamps	RT: Micrometers
BT: Lamps	Size measurement
Light emitting diodes	
RT: Light sources	<i>Lens</i>
	USE: Lenses
<i>LEDs</i>	
USE: Light emitting diodes	<b>Lenses</b>
	UF: Lens
<i>Left handed materials</i>	BT: Optical devices
USE: Metamaterials	RT: Focusing
	Optical materials
<i>Left-handed materials</i>	
USE: Metamaterials	<i>LEO</i>
	USE: Low earth orbit
<b>Leg</b>	satellites
BT: Extremities	
	<b>Lesions</b>
<i>Legal aspects</i>	BT: Tumors
USE: Law	NT: Tissue damage
<b>Legal factors</b>	<b>Levee</b>
BT: Engineering management	UF: Dike
RT: Censorship	Levee system



# 2019 IEEE Thesaurus

BT: Geoscience	
<i>Levee system</i>	<b>Licenses</b>
USE: Levee	UF: Licence
	Licensing
	BT: Contracts
<b>Level control</b>	<i>Licensing</i>
UF: Liquid level control	USE: Licenses
BT: Mechanical variables	
control	<i>Licensing (nuclear facilities)</i>
NT: Gyroscopes	USE: Nuclear facility regulation
<b>Level measurement</b>	<i>Lidar</i>
UF: Liquid level	USE: Laser radar
measurement	
BT: Geodesy	
<b>Level set</b>	<b>Life estimation</b>
BT: Calculus	UF: Accelerated testing
RT: Gradient methods	BT: Estimation
	RT: Aging
<i>Levels, energy</i>	Failure analysis
USE: Energy states	Fatigue
	Insulation life
<b>Levitation</b>	<i>Life Long Learning</i>
BT: Physics	USE: Continuing
NT: Electrostatic	professional development
levitation	
	<b>Life sciences</b>
	UF: Computational life
<i>LF noise</i>	sciences
USE: Low-frequency noise	BT: Science - general
	RT: Animals
<i>LHC</i>	Biology
USE: Large Hadron Collider	Plants (biology)
<i>Li</i>	<i>Life sciences computing</i>
USE: Lithium	USE: Computational modeling
<i>li-fi</i>	<b>Life testing</b>
USE: Light fidelity	BT: Testing
	RT: Reliability
<i>Li-ion batteries</i>	
USE: Lithium-ion batteries	<b>Lifetime estimation</b>
	UF: Lifetime measurement
<i>Li-S batteries</i>	Lifetime tests
USE: Lithium-sulfur	BT: Measurement
batteries	
	<i>Lifetime measurement</i>
<b>Libraries</b>	USE: Lifetime estimation
BT: Information services	
NT: Software libraries	<i>Lifetime tests</i>
	USE: Lifetime estimation
<i>Licence</i>	
USE: Licenses	



# 2019 IEEE Thesaurus

<i>Lifi</i>	USE: Light fidelity	RT: High-speed optical techniques
<b>Lifting equipment</b>	UF: Hoists Jacks	IEEE 802.15 Standard Optical fiber networks Radio frequency Visible light
<b>Lifting equipment</b>	BT: Materials handling	communication
	RT: Freight handling Materials handling Pulleys Winches	Wireless communication Wireless fidelity
	NT: Cranes	
<b>Ligaments</b>	BT: Musculoskeletal system	
<i>Light attenuation</i>	USE: Attenuation	<i>Light interferometry</i> USE: Optical interferometry
<b>Light deflectors</b>	BT: Optical devices RT: Bragg gratings	<i>Light polarisation</i> USE: Optical polarization
<i>Light emitters</i>	USE: Light emitting diodes	<i>Light polarization</i> USE: Optical polarization
<i>Light emitting diode lamps</i>	USE: LED lamps	<b>Light rail systems</b> UF: Light railways Streetcars BT: Rail transportation RT: Public transportation
<b>Light emitting diodes</b>	UF: LED LEDs Light emitters Light-emitting diodes	<i>Light railways</i> USE: Light rail systems
	BT: Optoelectronic devices	<b>Light scattering</b> BT: Scattering RT: Optical scattering Resonance light
	RT: Microcavities Molecular beam	scattering
applications	P-n junctions Visible light	<b>Light sources</b> BT: Optics RT: Arc discharges Glow discharge devices High intensity
communication	NT: Inorganic light	discharge lamps
emitting diodes	LED lamps Organic light emitting	LED lamps Lamps Lasers Lighting Lighting control Photometry Supercontinuum
diodes	Superluminescent	
diodes		
<b>Light fidelity</b>	UF: li-fi lifi	generation
	BT: Wireless LAN	NT: Synchrotron radiation Electroluminescent
		devices



# 2019 IEEE Thesaurus

	Fast light	NT:	Lightning protection
	Luminescent devices		
	Phosphors	<b>Lightning protection</b>	
	Slow light	BT:	Lightning
	Stray light		Protection
	Superluminescent		
diodes		<b>Lightweight structures</b>	
	Ultraviolet sources	BT:	Structural shapes
		RT:	Aerospace engineering
<b>Light trapping</b>			Aerospace industry
UF:	Plasmonic solar cells		Aerospace materials
BT:	Photovoltaic cells		Honeycomb structures
RT:	Reflectivity		Metal foam
			Sandwich structures
			Thin wall structures
<i>Light-emitting diodes</i>			
USE:	Light emitting diodes		
<b>Lighting</b>		<b>Limbic system</b>	
UF:	Arc lamps	BT:	Brain
	Illumination		
BT:	Optical devices	<i>Limit cycle</i>	
RT:	Building services	USE:	Limit-cycles
	Buildings		
	Filament lamps	<i>Limit-cycle</i>	
	Fluorescent lamps	USE:	Limit-cycles
	Gas discharge devices		
	High intensity	<b>Limit-cycles</b>	
discharge lamps		UF:	Limit cycle
	Light sources		Limit-cycle
	Lighting control	BT:	Mathematics
	Photometry		
	Visible light	<b>Limiting</b>	
communication		BT:	Signal processing
NT:	Daylighting	RT:	Nonlinear distortion
	Electrical ballasts		Voltage control
	Emergency lighting		
	Lamps	<i>Linac</i>	
	Solid state lighting	USE:	Linear particle
		accelerator	
<b>Lighting control</b>		<i>LINACS</i>	
UF:	Illumination control	USE:	Linear accelerators
BT:	Optical control		
RT:	High intensity	<b>Line enhancers</b>	
discharge lamps		BT:	Adaptive systems
	Lamps	RT:	Digital filters
	Light sources		Filtering theory
	Lighting		
<b>Lightning</b>		<i>Line output transformer</i>	
BT:	Meteorology	USE:	Flyback transformers
RT:	Dielectric breakdown		
	Electrostatic	<b>Line-of-sight propagation</b>	
processes		BT:	Electromagnetic
	Storms	radiation	



# 2019 IEEE Thesaurus

## Linear accelerators

UF: LINACS  
BT: Particle accelerators  
RT: Collimators

USE: Maximum likelihood detection

*Linear frequency modulation*

USE: Chirp modulation

## Linear algebra

UF: Linear systems  
(algebraic)  
BT: Algebra  
RT: Eigenvalues and eigenfunctions

*Linear integrated circuits*

USE: Analog integrated circuits

NT: Linear programming  
Matrices  
Vectors

## Linear matrix inequalities

BT: Mathematics  
RT: Linear systems  
Uncertain systems

## Linear antenna arrays

BT: Antenna arrays

*Linear parameter varying systems*

USE: Linear systems

## Linear approximation

BT: Approximation methods  
RT: Nonlinear equations  
Nonlinear systems

## Linear particle accelerator

UF: Linac  
Particle accelerator  
BT: High energy physics  
instrumentation computing

## Linear circuits

BT: Circuits  
RT: Ohmic contacts

## Linear predictive coding

BT: Prediction methods

## Linear codes

BT: Block codes  
RT: Error correction

## Linear programming

UF: Integer programming  
Linear-programming  
BT: Linear algebra  
RT: Algorithms  
Microeconomics  
Operations research  
Optimization methods  
NT: Data envelopment analysis

## Linear discriminant analysis

UF: Linear discriminant classification  
BT: Statistics  
RT: Machine learning

*Linear discriminant classification*

USE: Linear discriminant analysis

## Linear regression

BT: Regression analysis  
NT: Maximum likelihood

linear regression

## Linear feedback control systems

BT: Control systems  
Cybernetics  
RT: Linear systems  
NT: Frequency locked loops  
Phase locked loops  
State feedback  
Tracking loops

## Linear systems

UF: Linear parameter varying systems  
BT: Mathematics  
RT: Control systems  
Linear feedback

## Linear feedback shift registers

BT: Shift registers

control systems

Linear matrix

inequalities

Principal component

*Linear filtering*

analysis



# 2019 IEEE Thesaurus

Transfer functions		<b>LinkedIn</b>	
<i>Linear systems (algebraic)</i>		BT:	Social network services
USE:	Linear algebra		
<i>Linear-programming</i>		<i>Linking</i>	
USE:	Linear programming	USE:	Joining processes
<i>Linearisation techniques</i>		<b>Linux</b>	
USE:	Linearization techniques	BT:	High level languages
<b>Linearity</b>		<i>Lipid bilayers</i>	
BT:	Electromagnetic measurements	USE:	Lipidomics
<b>Linearization techniques</b>		<b>Lipidomics</b>	
UF:	Linearisation techniques	UF:	Lipid bilayers Lipids
BT:	Mathematics	BT:	Molecular biomarkers
RT:	Control system synthesis	RT:	Fats
	Control systems MOSFET circuits Modulation Operational amplifiers Transmitters	<i>Lipids</i>	
<i>Linguistic indexing</i>		USE:	Lipidomics
USE:	Image annotation	<b>Lips</b>	
<b>Linguistics</b>		BT:	Head
BT:	Natural languages	RT:	Stomatognathic system
RT:	Semiotics		
NT:	Phonetics Pragmatics	<b>Liquefied natural gas</b>	
<i>Linkages</i>		UF:	LNG
USE:	Couplings	BT:	Natural gas
<b>Linked data</b>		<b>Liquid cooling</b>	
BT:	Internet	BT:	Cooling
RT:	Big Data Database systems Knowledge based systems	NT:	Indirect liquid cooling
	Knowledge representation	<b>Liquid crystal devices</b>	
	Metadata NoSQL databases Ontologies Query processing Semantic Web	UF:	Liquid-crystal devices
		BT:	Displays
		RT:	Electrooptic devices Liquid crystals Microdisplays Thin film transistors
		NT:	Liquid crystal displays
			Liquid crystal on silicon
		<b>Liquid crystal displays</b>	
		UF:	LCD LCDs Liquid-crystal displays
		BT:	Liquid crystal devices



# 2019 IEEE Thesaurus

NT: Active matrix liquid  
crystal displays

## Liquid crystal on silicon

UF: Lcos  
BT: Liquid crystal devices  
RT: Integrated  
optoelectronics  
Microdisplays

## Liquid crystal polymers

UF: Liquid-crystal  
polymers  
BT: Polymers

## Liquid crystals

BT: Crystals  
RT: Liquid crystal devices

## Liquid flow

USE: Fluid flow

## Liquid insulation

USE: Dielectric liquids

## Liquid level control

USE: Level control

## Liquid level measurement

USE: Level measurement

## Liquid waveguides

BT: Hollow waveguides

## Liquid-crystal devices

USE: Liquid crystal devices

## Liquid-crystal displays

USE: Liquid crystal  
displays

## Liquid-crystal polymers

USE: Liquid crystal  
polymers

## Liquids

BT: Fluids  
RT: Aerosols  
Electrohydraulics  
Materials science and  
technology  
Spraying  
NT: Water

## LiquiFerrofluid

USE: Ferrofluid

## Lithium

UF: Li  
BT: Metals  
RT: Alloying  
Batteries  
NT: Lithium compounds

## Lithium batteries

BT: Batteries  
Lithium compounds

## Lithium compounds

BT: Lithium  
RT: Alloying  
Batteries  
NT: Lithium batteries  
Lithium niobate

## Lithium ion batteries

USE: Lithium-ion batteries

## Lithium niobate

BT: Lithium compounds

## Lithium-ion batteries

UF: Li-ion batteries  
Lithium ion batteries  
BT: Batteries

## Lithium-sulfur batteries

UF: Li-S batteries  
BT: Batteries

## Lithography

UF: Photolithography  
BT: Manufacturing  
RT: Nanotechnology  
Printing  
Proximity effects  
NT: Colloidal lithography  
Extreme ultraviolet

## lithography

Interferometric  
lithography  
Nanolithography  
Soft lithography  
Stereolithography  
X-ray lithography

## Lithotripsy

BT: Medical treatment





# 2019 IEEE Thesaurus

RT: Kidney stones Lithotriptors	Load management
<b>Lithotriptors</b>	UF: Load balancing Load compensation Load composition Load variations
BT: Biomedical equipment	BT: Energy management
RT: Lithotripsy	RT: Energy storage Load forecasting Pallets Power demand Vehicle-to-grid
<b>Liver</b>	
BT: Digestive system	
NT: Liver diseases	
<b>Liver diseases</b>	
BT: Liver	<b>Load modeling</b>
<b>Liver neoplasms</b>	BT: Modeling Power system modeling
BT: Neoplasms	RT: Power demand
<i>Livestock</i>	<i>Load tap changers</i>
USE: Agriculture	USE: On load tap changers
<i>LNG</i>	<i>Load variations</i>
USE: Liquefied natural gas	USE: Load management
<i>Load balancing</i>	<b>Loaded antennas</b>
USE: Load management	BT: Antennas
<i>Load compensation</i>	<b>Loaded waveguides</b>
USE: Load management	BT: Electromagnetic waveguides
<i>Load composition</i>	RT: Dielectric materials Waveguide
USE: Load management	discontinuities
<b>Load flow</b>	<b>Loading</b>
UF: Power flow	BT: Freight handling
BT: Power system	RT: Containers Filling Grippers Pulleys
management	
NT: Load flow analysis	
<b>Load flow analysis</b>	<b>Loans and mortgages</b>
UF: Power flow analysis	UF: Mortgages
BT: Load flow	BT: Financial management
RT: Power system security Power transmission	
<b>Load flow control</b>	<i>Local area network emulation</i>
UF: Power flow control	USE: LAN emulation
BT: Power system control	
NT: Power factor	<b>Local area networks</b>
correction	UF: LAN
<b>Load forecasting</b>	BT: Communication systems Digital systems
BT: Power demand	RT: Distributed computing Ethernet FDDI
RT: Load management	



# 2019 IEEE Thesaurus

Field buses		<i>Location metadata</i>	
File servers		USE:	Location awareness
IEEE 802.3 Standard		<i>Log normal distribution</i>	
IPTV		USE:	Log-normal
Internetworking		distribution	
LAN interconnection		<b>Log periodic antennas</b>	
Media Access Protocol		BT:	Antenna arrays
Multiprocessor		<b>Log-normal distribution</b>	
interconnection		UF:	Log normal
Office automation		distribution	
Open systems		BT:	Probability
Protocols		distribution	
Regional area networks		<b>Log-periodic dipole antennas</b>	
Storage area networks		UF:	LDPA
Token networks		BT:	Antennas
Virtual private		<b>Logic</b>	
networks		UF:	Formal logic
NT:	Wireless LAN	BT:	Computational and
<i>Local authorities</i>		artificial intelligence	
USE:	Local government	RT:	Boolean algebra
<b>Local government</b>		Cognitive science	
UF:	Local authorities	Computer science	
BT:	Government	Logic circuits	
<b>Local oscillators</b>		Logic functions	
BT:	Oscillators	NT:	Fuzzy logic
<b>Location awareness</b>		Multivalued logic	
UF:	Geo tagging	Probabilistic logic	
Location based		Sufficient conditions	
services		<b>Logic arrays</b>	
Location metadata		BT:	Circuits
Mobile location		Logic circuits	
management		NT:	Programmable logic
Mobile radio mobility		arrays	
management		<i>Logic CAD</i>	
BT:	Mobile communication	USE:	Logic design
RT:	Land mobile radio	<i>Logic circuit testing</i>	
Land mobile radio		USE:	Logic testing
cellular systems		<b>Logic circuits</b>	
Mobile computing		BT:	Circuits
Navigation		Switching circuits	
Personal communication		RT:	Adders
networks		Computers and	
Position measurement		information processing	
Wireless communication		Counting circuits	
NT:	Network location	Digital circuits	
awareness			
<i>Location based services</i>			
USE:	Location awareness		



# 2019 IEEE Thesaurus

circuits	Digital integrated	USE:	Logic testing
	Flip-flops	<b>Logic testing</b>	
	Logic	UF:	Logic circuit testing
	Logic design		Logic test
	Logic devices	BT:	Integrated circuit
	Logic functions	testing	
	Multiplying circuits	RT:	Design for testability
	Pulse inverters		
	Shift registers	<i>Logical decomposition</i>	
NT:	Combinational circuits	USE:	System analysis and
	Logic arrays	design	
	Programmable logic	<b>Logistics</b>	
arrays	Superconducting logic	UF:	Physical distribution
circuits		management	
		BT:	Production management
<b>Logic design</b>		RT:	Procurement
UF:	Circuit design (logic)	NT:	Reverse logistics
	Logic CAD		Supply chains
BT:	Design automation		
RT:	Circuit synthesis	<b>Long Term Evolution</b>	
	Design for testability	UF:	LTE
	Design methodology		LTE advanced
	Engineering education	BT:	3GPP Standards
	Logic circuits		Communication
	Timing	standards	
NT:	Reconfigurable logic	RT:	4G mobile
		communication	
<b>Logic devices</b>			High-speed networks
BT:	Circuits and systems		Mobile communication
RT:	Logic circuits		Mobile handsets
NT:	Logic gates		Wireless communication
	Programmable logic		
devices		<i>Look-up table</i>	
		USE:	Table lookup
<b>Logic functions</b>		<i>Lookup table</i>	
BT:	Boolean functions	USE:	Table lookup
RT:	Logic		
	Logic circuits	<i>Loop-filtering algorithm</i>	
	Multivalued logic	USE:	Filtering algorithms
<b>Logic gates</b>		<i>LOPT</i>	
BT:	Logic devices	USE:	Flyback transformers
RT:	Boolean algebra		
<i>Logic inverters</i>		<i>Loran</i>	
USE:	Pulse inverters	USE:	Radio navigation
<b>Logic programming</b>		<b>Lorentz covariance</b>	
BT:	Programming	UF:	Lorentz force
NT:	Constraint handling		Lorentz invariance
		BT:	Physics
<i>Logic test</i>			



# 2019 IEEE Thesaurus

*Lorentz force*  
USE: Lorentz covariance

UF: Low-voltage  
BT: Voltage measurement

*Lorentz invariance*  
USE: Lorentz covariance

## Low-carbon economy

UF: Decarbonisation  
Decarbonised economy  
Decarbonization  
Decarbonized economy  
Low fossile fuel

## Loss measurement

BT: Measurement  
RT: Attenuation  
measurement  
Magnetic losses  
Optical losses  
NT: Packet loss

## economy

BT: Power system economics  
RT: Carbon  
Ecosystems  
Environmental

## Lot sizing

BT: Production control  
RT: Materials requirements  
planning

## management

Global warming  
Greenhouse effect  
Renewable energy

## Loudspeakers

BT: Audio systems  
RT: Acoustic distortion

## sources

## Low-earth-orbit

USE: Low earth orbit  
satellites

*Low density parity check codes*  
USE: Parity check codes

## Low-frequency noise

UF: LF noise  
Low frequency noise  
BT: Noise

## Low earth orbit satellites

UF: LEO  
Low-earth-orbit  
BT: Artificial satellites

## Low-noise amplifiers

UF: Low noise amplifiers  
BT: Amplifiers

*Low fossile fuel economy*  
USE: Low-carbon economy

## Low-power electronics

UF: Low power electronics  
Ultra low power\*  
Ultra-low power\*  
BT: Consumer electronics  
RT: Electronic equipment  
Nanogenerators

*Low frequency noise*  
USE: Low-frequency noise

## Low latency communication

BT: Communication systems

## Low noise amplifiers

USE: Low-noise amplifiers

## Low-temperature plasmas

UF: Low temperature  
plasmas  
BT: Plasmas  
RT: Plasma applications

## Low pass filters

BT: Filters

## Low power electronics

USE: Low-power electronics

## Low-voltage

USE: Low voltage

## Low temperature plasmas

USE: Low-temperature

## LSI

USE: Large scale

plasmas

## integration

## Low voltage



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# 2019 IEEE Thesaurus

## *LTE*

USE: Long Term Evolution

## *LTE advanced*

USE: Long Term Evolution

## **Lubricants**

UF: Cutting fluids  
BT: Production materials  
RT: Lubrication

## **Lubricating oils**

UF: Oil filters  
Oiling (lubrication)  
BT: Oils

## **Lubrication**

BT: Mechanical factors  
RT: Friction  
Lubricants  
Mechanical bearings

## **Luminescence**

BT: Optics  
RT: Luminescent devices  
Muon colliders  
Scintillators  
NT: Bioluminescence  
Electroluminescence  
Fluorescence  
Phosphorescence  
Photoluminescence  
Thermoluminescence

## **Luminescent devices**

BT: Light sources  
Optical devices  
RT: Luminescence  
Muon colliders  
NT: Electroluminescent

## devices

## *Lunar*

USE: Moon

## **Lung**

BT: Respiratory system

## **Lung neoplasms**

BT: Neoplasms

## *LUT*

USE: Table lookup

## *Lutecium*

USE: Lutetium

## **Lutetium**

UF: Lutecium  
BT: Chemical elements

## *Lyapunov function*

USE: Lyapunov methods

## **Lyapunov methods**

UF: Lyapunov function  
Lyapunov stability  
BT: System analysis and  
design  
RT: Control design  
Functional analysis  
Stability

## *Lyapunov stability*

USE: Lyapunov methods

## **Lymph nodes**

BT: Lymphatic system

## **Lymphatic system**

BT: Anatomy  
NT: Lymph nodes

## *M2M*

USE: Machine-to-machine  
communications

## *MAC*

USE: Media Access Protocol

## *MAC protocol*

USE: Media Access Protocol

## **Mach-Zehnder interferometers**

UF: Mach-Zehnder  
modulation  
BT: Interferometers

## *Mach-Zehnder modulation*

USE: Mach-Zehnder  
interferometers

## *Machine added indexing*

USE: Machine assisted  
indexing

## *Machine aided indexing*



# 2019 IEEE Thesaurus

USE: Machine assisted indexing

## Machine assisted indexing

UF: Automated indexing  
Automatic indexing  
MAI  
Machine added indexing  
Machine aided indexing  
Machine indexing  
Machine-added indexing  
Machine-aided indexing  
Machine-assisted

indexing

BT: Indexes  
RT: Indexing

## Machine components

BT: Machinery  
Mechanical products  
RT: Couplings  
Engines  
Gears  
Turbomachinery  
Wheels  
NT: Air cleaners  
Belts  
Cams  
Engine cylinders  
Exhaust systems  
Impellers  
Intake systems  
Manifolds  
Mechanical splines  
Pistons  
Rotors  
Shafts  
Valves

## Machine control

BT: Industrial electronics  
NT: Machine vector control

## Machine indexing

USE: Machine assisted indexing

## Machine intelligence

BT: Computational and artificial intelligence  
RT: Machine-to-machine communications  
NT: Pattern analysis

## Machine learning

UF: Dictionary learning  
Machine-learning  
BT: Artificial intelligence  
RT: Bio-inspired computing  
Cognitive systems  
Convolutional neural networks  
Energy informatics  
Generative adversarial networks  
Linear discriminant analysis  
NT: Boosting  
Deep learning  
Dimensionality reduction  
Reinforcement learning  
Robot learning  
Statistical learning

## Machine learning algorithms

BT: Algorithms

## Machine shops

BT: Production facilities  
RT: Machine tools  
Machinery production

industries

Machining

## Machine tool spindles

UF: Spindle bearings  
BT: Machine tools  
RT: Mechanical splines  
Shafts

## Machine tools

BT: Production equipment  
RT: Clamps  
Coordinate measuring

machines

Cutting tools  
Fixtures  
Gears  
Hand tools  
Hobbing machines  
Machine shops  
Machining  
Manufacturing  
Mechanical guides  
Turning  
NT: Dies



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	Drilling machines		Machine intelligence
	Grinding machines		Remote monitoring
	Machine tool spindles		Wireless communication
	Metalworking machines		Wireless sensor
	Milling machines	networks	
	Presses		
	Sawing machines	<b>Machinery</b>	
<b>Machine vector control</b>		BT:	Industry applications
BT:	Machine control	RT:	Machinery production
RT:	AC-DC power converters	industries	
	DC-DC power converters		Machining
			Materials handling
<b>Machine vision</b>		equipment	
UF:	Vision systems	NT:	Production equipment
(nonbiological)			Agricultural machinery
BT:	Image processing		Ball bearings
RT:	Automatic optical		Belts
inspection			Drives
	IEEE 1394 Standard		Electric machines
	Image analysis		Fans
	Image recognition		Furnaces
	Manufacturing		Gears
automation			Hydraulic systems
	Observers		Machine components
	Pattern recognition		Motors
	Stereo vision		Printing machinery
	Visual systems		Pumps
NT:	Object recognition		Textile machinery
	Object segmentation		
<b>Machine windings</b>		<b>Machinery production industries</b>	
BT:	Windings	BT:	Manufacturing
		industries	
<i>Machine-added indexing</i>		RT:	Machine shops
USE:	Machine assisted		Machinery
indexing			
<i>Machine-aided indexing</i>		<b>Machining</b>	
USE:	Machine assisted	BT:	Materials processing
indexing		RT:	Burnishing
			Clamps
<i>Machine-assisted indexing</i>			Deburring
USE:	Machine assisted		Finishing
indexing			Machine shops
			Machine tools
<i>Machine-assisted indexing</i>			Machinery
USE:	Machine assisted		Manufacturing
indexing		NT:	Boring
<i>Machine-Learning</i>			Drilling
USE:	Machine learning		Electrochemical
		machining	
<b>Machine-to-machine communications</b>			Hobbing machines
UF:	M2M		Lapping
BT:	Communication systems		Milling
RT:	IP networks		Planing
	Internet of Things		Sawing



# 2019 IEEE Thesaurus

Turning	BT:	Magnetic variables
Virtual machining	measurement	
	RT:	Magnetic fields
<b>Macrocell networks</b>		Object detection
UF:	Macrocells	
BT:	Cellular networks	<b>Magnetic anomaly detectors</b>
RT:	Rural areas	BT:
		Magnetometers
<i>Macrocells</i>		RT:
USE:	Macrocell networks	Magnetic fields
		Military equipment
		Object detection
<b>Macroeconomics</b>		<i>Magnetic bearings</i>
BT:	Economics	USE:
RT:	Government	Magnetic levitation
	International trade	
	Public finance	<b>Magnetic circuits</b>
NT:	Privatization	BT:
		Circuits
<i>Maglev</i>		RT:
USE:	Magnetic levitation	Coils
		Magnetic devices
<b>Magnesium</b>		Windings
UF:	Mg	<b>Magnetic communication</b>
BT:	Metals	BT:
NT:	Magnesium compounds	Communication systems
		RT:
<b>Magnesium compounds</b>		Electromagnetic
BT:	Magnesium	induction
NT:	Magnesium oxide	Near field
		communication
<b>Magnesium oxide</b>		<b>Magnetic confinement</b>
UF:	Irtran 5	BT:
	MgO	Plasma confinement
BT:	Magnesium compounds	RT:
RT:	Ceramics	Electromagnets
	Optical materials	Fusion power
<b>Magnetic analysis</b>		generation
BT:	Magnetics	Tokamak devices
RT:	Electromagnetic	Tokamaks
analysis		<i>Magnetic core losses</i>
	Magnetic fields	USE:
NT:	Magnetization	Magnetic losses
<b>Magnetic anisotropy</b>		<b>Magnetic cores</b>
BT:	Magnetics	BT:
NT:	Magnetic domain walls	Magnetic devices
	Magnetic domains	RT:
	Magnetic moments	Inductors
	Perpendicular magnetic	NT:
anisotropy		Transformer cores
<b>Magnetic anomaly detection</b>		<b>Magnetic devices</b>
		BT:
		Magnetics
		RT:
		Magnetic circuits
		Magnetic materials
		NT:
		Accelerator magnets
		Ferrite devices
		Magnetic cores
		Magnetic gears
		Magnetic heads
		Magnetic memory
		Magnetic modulators





# 2019 IEEE Thesaurus

devices	Magnetooptic devices	fields	Toroidal magnetic
	Magnetoresistive		
devices	Magnetostrictive	<b>Magnetic films</b>	
	Solenoids	UF: Magnetic thin films	
	Transformer cores	BT: Films	
	Undulators	RT: Magnetic materials	
		NT: Thin films	
<b>Magnetic domain walls</b>		NT: Ferrimagnetic films	
BT: Magnetic anisotropy		Ferrite films	
		Garnet films	
<b>Magnetic domains</b>		<i>Magnetic filters</i>	
BT: Magnetic anisotropy		USE: Magnetic separation	
<b>Magnetic field induced strain</b>		<i>Magnetic fluids</i>	
BT: Magnetomechanical		USE: Magnetic liquids	
effects			
RT: Ferroelectric films		<b>Magnetic flux</b>	
materials	Ferroelectric	BT: Magnetics	
	MISFETs	RT: Remanence	
	Semiconductor diodes	NT: Flux pinning	
	Semiconductor films	Magnetic flux density	
	Semiconductor-metal	Magnetic flux leakage	
interfaces		<b>Magnetic flux density</b>	
<b>Magnetic field measurement</b>		BT: Magnetic flux	
BT: Magnetic variables			
measurement		<b>Magnetic flux leakage</b>	
RT: Magnetic fields		BT: Magnetic flux	
		Nondestructive testing	
<b>Magnetic fields</b>		RT: Corrosion	
BT: Magnetics		Pipelines	
RT: Biomagnetics			
Compass		<b>Magnetic force microscopy</b>	
Critical current		BT: Magnetics	
density (superconductivity)		RT: Atomic force	
Electromagnetic fields		microscopy	
Magnetic analysis		Magnetic forces	
Magnetic anomaly			
detection		<b>Magnetic forces</b>	
detectors	Magnetic anomaly	BT: Magnetics	
	Magnetic field	RT: Electromagnetic forces	
measurement		Force	
	Maxwell equations	Magnetic force	
	Remanence	microscopy	
	SQUID magnetometers	Magnetic levitation	
	Synchrotrons	NT: Coercive force	
NT: Geomagnetism		<b>Magnetic gears</b>	
Magnetic reconnection		BT: Gears	
Magnetic separation		Magnetic devices	
Magnetostatics		RT: Electromagnetic	
		devices	



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	Magnetic levitation		Ferrites
	Permanent magnets		Ferrofluid
	Power transmission		Ferromagnetic
	Variable speed drives	materials	
<b>Magnetic heads</b>			Garnet films
BT:	Magnetic devices		Garnets
RT:	Magnetic recording		Magnetic films
	Magnetoresistive		Magnetic liquids
devices		semiconductors	Magnetic
<b>Magnetic hysteresis</b>			Magnetic superlattices
BT:	Magnetics		Paramagnetic materials
RT:	Hysteresis	materials	Soft magnetic
	Remanence		
<b>Magnetic levitation</b>		<i>Magnetic measurements</i>	
UF:	Maglev	USE:	Magnetic variables
	Magnetic bearings	measurement	
BT:	Levitation	<b>Magnetic memory</b>	
	Magnetics	UF:	Magnetic storage
RT:	Electromagnets	BT:	Magnetic devices
	Magnetic forces		Memory
	Magnetic gears	RT:	Magnetic recording
	Rail transportation	NT:	Floppy disks
			Hard disks
<b>Magnetic liquids</b>		<b>Magnetic modulators</b>	
UF:	Magnetic fluids	BT:	Magnetic devices
BT:	Magnetic materials		Modulation
<b>Magnetic losses</b>		<b>Magnetic moments</b>	
UF:	Magnetic core losses	BT:	Magnetic anisotropy
BT:	Magnetics		
RT:	Eddy currents	<b>Magnetic multilayers</b>	
	Loss measurement	BT:	Magnetics
		RT:	Coatings
<b>Magnetic materials</b>		<b>Magnetic nanoparticles</b>	
BT:	Magnetics	BT:	Nanoparticles
	Materials		
RT:	Biomagnetics	<b>Magnetic noise</b>	
	Boron alloys	BT:	Magnetic recording
	Magnetic devices		
	Magnetoelasticity	<b>Magnetic particles</b>	
	Magnetostriction	BT:	Magnetics
	Permeability	RT:	Biomagnetics
NT:	Amorphous magnetic		Microelectromechanical
materials		devices	
	Antiferromagnetic	<i>Magnetic permeability</i>	
materials		USE:	Permeability
	Diamagnetic materials		
	Ferrimagnetic films	<b>Magnetic properties</b>	
materials	Ferrimagnetic		
	Ferrite films		



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BT: Magnetics	Magnetic resonance elastography
<b>Magnetic reconnection</b>	<b>Magnetic semiconductors</b>
BT: Magnetic fields	BT: Magnetic materials
<b>Magnetic recording</b>	Semiconductor materials
UF: Perpendicular recording	<b>Magnetic sensors</b>
BT: Recording	BT: Magnetics
RT: Magnetic heads	Sensors
Magnetic memory	NT: Spin valves
NT: Digital magnetic recording	<b>Magnetic separation</b>
Heat-assisted magnetic recording	UF: Magnetic filters
Magnetic noise	BT: Magnetic fields
Magnetooptic recording	RT: Particle separators
Microwave-assisted magnetic recording	<b>Magnetic shielding</b>
Perpendicular magnetic recording	BT: Electromagnetic shielding
<b>Magnetic resonance</b>	<b>Magnetic stimulation</b>
BT: Resonance	BT: Medical treatment
Resonant frequency	<i>Magnetic storage</i>
RT: Ferroresonance	USE: Magnetic memory
Magnetic resonance imaging	<b>Magnetic superlattices</b>
NT: Antiferromagnetic	BT: Magnetic materials
resonance	Superlattices
Ferromagnetic resonance	<b>Magnetic susceptibility</b>
Nuclear magnetic resonance	BT: Magnetics
Paramagnetic resonance	<b>Magnetic switching</b>
<b>Magnetic resonance elastography</b>	BT: Magnetics
BT: Magnetic resonance imaging	<i>Magnetic thin films</i>
<b>Magnetic resonance imaging</b>	USE: Magnetic films
UF: Biomedical MRI	<i>Magnetic tunnel junctions</i>
MRI	USE: Magnetic tunneling
NMR imaging	<b>Magnetic tunneling</b>
Nuclear magnetic resonance imaging	UF: Magnetic tunnel junctions
BT: Imaging	Magnetic tunnelling
RT: Diagnostic radiography	Spin-dependent tunneling
Image reconstruction	Spin-dependent tunnelling
Magnetic resonance	BT: Magnetoelectric effects
NT: Diffusion tensor imaging	
Functional magnetic resonance imaging	



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transport	RT: Tunneling Magnetoelectronics Spin polarized	Magnets Magnonics Microwave magnetics Nonlinear magnetics Remanence
<i>Magnetic tunnelling</i>	USE: Magnetic tunneling	<i>Magnetisation</i> USE: Magnetization
<b>Magnetic variables control</b>	BT: Control systems	<i>Magnetisation processes</i> USE: Magnetization processes
<b>Magnetic variables measurement</b>	UF: Magnetic measurements BT: Measurement NT: Magnetic anomaly	<i>Magnetisation reversal</i> USE: Magnetization reversal
detection	Magnetic field	<b>Magnetization</b> UF: Magnetisation BT: Magnetic analysis
measurement	Magnetometers Permeability	<b>Magnetization processes</b> UF: Magnetisation processes BT: Magnetics RT: Hysteresis NT: Magnetization reversal Saturation
measurement		magnetization
<b>Magnetics</b>	NT: Biomagnetics Demagnetization Gyromagnetism Magnetic analysis Magnetic anisotropy Magnetic devices Magnetic fields Magnetic flux Magnetic force	<b>Magnetization reversal</b> UF: Magnetisation reversal BT: Magnetization processes
microscopy	Magnetic forces Magnetic hysteresis Magnetic levitation Magnetic losses Magnetic materials Magnetic multilayers Magnetic particles Magnetic properties Magnetic sensors Magnetic	<b>Magneto electrical resistivity imaging technique</b> UF: MERIT BT: Imaging RT: Geophysical measurement techniques
susceptibility	Magnetic switching Magnetization	<b>Magnetoacoustic effects</b> UF: Acoustomagnetic effects BT: Magnetics RT: Acoustics Magnetomechanical
processes	Magnetoacoustic	effects
effects	Magnetoelectric	<b>Magnetoelasticity</b> BT: Magnetomechanical effects RT: Magnetic materials NT: Magnetostriction
effects	Magnetomechanical	
effects	Magneto optic effects	



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## Magnetoelectric effects

BT: Magnetics  
 NT: Hall effect  
 Magnetic tunneling  
 Magnetoelectronics  
 Magnetoresistance  
 Spintronics

## Magnetoelectronic devices

USE: Magnetoelectronics

## Magnetoelectronics

UF: Magnetoelectronic  
 devices  
 BT: Magnetoelectric  
 effects  
 RT: Magnetic tunneling  
 Magnetoresistive  
 devices  
 NT: Spin polarized  
 transport

## Magnetoencephalography

BT: Biomagnetics  
 RT: Biomedical image  
 processing  
 Brain

## Magnetofluid dynamics

USE: Magnetohydrodynamics

## Magnetofluid dynamics

USE: Magnetohydrodynamics

## Magnetohydrodynamic power generation

BT: Power generation  
 RT: Magnetohydrodynamics

## Magnetohydrodynamics

UF: Hydromagnetics  
 MHD  
 Magnetofluid dynamics  
 Magnetofluid dynamics  
 BT: Dynamics  
 Hydrodynamics  
 Mechanical factors  
 RT: Electrohydraulics  
 Fluid flow  
 Magnetohydrodynamic  
 power generation

## Magnetomechanical effects

UF: Piezomagnetic effects

BT: Magnetics  
 RT: Magnetoacoustic  
 effects  
 Mechanical factors  
 Stress  
 NT: Magnetic field induced  
 strain  
 Magnetoelasticity  
 Magnetostriction

## Magnetometers

UF: Magnetometry  
 BT: Magnetic variables  
 measurement  
 NT: Magnetic anomaly  
 detectors  
 SQUID magnetometers

## Magnetometry

USE: Magnetometers

## Magneto optic devices

UF: Photomagnetic devices  
 BT: Magnetic devices  
 RT: Magneto optic effects

## Magneto optic effects

UF: Photomagnetic effects  
 BT: Magnetics  
 RT: Kerr effect  
 Magneto optic devices  
 Magneto optic recording  
 Optics  
 NT: Faraday effect  
 Gyrotropism

## Magneto optic recording

BT: Laser applications  
 Magnetic recording  
 RT: Magneto optic effects

## Magnetoresistance

UF: Magnetoresistivity  
 BT: Magnetoelectric  
 effects  
 RT: Magnetoresistive  
 devices  
 Nanocontacts  
 Spin polarized  
 transport  
 NT: Anisotropic  
 magnetoresistance  
 Ballistic  
 magnetoresistance



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Colossal  
magnetoresistance  
Enhanced  
magnetoresistance  
Extraordinary  
magnetoresistance  
Giant  
magnetoresistance  
Ordinary  
magnetoresistance  
Tunneling  
magnetoresistance

**Magnetoresistive devices**  
UF: Magnetoresistors  
BT: Magnetic devices  
RT: Giant  
magnetoresistance  
Magnetic heads  
Magnetoelectronics  
Magnetoresistance  
Tunneling  
magnetoresistance

*Magnetoresistivity*  
USE: Magnetoresistance

*Magnetoresistors*  
USE: Magnetoresistive  
devices

**Magnetosphere**  
UF: Magnetotail  
BT: Terrestrial atmosphere  
RT: Geomagnetism

**Magnetostatic waves**  
BT: Waves  
RT: Electromagnetic  
propagation

Magnetostatics

**Magnetostatics**  
BT: Magnetic fields  
RT: Magnetostatic waves

**Magnetostriction**  
BT: Magnetoelasticity  
Magnetomechanical  
effects  
RT: Magnetic materials  
Magnetostrictive  
devices

**Magnetostrictive devices**  
BT: Magnetic devices  
RT: Magnetostriction  
Sensors

*Magnetotail*  
USE: Magnetosphere

**Magnetrons**  
BT: Electron tubes  
RT: Relativistic effects  
Sputtering

**Magnets**  
BT: Magnetics  
RT: Cobalt  
NT: Electromagnets  
Micromagnetics  
Permanent magnets

**Magnonics**  
BT: Magnetics

*MAI*  
USE: Machine assisted  
indexing

*Mail*  
USE: Postal services

*Mail (electronic)*  
USE: Electronic mail

*Main frames*  
USE: Mainframes

**Mainframes**  
UF: Main frames  
BT: Digital computers  
RT: Microcomputers  
Time sharing computer  
systems

**Maintenance**  
BT: Reliability

**Maintenance engineering**  
UF: Repair  
BT: Engineering - general  
RT: Automatic testing  
Availability  
Configuration  
management  
Fault diagnosis



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	Inspection	<i>Man machine systems</i>
	Monitoring	USE: Man-machine systems
	Remaining life	
assessment		<i>Man-machine interfaces</i>
	Testing	USE: User interfaces
NT:	Maintenance management	
	Predictive maintenance	<b>Man-machine systems</b>
	Preventive maintenance	UF: Cyborgs
	Systems support	Man machine systems
<b>Maintenance management</b>		BT: Systems, man, and
BT: Maintenance		cybernetics
engineering	Technical management	RT: Androids
		Cybernetics
		Ergonomics
		Human computer
<b>Maldistribution</b>		interaction
BT: Reliability		Human factors
		Persuasive systems
<i>Malicious software</i>		NT: Extended reality
USE: Malware		Interactive systems
<i>Malignancy</i>		<b>Management</b>
USE: Cancer		UF: Reliability management
		BT: Business
<i>Malignant</i>		RT: Analytic hierarchy
USE: Cancer		process
		Company reports
		Ethical aspects
<b>Malignant tumors</b>		Learning management
BT: Tumors		
		systems
<b>Malware</b>		Management information
UF: Malicious software		
BT: Software		Management training
RT: Anti-virus software		Operations research
		Personnel
		Productivity
		NT: Asset management
		Best practices
		Business continuity
NT: Computer viruses		Business process
		management
		engineering
		operations and management
<b>Mammary glands</b>		Communication system
BT: Glands		Conference management
		Content management
<i>Mammary neoplasms</i>		Contingency management
USE: Breast neoplasms		Contract management
		Contracts
		Customer relationship
<b>Mammography</b>		
BT: Biomedical imaging		management
RT: Medical tests		Decision making



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management	Dependability	RT:	Customer relationship management
	Distributed management		Knowledge management
planning	Enterprise resource		Management
	Facilities management	management	Supply chain
	Financial management	NT:	Portals
	Governmental factors		
management	Human resource	<b>Management training</b>	
	Information management	BT:	Training
	Interface management	RT:	Continuing education
	International		Management
collaboration	Knowledge management	<i>MANET</i>	
	Marketing management	USE:	Mobile ad hoc networks
	Organizational aspects		
	Outsourcing	<b>Manganese</b>	
	Process planning	UF:	Mn
	Production management	BT:	Metals
	Program management	NT:	Manganese alloys
	Project management		
	Public relations	<b>Manganese alloys</b>	
	Quality management	BT:	Manganese
	Requirements		
management	Research and	<b>Manifolds</b>	
development management	Resource management	UF:	Exhaust manifolds
	Risk analysis	BT:	Machine components
	Safety management	RT:	Engines
	Security management		Exhaust systems
	Storage management		Valves
	Supply chain		
management	Technical management	<b>Manipulator dynamics</b>	
	Technology management	BT:	Manipulators
		<i>Manipulator sensing systems</i>	
		USE:	Robot sensing systems
		<i>Manipulator vision systems</i>	
		USE:	Robot vision systems
<b>Management accounting</b>			
BT:	Financial management		
RT:	Company reports		
NT:	Cost accounting		
<b>Management information base</b>			
UF:	MIB		
BT:	Computer network		
management			
RT:	Information systems		
	Telecommunication		
network management		automation	
	Virtual environments		Materials handling
			Mechanical variables
<b>Management information systems</b>		control	
BT:	Information systems		Motion control





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	Nonlinear systems		Machine tools
	Position control		Machining
	Service robots		Materials handling
	Servomechanisms		Materials processing
	Servosystems		Production control
	Telerobotics		Production engineering
NT:	End effectors		Production facilities
	Manipulator dynamics		Production systems
	Micromanipulators		Productivity
			Soldering
<i>Manipulators (nonrobotic)</i>			Stereolithography
USE:	Remote handling		Welding
			Wheels
<i>Manpower planning</i>			Wire drawing
USE:	Labor resources	NT:	Assembly
			Assembly systems
<b>Manuals</b>			Embossing
UF:	Technical manuals		Fabrication
BT:	Professional		Green manufacturing
communication			Lithography
RT:	Documentation		Manufactured products
	Training		Manufacturing systems
	Writing		Mass customization
			Smart manufacturing
<b>Manufactured products</b>			Tolerance analysis
UF:	Counterfeit goods		
BT:	Manufacturing	<b>Manufacturing automation</b>	
RT:	Product customization	UF:	Factory automation
	Product design	BT:	Automation
	Product development		Industrial electronics
NT:	Ceramic products	RT:	Assembly
	Chemical products		Assembly systems
	Consumer products		Automatic optical
	Electrical products	inspection	
	Food products		Industrial control
	Fuels		Machine vision
	Glass products		Manipulators
	Mechanical products		Mobile robots
	Metal products		Process control
	Paper products		Programmable control
	Paper pulp		Robots
	Plastic products	NT:	Computer aided
	Rubber products	manufacturing	
	Sports equipment		Computer integrated
	Textile products	manufacturing	
	Tools	control	
	Windows	systems	Computer numerical
<b>Manufacturing</b>			Flexible manufacturing
BT:	Industry applications		
RT:	Bonding	<i>Manufacturing economics</i>	
	Business	USE:	Industrial economics
	Discrete-event systems		
	Industrial plants	<i>Manufacturing facilities</i>	



# 2019 IEEE Thesaurus

USE:	Production facilities	Cellular manufacturing	Flow production
<b>Manufacturing industries</b>		systems	
BT:	Industries		Food manufacturing
NT:	Aerospace industry		Forging
	Cement industry		Glass manufacturing
	Ceramics industry		Integrated
	Clothing industry	manufacturing systems	
	Electrical products		Intelligent
industry		manufacturing systems	
	Electronics industry		Job production systems
	Food industry		Joining processes
	Footwear industry		Layered manufacturing
	Fuel processing		Lean production
industries			Manufacturing
	Glass industry	processes	
	Machinery production		Mass production
industries			Melt processing
	Metal product		Pulp manufacturing
industries			Sheet metal processing
	Plastics industry		Thermoforming
	Pulp and paper		Three-dimensional
industry		printing	
	Rubber industry		
	Shipbuilding industry	<i>Many valued Logic</i>	
	Textile industry	USE:	Multivalued logic
	Toy manufacturing		
industry		<i>Manycore computing</i>	
		USE:	Manycore processors
<i>Manufacturing management</i>		<b>Manycore processors</b>	
USE:	Production management	UF:	Manycore computing
<i>Manufacturing process</i>		BT:	Multicore processing
USE:	Manufacturing	RT:	Program processors
processes			
<b>Manufacturing processes</b>		<b>Marine accidents</b>	
UF:	Compliant mechanisms	BT:	Accidents
	Froth flotation	RT:	Marine pollution
	Manufacturing process		Marine safety
BT:	Manufacturing systems		Marine vehicles
RT:	Rapid prototyping	<b>Marine animals</b>	
		UF:	Ocean animals
<b>Manufacturing systems</b>			Sea animals
BT:	Manufacturing	BT:	Animals
	Production systems	RT:	Aquaculture
RT:	Bleaching	NT:	Dolphins
	Industrial facilities		Whales
	Production engineering	<i>Marine cables</i>	
NT:	Agile manufacturing	USE:	Underwater cables
	Automobile manufacture		
	Batch production	<b>Marine equipment</b>	
systems		BT:	Marine technology
	Blanking		



# 2019 IEEE Thesaurus

<b>Marine navigation</b>	RT: Marine accidents
BT: Navigation	Marine safety
Oceanic engineering	Propellers
and marine technology	Seaports
RT: Sea state	NT: Boats
	Underwater vehicles
<b>Marine pollution</b>	<b>Market opportunities</b>
BT: Water pollution	BT: Marketing management
RT: Marine accidents	RT: Consumer behavior
Oil pollution	Customer profiles
Oils	Disruptive innovation
Thermal pollution	Disruptive
<b>Marine safety</b>	technologies
BT: Safety	<b>Market research</b>
RT: Marine accidents	BT: Customer relationship
Marine technology	management
Marine vehicles	Engineering management
<i>Marine science</i>	RT: Brand management
USE: Oceanography	Competitive
<b>Marine technology</b>	intelligence
UF: Ocean technology	Consumer products
BT: Oceanic engineering	Customer satisfaction
and marine technology	<b>Marketing management</b>
RT: Marine safety	BT: Management
Oceans	RT: Electronic commerce
Underwater vehicles	Public relations
NT: Marine equipment	NT: Advertising
Marine transportation	Brand management
Underwater cables	Distribution strategy
Underwater	Market opportunities
communication	Mass customization
Underwater equipment	Promotion - marketing
Underwater structures	<i>Markov decision processes</i>
Underwater technology	USE: Markov processes
<b>Marine transportation</b>	<i>Markov network</i>
BT: Marine technology	USE: Markov random fields
RT: Global Positioning	<b>Markov processes</b>
System	UF: Markov decision
Seaports	processes
NT: Marine vehicles	BT: Stochastic processes
<b>Marine vegetation</b>	RT: Dynamic programming
UF: Ocean vegetation	Hidden Markov models
Sea vegetation	Infinite horizon
BT: Vegetation	NT: Markov random fields
<b>Marine vehicles</b>	<b>Markov random fields</b>
UF: Ships	UF: Markov network
BT: Marine transportation	BT: Markov processes



# 2019 IEEE Thesaurus

## Markup languages

BT: Computer languages  
RT: Cascading style sheets  
Semantic Web  
NT: HTML  
OWL  
Page description

## languages

SGML  
XML

## Mars

BT: Planets

## Martensite

BT: Crystalline materials  
Steel  
RT: Smart materials

## Masers

UF: Microwave lasers  
BT: Microwave devices  
Microwave technology  
RT: Atomic clocks  
Relativistic effects  
Stimulated emission  
NT: Gyrotrons

## MASH

USE: Multi-stage noise

## shaping

## Mashing

USE: Mashups

## Mashups

UF: Mashing  
BT: Web services  
World Wide Web

## Masking threshold

BT: Psychoacoustic models

## Mass customization

BT: Manufacturing  
Marketing management

## Mass production

BT: Manufacturing systems  
RT: Production management

## Mass spectrometry

USE: Mass spectroscopy

## Mass spectroscopy

UF: Mass spectrometry  
BT: Spectroscopy

## Master-slave

BT: Protocols

## Mastercard

USE: Credit cards

## Masticatory muscles

BT: Stomatognathic system

## Matched filters

BT: Filters  
RT: Filtering theory

## Matching pursuit algorithms

BT: Algorithms

## Material properties

BT: Materials  
NT: Creep  
Elasticity  
Resilience

## Material storage

BT: Materials, elements,  
and compounds  
RT: Canning  
Energy storage  
Bulk storage  
Containers  
Fuel storage  
Secure storage  
Stacking  
Storage automation  
Warehousing  
Water storage

## Materials

BT: Materials, elements,  
and compounds  
RT: Materials handling  
Oxidation  
NT: Acoustic materials  
Additives  
Aggregates  
Amorphous materials  
Auxetic materials  
Biological materials  
Biomedical materials  
Building materials



# 2019 IEEE Thesaurus

	Ceramics		Waste materials
	Composite materials		Wire
	Conducting materials		
	Corrosion inhibitors	<b>Materials handling</b>	
	Crystalline materials	UF: Materials handling	
	Crystals	systems	
	Dielectric materials		Scrubbers
	Films	BT: Materials science and	
	Fluids	technology	
	Hazardous materials	RT: Canning	
	Inorganic materials	Compaction	
	Lacquers	Die casting	
	Laminates	Dispatching	
	Magnetic materials	Lifting equipment	
	Material properties	Manipulators	
	Media	Manufacturing	
	Mesoporous materials	Materials	
	Metal foam	Mobile robots	
	Metallic materials	Pipelines	
	Metamaterials	Radioactive waste	
	Nanostructured	Radioactive waste	
materials		disposal	
	Oils		Robots
	Optical materials		Stacking
hybrid materials	Organic inorganic	NT: Cleaning	
	Organic materials	Decontamination	
	Paints	Freight handling	
	Paper pulp	Materials handling	
	Petrochemicals		
	Phase change materials	equipment	
	Photoconducting		Pallets
materials			Remote handling
	Plastics	<b>Materials handling equipment</b>	
	Polymer foams	BT: Materials handling	
	Polymer gels	RT: Machinery	
	Polymers	Production equipment	
	Production materials	Waste handling	
	Radioactive materials	equipment	
	Raw materials	NT: Containers	
	Resins	Grippers	
	Resists	Lifting equipment	
	Semiconductor	Pulleys	
materials		Remote handling	
	Sheet materials	equipment	
	Smart materials		Winches
	Solids	<i>Materials handling systems</i>	
materials	Superconducting	USE: Materials handling	
	Surfactants		
	Terahertz materials	<b>Materials preparation</b>	
	Textiles	UF: Atmospheric sintering	
	Thermoelectric	BT: Materials science and	
materials		technology	
		RT: Corrosion inhibitors	



# 2019 IEEE Thesaurus

NT:	Flame retardants	BT:	Production planning
	Doping	RT:	Lot sizing
	Firing		Scheduling
	Ion implantation		Supply chain
	Laser sintering	management	
	Sputtering		Supply chains
		NT:	Bills of materials
<b>Materials processing</b>			
UF:	Mineral processing	<i>Materials science</i>	
BT:	Production	USE:	Materials science and
RT:	Bonding	technology	
	Canning	<b>Materials science and technology</b>	
	Corrosion inhibitors	UF:	Materials science
	Fabrication	BT:	Materials, elements,
	Finishing	and compounds	
	Foundries	RT:	Austenite
	Manufacturing		Crystals
	Materials science and		Gases
technology			Liquids
	Metalworking machines		Materials processing
	Plasma welding		Solid-state physics
	Soldering		Solids
	Welding	NT:	Absorption
NT:	Annealing		Aging
	Bleaching		Chemical analysis
	Casting		Contamination
	Coatings		Degradation
	Curing		Filtration
	Etching		Hysteresis
	Heat treatment		Impurities
	Joining processes		Materials handling
	Lamination		Materials preparation
	Machining		Materials reliability
	Melt processing		Materials testing
processing	Plasma materials		Metallurgy
			Microstructure
	Plating		Periodic structures
	Pressing		Pigmentation
	Punching		Separation processes
	Refining		Surface engineering
	Shearing		Surfaces
	Smelting		
	Softening		
	Swaging		
<b>Materials reliability</b>			
BT:	Materials science and	<b>Materials testing</b>	
technology		BT:	Materials science and
	Reliability	technology	
RT:	Green's function	NT:	Testing
methods			Accelerated aging
			Acoustic testing
			Adhesive strength
			Bonding forces
			Delamination
			Elastic recovery
<b>Materials requirements planning</b>			
UF:	MRP		Nondestructive testing



# 2019 IEEE Thesaurus

<b>Materials, elements, and compounds</b>		check	Cyclic redundancy
NT: Chemical elements			Eigenvalues and
Compounds		eigenfunctions	Equations
Material storage			Estimation
Materials			Euclidean distance
Materials science and			Finite difference
technology			
Metals		methods	Finite element
<i>Maternity benefits</i>		analysis	Fourier series
USE: Employee welfare			Functional analysis
<b>Mathematical analysis</b>			Geometry
BT: Mathematical model			Gradient methods
NT: Formal concept			Graph theory
analysis			Harmonic analysis
Fractional calculus			Iterative methods
Modal analysis			Kernel
			Laplace equations
<b>Mathematical model</b>			Lattices
BT: Mathematics			Limit-cycles
RT: Artificial neural			Linear matrix
networks			
NT: Mathematical analysis		inequalities	Linear systems
			Linearization
<b>Mathematical programming</b>		techniques	Mathematical model
BT: Mathematics			Mathematical
Optimization methods		programming	Method of moments
<b>Mathematics</b>			Minimization
RT: Bio-inspired computing			Mode matching methods
Econometrics			Network theory
Maximum likelihood			
detection		(graphs)	Nonlinear equations
STEM			Nonlinear systems
Viterbi algorithm			Numerical analysis
Waveguide theory			Optimization
NT: Accuracy			Piecewise linear
Algebra			
Algorithms		techniques	Predator prey systems
Arithmetic			Probability
Azimuth			Quaternions
Boundary value			Random processes
problems			Root mean square
Calculus			Sequences
Closed-form solutions			Set theory
Combinatorial			Simulated annealing
mathematics			Smoothing methods
Computational			Spirals
efficiency			Statistics
Conformal mapping			Stochastic processes
Convergence			Superposition calculus
Convex functions			



# 2019 IEEE Thesaurus

	Taylor series	BT:	Waves
	Tensors		
	Topology		
	Transforms		
	Transmission line		
matrix methods			
	Uncertain systems		
	Utility theory		
Mathematics computing			
BT:	Computer applications		
NT:	Matlab		
Matlab			
UF:	Matrix laboratory		
BT:	Mathematics computing		
RT:	Computer aided		
instruction			
	Numerical analysis		
	Simulation		
	Software libraries		
Matrices			
UF:	Matrix algebra		
BT:	Linear algebra		
RT:	Method of moments		
	Mode matching methods		
NT:	Jacobian matrices		
	Matrix decomposition		
	Singular value		
decomposition			
Matrix algebra			
USE:	Matrices		
Matrix converters			
UF:	Matrix convertors		
BT:	Power conversion		
RT:	Power electronics		
Matrix convertors			
USE:	Matrix converters		
Matrix decomposition			
BT:	Matrices		
RT:	Signal processing		
	Statistics		
Matrix Laboratory			
USE:	Matlab		
Matter waves			
UF:	De Broglie methods		
	De broglie hypothesis		





# 2019 IEEE Thesaurus

<b>Maximum likelihood estimation</b>	RT:	Error analysis
UF: MLE		Estimation theory
BT: Estimation		Least squares
Statistics	approximation	
RT: Set theory	NT: Least mean squares	
Tracking	methods	
<b>Maximum likelihood linear regression</b>	<b>Measurement</b>	
BT: Linear regression	UF: Metrics	
	Performance	
<b>Maximum power point trackers</b>	measurement	
UF: MPPT		Performance metrics
Maximum power point	BT: Instrumentation and	
tracking	measurement	
BT: Solar power generation	RT: Containers	
RT: Inverters	Data acquisition	
Power conversion	Instruments	
Solar energy	Measurement standards	
	Phase frequency	
<i>Maximum power point tracking</i>	detector	
USE: Maximum power point		Telemetry
trackers		Testing
		Transducers
<b>Maxwell equations</b>	NT: Accelerometers	
BT: Equations	Acoustic measurements	
RT: Electric fields	Antenna measurements	
Magnetic fields	Anthropometry	
Perfectly matched	Area measurement	
layers	Atmospheric	
	measurements	
<b>Maxwell-Boltzmann distribution</b>		Atomic measurements
UF: Maxwell-Boltzmann		Biomedical measurement
statistics		Calorimetry
BT: Probability		Coordinate measuring
distribution	machines	
		Density measurement
<i>Maxwell-Boltzmann statistics</i>		Distance measurement
USE: Maxwell-Boltzmann		Distortion measurement
distribution		Doppler measurement
		Dosimetry
<i>MC-CDMA</i>		Dynamic range
USE: Multicarrier code		Electric variables
division multiple access	measurement	
		Electromagnetic
<i>MCCDMA</i>	measurements	
USE: Multicarrier code		Extraterrestrial
division multiple access	measurements	
		Fluid flow measurement
<i>MDDI</i>		Frequency measurement
USE: Musical instrument		Gain measurement
digital interfaces		Gas chromatography
		Geologic measurements
<b>Mean square error methods</b>		Geophysical
BT: Approximation methods	measurements	



# 2019 IEEE Thesaurus

indicator	Interferometry	Wavelength measurement
	Key performance	Wide area measurements
measurement	Length measurement	pH measurement
	Lifetime estimation	
beam	Loss measurement	<b>Measurement by laser beam</b>
	Magnetic variables	BT: Measurement
uncertainty	Measurement by laser	RT: Laser applications
	Measurement errors	NT: Laser velocimetry
measurement	Measurement techniques	<b>Measurement errors</b>
	Measurement	BT: Measurement
uncertainty	Measurement units	RT: Error analysis
	Mechanical variables	Statistical analysis
measurement	Micrometers	<b>Measurement standards</b>
	Moisture measurement	BT: Standards categories
measurement	Noise measurement	RT: ISO
	Nuclear measurements	Measurement
measurements	Optical variables	Measurement units
	Particle beam	<b>Measurement techniques</b>
measurements	Particle measurements	BT: Measurement
	Performance evaluation	RT: Measurement
results	Phase measurement	uncertainty
	Plasma measurements	NT: Calibration
measurement	Plethysmography	Dynamic equilibrium
	Pollution measurement	<b>Measurement uncertainty</b>
measurement	Pressure measurement	BT: Measurement
	Pulse measurements	RT: Estimation
results	Reflectometry	Measurement techniques
	Reproducibility of	<b>Measurement units</b>
measurement	Scintillation counters	UF: Units (measurement)
	Sea state	BT: Measurement
measurement	Semiconductor device	RT: Measurement standards
	Sensitivity	NT: International System
measurement	Shape measurement	of Units
	Size measurement	Nanometers
measurement	Software measurement	<b>Mechanical bearings</b>
	Soil measurements	BT: Friction
measurement	Spectral efficiency	RT: Ball bearings
	Spectroscopy	Lubrication
measurement	Thermal variables	Mechanical factors
	Time measurement	NT: Rolling bearings
measurement	UHF measurements	<b>Mechanical cables</b>
	Ultrasonic variables	UF: Cables (mechanical)
measurement	Viscosity	BT: Cables
		<b>Mechanical energy</b>
		BT: Mechanical systems
		RT: Kinetic energy



# 2019 IEEE Thesaurus

Potential energy	UF:	Continuously variable transmission
<b>Mechanical engineering</b>		Powertrain
BT: Engineering - general	BT:	Mechanical engineering
RT: Mechanical products	RT:	Cams
Precision engineering		Drives
Pressure vessels		Engines
NT: Mechanical power		Gears
transmission		Oils
Mechanical systems		Power systems
		Shafts
<b>Mechanical factors</b>	NT:	Torque converters
UF: Mechanical properties	<b>Mechanical products</b>	
BT: Physics	UF: Ball screws	
RT: Acoustic noise	BT: Manufactured products	
Electrostriction		Production
Magnetomechanical	RT: Escalators	
effects		Mechanical engineering
Mechanical bearings		Structural rings
Mechanical variables	NT: Automotive components	
control		Axles
Oils		Bellows
Structural engineering		Blades
NT: Acceleration		Brakes
Aerodynamics		Couplings
Biomechanics		Fasteners
Damping		Flanges
Dynamics		Gears
Fatigue		Hoses
Force		Machine components
Friction		Mechanical guides
Hydrodynamics		Needles
Kinematics		Orifices
Lubrication		Pistons
Magnetohydrodynamics		Pressure vessels
Photoelasticity		Seals
Pressure effects		Springs
Shock (mechanics)		Steering systems
Strain		Structural shapes
Stress		Tires
Surface cracks		Vents
Torque		Wheels
Vibrations		
Volume relaxation		
Workability		
<b>Mechanical guides</b>	<i>Mechanical properties</i>	
UF: Guideways (mechanical)	USE: Mechanical factors	
Slideways (mechanical)	<b>Mechanical sensors</b>	
BT: Mechanical products	BT: Sensors	
RT: Machine tools	NT: Capacitive sensors	
Position control	<b>Mechanical splines</b>	
<b>Mechanical power transmission</b>	BT: Machine components	
	RT: Gears	



# 2019 IEEE Thesaurus

	Machine tool spindles		Motion measurement
	Shafts		Position measurement
			Rotation measurement
<i>Mechanical stress</i>			Strain measurement
USE:	Stress		Stress measurement
			Thickness measurement
<b>Mechanical systems</b>			Torque measurement
BT:	Mechanical engineering		Velocity measurement
RT:	Gears		Vibration measurement
	Mechatronics		Volume measurement
	Microelectromechanical		Weight measurement
devices			
	Pneumatic systems	<i>Mechanical vibrations</i>	
	Turbomachinery	USE:	Vibrations
NT:	Mechanical energy		
	Micromechanical	<b>Mechanobiology</b>	
devices		BT:	Biology
	Suspensions	RT:	Biological system
(mechanical systems)		modeling	
			Biomechanics
<b>Mechanical variables control</b>			Cell signaling
BT:	Control systems		Nanomedicine
RT:	Flexible structures		
	Frequency control	<b>Mechatronics</b>	
	Manipulators	BT:	Electron devices
	Mechanical factors	RT:	Autonomous vehicles
	Mobile robots		Control equipment
	Motor drives		Intelligent control
	Robots		Intelligent sensors
NT:	Displacement control		Mechanical systems
	Force control		Microelectromechanical
	Level control	devices	
	Motion control		Microelectromechanical
	Pitch control	systems	
(position)			Robots
	Position control		Vehicular automation
	Shape control	NT:	Biomechatronics
	Size control		
	Strain control	<b>Media</b>	
	Stress control	BT:	Materials
	Thickness control	RT:	Design tools
	Torque control	NT:	Nonhomogeneous media
	Velocity control		Random media
	Vibration control		
	Weight control	<i>Media access control</i>	
		USE:	Media Access Protocol
<b>Mechanical variables measurement</b>		<b>Media Access Protocol</b>	
BT:	Measurement	UF:	MAC
RT:	Frequency measurement		MAC protocol
	Transducers		Media access control
NT:	Angular velocity		Medium access control
	Displacement		
measurement		BT:	Access protocols
	Force measurement	RT:	Local area networks



# 2019 IEEE Thesaurus

networks	Metropolitan area	NT:	Autopsy Bronchoscopy Colonography Computer aided
<i>Media streaming</i>			
USE:	Streaming media	diagnosis	Medical signal
<b>Mediation</b>		detection	Nanomedicine Plethysmography Sensitivity and
BT:	Middleware		
<i>Medical computing</i>		specificity	
USE:	Biomedical computing		
<b>Medical conditions</b>		<b>Medical diagnostic imaging</b>	
UF:	Medical disorders	BT:	Biomedical imaging
BT:	Medical services	RT:	Cancer Positron emission
NT:	Aneurysm Atrophy Autism Blindness Cataracts Deafness Diabetes Diseases Hemorrhaging Hypertension Hyperthermia Injuries Kidney stones Obesity Pregnancy Sleep apnea Stroke (medical	tomography	Solid scintillation
condition)	Thrombosis Tumors	detectors	Tumors NT: Anatomical structure
		<i>Medical disorders</i>	USE: Medical conditions
		<i>Medical equipment</i>	USE: Biomedical equipment
		AND	Medical instruments
		<b>Medical expert systems</b>	BT: Biomedical computing Expert systems RT: Medical diagnosis Medical treatment
<b>Medical control systems</b>		<i>Medical image processing</i>	USE: Biomedical image
BT:	Control systems	processing	
RT:	Assistive technology Biomedical equipment Orthotics Prosthetics	<i>Medical imaging</i>	USE: Biomedical imaging
<b>Medical diagnosis</b>		<b>Medical information systems</b>	
UF:	Diagnosis (medical) Patient diagnosis	BT:	Biomedical computing Computer applications Information systems
BT:	Medical services	NT:	Electronic medical
RT:	Biomedical imaging Diagnostic radiography Diseases Electroencephalography Medical expert systems Occupational medicine Radiography	records	
		<b>Medical instruments</b>	UF: Medical equipment BT: Biomedical equipment Instruments



# 2019 IEEE Thesaurus

		BT:	Simulation
<b>Medical robotics</b>		<b>Medical specialties</b>	
UF:	Medical robots	BT:	Engineering in
	Surgical robots	medicine and biology	
BT:	Robots	NT:	Anesthesiology
RT:	Biomedical equipment		Cardiology
	Endomicroscopy		Dermatology
	Wearable robots		Gastroenterology
NT:	Rehabilitation		Gerontology
robotics			Gynecology
<i>Medical robots</i>			Neonatology
USE:	Medical robotics		Neurology
<b>Medical services</b>			Oncology
UF:	Doctor		Pathology
	Emergency medical		Pediatrics
services		<b>Medical tests</b>	
	Health care	BT:	Medical services
	Healthcare	RT:	Mammography
	Nursing	NT:	Amniocentesis
	Physician		Biopsy
BT:	Engineering in		Cancer detection
medicine and biology			Colonoscopy
RT:	Behavioral sciences		Pregnancy test
	Chemotherapy	<b>Medical treatment</b>	
	Emergency services	UF:	Patient identification
NT:	Assisted living		Patient treatment
	Catheterization		Therapy
	Clinical diagnosis	BT:	Medical services
	Cybercare	RT:	Biohazards
	Electronic healthcare		Biomedical
	Health information	applications of radiation	
management			Medical expert systems
	Hospitals		Occupational medicine
	In vitro		Psychiatry
	In vivo	NT:	Anesthesia
	Medical conditions		Angioplasty
	Medical diagnosis		Brachytherapy
	Medical tests		Brain stimulation
	Medical treatment		Chemotherapy
	Occupational medicine		Clinical trials
	Point of care		Cryotherapy
	Prosthetics		Defibrillation
	Public healthcare		Dentistry
	Sensory aids		Electrical stimulation
	Smart healthcare		Electronic medical
	Vaccines	prescriptions	
	X-rays		Embolization
<b>Medical signal detection</b>			Fibrillation
BT:	Medical diagnosis		Geriatrics
<b>Medical simulation</b>			Hepatectomy
			Hospitals



# 2019 IEEE Thesaurus

stimulation	Hyperthermia	<b>Melt processing</b>	BT:	Manufacturing systems	
	Lithotripsy			Materials processing	
	Magnetic stimulation		RT:	Die casting	
	Neuromuscular			Smelting	
therapy	Neutron capture		NT:	Vacuum arc remelting	
	Noninvasive treatment	<b>Membrane potentials</b>	UF:	Membrane voltage	
	Orthopedic procedures			Transmembrane	
	Orthotics	potential	BT:	Cells (biology)	
	Patient rehabilitation		RT:	Action potentials	
	Pharmaceuticals			Neurons	
	Proton therapy				
	Surgery				
<i>Medium access control</i>					
	USE:	Media Access Protocol	<i>Membrane voltage</i>		
			USE:	Membrane potentials	
<i>Medium resolution imaging spectrometer</i>					
	USE:	MERIS	<i>Membranes</i>		
			USE:	Biomembranes	
<b>Medium voltage</b>					
	UF:	Medium-voltage	<b>Memetics</b>		
	BT:	Voltage measurement	BT:	Evolution (biology)	
			RT:	Cultural differences	
<i>Medium-voltage</i>				Genetics	
	USE:	Medium voltage			
<b>Meeting planning</b>					
	BT:	Planning	<i>Memoirs</i>		
			USE:	Autobiographies	
<b>Meetings</b>					
	UF:	Technical meetings	<b>Memory</b>		
	BT:	Professional	UF:	Data storage	
communication	RT:	Public speaking	BT:	Computers and	
		Teleconferencing	information processing		
	NT:	Conferences		RT:	CMOS memory circuits
					Memory architecture
				Phase change materials	
				Recording	
<i>Meetings (technical)</i>			NT:	Analog memory	
	USE:	Conferences		Associative memory	
				Buffer storage	
				Cache memory	
<b>Mel frequency cepstral coefficient</b>				Content addressable	
	UF:	MFCC	storage		
		Mel-frequency cepstral			Flash memories
coefficient					Magnetic memory
	BT:	Cepstral analysis			Memory management
				Nonvolatile memory	
<i>Mel-frequency cepstral coefficient</i>				Phase change memory	
	USE:	Mel frequency cepstral		Random access memory	
coefficient				Read only memory	
				Read-write memory	
				Registers	
<b>Melanoma</b>					
	BT:	Skin cancer			



# 2019 IEEE Thesaurus

storage Scanning probe data

Semiconductor memory

## Memory architecture

BT: Computer architecture  
RT: Memory  
Memory management

## Memory management

UF: Garbage collection  
(computers)  
BT: Computer architecture  
Memory  
RT: Memory architecture  
Memory modules  
Storage management

## Memory modules

BT: Printed circuits  
RT: Integrated circuits  
Memory management

## Memory resistors

USE: Memristors

## Memoryless channel

USE: Memoryless systems

## Memoryless systems

UF: Memoryless channel  
BT: Probability

## Memristor circuits

USE: Memristors

## Memristors

UF: Memory resistors  
Memristor circuits  
BT: Resistors  
RT: Resistive RAM

## MEMS

USE: Microelectromechanical  
systems

## MEMS switches

USE: Microswitches

## Mental disorders

BT: Psychiatry

## Mental models

USE: Cognitive science

## Mentoring

BT: Career development  
RT: Training

## Mercury (metals)

UF: Hg  
BT: Chemical elements  
Metals

## Mercury (planets)

BT: Planets

## Mergers

USE: Corporate acquisitions

## Merging

BT: Data handling  
RT: Sorting

## MERIS

UF: Medium resolution  
imaging spectrometer  
BT: Spectroscopy

## MERIT

USE: Magneto electrical  
resistivity imaging technique

## Merit pay

USE: Incentive schemes

## Mesencephalon

USE: Midbrain

## MESFET circuits

BT: FET circuits  
RT: MESFETs  
NT: MESFET integrated  
circuits

## MESFET integrated circuits

BT: FET integrated  
circuits  
Integrated circuits  
MESFET circuits  
RT: MESFETs  
NT: Microwave FET  
integrated circuits

## MESFETs

UF: Schottky FETs  
BT: Field effect  
transistors





# 2019 IEEE Thesaurus

circuits	RT: MESFET circuits MESFET integrated	systems	Publish subscribe Voice mail
	NT: Schottky barriers Microwave FETs	<b>Message-oriented middleware</b>	BT: Middleware
<b>Mesh generation</b>	BT: Computer displays RT: Computer graphics	<i>Messaging service</i>	USE: Message service
<b>Mesh networks</b>	BT: Ad hoc networks	<i>Meta data</i>	USE: Metadata
<b>Mesomycetozoea</b>	BT: Organisms	<i>Meta search</i>	USE: Metasearch
<b>Mesons</b>	UF: Kaons Muons Pions BT: Elementary particles RT: Cosmic rays	<i>Meta-modeling</i>	USE: Metamodeling
<i>Mesoporous</i>	USE: Mesoporous materials	<i>Meta-search</i>	USE: Metasearch
<b>Mesoporous materials</b>	UF: Mesoporous BT: Materials	<i>Metabolic networks</i>	USE: Biochemistry
<b>Message authentication</b>	BT: Data security RT: Cryptography Digital signatures Message systems NT: Steganography	<i>Metabolism</i>	USE: Biochemistry
<b>Message passing</b>	BT: Distributed processing	<b>Metabolomics</b>	BT: Molecular biomarkers
<b>Message service</b>	UF: Messaging service BT: Web services	<b>Metacomputing</b>	BT: Distributed computing NT: Grid computing
<b>Message systems</b>	BT: Communications	<b>Metadata</b>	UF: Meta data BT: Data models RT: Image annotation Linked data
technology	RT: Cluster computing Digital signatures Message authentication NT: Electronic mail Electronic messaging Postal services	<b>Metal cutting tools</b>	BT: Cutting tools RT: Plasma jets
		<b>Metal foam</b>	BT: Materials RT: Lightweight structures Metals Polymer foams
		<i>Metal oxide semiconductor heterojunction FETs</i>	USE: MOSHFETs



# 2019 IEEE Thesaurus

## Metal product industries

BT: Manufacturing industries  
RT: Metal products

## Metal products

BT: Manufactured products  
RT: Ball bearings  
Blanking  
Metal product industries  
Metals industry  
Swaging

## Metal vapor lasers

USE: Gas lasers

## Metal-insulator structures

BT: Insulators  
RT: Electrodes  
MIS devices  
MOS integrated circuits  
NT: MIM capacitors  
MIM devices

## Metal-insulator-metal capacitors

USE: MIM capacitors

## Metal-insulator-metal devices

USE: MIM devices

## Metal-insulator-semiconductor devices

USE: MIS devices

## Metal-oxide semiconductor field effect transistor

USE: MOSFET circuits

## Metal-oxide semiconductors

USE: MOS devices

## Metal-oxide-nitride-oxide-semiconductors

USE: MONOS devices

## Metal-oxide-nitride-oxide-silicon

USE: MONOS devices

## Metal-oxide-semiconductor devices

USE: MOS devices

## Metal-semiconductor interfaces

USE: Semiconductor-metal interfaces

## Metallic materials

BT: Materials  
RT: Cermet

## Metallic superlattices

BT: Superlattices

## Metallisation

USE: Metallization

## Metallization

UF: Metallisation  
BT: Metals  
RT: Wiring  
NT: Integrated circuit metallization

## Metallurgy

BT: Materials science and technology  
RT: Iron alloys  
Metals

## Metalorganic vapor deposition

USE: MOCVD

## Metals

UF: Alloys  
BT: Materials, elements, and compounds  
RT: Blanking  
Die casting  
Filler metals  
Inorganic compounds  
Metal foam  
Metallurgy  
Metalworking machines  
NT: Alloying  
Aluminum  
Barium  
Bismuth  
Boron  
Cadmium  
Calcium  
Chromium  
Cobalt  
Copper  
Digital alloys  
Erbium  
Gallium  
Germanium



# 2019 IEEE Thesaurus

Gold	NT:	Electromagnetic
Hafnium	metamaterials	
Indium		Optical cloaking
Iron		Optical metamaterials
Lanthanum		
Lead	<b>Metamodeling</b>	
Lithium	UF:	Meta-modeling
Magnesium	BT:	Modeling
Manganese		
Mercury (metals)	<i>Metamorphic HEMTs</i>	
Metallization	USE:	mHEMTs
Neodymium		
Nickel	<b>Metasearch</b>	
Niobium	UF:	Federated search
Palladium		Federated searching
Platinum		Meta search
Rare earth metals		Meta-search
Samarium	BT:	Search methods
Silver	RT:	Triples (Data
Steel	structure)	
Strontium		
Tin	<b>Metastasis</b>	
Titanium	UF:	Metastatic disease
Tungsten	BT:	Cancer
Yttrium	RT:	Diseases
Zinc		
<b>Metals industry</b>		
UF:	Aluminium industry	
	Aluminum industry	
BT:	Industries	
RT:	Metal products	
	Smelting	
<b>Metalworking machines</b>		
BT:	Machine tools	
RT:	Cutting tools	
	Materials processing	
	Metals	
<i>Metamaterial cloaking</i>		
USE:	Optical cloaking	
<b>Metamaterials</b>		
UF:	Acoustic metamaterials	
	Left handed materials	
	Left-handed materials	
	Microwave	
metamaterials		
BT:	Materials	
RT:	Nanocomposites	
	Optical materials	
	Refractive index	
	Smart materials	
		measurements
		Data assimilation
		Environmental factors
		Ice
		Ionosphere
		Pressure effects
		Remote sensing



# 2019 IEEE Thesaurus

	Terrestrial atmosphere	Integral equations
NT:	Humidity	Matrices
	Lightning	
	Monsoons	<i>Method-of-moments</i>
	Rain	USE: Method of moments
	Snow	
	Storms	<i>Methyl alcohol</i>
	Weather forecasting	USE: Methanol
	Wind	
<b>Meter reading</b>		<i>Metrics</i>
BT:	Power system	USE: Measurement
measurements		<i>Metro area networks</i>
NT:	Automatic meter	USE: Metropolitan area
reading	Smart meters	networks
<b>Meters</b>		<b>Metrology</b>
BT:	Instruments	BT: Science - general
NT:	Dynamometers	NT: Optical metrology
	Flowmeters	
	Goniometers	<b>Metropolitan area networks</b>
	Potentiometers	UF: Metro area networks
	Radiometers	BT: Communication systems
	Tachometers	Computer networks
	Vibrometers	Digital systems
	Voltmeters	RT: Distributed computing
	Watthour meters	IEEE 802.16 Standard
	Wattmeters	Internetworking
		LAN interconnection
<b>Methane</b>		Media Access Protocol
BT:	Natural gas	Multiprocessor
RT:	Carbon emissions	interconnection
		Open systems
<b>Methanol</b>		Protocols
UF:	Carbinol	Regional area networks
	Methyl alcohol	Token networks
	Wood alcohol	
	Wood naphtha	<i>Metropolitan areas</i>
	Wood spirits	USE: Urban areas
BT:	Chemical compounds	
RT:	Anti-freeze	<i>MFCC</i>
	Fuels	USE: Mel frequency cepstral
	Solvents	coefficient
<b>Method of moments</b>		<i>Mg</i>
UF:	Galerkin method	USE: Magnesium
	Method-of-moments	
	MoM	<i>MgO</i>
	Moment methods	USE: Magnesium oxide
BT:	Mathematics	
	Numerical analysis	<i>MHD</i>
RT:	Boundary element	USE: Magnetohydrodynamics
methods		<b>mHEMTs</b>



# 2019 IEEE Thesaurus

	UF:	Metamorphic HEMTs			
	BT:	HEMTs		<b>Microactuators</b>	
<i>MIB</i>				BT:	Actuators
					Microelectromechanical
base	USE:	Management information		devices	
				RT:	Microrelays
<i>MIC</i>				<b>Microarchitecture</b>	
	USE:	Microwave integrated		BT:	Software architecture
circuits				<b>Microassembly</b>	
<b>Mice</b>				UF:	Die attach
	UF:	Mouse			Die bonding
	BT:	Animals		BT:	Assembly
				RT:	Flip-chip devices
<i>Mice flows</i>					Integrated circuit
	USE:	Communication system		manufacture	
traffic AND		Computer networks			Micromachining
					Semiconductor device
				manufacture	
<i>Micro air vehicles</i>				<i>Microbial eletrolysis cells</i>	
	USE:	Unmanned aerial		USE:	Fuel cells
vehicles				<i>Microbial fuel cells</i>	
<i>Micro computers</i>				USE:	Fuel cells
	USE:	Microcomputers		<b>Microcavities</b>	
<i>Micro-computers</i>				BT:	Optical resonators
	USE:	Microcomputers		RT:	Cavity resonators
<i>Micro-electro-mechanical devices</i>					Light emitting diodes
	USE:	Microelectromechanical			Microoptics
devices					Photoluminescence
<i>Micro-electro-mechanical systems</i>					Spontaneous emission
	USE:	Microelectromechanical			Whispering gallery
systems				modes	
<i>Micro-electromechanical devices</i>				<b>Microcell networks</b>	
	USE:	Microelectromechanical		UF:	Microcells
devices					Small cell networks
<i>Micro-electromechanical systems</i>				BT:	Cellular networks
	USE:	Microelectromechanical		RT:	Ultra-dense networks
systems				<i>Microcells</i>	
<i>Micro-hydro</i>				USE:	Microcell networks
	USE:	Microhydro power		<b>Microchannels</b>	
<i>Micro-optical components</i>				BT:	Hydraulic diameter
	USE:	Microoptics		<b>Microchip lasers</b>	
<i>Micro-opticalmechanical devices</i>				BT:	Solid lasers
	USE:	Microoptics		<i>Microchips</i>	
				USE:	Integrated circuits



# 2019 IEEE Thesaurus

## Microcomputers

UF: Laptops  
Micro computers  
Micro-computers  
Minicomputers  
Personal computers  
BT: Computers  
RT: Consumer electronics  
Home computing  
Mainframes  
Microprocessors  
Office automation  
NT: Portable computers  
Workstations

## Microcontact printing

USE: Soft lithography

## Microcontrollers

BT: Control equipment  
Microprocessors  
RT: CMOS technology  
Control systems  
High-speed integrated

circuits

Neurocontrollers  
System-on-chip

## Microdisplays

BT: Displays  
RT: Liquid crystal devices  
Liquid crystal on

silicon

Microoptics

## Microeconomics

BT: Economics  
RT: Linear programming  
Monopoly  
Oligopoly  
Supply and demand  
NT: Economies of scale  
Industrial economics

## Microelectrodes

BT: Electrodes  
RT: Neurophysiology  
Neurostimulation

## Microelectromechanical devices

UF: Micro-electro-mechanical devices

Micro-electromechanical devices

BT: Microelectromechanical systems

RT: Magnetic particles  
Mechanical systems  
Mechatronics  
Micromachining  
Microsensors  
NT: Microactuators  
Micromotors  
Micropumps  
Microvalves

## Microelectromechanical systems

UF: MEMS  
Micro-electro-mechanical systems

Micro-electromechanical systems

BT: Electron devices  
RT: Mechatronics  
Nanoelectromechanical

systems

NT: Microelectromechanical devices

Radiofrequency microelectromechanical systems

## Microelectronic implants

BT: Implants

## Microelectronic stimulation

USE: Electrical stimulation

## Microelectronics

BT: Electronic equipment  
RT: Integrated circuits

## Microfabrication

BT: Fabrication  
Micromechanical

devices

RT: Fiducial markers  
Nanotechnology

## Microfiltration

BT: Filtration  
RT: Contamination

## Microfluidics

BT: Electron devices  
Fluidics  
RT: Biochips



# 2019 IEEE Thesaurus

	Biomedical engineering		Microsystems
	Fluidic microsystems	BT:	Electron devices
	Hydrodynamics		Mechanical systems
<i>Micrographs</i>		RT:	Microoptics
USE:	Photomicrography		Nanogenerators
		NT:	Biomedical
<b>Microgrids</b>			microelectromechanical systems
BT:	Power grids		Fluidic microsystems
RT:	Distributed power		Microfabrication
generation	Power generation	<i>Micromechanical systems</i>	
	Power system	USE:	Micromechanical
management	Power system	devices	
reliability	Smart grids	<b>Micrometers</b>	
<i>Microgrippers</i>		UF:	Micrometres
USE:	Grippers		Micrometry
			Microns
<b>Microhydro power</b>		BT:	Measurement
UF:	Micro-hydro	RT:	Distance measurement
BT:	Hydroelectric power		Interferometry
generation			Length measurement
RT:	Appropriate technology		Strain measurement
			Thickness measurement
<b>Microinjection</b>		<i>Micrometres</i>	
BT:	Biology	USE:	Micrometers
		<i>Micrometry</i>	
<b>Micromachining</b>		USE:	Micrometers
BT:	Electronic equipment	<b>Micromirrors</b>	
manufacture		UF:	Digital micromirror
RT:	Electrochemical	devices	
machining	Embossing	BT:	Microoptics
	Etching		Mirrors
	Integrated circuit	RT:	Optical arrays
manufacture			Optical projectors
	Microassembly	<b>Micromotors</b>	
	Microelectromechanical	BT:	Microelectromechanical
devices		devices	
manufacture	Semiconductor device		Motors
			Rotating machines
<b>Micromagnetics</b>		<i>Microns</i>	
BT:	Magnets	USE:	Micrometers
<b>Micromanipulators</b>		<i>Microoptical components</i>	
BT:	Manipulators	USE:	Microoptics
<b>Micromechanical devices</b>		<b>Microoptics</b>	
UF:	Micromechanical	UF:	Micro-optical
systems		components	



# 2019 IEEE Thesaurus

opticalmechanical devices	Micro-	NT:	Automatic logic units
components	Microoptical		Biomimetics
			Coprocessors
	BT: Optics		Microcontrollers
	RT: Integrated optics		Microprocessor chips
	Integrated		Vector processors
optoelectronics		<b>Microprogramming</b>	
	Microcavities	UF:	Firmware
	Microdisplays	BT:	Programming
	Micromechanical	RT:	Computer architecture
devices			Software
	Microswitches		
	NT: Micromirrors	<b>Micropumps</b>	
<b>Microorganisms</b>		BT:	Microelectromechanical
	UF: Bacteria	devices	Pumps
	Bacterial content		
	Viruses	<b>Microrelays</b>	
(microorganisms)		BT:	Relays
	BT: Organisms	RT:	Microactuators
	RT: Biological cells		
	Immune system	<b>Microsatellites</b>	
	Molecular biophysics	USE:	Small satellites
	NT: Adenoviruses		
<b>Microphone arrays</b>		<b>Microscopy</b>	
	BT: Microphones	BT:	Imaging
			Instruments
<b>Microphones</b>		RT:	Optical imaging
	BT: Audio systems	NT:	Atomic force
	NT: Microphone arrays	microscopy	Electron microscopy
<i>Microphotographs</i>			Endomicroscopy
	USE: Photomicrography	microscopy	Scanning microwave
<i>Microphotography</i>		microscopy	Scanning probe
	USE: Photomicrography		
<b>Microprocessor chips</b>		<b>Microsensors</b>	
	BT: Microprocessors	BT:	Electromechanical
	RT: Flip-chip devices	sensors	
	Substrates	RT:	Control systems
	Yield estimation	devices	Microelectromechanical
<b>Microprocessors</b>			Wireless sensor
	BT: Circuits	networks	
	Integrated circuits	<i>Microsoft Excel</i>	
	RT: CMOS technology	USE:	Spreadsheet programs
	Embedded systems		
	Flip-chip devices	<b>Microsoft Windows</b>	
	Microcomputers	BT:	Operating systems
	Processor scheduling		
	System-on-chip	<b>Microstrip</b>	





# 2019 IEEE Thesaurus

lines  
 UF: Microstrip lines  
 BT: Planar transmission  
 RT: Broadband antennas  
 NT: Microstrip components

## Microstrip antenna arrays

UF: Microstrip arrays  
 BT: Antenna arrays  
 RT: Antennas  
 Aperture coupled  
 antennas  
 Microstrip antennas

## Microstrip antennas

BT: Antennas  
 RT: Aperture coupled  
 antennas  
 Microstrip antenna  
 arrays  
 Patch antennas

## Microstrip arrays

USE: Microstrip antenna  
 arrays

## Microstrip components

BT: Microstrip  
 RT: Power combiners  
 Power dividers  
 Thick film inductors  
 NT: Microstrip resonators

## Microstrip filters

BT: Filters  
 RT: Microwave  
 communication

## Microstrip Lines

USE: Microstrip

## Microstrip resonators

BT: Microstrip components  
 RT: Resonance

## Microstructure

BT: Materials science and  
 technology  
 RT: Crystal microstructure

## Microstructured fibres

USE: Photonic crystal  
 fibers

*Microstructured fibres*  
 USE: Photonic crystal  
 fibers

## Microsurgery

BT: Surgery

## Microswitches

UF: MEMS switches  
 BT: Switches  
 RT: Microoptics

## Microsystems

USE: Micromechanical  
 devices

## Microvalves

BT: Microelectromechanical  
 devices  
 Valves

## Microwave amplifiers

BT: Microwave devices

## Microwave antenna arrays

BT: Antenna arrays

## Microwave antennas

BT: Antennas

## Microwave bands

BT: Microwave technology  
 NT: C-band  
 K-band  
 L-band

## Microwave circuits

BT: Circuits  
 Microwave technology  
 RT: Analog circuits  
 Distributed parameter  
 circuits  
 Microwave devices  
 Microwave integrated  
 circuits  
 Microwave photonics

## Microwave communication

BT: Communication systems  
 Microwave technology  
 RT: Microstrip filters  
 Microwave photonics  
 NT: Rectennas



# 2019 IEEE Thesaurus

## Microwave devices

BT: Microwave technology  
RT: Electromagnetic

waveguides

Microwave circuits  
Microwave photonics  
Photonic crystals  
Superconducting

microwave devices

NT: Masers  
Microwave amplifiers  
Microwave filters  
Microwave transistors

## Microwave FET integrated circuits

BT: MESFET integrated

circuits

RT: Microwave FETs

## Microwave FETs

BT: MESFETs  
Microwave transistors  
RT: Microwave FET

integrated circuits

## Microwave filters

BT: Microwave devices

## Microwave frequencies

BT: Microwave measurement

## Microwave generation

BT: Microwave technology  
NT: High power microwave

generation

## Microwave heating

USE: Electromagnetic

heating

## Microwave imaging

BT: Imaging  
RT: Remote sensing

## Microwave integrated circuits

UF: MIC  
BT: Integrated circuits  
RT: Analog integrated

circuits

Microwave circuits  
NT: MMICs

## Microwave lasers

USE: Masers

## Microwave magnetics

BT: Magnetism

## Microwave measurement

BT: Electromagnetic

measurements

RT: Microwave technology

NT: Microwave frequencies

## Microwave metamaterials

USE: Metamaterials

## Microwave oscillators

BT: Oscillators

## Microwave ovens

BT: Consumer electronics  
Consumer products  
Home appliances  
Ovens

## Microwave photonics

BT: Microwave technology  
Photonics

RT: Electrooptic

modulators

Elementary particles  
Integrated

optoelectronics

Microwave circuits  
Microwave

communication

Microwave devices  
Optical modulation

## Microwave propagation

BT: Electromagnetic

propagation

RT: Broadband antennas  
Electromagnetic

waveguides

## Microwave radar

USE: Radar

## Microwave radiometry

BT: Radiometry

## Microwave sensors

BT: Microwave technology

## Microwave technology



# 2019 IEEE Thesaurus

techniques	BT: Microwave theory and techniques	Web services
	RT: Microwave measurement Radar	<b>Mie scattering</b>
	NT: Baluns	BT: Electromagnetic scattering
	Beam steering	RT: Electromagnetic analysis
	Circulators	Electromagnetic fields
	Masers	Electromagnetic forces
	Microwave bands	Electromagnetic measurements
	Microwave circuits	Electromagnetic propagation
communication	Microwave	<i>Mil standards</i>
	Microwave devices	USE: Military standards
	Microwave generation	<b>Military aircraft</b>
	Microwave photonics	BT: Military equipment
	Microwave sensors	RT: Aircraft
<b>Microwave theory and techniques</b>		Hyperspectral sensors
NT: Microwave technology		NT: Payloads
technology	Submillimeter wave	<i>Military command and control</i>
technology		USE: Command and control systems
<b>Microwave transistors</b>		<b>Military communication</b>
BT: Microwave devices		BT: Communication systems
NT: Microwave FETs		RT: Command and control systems
<b>Microwave-assisted magnetic recording</b>		Cross layer design
BT: Magnetic recording		Electronic countermeasures
<b>Midbrain</b>		Hyperspectral sensors
UF: Mesencephalon		Military satellites
BT: Brain		Ultra wideband
Central nervous system		communication
RT: Forebrain		NT: Reconnaissance
Hindbrain		<b>Military computing</b>
<b>Middleboxes</b>		BT: Computer applications
BT: Computer network management		RT: Mobile computing
Internet		<b>Military equipment</b>
<b>Middleware</b>		BT: Aerospace and electronic systems
BT: Client-server systems		RT: Defense industry
Software		Explosion protection
RT: Computer applications		Ground support
Computer networks		Landmine detection
Internet of Things		Magnetic anomaly detectors
Publish subscribe		Night vision
systems		
NT: Mediation		
Message-oriented		
middleware		



# 2019 IEEE Thesaurus

	Open area test sites		
	Wearable robots		
NT:	Military aircraft		
	Military satellites		
	Military vehicles		
	Weapons		
<b>Military satellites</b>			
BT:	Artificial satellites		
	Military equipment		
RT:	Global Positioning		
System			
	Hyperspectral sensors		
	Military communication		
<b>Military standards</b>			
UF:	Mil standards		
BT:	Standards categories		
<b>Military vehicles</b>			
BT:	Military equipment		
	Vehicles		
<i>Milk</i>			
USE:	Dairy products		
<i>Millennial generation</i>			
USE:	Millennials		
<b>Millennials</b>			
UF:	Generation Y		
	Millennial generation		
BT:	Social groups		
<b>Millimeter wave circuits</b>			
UF:	Millimeter-wave		
circuits			
BT:	Circuits		
	Millimeter wave		
technology			
RT:	Analog circuits		
	Distributed parameter		
circuits			
	Millimeter wave		
devices			
NT:	Millimeter wave		
integrated circuits			
<b>Millimeter wave communication</b>			
UF:	Millimeter-wave		
communication			
BT:	Radio communication		
RT:	Millimeter wave		
propagation			
<b>Millimeter wave devices</b>			
UF:	Millimeter-wave		
devices			
BT:	Millimeter wave		
technology			
RT:	Millimeter wave		
circuits			
	Millimeter wave		
integrated circuits			
NT:	Millimeter wave		
transistors			
<b>Millimeter wave integrated circuits</b>			
UF:	Millimeter-wave		
integrated circuits			
BT:	Circuits		
	Integrated circuits		
	Millimeter wave		
circuits			
	Millimeter wave		
technology			
RT:	Analog integrated		
circuits			
	Millimeter wave		
devices			
NT:	MIMICs		
<b>Millimeter wave measurements</b>			
UF:	Millimeter-wave		
measurements			
BT:	Electromagnetic		
measurements			
RT:	Millimeter wave		
technology			
<i>Millimeter wave monolithic integrated circuits</i>			
USE:	MIMICs		
<b>Millimeter wave propagation</b>			
UF:	Millimeter-wave		
propagation			
BT:	Electromagnetic		
propagation			
RT:	Millimeter wave		
communication			
<b>Millimeter wave radar</b>			
UF:	Millimeter-wave radar		
BT:	Millimeter wave		
technology			
	Radar		



# 2019 IEEE Thesaurus

## Millimeter wave technology

UF: Millimeter-wave technology  
 BT: Microwave theory and techniques  
 RT: Millimeter wave measurements  
 NT: Millimeter wave circuits  
 Millimeter wave devices  
 Millimeter wave integrated circuits  
 Millimeter wave radar

## Millimeter wave transistors

UF: Millimeter-wave transistors  
 BT: Millimeter wave devices  
 Transistors

## Millimeter-wave circuits

USE: Millimeter wave circuits

## Millimeter-wave communication

USE: Millimeter wave communication

## Millimeter-wave devices

USE: Millimeter wave devices

## Millimeter-wave integrated circuits

USE: Millimeter wave integrated circuits

## Millimeter-wave measurements

USE: Millimeter wave measurements

## Millimeter-wave monolithic integrated circuits

USE: MIMICs

## Millimeter-wave propagation

USE: Millimeter wave propagation

## Millimeter-wave radar

USE: Millimeter wave radar

## Millimeter-wave technology

USE: Millimeter wave technology

## Millimeter-wave transistors

USE: Millimeter wave transistors

## Millimicron

USE: Nanometers

## Milling

BT: Machining  
 RT: Boring  
 Milling machines

## Milling machines

BT: Machine tools  
 RT: Ball milling  
 Cutting tools  
 Milling

## MIM capacitors

UF: Metal-insulator-metal capacitors  
 BT: Metal-insulator structures

## MIM devices

UF: Metal-insulator-metal devices  
 BT: Metal-insulator structures  
 RT: Semiconductor-insulator interfaces

## MIMICs

UF: Millimeter wave monolithic integrated circuits  
 Millimeter-wave monolithic integrated circuits  
 BT: Millimeter wave integrated circuits  
 Monolithic integrated circuits  
 RT: MMICs  
 Radiofrequency integrated circuits

## MIMO communication

UF: MIMO systems  
 Multiple antenna systems  
 Multiple input multiple output



# 2019 IEEE Thesaurus

multiple input systems  
multiple output systems  
multiple-input  
multiple-output  
multiple-input  
multiple-output systems  
multiple-input-  
multiple-output  
Multivariable systems  
BT: Communication systems  
RT: 3G mobile  
communication  
Control systems  
IEEE 802.11 Standard  
IEEE 802.11n Standard  
IEEE 802.16 Standard  
MISO communication  
Multipath channels  
NOMA  
OFDM  
Optimization methods  
Radio communication  
SIMO communication  
SISO communication  
NT: Rician channels  
**MIMO radar**  
BT: Multistatic radar  
*MIMO systems*  
USE: MIMO communication  
*Mind-machine interfaces*  
USE: Brain-computer  
interfaces  
*Mineral processing*  
USE: Materials processing  
**Mineral resources**  
BT: Minerals  
**Mineralization**  
BT: Minerals  
**Minerals**  
BT: Geology  
NT: Mineral resources  
Mineralization  
Ores  
*Miniaturized satellites*  
USE: Small satellites

*Minicomputers*  
USE: Microcomputers  
**Minimally invasive surgery**  
UF: Laparoscopic surgery  
BT: Surgery  
RT: Laparoscopes  
**Minimax techniques**  
UF: Minmax techniques  
BT: Statistics  
RT: Artificial  
intelligence  
Game theory  
Minimization methods  
*Minimisation*  
USE: Minimization  
*Minimisation methods*  
USE: Minimization methods  
**Minimization**  
UF: Minimisation  
BT: Mathematics  
RT: Optimization  
NT: Minimization methods  
**Minimization methods**  
UF: Minimisation methods  
BT: Minimization  
RT: Approximation methods  
Minimax techniques  
*Minimum analog-digital integrated circuits*  
USE: Analog-digital  
integrated circuits  
**Mining equipment**  
BT: Production equipment  
RT: Mining industry  
**Mining industry**  
BT: Industries  
RT: Fracking  
Fuel processing  
industries  
Geoengineering  
Hyperspectral sensors  
Mining equipment  
Raw materials  
NT: Coal mining



# 2019 IEEE Thesaurus

## *Minmax techniques*

USE: Minimax techniques

USE: Mission critical systems

## **Mirrors**

BT: Optical devices  
RT: Optical materials  
Optical reflection  
Reflection  
NT: Distributed Bragg reflectors  
Micromirrors

## *Mixed analog digital integrated circuits*

USE: Mixed analog-digital integrated circuits

## **Mixed analog-digital integrated circuits**

UF: Mixed analog digital integrated circuits  
BT: Analog-digital integrated circuits  
RT: Analog processing circuits  
System-on-chip

## **MIS devices**

UF: Metal-insulator-semiconductor devices  
BT: Semiconductor devices  
RT: Metal-insulator structures  
Semiconductor-insulator interfaces  
NT: Charge coupled devices  
MOS devices

## *Mixed convection*

USE: Convection

## **MISFETs**

BT: Field effect transistors  
RT: CMOSFET logic devices  
Magnetic field induced strain

## **Mixed integer linear programming**

UF: Mixed-integer linear programming  
BT: Integer linear programming

## *Mixed reality*

USE: Virtual reality

## **MISO communication**

UF: multiple input single-output  
multiple-input single output  
multiple-input single-output  
BT: Communication systems  
RT: MIMO communication  
SIMO communication  
SISO communication

## *Mixed-integer linear programming*

USE: Mixed integer linear programming

## **Mixers**

BT: Frequency conversion  
RT: Demodulation  
Modulation  
Nonlinear circuits

## **Missiles**

UF: Torpedoes  
BT: Weapons  
RT: Aerospace control  
Ground support

## **Mixture models**

BT: Statistics  
RT: Feature extraction  
Image segmentation  
Probabilistic logic

## **Mission critical systems**

UF: Mission-critical systems  
BT: Contingency management

## *MLE*

USE: Maximum likelihood estimation

## **MLFMA**

UF: Multilevel fast multipole algorithm  
BT: Algorithms

## *Mission-critical systems*



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# 2019 IEEE Thesaurus

<b>MMICs</b> integrated circuits circuits circuits circuits integrated circuits	UF:	Monolithic microwave	BT:	Communication systems
	BT:	Microwave integrated		Near field
		Monolithic integrated	communication	
	RT:	Analog integrated	RT:	Acoustic communication
		MIMICs	(telecommunication)	Block codes
<i>Mn</i>  <i>MNV</i> network	USE:	Manganese	resonators	Film bulk acoustic
				Indoor communication
	USE:	Multi-layer neural	management	Long Term Evolution
				Mobile applications
				Mobile handsets
<b>Mobile ad hoc networks</b> network	BT:	Ad hoc networks		Multiuser detection
				Network resource
			networks	
			NT:	3G mobile
			communication	4G mobile
<b>Mobile agents</b> systems	BT:	Knowledge based	communication	5G mobile
	RT:	Computer applications	communication	Ambient networks
		Distributed computing		Dual band
		Intelligent systems		Land mobile radio
		Learning systems		Location awareness
<b>Mobile antennas</b> equipment		Mobile computing		Mobile learning
	BT:	Antennas		Mobile nodes
		Land mobile radio		Mobile security
	RT:	Land mobile radio		Software radio
				Ultra-dense networks
<i>Mobile application development</i> programming interfaces			<b>Mobile computing</b>	
	USE:	Application	BT:	Computers and
			information processing	
			RT:	Ad hoc networks
				Bring your own device
<b>Mobile applications</b>	BT:	Computer applications		Crowdsourcing
	RT:	Mobile communication		Data dissemination
		Mobile handsets		Edge computing
		Wireless communication		Location awareness
				Military computing
<b>Mobile communication</b>			networking	Mobile agents
			computing	Mobile learning
			NT:	Software defined
				Telecommunication
				Wireless access points





# 2019 IEEE Thesaurus

## *Mobile device security*

USE: Mobile security

## *Mobile devices*

USE: Mobile handsets

## **Mobile handsets**

UF: Mobile devices  
Mobile phones  
BT: Telephone sets  
RT: Dual band  
Land mobile radio  
Long Term Evolution  
Mobile applications  
Mobile communication  
Personal communication

## networks

Tablet computers  
Transceivers  
UHF communication  
NT: Smart phones

## **Mobile learning**

BT: Electronic learning  
Mobile communication  
RT: Distance learning  
Mobile computing

## *Mobile location management*

USE: Location awareness

## **Mobile nodes**

BT: Mobile communication  
Telecommunication

## network management

## *Mobile office*

USE: Teleworking

## *Mobile phones*

USE: Mobile handsets

## *Mobile radio*

USE: Land mobile radio

## *Mobile radio mobility management*

USE: Location awareness

## *Mobile robot sensing systems*

USE: Robot sensing systems

## *Mobile robot vision systems*

USE: Robot vision systems

## **Mobile robots**

BT: Robots  
RT: Assembly systems  
Control systems  
Humanoid robots  
Industrial control  
Manufacturing

## automation

## control

Materials handling  
Mechanical variables  
Motion control  
Nonlinear systems  
Service robots  
Telerobotics  
Unmanned aerial

## vehicles

Vehicles  
Vehicular automation  
Wearable robots  
NT: Autonomous automobiles  
Climbing robots  
Legged locomotion

## **Mobile security**

UF: Mobile device security  
BT: Computer security  
Mobile communication

## *Mobile television*

USE: TV

## **Mobile TV**

BT: TV

## **MOCVD**

UF: Metalorganic vapor  
deposition  
BT: Chemical vapor  
deposition

## **Modal analysis**

BT: Mathematical analysis  
RT: Vibration measurement

## **Mode matching methods**

BT: Mathematics  
Numerical analysis  
Statistical analysis  
RT: Antenna theory  
Matrices  
Waveguide theory



# 2019 IEEE Thesaurus

## Model checking

BT: System testing  
RT: Algorithms  
Concurrent computing  
Formal verification  
Static analysis

models

Context modeling  
Data models  
Deformable models  
Digital elevation

Emulation  
Graphical models  
Green's function

## Model driven engineering

UF: Model-driven  
engineering

methods

BT: Software design

Hidden Markov models  
Input variables  
Integrated circuit

## Model predictive control

USE: Predictive control

modeling

## Model reduction

USE: Reduced order systems

Inverse problems  
Load modeling  
Metamodeling  
Numerical models  
Object oriented

## Model-based reasoning

USE: Inference mechanisms

modeling

Power system modeling  
Process modeling  
Semiconductor device

## Model-driven development

BT: Software development  
management

modeling

Semiconductor process

modeling

## Model-driven engineering

USE: Model driven  
engineering

Signal representation  
Simulation  
Solid modeling  
System identification  
Systems modeling

## Model-predictive control

USE: Predictive control

## Modelling

USE: Modeling

## Modeling

UF: Modelling  
System modeling  
BT: Systems engineering  
and theory  
RT: Computer graphics  
Data visualization  
Digital simulation  
Haptic interfaces  
Monte Carlo methods  
Numerical simulation  
Petri nets  
Plasma simulation  
Power system analysis

## Modems

UF: Modulator-demodulators  
BT: Communication

equipment

RT: Computer peripherals  
Data communication  
Demodulation  
Modulation

computing

Systems Modeling

## Moderate resolution imaging spectroradiometer

USE: MODIS

Language

## Moderate-resolution Imaging Spectroradiometer

USE: MODIS

NT: Time series analysis  
Analytical models  
Atmospheric modeling  
Brain modeling  
Computational modeling

## MODFET circuits

BT: FET circuits  
RT: MODFETs



# 2019 IEEE Thesaurus

amplifiers	Rail to rail	Modulators
		BT: Communications
	Rail to rail operation	technology
NT: MODFET integrated		Signal processing
circuits		RT: Direct sequence spread
		spectrum communication
<b>MODFET integrated circuits</b>		Encoding
BT: MODFET circuits		IEEE 802.11 Standard
RT: MODFETs		IEEE 802.11g Standard
		IEEE 802.11n Standard
<b>MODFETs</b>		Linearization
UF: Heterostructure FETs	techniques	
SDHTs		Mixers
Selectively doped		Modems
heterojunction transistors		OFDM
TEGFETs		Phase locked loops
Two-dimensional		Tracking loops
electron gas FETs		Transmitters
BT: Field effect	NT: Amplitude modulation	
transistors	Chirp modulation	
RT: HEMTs	Demodulation	
MODFET circuits	Digital modulation	
MODFET integrated	Frequency modulation	
circuits	Magnetic modulators	
	Modulation coding	
<b>MODIS</b>	Optical modulation	
UF: Moderate resolution	Phase modulation	
imaging spectroradiometer	Pulse modulation	
Moderate-resolution	Pulse width modulation	
Imaging Spectroradiometer		
BT: Payloads	<b>Modulation coding</b>	
Spectroradiometers	BT: Modulation	
	RT: Encoding	
<b>Modular construction</b>	Information theory	
BT: Construction	NT: Interleaved codes	
RT: Buildings		
Prefabricated	<i>Modulation format</i>	
construction	USE: Modulation	
<i>Modular multi-level converters</i>	<i>Modulation index</i>	
USE: Modular multilevel	USE: Modulation	
converters AND		
Voltage-source	<i>Modulation-coding</i>	
converters	USE: Modulation	
<b>Modular multilevel converters</b>	<i>Modulator-demodulators</i>	
UF: Modular multi-level	USE: Modems	
converters		
BT: Converters	<i>Modulators</i>	
	USE: Modulation	
<b>Modulation</b>		
UF: Modulation format	<b>Modules (abstract algebra)</b>	
Modulation index	BT: Abstract algebra	
Modulation-coding		



# 2019 IEEE Thesaurus

## Moisture

BT: Geophysics  
RT: Moisture control  
Moisture measurement  
Trees - insulation

UF: Biological  
macromolecules  
Biomolecules  
BT: Biophysics  
RT: Biochemistry  
Biomedical equipment  
Biomedical imaging  
Biomedical materials  
Cellular biophysics  
DNA  
Genetic engineering  
Genetics  
Microorganisms

## Moisture control

BT: Control systems  
RT: Moisture  
NT: Humidity control

## Moisture measurement

BT: Measurement  
RT: Moisture  
Soil measurements  
NT: Humidity measurement

## Molecular clones

USE: Cloning

## Molding equipment

UF: Moulding equipment  
BT: Production equipment

## Molecular communication

BT: Biological systems  
Communication systems  
RT: Nanocommunication  
(telecommunication)

## Molecular beam applications

BT: Molecular beams  
RT: Light emitting diodes  
Semiconductor devices  
Semiconductor lasers

## Molecular computing

BT: Computers and  
information processing  
Nanotechnology  
RT: DNA computing

## Molecular beam epitaxial growth

BT: Epitaxial growth  
RT: Crystals  
Gallium  
Thin films

## Molecular electronics

UF: Biomolecular  
electronics  
BT: Nanotechnology  
RT: Graphene devices  
Nanoelectronics  
Organic light emitting  
diodes

## Molecular beams

BT: Beams  
RT: Epitaxial growth  
Thin films  
NT: Molecular beam  
applications

## Molecular imaging

BT: Biomedical imaging

## Molecular biology

BT: Biological processes  
NT: Biochips

## Molecular sieves

BT: Chemical processes  
RT: Adsorption

## Molecular biomarkers

BT: Biomarkers  
RT: Drugs  
NT: Genomics  
Glycomics  
Lipidomics  
Metabolomics  
Proteomics

## Molybdenum

BT: Chemical elements

## MoM

USE: Method of moments

## Moment methods

USE: Method of moments

## Molecular biophysics



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# 2019 IEEE Thesaurus

## *Money management*

USE: Financial management

## **Monitoring**

BT: Instrumentation and  
measurement

RT: Alarm systems  
Maintenance

engineering

Power system

management

NT: Computerized

monitoring

Environmental

monitoring

Patient monitoring  
Radiation monitoring  
Remote monitoring  
Surveillance

## **Monolithic integrated circuits**

UF: Monolithic integration

BT: Circuits  
Integrated circuits

NT: MIMICs  
MMICs

## *Monolithic integration*

USE: Monolithic integrated  
circuits

## *Monolithic microwave integrated circuits*

USE: MMICs

## **Monopoly**

BT: Economics  
RT: Microeconomics

## **MONOS devices**

UF: Metal-oxide-nitride-  
oxide-semiconductors

Metal-oxide-nitride-  
oxide-silicon

BT: Semiconductor devices

## **Monsoons**

BT: Meteorology  
RT: Rain  
Storms

## **Monte Carlo methods**

UF: Importance sampling

simulations

simulations

BT: Statistical analysis

RT: Computational  
electromagnetics

Monte Carlo

Monte-Carlo methods

Monte-Carlo

Modeling

Probability

Simulated annealing

Simulation

## *Monte Carlo simulations*

USE: Monte Carlo methods

## *Monte-Carlo methods*

USE: Monte Carlo methods

## *Monte-Carlo simulations*

USE: Monte Carlo methods

## **Mood**

BT: Psychology

## **Moon**

UF: Lunar

BT: Satellites

## **Moore's Law**

BT: Integrated circuit  
technology

## *Mopeds*

USE: Motorcycles

## *Morals*

USE: Ethics

## **Morphological operations**

BT: Image processing

RT: Topology

## **Morphology**

BT: Natural language  
processing

## **Mortar**

BT: Building materials

Chemical products

RT: Construction industry

## *Mortgages*

USE: Loans and mortgages



# 2019 IEEE Thesaurus

<b>MOS capacitors</b>			
BT:	MOS devices	amplifiers	Rail to rail
RT:	Capacitors		Rail to rail operation
			Threshold voltage
<b>MOS devices</b>		NT:	CMOSFET circuits
UF:	Metal-oxide		MOS integrated
semiconductors		circuits	Power MOSFET
	Metal-oxide-		
semiconductor devices		<b>MOSHFETs</b>	
BT:	MIS devices	UF:	Metal oxide
RT:	Semiconductor-	semiconductor heterojunction FETs	
insulator interfaces		BT:	Field effect
NT:	MOS capacitors	transistors	
	MOSFET		
	Negative bias	<b>Motion analysis</b>	
temperature instability		BT:	Robot kinematics
		NT:	Active contours
<b>MOS integrated circuits</b>			Motion segmentation
BT:	MOSFET circuits		Robot localization
RT:	Metal-insulator		
structures		<b>Motion artifacts</b>	
		BT:	Biomedical image
<b>MOS transistors</b>		processing	
USE:	MOSFET		Video signal
		processing	
<b>MOSFET</b>		<b>Motion compensation</b>	
UF:	MOS transistors	BT:	Control systems
	nMOSFETs	RT:	Image communication
	pMOSFETs		
BT:	Field effect	<b>Motion control</b>	
transistors		BT:	Mechanical variables
	MOS devices	control	
RT:	CMOS technology	RT:	Aerospace control
	CMOSFET logic devices		Legged locomotion
	Gate drivers		Manipulators
	TFETs		Mobile robots
NT:	CMOSFETs		Motor coordination
	FinFETs		Servosystems
	Interface states		Structure from motion
	Junctionless nanowire		Trajectory
transistors			Trajectory tracking
			Velocity control
<b>MOSFET circuits</b>		NT:	Collision avoidance
UF:	Metal-oxide		Collision mitigation
semiconductor field effect transistor			Kinetic theory
BT:	Circuits		Motion planning
	FET circuits		Path planning
RT:	Active inductors		Visual servoing
	Linearization		
techniques		<b>Motion detection</b>	
	Operational amplifiers	BT:	Signal detection
	Power dissipation	RT:	Corner detection



# 2019 IEEE Thesaurus

## Motion estimation

BT: Parameter estimation  
RT: Object tracking

## Motion measurement

BT: Mechanical variables  
measurement  
RT: Doppler measurement  
Gaze tracking  
Velocity measurement  
NT: Tracking  
Tribology

## Motion pictures

UF: Cinema  
Films (Motion pictures)  
Movies  
BT: Broadcasting  
RT: Cameras  
Cinematography  
Entertainment industry  
Imaging  
Optical projectors

## Motion planning

BT: Motion control  
RT: Navigation  
Robot control

## Motion segmentation

BT: Motion analysis

## Motor control

USE: Motor drives

## Motor coordination

BT: Kinematics  
RT: Motion control

## Motor drives

UF: Motor control  
BT: Drives  
RT: Industrial control  
Mechanical variables  
control  
Motors  
Sensorless control  
Servosystems  
Torque control  
Variable speed drives  
Velocity control  
Voltage control

## Motorbikes

USE: Motorcycles

## Motorcycles

UF: Mopeds  
Motorbikes  
Scooters  
BT: Road vehicles

## Motors

BT: Energy conversion  
Machinery  
RT: Coils  
Motor drives  
Sensorless control  
NT: AC motors  
Brushless motors  
Commutation  
DC motors  
Electric motors  
Hysteresis motors  
Induction motors  
Micromotors  
Permanent magnet

## motors

Servomotors  
Traction motors  
Universal motors

## Moulding equipment

USE: Molding equipment

## Mouse

USE: Mice

## Mouth

BT: Digestive system  
Head  
RT: Stomatognathic system  
NT: Teeth

## Movies

USE: Motion pictures

## Moving object databases

USE: Visual databases

## Moving picture experts group

USE: MPEG standards

## Moving Pictures Experts Group

BT: IEC  
ISO



# 2019 IEEE Thesaurus

MP3			NT:	MPEG 1 Standard	
	USE:	Digital audio players		MPEG 2 Standard	
AND				MPEG 4 Standard	
		Portable media players		MPEG 7 Standard	
MPEG			MPEG4		
	USE:			MPEG 4 Standard	
	USE:	Transform coding			
			MPEG7		
MPEG 1 Standard					
BT:		MPEG standards		USE:	MPEG 7 Standard
MPEG 2 Standard			MPLS		
BT:		MPEG standards		USE:	Multiprotocol label switching
MPEG 4 Standard			MPPT		
UF:		MPEG4		USE:	Maximum power point trackers
BT:		MPEG standards			
RT:		Digital multimedia			
broadcasting			MRI		
		High efficiency video		USE:	Magnetic resonance
coding				imaging	
		Streaming media			
		Vector quantization			
		Video codecs			
		Video coding		USE:	Materials requirements
		Video signal		planning	
processing			Mud		
				USE:	Sediments
MPEG 7 Standard			Mufflers		
UF:		MPEG7		USE:	Exhaust systems
BT:		MPEG standards			
RT:		Audio coding			
		Content management			
		Digital multimedia		Multi modal integration	
broadcasting				USE:	Multisensory
		Multimedia		integration	
communication					
		Multimedia systems		Multi sensory integration	
				USE:	Multisensory
MPEG standards				integration	
UF:		Moving picture experts			
group				Multi stage noise shaping	
				USE:	Multi-stage noise
	BT:	IEC Standards		shaping	
		ISO Standards			
	RT:	Digital multimedia		Multi-agent models	
broadcasting				USE:	Multi-agent systems
		Image coding			
		Streaming media		Multi-agent systems	
		Transform coding		UF:	Multi-agent models
		Video codecs			Multiagent models
		Video coding			Multiagent systems
		Video signal		BT:	Adaptive systems
processing				RT:	Agent-based modeling





# 2019 IEEE Thesaurus

design	Autonomous vehicles System analysis and	shaping	Multistage noise
	NT: Vehicular automation	BT: Noise shaping	
intelligence	Collaborative	<i>Multi-threaded comput*</i>	
		USE: Multithreading	
<i>Multi-carrier code division multiple access</i>		<i>Multi-threaded systems</i>	
USE: Multicarrier code		USE: Program processors	
division multiple access		<i>Multi-threading systems</i>	
		USE: Program processors	
<i>Multi-casting</i>		<i>Multi-user detection</i>	
USE: Multicast		USE: Multiuser detection	
communication			
<i>Multi-core processing</i>		<i>Multi-vibrators</i>	
USE: Multicore processing		USE: Multivibrators	
<i>Multi-core processors</i>		<b>Multiaccess communication</b>	
USE: Multicore processing		UF: CDMA	
<b>Multi-factor authentication</b>		CSMA	
BT: Access control		Carrier sense	
Authentication		multiaccess	
<i>Multi-hop</i>		multiaccess	
USE: Spread spectrum			
communication			
<b>Multi-layer neural network</b>			
UF: MNN			
BT: Neural networks			
<i>Multi-modal sensors</i>			
USE: Multimodal sensors			
<i>Multi-objective programming</i>			
USE: Pareto optimization			
<i>Multi-resolution</i>			
USE: Multiresolution			
analysis			
<b>Multi-robot systems</b>			
UF: Multirobot systems			
BT: Robotics and			
automation			
NT: Swarm robotics			
<b>Multi-stage noise shaping</b>			
UF: MASH			
Multi stage noise			
shaping			



# 2019 IEEE Thesaurus

Time division  
synchronous code division multiple  
access  
Zero correlation zone

## *Multiaccess systems*

USE: Multiaccess  
communication

## *Multiagent models*

USE: Multi-agent systems

## *Multiagent systems*

USE: Multi-agent systems

## *Multiattribute optimization*

USE: Pareto optimization

## **Multicarrier code division multiple access**

UF: MC-CDMA  
MCCDMA  
Multi-carrier code  
division multiple access  
BT: Multiaccess  
communication  
RT: Code division  
multiplexing  
Communication channels  
OFDM  
Protocols  
Spread spectrum  
communication  
Telecommunications  
Time division  
synchronous code division multiple  
access

## **Multicast algorithms**

BT: Algorithms

## **Multicast communication**

UF: Multi-casting  
Multicasting  
BT: Communication systems  
RT: Ad hoc networks  
Multicast protocols  
Optical wavelength  
conversion  
Routing  
Telecommunications  
Wavelength division  
multiplexing  
NT: Multicast VPN

## **Multicast protocols**

BT: Protocols  
RT: Internet  
Multicast  
communication  
Routing protocols

## **Multicast VPN**

BT: Multicast  
communication

## *Multicasting*

USE: Multicast  
communication

## **Multichip modules**

BT: Integrated circuit  
packaging  
Packaging

## **Multiconductor transmission lines**

BT: Transmission lines  
RT: Coupled mode analysis

## *Multicore*

USE: Multicore processing

## **Multicore processing**

UF: Multi-core processing  
Multi-core processors  
Multicore  
BT: Parallel architectures  
NT: Embedded multicore  
processing  
Manycore processors

## **Multidimensional signal processing**

BT: Signal processing  
RT: Image processing  
NT: Video signal  
processing

## **Multidimensional systems**

BT: Systems engineering  
and theory

## **Multifilamentary superconductors**

BT: Superconducting  
materials

## **Multifrequency antennas**

BT: Antennas



# 2019 IEEE Thesaurus

## Multigrid methods

BT: Numerical analysis

## Multihop

USE: Spread spectrum  
communication

## Multilayer perceptrons

BT: Feedforward neural  
networks

## Multilayers

USE: Nonhomogeneous media

## Multileaf collimators

USE: Collimators

## Multilevel fast multipole algorithm

USE: MLFMA

## Multilevel systems

BT: Hierarchical systems

## Multilinear systems

USE: Nonlinear systems

## Multimedia communication

BT: Communication systems  
Multimedia systems  
RT: B-ISDN  
Broadband

## communication

Diffserv networks  
Digital multimedia

## broadcasting

Huffman coding  
IEEE 802.16 Standard  
ISDN  
Intserv networks  
MPEG 7 Standard  
Multimedia computing  
Streaming media  
Transcoding

## Multimedia computing

BT: Multimedia systems  
RT: Audio user interfaces  
Collaborative work  
Computer graphics  
Computers and  
information processing  
Content management  
Information systems

## Multimedia

Multimedia databases  
Video sequences

## Multimedia databases

BT: Database systems  
Databases  
Multimedia systems  
RT: Audio databases  
Huffman coding  
Multimedia computing

## Multimedia products

USE: Videos

## Multimedia systems

BT: Consumer electronics  
RT: Authoring systems  
Electronic publishing  
Huffman coding  
MPEG 7 Standard  
NT: Multimedia

## communication

Multimedia computing  
Multimedia databases

## Multimodal integration

USE: Multisensory

## integration

## Multimodal sensing

USE: Multimodal sensors

## Multimodal sensors

UF: Multi-modal sensors  
Multimodal sensing  
BT: Sensors  
RT: Sensor fusion

## Multiobjective programming

USE: Pareto optimization

## multiobjective programming

USE: Pareto optimization

## Multipath channels

BT: Communication channels  
RT: Channel estimation  
Diversity methods  
Fading channels  
MIMO communication  
Meteorological factors  
Multiuser detection



# 2019 IEEE Thesaurus

Radio propagation	NT:	Code division
Terrain factors	multiplexing	
Ultra wideband		Demultiplexing
communication		Frequency division
<b>Multiple access interference</b>	multiplexing	Multiplexing equipment
BT:		OFDM
		Time division
<i>Multiple antenna systems</i>	multiplexing	Wavelength division
USE:	multiplexing	
<i>Multiple input multiple output</i>	<b>Multiplexing equipment</b>	
USE:	BT:	Multiplexing
	RT:	Communication
<i>Multiple input multiple output systems</i>	equipment	
USE:	NT:	Add-drop multiplexers
<i>multiple input single-output</i>	<b>Multiplying circuits</b>	
USE:	BT:	Circuits
	RT:	Digital integrated
<b>Multiple sclerosis</b>	circuits	
BT:		Logic circuits
<b>Multiple signal classification</b>	<b>Multiprocessing systems</b>	
UF:	BT:	Parallel processing
BT:	RT:	Computer networks
		Computers and
<i>Multiple-input multiple-output</i>	information processing	
USE:		Concurrency control
		Distributed computing
<i>Multiple-input multiple-output systems</i>		Parallel languages
USE:		Parallel programming
		Pipeline processing
<i>multiple-input single output</i>	NT:	Data flow computing
USE:		Processor scheduling
		Systolic arrays
<i>multiple-input single-output</i>		
USE:		
	<b>Multiprocessor interconnection</b>	
<i>Multiple-input-multiple-output</i>	UF:	Interconnection
USE:	networks	
		Parallel processor
<i>Multiplexed</i>	interconnection	
USE:	BT:	Computer architecture
	RT:	Computer networks
<b>Multiplexing</b>		Data communication
UF:		Local area networks
BT:		Metropolitan area
Communications	networks	
technology		Wide area networks
RT:		Hypercubes
Arrayed waveguide	NT:	
gratings		
Multiaccess	<b>Multiprocessor interconnection networks</b>	
communication	BT:	Computer networks



# 2019 IEEE Thesaurus

## *Multiprocessor scheduling*

USE: Processor scheduling

## **Multiprotocol label switching**

UF: Label swapping

MPLS

BT: Communication

switching

Packet switching

Protocols

RT: Asynchronous transfer

mode

Internet

Routing protocols

## **Multiresolution analysis**

UF: Multi-resolution

BT: Wavelet analysis

## *Multirobot systems*

USE: Multi-robot systems

## **Multisensor systems**

BT: Sensor fusion

RT: Robot sensing systems

## **Multisensory integration**

UF: Multi modal

integration

Multi sensory

integration

Multimodal integration

BT: Sense organs

## **Multiskilling**

UF: Job rotation

BT: Human resource

management

RT: Industrial training

Job specification

Vocational training

## **Multispectral imaging**

BT: Imaging

## *Multistage noise shaping*

USE: Multi-stage noise

shaping

## **Multistatic radar**

BT: Radar

NT: MIMO radar

## **Multitasking**

BT: Computers and  
information processing

NT: Parametric study

## *Multithreaded systems*

USE: Program processors

## **Multithreading**

UF: Multi-threaded comput\*

Multithreading comput\*

BT: Parallel processing

## *Multithreading comput\**

USE: Multithreading

## *Multithreading systems*

USE: Program processors

## **Multiuser channels**

BT: Communication channels

## **Multiuser detection**

UF: Multi-user detection

BT: Signal detection

RT: Land mobile radio

Land mobile radio

cellular systems

Mobile communication

Multipath channels

Spread spectrum

communication

## **Multivalued logic**

UF: Many valued logic

Ternary logic

BT: Logic

RT: Logic functions

## *Multivariable systems*

USE: MIMO communication

## **Multivariate regression**

BT: Regression analysis

## **Multivibrators**

UF: Multi-vibrators

BT: Electronic circuits

## **Multiwave mixing**

BT: Optical mixing

## *Munitions*

USE: Weapons



# 2019 IEEE Thesaurus

<b>Muon colliders</b>	USE: Music	
UF: Muon sources		<b>Musical instrument digital interfaces</b>
BT: Colliding beam devices		UF: MDDI
RT: Luminescence		BT: Computer interfaces
Luminescent devices		Music
Storage rings		RT: Digital communication
<i>Muon sources</i>		<i>Mutual conductance</i>
USE: Muon colliders		USE: Transconductance
<i>Muons</i>		<b>Mutual coupling</b>
USE: Mesons		BT: Electromagnetic coupling
<b>Muscles</b>		<b>Mutual funds</b>
BT: Musculoskeletal system		BT: Financial management
NT: Myocardium		
Neuromuscular		<b>Mutual information</b>
<b>Musculoskeletal system</b>		UF: Transinformation
BT: Anatomy		BT: Information theory
NT: Cartilage		
Fascia		<b>Myelin</b>
Ligaments		BT: Nerve fibers
Muscles		RT: Axons
Skeleton		
Tendons		<i>Myocardial</i>
<i>MUSIC</i>		USE: Myocardium
USE: Multiple signal classification		<b>Myocardium</b>
<b>Music</b>		UF: Myocardial
UF: Computer music		BT: Muscles
Musical		
BT: Acoustics		<i>Myopia</i>
RT: Audio systems		USE: Vision defects
White noise		<b>MySpace</b>
NT: Computer generated		BT: Social network services
music		Video sharing
Electronic music		Web sites
Musical instrument		
digital interfaces		<b>NACE International</b>
Rhythm		UF: National Association of Corrosion Engineers
Timbre		BT: Standards organizations
<b>Music information retrieval</b>		<b>NACE Standards</b>
BT: Information retrieval		BT: Standards publications
RT: Cepstral analysis		
<i>Music recommendation</i>		<b>Nails</b>
USE: Recommender systems		BT: Integumentary system
<i>Musical</i>		



# 2019 IEEE Thesaurus

## Nakagami distribution

BT: Probability  
distribution

## NAND flash

USE: Flash memories

## Nano communication

USE: Nanocommunication  
(telecommunication)

## Nano devices

USE: Nanoscale devices

## Nano generators

USE: Nanogenerators

## Nano ribbons

USE: Nanoribbons

## Nanoactuators

USE: Actuators AND  
Nanoelectronics

## Nanobioscience

BT: Biology  
Nanotechnology  
RT: Colloidal lithography  
Nanofluidics  
NT: DNA computing  
Nanobiotechnology

## Nanobiotechnology

BT: Nanobioscience  
RT: Nanomedicine

## Nanocommunication (telecommunication)

UF: Nano communication  
BT: Communication systems  
Nanotechnology  
RT: Biomedical  
communication  
Molecular  
communication  
Wireless networks  
Wireless sensor  
networks

## Nanocomposites

BT: Nanostructured  
materials  
RT: Metamaterials

## Nanocontacts

BT: Nanoscale devices  
RT: Enhanced  
magnetoresistance

Magnetoresistance  
Nanoelectronics  
Nanowires

## Nanocrystal

USE: Nanocrystals

## Nanocrystals

UF: Nanocrystal  
BT: Crystalline materials  
Nanoparticles  
RT: Quantum dots  
NT: Colloidal nanocrystals

## Nanodevices

USE: Nanoscale devices

## Nanoelectromechanical systems

UF: NEMS  
BT: Nanotechnology  
RT: Microelectromechanical  
systems

## Nanoelectronics

UF: Nanoactuators  
BT: Nanotechnology  
RT: Graphene devices  
Molecular electronics  
Nanocontacts  
NT: Junctionless nanowire  
transistors

## Nanofabrication

BT: Nanotechnology

## Nanofiltration

USE: Filtration

## Nanofluidics

UF: Nanofluids  
BT: Fluidics  
Nanotechnology  
RT: Nanobioscience

## Nanofluids

USE: Nanofluidics

## Nanogenerators

UF: Nano generators  
BT: Energy harvesting  
RT: Electric generators



# 2019 IEEE Thesaurus

devices	Low-power electronics Micromechanical	BT: Nanotechnology Photonics
	Nanowires Piezoelectric devices Triboelectricity Vibrations	<b>Nanoporous materials</b> BT: Nanostructured materials
<i>Nanoimprint lithography</i>	USE: Nanolithography	<b>Nanopositioning</b> BT: Nanotechnology Position control
<b>Nanolithography</b> lithography	UF: Nanoimprint BT: Lithography Nanotechnology RT: Nanopatterning Soft lithography	<i>Nanopowders</i> USE: Nanoparticles
<b>Nanomaterials</b>	BT: Nanotechnology	<b>Nanoribbons</b> UF: Nano ribbons BT: Nanostructures
<b>Nanomedicine</b>	BT: Biomedical monitoring Medical diagnosis RT: Cellular biophysics Mechanobiology Nanobiotechnology Nanoparticles	<i>Nanosatellites</i> USE: Small satellites
<b>Nanometers</b>	UF: Millimicron Nanometres BT: Measurement units	<b>Nanoscale devices</b> UF: Nano devices Nanodevices BT: Nanotechnology RT: Single electron devices NT: Nanocontacts Nanotube devices
<i>Nanometres</i>	USE: Nanometers	<b>Nanosensors</b> BT: Nanotechnology Sensors RT: Biomedical equipment Nanoparticles Nanostructures
<b>Nanoparticles</b>	UF: Nanopowders BT: Nanostructures RT: Nanomedicine Nanosensors NT: Magnetic nanoparticles Nanocrystals	<b>Nanostructured materials</b> UF: Core-shelf nanostructures BT: Materials Nanotechnology NT: Nanocomposites Nanoporous materials
<b>Nanopatterning</b>	BT: Nanotechnology RT: Nanolithography Nanotopography Soft lithography NT: Colloidal lithography	<b>Nanostructures</b> BT: Nanotechnology RT: Nanosensors NT: Nanoparticles Nanoribbons Nanotubes Nanowires Semiconductor nanostructures
<b>Nanophotonics</b>		





# 2019 IEEE Thesaurus

## Nanotechnology

RT: Atomic force microscopy

Epitaxial growth  
Fluidics  
Lithography  
Microfabrication  
Nanotube devices  
Power dissipation  
Quantum mechanics  
Semiconductor device

manufacture

devices

integration

NT: Bionanotechnology  
Casimir effect  
Molecular computing  
Molecular electronics  
Nanobioscience  
Nanocommunication  
(telecommunication)  
Nanoelectromechanical systems

Nanoelectronics  
Nanofabrication  
Nanofluidics  
Nanolithography  
Nanomaterials  
Nanopatterning  
Nanophotonics  
Nanopositioning  
Nanoscale devices  
Nanosensors  
Nanostructured

materials

Nanostructures  
Self-assembly  
Self-replicating

machines

## Nanotopography

BT: Surface topography  
RT: Colloidal lithography  
Nanopatterning

## Nanotube devices

BT: Nanoscale devices  
RT: Nanotechnology

## Nanotubes

BT: Nanostructures

NT: Carbon nanotubes  
Semiconductor nanotubes

## Nanowires

BT: Nanostructures  
RT: Junctionless nanowire transistors

Nanocontacts  
Nanogenerators  
Wires

## Narrowband

BT: Bandwidth  
Communication systems  
RT: Wideband

## NASA

UF: National Aeronautics & Space Administration  
National Aeronautics and Space Administration  
BT: US Government agencies  
RT: Space exploration  
Space missions  
Space technology

## Nash equilibrium

BT: Game theory

## National Aeronautics & Space Administration

USE: NASA

## National Aeronautics and Space Administration

USE: NASA

## National Association of Corrosion Engineers

USE: NACE International

## National Bureau of Standards

USE: NIST

## National Electric Code

UF: National electric safety code  
BT: ANSI Standards

## National electric safety code

USE: National Electric Code

## National Fire Protection Agency



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# 2019 IEEE Thesaurus

USE: NFPA  
*National Fire Protection Association*  
 USE: NFPA  
*National Institute of Standards & Technology*  
 USE: NIST  
*National Institute of Standards and Technology*  
 USE: NIST  
**National security**  
 BT: Terrorism  
 RT: Control system  
 security  
 Cyber warfare  
**National Society Agreement awards**  
 BT: IEEE Awards activities  
*National Telecommunications and Information Administration*  
 USE: NTIA  
*National vocational qualification*  
 USE: Vocational training  
**Natural fibers**  
 UF: Natural fibres  
 BT: Textile fibers  
 RT: Cotton  
 Wool  
 NT: Bamboo  
*Natural fibres*  
 USE: Natural fibers  
**Natural gas**  
 BT: Fossil fuels  
 RT: Energy resources  
 Fracking  
 Gases  
 NT: Natural gas industry  
 Liquefied natural gas  
 Methane  
**Natural gas industry**  
 BT: Industries  
 RT: Natural gas  
 Petroleum industry  
 Pipelines

*Natural Language*  
 USE: Natural languages  
**Natural language processing**  
 UF: NLP  
 BT: Natural languages  
 RT: Phonetics  
 Pragmatics  
 Semantic search  
 Semantic technology  
 Semantics  
 Semiotics  
 Syntactics  
 NT: Morphology  
 Sentiment analysis  
 Tokenization  
**Natural languages**  
 UF: Natural language  
 Natural speech  
 BT: Systems, man, and  
 cybernetics  
 RT: Artificial  
 intelligence  
 NT: Computer languages  
 Linguistics  
 Natural language  
 processing  
*Natural response*  
 USE: Transient response  
*Natural speech*  
 USE: Natural languages  
**Navier-Stokes equations**  
 BT: Differential equations  
 Fluid dynamics  
 RT: Finite volume methods  
 Viscosity  
**Navigation**  
 UF: Direction-finding  
 Geomagnetic navigation  
 BT: Intelligent  
 transportation systems  
 Vehicular and wireless  
 technologies  
 RT: Compass  
 Ground support  
 Location awareness  
 Motion planning  
 Position measurement  
 Sensor systems



# 2019 IEEE Thesaurus

systems	NT:	Aircraft navigation			Nearest neighbour
		Course correction	methods		
		Dead reckoning			k neighbor methods
		Indoor navigation			k neighbour methods
		Inertial navigation		BT:	Learning (artificial
Nb		Marine navigation	intelligence)		
		Radio navigation	statistics		Nonparametric
		Satellite navigation			Pattern recognition
				RT:	Data mining
		Sonar navigation			Pattern classification
Nb3Sn					Pattern clustering
	USE:	Niobium			Regression analysis
					Search methods
					Statistical analysis
	USE:	Niobium-tin			
NBS					<i>Nearest neighbor searches</i>
	USE:	NIST			USE: Nearest neighbor
			methods		
					<i>Nearest neighbour methods</i>
				USE:	Nearest neighbor
NBTI	USE:	Negative bias			methods
		temperature instability			
NC machines					<b>Neck</b>
	USE:	Computer numerical		BT:	Body regions
		control			
					<b>Needles</b>
				BT:	Mechanical products
Nd				RT:	Biomedical equipment
	USE:	Neodymium			Textile machinery
Near field communication					<b>Negative bias temperature instability</b>
	UF:	NFC			UF: NBTI
	BT:	Communication			BT: MOS devices
standards		Radio communication			<b>Negative feedback</b>
	RT:	Magnetic communication			BT: Feedback
	NT:	Mobile communication			
Near field radiation pattern					<i>Negative feedback amplifier</i>
	USE:	Near-field radiation			USE: Feedback amplifiers
		pattern			
Near-field radiation pattern					<b>Negative feedback loops</b>
	UF:	Near field radiation			BT: Feedback loop
		pattern			
	BT:	Antenna radiation			
		patterns			
Nearest neighbor methods					<i>NEMS</i>
	UF:	K-NN methods			USE: Nanoelectromechanical
		Nearest neighbor			systems
searches					<b>Neodymium</b>
				UF:	Nd
				BT:	Metals
				NT:	Neodymium alloys
					Neodymium compounds



# 2019 IEEE Thesaurus

<b>Neodymium alloys</b>		stimulation	Neuromuscular
BT:	Neodymium		Neuropathology
RT:	Alloying	NT:	Autonomic nervous
<b>Neodymium compounds</b>		system	
BT:	Neodymium		Brain
<b>Neon</b>			Brain mapping
BT:	Chemical elements		Central nervous system
<b>Neonatology</b>			Cranial
BT:	Medical specialties		Ganglia
RT:	Pediatrics		Glial cells
<i>Neoplasia</i>			Nerve endings
USE:	Neoplasms		Nerve tissues
<b>Neoplasms</b>			Neural pathways
UF:	Neoplasia		Neuroanatomy
BT:	Biological tissues	system	Neurons
NT:	Breast neoplasms		Neuroradiology
	Liver neoplasms		Neuroscience
	Lung neoplasms		Peripheral nervous
	Skin neoplasms		
<i>Nephrolithiasis</i>			Pituitary gland
USE:	Kidney stones	<i>Net neutrality</i>	Spinal cord
<b>Neptunium</b>		USE:	Spine
BT:	Chemical elements		Synapses
<i>Nerve cells</i>		<b>Network address translation</b>	
USE:	Neurons	BT:	Computer network
<b>Nerve endings</b>		management	
BT:	Nervous system	<b>Network analyzers</b>	
<b>Nerve fibers</b>		BT:	Instruments
BT:	Neurons	<b>Network architecture</b>	
NT:	Axons	BT:	Network topology
	Myelin		Telecommunication
<b>Nerve tissues</b>		network management	
BT:	Nervous system	NT:	Network function
<b>Nervous system</b>		virtualization	
BT:	Anatomy		Network slicing
RT:	Bioelectric phenomena	<b>Network coding</b>	
	Computational	BT:	Information theory
neuroscience		RT:	Network security
	Neural networks	<i>Network control systems</i>	
	Neurological diseases	USE:	Networked control
	Neurology	systems	
		<b>Network function virtualization</b>	
		UF:	NFV
		BT:	Computer networks



# 2019 IEEE Thesaurus

RT: Network architecture  
virtualization Application  
Cloud computing  
Intrusion detection  
Servers  
Software defined  
networking

## Network interfaces

BT: Interface phenomena  
RT: Interface management

## Network location awareness

BT: Location awareness

## Network neutrality

UF: Internet neutrality  
Net neutrality  
BT: Telecommunication

## network management

## Network of workstations

USE: Cluster computing

## Network operating systems

BT: Operating systems  
RT: Software defined

## networking

NT: Autonomic systems

## Network resource management

UF: Dynamic service

## delivery

BT: Resource management  
Telecommunication

## network management

RT: Land mobile radio

## cellular systems

Mobile communication

## Network security

BT: Computer networks  
Security  
RT: Communication networks  
Network coding

## Network servers

BT: Computer networks

## Network slicing

BT: Network architecture  
RT: Augmented reality

## Network synthesis

BT: Computer network  
management

## Network theory (graphs)

BT: Computer science  
Mathematics  
Physics

## Network throughput

USE: Throughput

## Network topology

BT: Communications  
technology  
RT: Overlay networks  
Telecommunication

## network topology

NT: Complex networks  
Computer network

## reliability

Network architecture

## Network traffic

USE: Telecommunication  
traffic

## Network-on-a-chip

USE: Network-on-chip

## Network-on-chip

UF: Network-on-a-chip  
BT: System-on-chip

## Networked control systems

UF: Network control  
systems  
BT: Control systems  
RT: Real-time systems

## Neural activity

UF: Neural oscillation  
BT: Brain

## Neural chips

USE: Neural network  
hardware

## Neural engineering

UF: Neuro engineering  
Neuroengineering  
BT: Biomedical engineering  
RT: Brain-computer  
interfaces



# 2019 IEEE Thesaurus

sensors	Intracranial pressure	networks	Cellular neural
NT:	Neural microtechnology	networks	Feedforward neural
	Neural nanotechnology	network	Multi-layer neural
	Neural prosthesis	hardware	Neural network
<b>Neural implants</b>		networks	Radial basis function
UF:	Brain implants	networks	Recurrent neural
BT:	Brain		
	Implants		
<b>Neural microtechnology</b>			
BT:	Neural engineering		
<b>Neural nanotechnology</b>			
BT:	Neural engineering		
<i>Neural nets</i>			
USE:	Neural networks		
<b>Neural network hardware</b>			
UF:	Neural chips		
BT:	Neural networks		
RT:	Analog integrated		
circuits			
	Integrated circuits		
	Neurocontrollers		
<b>Neural networks</b>			
UF:	Neural nets		
	Wavelet neural		
networks			
BT:	Computational and		
artificial intelligence			
RT:	Adaptive systems		
	Artificial		
intelligence			
	Associative memory		
	Backpropagation		
	Bio-inspired computing		
	Cybernetics		
	Dynamic programming		
	Generative adversarial		
networks			
	Nervous system		
	Neurophysiology		
	Nonlinear dynamical		
systems			
	Pattern classification		
	Systems neuroscience		
NT:	Artificial neural		
networks			
	Biological neural		
networks			



# 2019 IEEE Thesaurus

BT:	Anatomy	Neurology	BT:	Medical specialties
	Nervous system		RT:	Nervous system
<b>Neurocontrollers</b>		<b>Neuromodulation</b>		
BT:	Intelligent control	BT:	Neurons	
RT:	Artificial		Physiology	
intelligence		RT:	Control systems	
	Microcontrollers	NT:	Neurostimulation	
	Neural network			
hardware		<b>Neuromorphic engineering</b>		
<b>Neurodynamics</b>		BT:	Neuromorphics	
BT:	Brain	RT:	Artificial neural	
RT:	Neurophysiology	networks		
			Synapses	
<i>Neuroengineering</i>		<b>Neuromorphics</b>		
USE:	Neural engineering	BT:	Very large scale	
<b>Neurofeedback</b>		integration		
UF:	Neuro-feedback	RT:	Analog circuits	
BT:	Feedback	NT:	Neuromorphic	
		engineering		
<i>Neuroglia</i>		<b>Neuromuscular</b>		
USE:	Glial cells	BT:	Muscles	
<b>Neuroimaging</b>		<b>Neuromuscular stimulation</b>		
UF:	Neuro imaging	UF:	Functional electrical	
	Neuro-imaging	stimulation		
BT:	Biomedical image	BT:	Medical treatment	
processing		RT:	Nervous system	
	Brain mapping			
RT:	Neuroradiology	<i>Neuronal networks</i>		
NT:	Functional	USE:	Biological neural	
neuroimaging		networks		
<b>Neuroinformatics</b>		<i>Neuronal process</i>		
BT:	Bioinformatics	USE:	Neurites	
	Informatics			
	Neuroscience	<i>Neurone</i>		
RT:	Analytical models	USE:	Neurons	
	Big Data			
	Computational modeling	<b>Neurons</b>		
	Data science	UF:	Nerve cells	
	Synapses		Neurone	
<b>Neurological diseases</b>		BT:	Nervous system	
UF:	Neurological disorders	RT:	Action potentials	
BT:	Diseases		Membrane potentials	
RT:	Nervous system		Synapses	
	Spinal cord injury	NT:	Dendrites (neurons)	
			Nerve fibers	
<i>Neurological disorders</i>			Neurites	
USE:	Neurological diseases		Neuromodulation	
			Photoreceptors	



# 2019 IEEE Thesaurus

	Soma		NT: Transcranial direct current stimulation
<b>Neuropathic pain</b>			Transcranial magnetic stimulation
BT:	Pain		
<b>Neuropathology</b>		<b>Neurosurgery</b>	
BT:	Pathology	BT:	Surgery
RT:	Nervous system		
<b>Neurophysiology</b>		<b>Neurotechnology</b>	
BT:	Brain	BT:	Brain Technology
RT:	Biomedical signal processing		
	Microelectrodes	<i>Neurotransmission</i>	
	Neural networks	USE:	Neurotransmitters
	Neurodynamics		
	Science - general	<b>Neurotransmitters</b>	
NT:	Biological neural networks	UF:	Neuro transmitters Neuro-transmitters Neurotransmission Synaptic transmission
	Neuroplasticity	BT:	Transmitters
<b>Neuroplasticity</b>		RT:	Synapses
UF:	Brain plasticity Cortical plasticity	<i>Neutrino</i>	
BT:	Neurophysiology	USE:	Neutrino sources
<b>Neuropsychology</b>		<b>Neutrino sources</b>	
BT:	Brain Psychology	UF:	Neutrino Neutrinos
<b>Neuroradiology</b>		BT:	Elementary particles
BT:	Nervous system Radiology	RT:	Radioactive materials
RT:	Electromagnetics Neuroimaging	<i>Neutrinos</i>	
<b>Neuroscience</b>		USE:	Neutrino sources
BT:	Nervous system Science - general	<i>Neutron beams</i>	
NT:	Clinical neuroscience Cognitive neuroscience Computational	USE:	Particle beams
neuroscience	Neuroinformatics Systems neuroscience Transcranial direct current stimulation	<b>Neutron capture therapy</b>	
stimulation	Transcranial magnetic stimulation	UF:	BNCT Boron neutron capture therapy
<b>Neurostimulation</b>		BT:	Medical treatment
BT:	Neuromodulation	RT:	Biological effects of radiation
RT:	Microelectrodes		Dosimetry
		<b>Neutron radiation effects</b>	
		BT:	Radiation effects
		<i>Neutron scattering</i>	
		USE:	Neutron spin echo
		<b>Neutron spin echo</b>	





# 2019 IEEE Thesaurus

UF:	Neutron scattering	networks	Next generation
BT:	Spectroscopy	networks	Next-generation
<b>Neutrons</b>		BT:	Computer networks
BT:	Elementary particles	RT:	3G mobile
RT:	Cosmic rays	communication	4G mobile
<i>New media age</i>		communication	5G mobile
USE:	Information age	communication	IP networks
<i>Newborns</i>			Internet
USE:	Pediatrics		Packet switching
<i>Newton Fourier method</i>			Pervasive computing
USE:	Newton method		Quality of service
<b>Newton method</b>			Telecommunications
UF:	Newton Fourier method	<i>Next generation networks</i>	
	Newton Raphson method	USE:	Next generation
	Newton's method	networking	
	Newton-Fourier method	<i>Next-generation networks</i>	
	Newton-Raphson method	USE:	Next generation
	Newtons method	networking	
BT:	Numerical analysis	<i>NFB</i>	
RT:	Optimization methods	USE:	Feedback amplifiers
	Poles and zeros	<i>NFC</i>	
<i>Newton Raphson method</i>		USE:	Near field
USE:	Newton method	communication	
<i>Newton's method</i>		<b>NFPA</b>	
USE:	Newton method	UF:	National Fire
<i>Newton-Fourier method</i>			Protection Agency
USE:	Newton method		National Fire
<i>Newton-Raphson method</i>			Protection Association
USE:	Newton method	BT:	Standards
<i>Newtons method</i>		organizations	
USE:	Newton method	<i>NFV</i>	
<i>Next generation network architecture</i>		USE:	Network function
USE:	Next generation	virtualization	
networking		<i>NGN</i>	
<b>Next generation networking</b>		USE:	Next generation
UF:	21CN	networking	
	21st century networks	<i>NGNA</i>	
	NGN	USE:	Next generation
	NGNA	networking	
	Next generation	<i>Ni</i>	
network architecture			



# 2019 IEEE Thesaurus

	USE:	Nickel		National Institute of Standards & Technology
<b>Nickel</b>	UF:	Ni		National Institute of Standards and Technology
	BT:	Metals	BT:	Standards organizations
	NT:	Nickel alloys		US Department of Commerce
		Nickel compounds		
<b>Nickel alloys</b>			<b>NIST Standards</b>	
	BT:	Nickel	BT:	Standards publications
	RT:	Alloying		
<b>Nickel cadmium batteries</b>			<b>Nitrogen</b>	
	BT:	Batteries	BT:	Chemical elements
<b>Nickel compounds</b>				Gases
	BT:	Nickel	NT:	Silicon nitride
<b>Night vision</b>			<i>NLP</i>	
	BT:	Infrared imaging	USE:	Natural language processing
	RT:	Image sensors		
		Military equipment	<i>nMOSFETs</i>	
<b>Niobium</b>			USE:	MOSFET
	UF:	Nb	<i>NMR</i>	
	BT:	Metals	USE:	Nuclear magnetic resonance
	RT:	Type II		
superconductors	NT:	Niobium alloys	<i>NMR imaging</i>	
		Niobium compounds	USE:	Magnetic resonance imaging
<b>Niobium alloys</b>			<b>Noise</b>	
	BT:	Niobium	BT:	Signal processing
	RT:	Alloying	RT:	Autoregressive processes
	NT:	Niobium-tin		Cyclic redundancy check
<b>Niobium compounds</b>				Distortion
	BT:	Niobium		Electromagnetic interference
<b>Niobium-tin</b>				Interference
	UF:	Nb3Sn		Noise generators
	BT:	Niobium alloys		Noise measurement
materials		Superconducting		Roundoff errors
		Tin alloys	NT:	1/f noise
<b>NISO Standards</b>				Additive noise
	BT:	Standards publications		Colored noise
<b>NIST</b>				Gaussian noise
	UF:	NBS		Laser noise
		National Bureau of Standards		Low-frequency noise
				Noise cancellation
				Phase noise
				Signal to noise ratio



# 2019 IEEE Thesaurus

noise	Superconducting device	Noise robustness	UF: Noise robust
	White noise		BT: Noise reduction
Noise abatement		Noise shaping	UF: Noise-shaping
USE: Noise reduction			BT: Noise measurement
Noise cancellation			NT: Multi-stage noise
UF: Noise cancellers		shaping	
BT: Acoustic noise		Noise suppression	
RT: Filtering		USE: Noise reduction	
Noise cancellers		Noise-shaping	
USE: Noise cancellation		USE: Noise shaping	
Noise figure		Noisy	
BT: Noise measurement		USE: Noise measurement	
RT: Signal to noise ratio			
Noise generators		NOMA	
BT: Signal generators		UF: non-orthogonal	
RT: Noise		multiple access	
Noise level		BT: Communication systems	
BT: Acoustic noise		RT: MIMO communication	
Noise measurement		OFDM	
UF: Noisy		Radio communication	
BT: Measurement		Non relational databases	
RT: Distortion measurement		USE: NoSQL databases	
Electric variables		Non-gyroscopes	
measurement	Noise	USE: Gyroscopes	
	Packet loss	non-orthogonal multiple access	
NT: Multiple signal		USE: NOMA	
classification	Noise figure	Non-parametric statistics	
	Noise shaping	USE: Nonparametric	
Noise reduction		statistics	
UF: Audio enhancement		Non-united-states activities	
De-noising		USE: IEEE Professional	
Denoising		activities	
Noise abatement		Non-volatile memory	
Noise suppression		USE: Nonvolatile memory	
BT: Acoustic noise		Non-volatile single electron memory	
NT: Active noise reduction		USE: Nonvolatile single	
Noise robustness		electron memory	
Wiener filters		Non-volatile single-electron memory	
Noise robust		USE: Nonvolatile single	
USE: Noise robustness		electron memory	



# 2019 IEEE Thesaurus

## Nonconductive adhesives

BT: Adhesives

## Nondestructive testing

BT: Materials testing  
RT: Acoustic emission  
Ultrasonic transducers  
NT: Magnetic flux leakage

## *Nondeterministic polynomial-time hard*

USE: NP-hard problem

## *Nongyroscopes*

USE: Gyroscopes

## Nonhomogeneous media

UF: Composite media  
Inhomogeneous media  
Layered media  
Multilayers  
Periodic media  
Stratified media  
BT: Media  
RT: Random media

## *Noninvasive diagnosis*

USE: Noninvasive treatment

## *Noninvasive measurement*

USE: Noninvasive treatment

## *Noninvasive surgery*

USE: Noninvasive treatment

## *Noninvasive technique*

USE: Noninvasive treatment

## Noninvasive treatment

UF: Noninvasive diagnosis  
Noninvasive  
measurement  
Noninvasive surgery  
Noninvasive technique  
BT: Medical treatment  
NT: Embolization  
Pulse oximetry

## Nonlinear acoustics

BT: Acoustics  
RT: Acoustic distortion  
Nonlinear wave

propagation

## Nonlinear circuits

BT: Circuits  
RT: Chaos  
Mixers  
Power conversion  
Rail to rail inputs  
Rail to rail outputs  
NT: Nonlinear network  
analysis

## Nonlinear control systems

BT: Control systems  
RT: Control nonlinearities  
Piecewise linear  
techniques

## Nonlinear distortion

BT: Distortion  
RT: Limiting  
Predistortion  
NT: Harmonic distortion  
Intermodulation  
distortion

## Nonlinear dynamical systems

UF: Nonlinear dynamics  
BT: Nonlinear systems  
RT: Chaos  
Econophysics  
Fuzzy sets  
Kalman filters  
Neural networks  
Pattern formation  
Possibility theory  
Predator prey systems  
Spatiotemporal  
phenomena  
Uncertainty

## *Nonlinear dynamics*

USE: Nonlinear dynamical  
systems

## Nonlinear equations

BT: Equations  
Mathematics  
RT: Algebra  
Linear approximation  
Nonlinear systems  
Numerical analysis  
NT: Bifurcation

## Nonlinear filters

BT: Filters



# 2019 IEEE Thesaurus

RT: Detectors Phase locked loops	NT: Nearest neighbor methods
<b>Nonlinear magnetics</b> BT: Magnetics RT: Ferroresonance	<i>Nonrelational databases</i> USE: NoSQL databases
<b>Nonlinear network analysis</b> BT: Circuit analysis Nonlinear circuits	<b>Nonuniform electric fields</b> BT: Electric fields
<b>Nonlinear optical devices</b> BT: Nonlinear optics RT: Optical detectors	<b>Nonuniform sampling</b> BT: Sampling methods
<b>Nonlinear optics</b> BT: Optics RT: Electrooptic effects Pattern formation Photonic crystals Thermal lensing NT: Fiber nonlinear optics Nonlinear optical devices Optical mixing Optical saturation Photorefractive effect Raman scattering Supercontinuum generation	<i>Nonuniform transmission lines</i> USE: Distributed parameter circuits  <i>Nonvolatile memories</i> USE: Nonvolatile memory
<b>Nonlinear systems</b> UF: Bilinear systems Multilinear systems BT: Mathematics RT: Control systems Linear approximation Manipulators Mobile robots Nonlinear equations Robots NT: Chaos Nonlinear dynamical systems	<b>Nonvolatile memory</b> UF: Non-volatile memory Nonvolatile memories BT: Memory NT: Nonvolatile single electron memory  <b>Nonvolatile single electron memory</b> UF: Non-volatile single electron memory Non-volatile single- electron memory Nonvolatile single- electron memory BT: Nonvolatile memory  <i>Nonvolatile single-electron memory</i> USE: Nonvolatile single electron memory  <i>Normal distribution</i> USE: Gaussian distribution
<b>Nonlinear wave propagation</b> BT: Propagation RT: Nonlinear acoustics	<b>North America</b> BT: Continents
<b>Nonparametric statistics</b> UF: Non-parametric statistics BT: Statistics	<b>North Pole</b> BT: Arctic  <b>Nose</b> BT: Head Sense organs NT: Olfactory
	<b>NoSQL databases</b>



# 2019 IEEE Thesaurus

databases	UF: Non relational	Fusion reactors
	Nonrelational	Gamma-rays
databases		Gas discharge devices
	BT: Database systems	High energy physics
	RT: Big Data	instrumentation computing
	Data structures	Ion beam applications
	Data warehouses	Nuclear electronics
	Distributed databases	Nuclear imaging
	Linked data	Nuclear medicine
	Query processing	Nuclear physics
<b>Notch filters</b>		Particle accelerators
	UF: Band-stop filters	Particle beam handling
	BT: Filters	Particle beam
<b>Notice of Violation</b>		Plasmas
	BT: IEEE publications	Radiation effects
	RT: Intellectual property	Radiation hardening
	Plagiarism	Radiation monitoring
<i>NP hard problem</i>		Radiation safety
	USE: NP-hard problem	Reactor
<i>NP-C</i>		instrumentation
	USE: NP-complete problem	Scintillation counters
		Thermionic emission
<b>NP-complete problem</b>		<i>Nuclear batteries</i>
	UF: NP-C	USE: Atomic batteries
	BT: Complexity theory	<i>Nuclear bombs</i>
		USE: Nuclear weapons
<b>NP-hard problem</b>		<b>Nuclear electronics</b>
	UF: NP hard problem	BT: Nuclear and plasma
	Nondeterministic	sciences
polynomial-time hard		RT: FET circuits
	BT: Complexity theory	High energy physics
	NT: Traveling salesman	instrumentation computing
problems		<i>Nuclear facility licensing</i>
<b>NTIA</b>		USE: Nuclear facility
	UF: National	regulation
Telecommunications and Information		<b>Nuclear facility regulation</b>
Administration		UF: Licensing (nuclear
	BT: US Department of	facilities)
Commerce		Nuclear facility
<b>Nuclear and plasma sciences</b>		licensing
	NT: Biomedical	BT: Power industry
applications of radiation		RT: Radioactive waste
	Colliding beam devices	<i>Nuclear fission</i>
	Electron emission	USE: Fission reactors
	Elementary particles	
	Fusion power	<b>Nuclear fuels</b>
generation		



# 2019 IEEE Thesaurus

BT: Energy resources  
Fuels  
Radioactive materials  
RT: Nuclear power  
generation  
Radioactive waste

## Nuclear imaging

UF: Gamma-ray imaging  
BT: Imaging  
sciences  
Nuclear and plasma  
RT: Nuclear medicine  
Radiography  
NT: Energy resolution  
Ion emission

## Nuclear magnetic resonance

UF: NMR  
BT: Magnetic resonance

*Nuclear magnetic resonance imaging*  
USE: Magnetic resonance  
imaging

## Nuclear measurements

BT: Measurement  
RT: Atomic measurements  
CAMAC  
Fastbus  
Position sensitive  
particle detectors  
Radiation detectors  
Spectroscopy  
NT: Particle tracking

## Nuclear medicine

BT: Engineering in  
medicine and biology  
Nuclear and plasma  
sciences  
RT: Energy resolution  
Gamma-rays  
Nuclear imaging  
Positron emission  
tomography

## Nuclear phase transformations

UF: Nuclear phase  
transformations  
nuclear  
Phase transformations,  
nuclear  
Phase transitions,

BT: Nuclear physics  
RT: Nuclear thermodynamics

## *Nuclear phase transitions*

USE: Nuclear phase  
transformations

## Nuclear physics

BT: Nuclear and plasma  
sciences  
RT: Hafnium  
NT: Alpha particles  
Beta rays  
Ignition  
Ion sources  
Isotopes  
Nuclear phase  
transformations  
Nuclear thermodynamics  
Relativistic effects

## *Nuclear Power Generating Stations*

USE: Nuclear power  
generation

## Nuclear power generation

UF: Atomic energy  
Nuclear Power  
Generating Stations  
BT: Power generation  
RT: Nuclear fuels  
NT: Atomic batteries  
Fission reactors  
Fusion power  
generation

## *Nuclear reactors (fission)*

USE: Fission reactors

## *Nuclear reactors (fusion)*

USE: Fusion reactors

## Nuclear thermodynamics

BT: Nuclear physics  
RT: Elementary particles  
Entropy  
Nuclear phase  
transformations  
Phase change materials

## *Nuclear wastes*

USE: Radioactive pollution

## Nuclear weapons



# 2019 IEEE Thesaurus

UF:	Nuclear bombs	Transmission line
BT:	Weapons	matrix methods
<b>Null space</b>		<b>Numerical models</b>
BT:	Kernel	BT: Modeling
		RT: Numerical analysis
<b>Null value</b>		<b>Numerical simulation</b>
UF:	Nullvalue	BT: Numerical analysis
BT:	Data structures	RT: Modeling
RT:	Programming	Plasma simulation
<i>Nullvalue</i>		Simulation
USE:	Null value	
<b>Numerical analysis</b>		<b>Numerical stability</b>
BT:	Mathematics	BT: Numerical analysis
RT:	Convolution	RT: Algorithms
	Deconvolution	
	Difference equations	<i>Nursing</i>
	Differential equations	USE: Medical services
	Error analysis	
	Integral equations	<i>Nuts (fasteners)</i>
	Inverse problems	USE: Fasteners
	Matlab	
	Nonlinear equations	<i>NVQ</i>
	Numerical models	USE: Vocational training
	Transforms	
NT:	Adaptive mesh	<i>Nylon fiber</i>
refinement		USE: Synthetic fibers
	Approximation methods	<i>O-rings</i>
	Convergence of	USE: Structural rings
numerical methods		
	Finite difference	<i>OATS</i>
methods		USE: Open area test sites
	Finite element	
analysis		<b>Obesity</b>
	Finite volume methods	BT: Medical conditions
	Gradient methods	
	Independent component	<b>Obituaries</b>
analysis		BT: IEEE indexing
	Iterative methods	
approximation	Least squares	<b>Object detection</b>
	Method of moments	UF: Image object detection
	Mode matching methods	Target detection
	Multigrid methods	BT: Image analysis
	Newton method	RT: Image matching
	Numerical simulation	Internet of Things
	Numerical stability	Magnetic anomaly
	Relaxation methods	detection
	Sparse matrices	Magnetic anomaly
	Splines (mathematics)	detectors
	Surface fitting	Robot vision systems
	Symmetric matrices	NT: Buried object
		detection





# 2019 IEEE Thesaurus

arrival	Time difference of	processing	Video signal
<b>Object oriented databases</b>		<i>Object-oriented programming</i>	
BT: Database systems		USE: Object oriented	
RT: Databases		programming	
RT: Object oriented			
methods		<b>Observability</b>	
		BT: Control theory	
<b>Object oriented methods</b>		<b>Observatories</b>	
BT: Programming		BT: Astronomy	
RT: Object oriented		RT: Telescopes	
databases			
Object oriented		<b>Observers</b>	
programming		BT: State estimation	
<b>Object oriented modeling</b>		RT: Machine vision	
BT: Modeling		NT: Disturbance observers	
		Earth Observing System	
<b>Object oriented programming</b>			
UF: Object-oriented		<i>Obstacle avoidance</i>	
programming		USE: Collision avoidance	
BT: Programming			
RT: C languages		<b>Occipital Lobe</b>	
RT: C# languages		BT: Brain	
RT: Object oriented			
methods		<b>Occupational health</b>	
	Python	UF: Health (occupational)	
	Software libraries	BT: Health and safety	
	Software reusability	RT: Accidents	
NT: Dispatching		Biological effects of	
<b>Object recognition</b>		radiation	
UF: Image object		Domestic safety	
recognition		Electric shock	
BT: Machine vision		Employee welfare	
RT: Image matching		Environmental factors	
RT: Image recognition		Ergonomics	
RT: Object tracking		Eye protection	
RT: Robot vision systems		Occupational medicine	
NT: Target recognition		Occupational safety	
		Pollution	
<b>Object segmentation</b>		Protective clothing	
BT: Machine vision		Radioactive materials	
NT: Subspace constraints		Risk analysis	
		Safety	
<b>Object tracking</b>		Toxicology	
BT: Tracking		Working environment	
RT: Cinematography		noise	
Image motion analysis		NT: Occupational stress	
Image segmentation			
Motion estimation		<b>Occupational medicine</b>	
Object recognition		BT: Medical services	
Trajectory		RT: Medical diagnosis	
		Medical treatment	



# 2019 IEEE Thesaurus

Occupational health	BT: Oceanic engineering and marine technology
<i>Occupational pensions</i>	Oceans
USE: Pensions	RT: Global warming
	Land surface
<b>Occupational safety</b>	temperature
UF: OSHA	<i>Ocean vegetation</i>
BT: Health and safety	USE: Marine vegetation
RT: Accidents	
Domestic safety	<b>Ocean waves</b>
Electric shock	BT: Hydrology
Employee welfare	RT: Ocean circulation
Eye protection	NT: Sea state
Industrial accidents	Wave power
Occupational health	
Protection	<b>Oceanic engineering and marine technology</b>
Protective clothing	NT: Marine navigation
Radioactive materials	Marine technology
Risk analysis	Ocean temperature
Working environment	Oceanographic
noise	techniques
<b>Occupational stress</b>	Water pollution
BT: Occupational health	
RT: Employee welfare	<b>Oceanographic techniques</b>
Hazards	BT: Oceanic engineering and marine technology
<i>OCDM</i>	RT: Acoustic imaging
USE: Code division	Hydrologic
multiplexing	measurements
<i>Ocean animals</i>	Radar applications
USE: Marine animals	Remote sensing
<b>Ocean circulation</b>	
BT: Oceanography	<b>Oceanography</b>
RT: Ocean waves	UF: Marine science
Sea level	Oceanology
Tides	BT: Geoscience
	RT: Oceans
	NT: Ocean circulation
<i>Ocean composition</i>	
USE: Oceans	<i>Oceanology</i>
<b>Ocean salinity</b>	USE: Oceanography
BT: Oceans	
RT: Salinity (geophysical)	<b>Oceans</b>
NT: SMOS mission	UF: Ocean composition
<i>Ocean technology</i>	Planetary oceans
USE: Marine technology	BT: Geoscience
	RT: Geophysics
<b>Ocean temperature</b>	Marine technology
UF: Sea surface	Oceanography
temperature	Sea ice
	Sea measurements
	Water



# 2019 IEEE Thesaurus

NT:	Ocean salinity		
	Ocean temperature		
	Sea coast		
	Sea floor		
	Sea level		
	Sea surface		
	Tides		
OCR			
USE:	Optical character		
	recognition software		
<b>Octrees</b>			
BT:	Data structures		
<b>OFDM</b>			
UF:	Orthogonal frequency		
	division multiple access		
	Orthogonal frequency		
	division multiplexing		
BT:	Multiplexing		
RT:	3G mobile		
	communication		
	Acoustic communication		
	(telecommunication)		
	Communication channels		
	Digital signal		
	processing		
	MIMO communication		
	Modulation		
	Multiaccess		
	communication		
	Multicarrier code		
	division multiple access		
	NOMA		
NT:	Multiple access		
	interference		
	OFDM modulation		
	Partial transmit		
	sequences		
	Peak to average power		
	ratio		
<b>OFDM modulation</b>			
BT:	OFDM		
<b>OFETs</b>			
UF:	Organic FETS		
	Organic field effect		
	transistors		
	Organic field-effect		
	transistors		
BT:	Field effect		
	transistors		
		<b>Office automation</b>	
		BT:	Automation
		RT:	Bring your own device
			Communication systems
			Data communication
			Desktop publishing
			Document handling
			Electronic mail
			Information systems
			Local area networks
			Microcomputers
			Teleconferencing
			Text processing
			Unsolicited electronic
		mail	
			Voice mail
		NT:	Workflow management
		software	
		<i>Offshore distribution systems</i>	
		USE:	Offshore installations
		<b>Offshore installations</b>	
		UF:	Gas platforms
			Offshore distribution
		systems	
			Offshore power plants
			Oil platforms
		BT:	Structural engineering
		RT:	Oil drilling
			Petroleum industry
			Power industry
		<i>Offshore power plants</i>	
		USE:	Offshore installations
		<i>OGC</i>	
		USE:	Open Geospatial
		Consortium	
		<b>Ohmic contacts</b>	
		BT:	Contacts
		RT:	Linear circuits
		<i>Ohmmeters</i>	
		USE:	Electrical resistance
		measurement	
		<b>Oil drilling</b>	
		UF:	Drilling oil
		BT:	Petroleum industry
		RT:	Drilling



# 2019 IEEE Thesaurus

industries	Fuel processing	industries	Fractionation
	Offshore installations		Fuel processing
	Technology		Insulation
	Well logging		Marine pollution
<b>Oil filled cables</b>			Mechanical factors
BT:	Oil insulation	transmission	Mechanical power
RT:	Cable insulation		Oil insulation
<i>Oil filters</i>			Oil pollution
USE:	Lubricating oils		Petroleum
<i>Oil industry</i>			Petroleum industry
USE:	Petroleum industry	NT:	Pipelines
<b>Oil insulation</b>			Water pollution
UF:	Transformer oil		Lubricating oils
BT:	Insulation		Vegetable oils
RT:	Oils		
NT:	Oil filled cables	<i>OLED</i>	
<i>Oil platforms</i>		USE:	Organic light emitting
USE:	Offshore installations	diodes	
<b>Oil pollution</b>		<b>Olfactory</b>	
BT:	Pollution	BT:	Nose
RT:	Accidents	<b>Olfactory bulb</b>	
	Land pollution	BT:	Forebrain
	Marine pollution		Sense organs
	Oils	<b>Oligopoly</b>	
	Petroleum	BT:	Economics
	Petroleum industry	RT:	Game theory
<b>Oil refineries</b>			Microeconomics
BT:	Petroleum industry	<b>Omnidirectional antennas</b>	
<i>Oil sands</i>		BT:	Antennas
USE:	Hydrocarbons	<b>On board unit</b>	
<i>Oil shale</i>		BT:	Communication
USE:	Hydrocarbons	equipment	
<i>Oil tanks</i>		RT:	Dedicated short range
USE:	Fuel storage	communication	Vehicle-to-everything
<i>Oiling (lubrication)</i>		<i>On demand software</i>	
USE:	Lubricating oils	USE:	Software as a service
<b>Oils</b>		<b>On load tap changers</b>	
BT:	Materials	UF:	Load tap changers
RT:	Engines		On-load tap changers
	Fats		Onload tap changers
	Fluids	BT:	Power transformers
		RT:	Voltage control
		<b>On the job training</b>	



# 2019 IEEE Thesaurus

UF:	On-the-job training		On-line services
BT:	Training		Reverse teaching
RT:	Industrial training	BT:	Information retrieval
		RT:	Cloud gaming
<i>On-chip</i>			Google
USE:	System-on-chip		Internet
		NT:	Online banking
<i>On-demand software</i>		<i>Online voting</i>	
USE:	Software AND Software as a service	USE:	Electronic voting
<i>On-line services</i>		<i>Onload tap changers</i>	
USE:	Online services	USE:	On load tap changers
<i>On-load tap changers</i>		<b>Ontologies</b>	
USE:	On load tap changers	UF:	Ontology
<i>On-the-job training</i>		BT:	Knowledge
USE:	On the job training	representation	
<b>Oncological surgery</b>		RT:	Linked data
UF:	Otologic surgery		Ranking (statistics)
	Surgery oncology		Semantic Web
BT:	Surgery		Semantic search
RT:	Cancer		Thesauri
	Oncology	NT:	Description logic
<b>Oncology</b>		<i>Ontology</i>	
BT:	Medical specialties	USE:	Ontologies
RT:	Cancer	<i>ONU</i>	
	Chemotherapy	USE:	Optical network units
	Oncological surgery	<i>OOO</i>	
	Tumors	USE:	Out of order
<b>Online banking</b>		<i>Op amp</i>	
UF:	Digital currency	USE:	Operational amplifiers
	E-banking	<b>Open Access</b>	
	E-currency	BT:	Open systems
	Electronic banking		Publishing
	Electronic currency	NT:	Public domain software
	Internet banking	<b>Open area test sites</b>	
	Virtual currency	UF:	OATS
BT:	Banking	BT:	Test facilities
	Online services	RT:	Electromagnetic
RT:	Bitcoin	compatibility and interference	
	Cryptocurrency		Electromagnetic
	Electronic commerce	interference	
NT:	Distributed ledger		Immunity testing
<i>Online indexing</i>			Military equipment
USE:	Indexing	<b>Open Educational Resources</b>	
<b>Online services</b>		BT:	Education courses
UF:	Inverted classroom		



# 2019 IEEE Thesaurus

Open systems	USE: Open source hardware
<b>Open Geospatial Consortium</b>	<i>Operating cost reduction</i>
UF: OGC	USE: Costing
BT: Standards organizations	<b>Operating systems</b>
<i>Open Loop control</i>	UF: Computer operating systems
USE: Open loop systems	Executive programs
<b>Open loop systems</b>	Robot operating systems
UF: Open loop control	Supervisory programs
BT: Control systems	BT: System software
RT: Feedforward systems	RT: Computer security
Operational amplifiers	Cyber-physical systems
<b>Open source hardware</b>	Program processors
UF: Opensource hardware	Software defined
BT: Hardware	networking
<b>Open source software</b>	NT: System recovery
UF: Open-source	Android (operating system)
BT: Software	Bootling
RT: Public domain software	Embedded systems
<b>Open systems</b>	Input-output programs
UF: OSI	Kernel
BT: Computers and information processing	Microsoft Windows
System analysis and design	Network operating systems
RT: Common Information Model (electricity)	System kernels
Computer networks	<b>Operational amplifiers</b>
Internetworking	UF: Op amp
Interoperability	BT: Active circuits
Local area networks	Amplifiers
Metropolitan area networks	RT: FET circuits
Standards	Linearization techniques
Wide area networks	MOSFET circuits
NT: Open Access	Open loop systems
Open Educational	NT: Feedback amplifiers
Resources	<b>Operations research</b>
Physical layer	BT: Business
<b>Open wireless architecture</b>	RT: Linear programming
UF: OWA	Management
BT: Wireless communication	Optimization methods
<i>Open-source</i>	Principal component analysis
USE: Open source software	Resource management
<i>Opensource hardware</i>	Statistics
	TOPSIS
	NT: Inventory control
	Virtual enterprises



# 2019 IEEE Thesaurus

## Opportunistic software systems development

BT: Programming

## *Optic flow*

USE: Optical flow

## Optical add-drop multiplexers

UF: ROADMS

BT: Add-drop multiplexers

## *Optical amplification*

USE: Stimulated emission

## Optical amplifiers

BT: Optics

RT: Erbium

NT: Doped fiber amplifiers  
Erbium-doped fiber

## amplifiers

Semiconductor optical

## amplifiers

## Optical arrays

BT: Optical devices

RT: Micromirrors

Phased arrays

## Optical attenuators

UF: Variable optical

## attenuators

BT: Attenuators

Optical devices

RT: Optical communication

## equipment

Optical losses

## Optical beam splitting

BT: Optical beams

## Optical beams

BT: Beams

RT: Bragg gratings

Laser beams

Laser theory

NT: Optical beam splitting

## Optical bistability

UF: Bistability (optical)

BT: Electrooptic effects

RT: Electrooptic devices

Optical switches

## Optical buffering

BT: Optical fiber communication

## Optical burst switching

BT: Burst switching

## Optical character recognition software

UF: OCR

BT: Software

## Optical cloaking

UF: Metamaterial cloaking

BT: Metamaterials

Optical materials

## *Optical code division multiplexing*

USE: Code division

## multiplexing

## Optical coherence tomography

BT: Tomography

RT: Eyes

## Optical collimators

BT: Optical devices

## *Optical communication*

USE: Optical fiber

## communication

## Optical communication equipment

BT: Communication

## equipment

RT: Biomedical optical

## imaging

Optical attenuators

Optical switches

NT: Optical transmitters

## *Optical components*

USE: Optical devices

## Optical computing

BT: Computers and

## information processing

## Optical control

BT: Control systems

RT: Optical switches

NT: Lighting control

Optical variables

## control

## Optical coupling



# 2019 IEEE Thesaurus

coupling	BT: Electromagnetic	fabrication	Optical device
	RT: Optical fiber couplers		Optical filters
<b>Optical crosstalk</b>			Optical resonators
	BT: Optics		Optical sensors
	RT: Optical fiber		Thermooptical devices
communication		<b>Optical diffraction</b>	
		BT: Electromagnetic	
<b>Optical design</b>		diffraction	
	BT: Optics	RT: Photonic band gap	
	RT: Laser theory	NT: Diffraction gratings	
	NT: Optical design		
techniques		<b>Optical distortion</b>	
		BT: Optics	
<b>Optical design techniques</b>		RT: Lasers	
	BT: Optical design		Optical noise
	RT: Design methodology		Thermal lensing
	NT: High-speed optical		
techniques		<i>Optical distortion measurement</i>	
		USE: Distortion measurement	
<b>Optical detectors</b>		<b>Optical engineering</b>	
	BT: Optical sensors	BT: Engineering - general	
	RT: Nonlinear optical	Optics	
devices		RT: Optical materials	
	NT: Bar codes		
<b>Optical device fabrication</b>		<b>Optical feedback</b>	
	BT: Fabrication	BT: Image processing	
	Optical devices	RT: Distributed feedback	
	RT: Electronic equipment	devices	
manufacture		<b>Optical fiber amplifiers</b>	
		UF: Optical fibre	
<b>Optical devices</b>		amplifiers	
	UF: Optical components	BT: Optical fibers	
	BT: Optics	RT: Amplifiers	
	RT: Biomedical optical		
imaging		<b>Optical fiber applications</b>	
	Endomicroscopy	UF: Optical fibre	
	Gratings	applications	
	Optical materials	BT: Optics	
	NT: Bragg gratings	RT: Channel spacing	
	Collimators	Code division	
	Displays	multiplexing	
	Holographic optical		Optical fiber cables
components			Optical fiber
	Lenses	communication	
	Light deflectors		Optical fibers
	Lighting	NT: Optical fiber devices	
	Luminescent devices		
	Mirrors	<b>Optical fiber cables</b>	
	Optical arrays	UF: Communication cables	
	Optical attenuators	(optical)	
	Optical collimators		





# 2019 IEEE Thesaurus

BT: Optical fibre cables  
 applications Cables  
 RT: Optical fiber  
 Splicing

## Optical fiber communication

UF: Infrared communication  
 Optical communication  
 Optical fibre  
 communication  
 Optical links  
 BT: Communication systems  
 RT: Avalanche photodiodes  
 Broadband  
 communication  
 Indoor communication  
 Optical crosstalk  
 Optical fiber  
 applications

Optical transmitters  
 Quantum communication  
 Silicon photonics  
 Synchronous digital

hierarchy  
 NT: FDDI  
 Free-space optical

communication  
 Optical buffering  
 Optical fiber networks  
 Optical fiber

subscriber loops  
 Optical

interconnections  
 Optical packet

switching  
 Optical wavelength

conversion  
 SONET  
 Scheduling algorithms  
 Visible light

communication

## Optical fiber couplers

UF: Optical fibre couplers  
 BT: Optical fibers  
 RT: Optical coupling

## Optical fiber devices

UF: Optical fibre devices  
 BT: Optical fiber  
 applications  
 RT: Optical fibers  
 NT: Optical fiber sensors

## Optical fiber dispersion

UF: Optical fibre  
 dispersion  
 BT: Dispersion

## Optical fiber filters

BT: Optical filters

## Optical fiber LAN

UF: Optical fiber local  
 area network

Optical fibre LAN  
 Optical fibre local

area network  
 BT: Optical fiber networks

## Optical fiber local area network

USE: Optical fiber LAN

## Optical fiber loss

USE: Optical fiber losses

## Optical fiber losses

UF: Optical fiber loss  
 Optical fibre losses  
 BT: Optical fibers

## Optical fiber networks

UF: Elastic optical  
 networks

Optical fibre networks  
 Optical networks  
 Optical-fiber networks  
 Optical-fibre networks  
 BT: Optical fiber

communication  
 RT: Light fidelity  
 NT: All-optical networks  
 LAN emulation  
 Optical fiber LAN  
 Optical network units  
 Passive optical

networks

Protection switching  
 Wavelength assignment

## Optical fiber polarization

UF: Optical fibre  
 polarisation  
 Polarization-  
 maintaining optical fibers  
 BT: Optical fibers  
 RT: Optical fiber sensors



# 2019 IEEE Thesaurus

NT: dispersion	Optical interferometry Polarization mode	NT: amplifiers	Optical fiber Optical fiber couplers Optical fiber losses Optical fiber
<b>Optical fiber sensors</b>		polarization	Optical fiber theory Plastic optical fiber Wavelength conversion
UF: Fiber optic sensors Fibre optic sensors Optical fibre sensors		<i>Optical fibre amplifiers</i>	
BT: Optical fiber devices Optical sensors		USE: Optical fiber amplifiers	
RT: Optical fiber		<i>Optical fibre applications</i>	
polarization	Partial discharge	USE: Optical fiber applications	
measurement		<i>Optical fibre cables</i>	
<b>Optical fiber subscriber loops</b>		USE: Optical fiber cables	
UF: FTTH Fiber-in-the-loop Optical fibre		<i>Optical fibre communication</i>	
subscriber loops		USE: Optical fiber communication	
BT: Optical fiber		<i>Optical fibre couplers</i>	
communication		USE: Optical fiber couplers	
<b>Optical fiber testing</b>		<i>Optical fibre devices</i>	
UF: Optical fibre testing		USE: Optical fiber devices	
BT: Testing		<i>Optical fibre dispersion</i>	
RT: Optical fibers		USE: Optical fiber dispersion	
<b>Optical fiber theory</b>		<i>Optical fibre LAN</i>	
UF: Optical fibre theory		USE: Optical fiber LAN	
BT: Optical fibers		<i>Optical fibre local area network</i>	
RT: Electromagnetic field		USE: Optical fiber LAN	
theory		<i>Optical fibre losses</i>	
<b>Optical fibers</b>		USE: Optical fiber losses	
UF: Optical fibres		<i>Optical fibre networks</i>	
BT: Fiber optics Optical waveguides		USE: Optical fiber networks	
RT: Electromagnetic		<i>Optical fibre polarisation</i>	
waveguides		USE: Optical fiber polarization	
applications	Optical fiber	<i>Optical fibre sensors</i>	
	Optical fiber devices	USE: Optical fiber sensors	
	Optical fiber testing		
	Optical materials		
	Optical propagation		
	Optical waveguide		
theory	Optical wavelength		
conversion	Supercontinuum		
generation	Temperature sensors		



# 2019 IEEE Thesaurus

*Optical fibre subscriber loops*

USE: Optical fiber  
subscriber loops

*Optical fibre testing*

USE: Optical fiber testing

*Optical fibre theory*

USE: Optical fiber theory

*Optical fibres*

USE: Optical fibers

**Optical films**

BT: Films  
RT: Integrated optics  
Optical materials

**Optical filters**

BT: Optical devices  
RT: Photography  
NT: Optical fiber filters

**Optical flow**

UF: Optic flow  
BT: Optical imaging  
Relativistic effects

*Optical frequency combs*

USE: Optical harmonic  
generation

**Optical frequency conversion**

BT: Frequency conversion

*Optical gratings*

USE: Gratings

**Optical harmonic generation**

UF: Optical frequency  
combs  
BT: Optics

*Optical heterodyning*

USE: Optical mixing

**Optical imaging**

BT: Imaging  
RT: Infrared imaging  
Microscopy  
Remote sensing  
NT: Optical flow  
Optical projectors  
Talbot effect

Thermoreflectance

imaging

**Optical interconnections**

UF: Optical interconnects  
BT: Optical fiber  
communication

*Optical interconnects*

USE: Optical  
interconnections

**Optical interferometry**

UF: Light interferometry  
BT: Interferometry  
RT: Optical fiber  
polarization

Speckle

Talbot effect

*Optical lattices*

USE: Lattices

*Optical links*

USE: Optical fiber  
communication

**Optical losses**

BT: Optics  
RT: Loss measurement  
Optical attenuators  
Optical scattering

**Optical materials**

BT: Materials  
RT: Glass  
Indium tin oxide  
Lenses  
Magnesium oxide  
Metamaterials  
Mirrors  
Optical devices  
Optical engineering  
Optical fibers  
Optical films  
Optics  
Organic inorganic  
hybrid materials  
Phase change materials  
Photonic crystals  
SIMO communication  
NT: Colloidal nanocrystals  
Optical cloaking  
Optical polymers



# 2019 IEEE Thesaurus

Optical retarders  
Optical superlattices  
Photorefractive  
materials

*Optical measurements*  
USE: Optical variables  
measurement

**Optical metamaterials**  
UF: Photonic metamaterials  
BT: Metamaterials  
RT: Electromagnetic  
metamaterials

**Optical metrology**  
BT: Metrology

**Optical microscopy**  
BT: Optics

**Optical mixing**  
UF: Optical heterodyning  
BT: Nonlinear optics  
Optics  
RT: Photorefractive  
materials  
NT: Multiwave mixing

**Optical modulation**  
BT: Modulation  
RT: Indoor communication  
Microwave photonics  
Optical transmitters  
NT: Electrooptic  
modulators  
Intensity modulation

*Optical multilayers*  
USE: Optical superlattices

**Optical network units**  
UF: ONU  
BT: Optical fiber networks

*Optical networks*  
USE: Optical fiber networks

**Optical noise**  
BT: Integrated circuit  
noise  
RT: Optical distortion  
NT: Speckle

**Optical packet switching**  
BT: Optical fiber  
communication

**Optical planar waveguides**  
BT: Optical waveguides

*Optical polarisation*  
USE: Optical polarization

**Optical polarization**  
UF: Light polarisation  
Light polarization  
Optical polarisation  
BT: Optics  
RT: Photoelasticity  
NT: Polarization shift  
keying  
Stokes parameters

**Optical polymers**  
BT: Optical materials  
Polymers

**Optical projectors**  
UF: projectors (optical)  
BT: Optical imaging  
Video equipment  
RT: Image processing  
Micromirrors  
Motion pictures

**Optical propagation**  
UF: Infrared propagation  
BT: Electromagnetic  
propagation  
RT: Optical fibers  
Theroptic effects  
NT: Optical surface waves  
Optical waveguides

**Optical pulse compression**  
BT: Pulse compression  
methods

**Optical pulse generation**  
BT: Pulse generation  
RT: Optical pulse shaping

**Optical pulse shaping**  
BT: Pulse shaping methods  
RT: Optical pulse  
generation



# 2019 IEEE Thesaurus

## Optical pulses

BT: Optics

## Optical pumping

BT: Laser excitation

## Optical radar

USE: Laser radar

## Optical receivers

BT: Receivers

## Optical recording

BT: Recording  
RT: Laser applications  
NT: CD recording

## Optical reflection

BT: Electromagnetic reflection  
RT: Mirrors  
Optical scattering  
Reflectivity  
Reflectometry  
Thermooptic effects

## Optical refraction

BT: Physical optics  
RT: Photorefractive effect  
Photorefractive materials  
Refractive index  
Thermooptic effects

## Optical regenerators

USE: Repeaters

## Optical resonators

BT: Optical devices  
RT: Digital filters  
Laser cavity  
resonators  
Resonance  
NT: Microcavities  
Optical ring  
resonators

## Optical retarders

UF: Half-wave plates  
Quarter-wave plates  
BT: Optical materials  
Optics  
RT: Polarimetry

## Optical ring resonators

UF: Ring resonators  
BT: Optical resonators

## Optical saturation

BT: Nonlinear optics  
Optics

## Optical scan voting systems

BT: Electronic voting systems

## Optical scattering

BT: Electromagnetic scattering  
RT: Laser radar  
Light scattering  
Optical losses  
Optical reflection  
Speckle

## Optical sensors

BT: Optical devices  
Sensors  
RT: Image sensors  
NT: Optical detectors  
Optical fiber sensors

## Optical signal detection

BT: Signal detection  
RT: Photodetectors

## Optical signal processing

BT: Signal processing  
NT: Laser noise

## Optical solitons

BT: Optics  
Solitons  
RT: Optical vortices

## Optical superlattices

UF: Optical multilayers  
BT: Optical materials  
Superlattices

## Optical surface waves

BT: Optical propagation

## Optical switch

USE: Optical switches

## Optical switches

UF: Optical switch



# 2019 IEEE Thesaurus

BT: Switches  
 RT: Optical bistability  
 Optical communication equipment  
 Optical control  
 Photothyristors  
 Smart pixels  
 Thermo-optical devices

## Optical transmitters

BT: Optical communication equipment  
 Transmitters  
 RT: Bragg gratings  
 Diodes  
 Optical fiber communication  
 Optical modulation  
 Photodiodes  
 Semiconductor lasers  
 Semiconductor optical amplifiers

## Optical tuning

BT: Optics  
 Tuning  
 RT: Laser tuning

## Optical variables control

BT: Optical control  
 RT: Frequency control  
 Phase control

## Optical variables measurement

UF: Optical measurements  
 BT: Measurement  
 RT: Frequency measurement  
 Phase measurement  
 Reflectometry  
 Wavelength measurement  
 NT: Ellipsometry  
 Photometry  
 Reflection coefficient  
 Refractive index

## Optical vortex

USE: Optical vortices

## Optical vortices

UF: Optical vortex  
 Vortices, optical  
 BT: Physical optics  
 RT: Laser beams  
 Optical solitons

## Optical waveguide components

BT: Optical waveguides

## Optical waveguide theory

BT: Optical waveguides  
 RT: Optical fibers

## Optical waveguides

BT: Optical propagation  
 Waveguide components  
 RT: Electro-optic modulators  
 Integrated optics  
 Photonic crystals  
 NT: Arrayed waveguide gratings  
 Electro-optical waveguides  
 Optical fibers  
 Optical planar waveguides  
 Optical waveguide components  
 Optical waveguide theory

## Optical wavelength conversion

BT: Optical fiber communication  
 Signal processing  
 RT: Multicast communication  
 Optical fibers  
 Telecommunications

## Optical-fiber networks

USE: Optical fiber networks

## Optical-fibre networks

USE: Optical fiber networks

## Optics

BT: Lasers and electro-optics  
 RT: Erbium  
 Fourier transforms  
 Laser theory  
 Magneto-optic effects  
 Optical materials  
 NT: Adaptive optics  
 Birefringence  
 Brightness  
 Color



# 2019 IEEE Thesaurus

coefficients	Electron optics	<i>Optimisation</i>	
	Extinction	USE:	Optimization
	Fiber optics	<i>Optimisation methods</i>	
	Fluorescence	USE:	Optimization methods
	Four-wave mixing	<i>Optimised production technology</i>	
	Geometrical optics	USE:	Optimized production
	Integrated optics	technology	
	Light fields	<i>Optimising compilers</i>	
	Light sources	USE:	Optimizing compilers
	Luminescence	<b>Optimization</b>	
applications	Microoptics	UF:	Optimisation
	Nonlinear optics	Performance	
	Optical amplifiers	optimisation	
	Optical crosstalk	Performance	
	Optical design	optimization	
	Optical devices	BT:	Mathematics
	Optical distortion	RT:	Artificial bee colony
	Optical engineering	algorithm	
	Optical fiber	Doping profiles	
	Optical harmonic	Least squares	
generation	Optical losses	approximation	
	Optical microscopy	Minimization	
	Optical mixing	Parametric study	
	Optical polarization	Performance analysis	
	Optical pulses	TOPSIS	
	Optical retarders	NT:	Cost function
	Optical saturation	Optimal scheduling	
	Optical solitons	Optimization methods	
	Optical tuning	Trajectory	
	Particle beam optics	optimization	
modes	Photoluminescence	<b>Optimization methods</b>	
	Physical optics	UF:	Optimisation methods
	Ray tracing	BT:	Optimization
	Stray light	RT:	Infinite horizon
	Ultrafast optics	Linear programming	
	Whispering gallery	MIMO communication	
		Newton method	
		Operations research	
		Processor scheduling	
		Response surface	
<b>Optimal control</b>	BT:	Control systems	
	RT:	Game theory	
	H infinity control		
	NT:	Bang-bang control	
	Infinite horizon	methodology	
		Search methods	
<b>Optimal matching</b>		Single machine	
		scheduling	
	BT:	Graph theory	
<b>Optimal scheduling</b>		NT:	Circuit optimization
	BT:	Optimization	Design optimization
			Fireworks algorithm
			Gradient methods
			H infinity control



# 2019 IEEE Thesaurus

programming Mathematical  
 technology Optimized production  
 Pareto optimization  
 Quadratic programming  
 Simulated annealing

## Optimized production technology

UF: Optimised production  
 technology  
 BT: Optimization methods  
 Production control  
 RT: Production planning  
 Production systems

## Optimizing compilers

UF: Optimising compilers  
 BT: Program processors

## Opto-electronic devices

USE: Optoelectronic devices

## Optoacoustic effects

USE: Photoacoustic effects

## Optoelectronic and photonic sensors

BT: Sensors

## Optoelectronic devices

UF: Opto-electronic  
 devices  
 BT: Lasers and  
 electrooptics  
 RT: Electrooptic devices  
 Phototransistors  
 NT: Charge-coupled image  
 sensors  
 Integrated  
 optoelectronics  
 Light emitting diodes  
 Photoconducting  
 devices  
 Photodetectors  
 Superluminescent  
 diodes

## Optothermal effects

USE: Photothermal effects

## Optothyristors

USE: Photothyristors

## Oral communication

UF: Speech communication  
 BT: Professional  
 communication  
 NT: Public speaking  
 Speech

## Orange technology

USE: Social implications of  
 technology

## Orbital calculations

BT: Energy states

## Orbital debris

USE: Space debris

## Orbital robotics

BT: Robots

## Orbits

BT: Astrophysics  
 RT: Geostationary  
 satellites  
 NT: Orbits (stellar)  
 Planetary orbits

## Orbits (stellar)

BT: Orbits  
 RT: Stellar motion

## Ordinance

USE: Weapons

## Ordinary magnetoresistance

BT: Magnetoresistance

## Ores

BT: Minerals

## Organic chemicals

BT: Chemistry  
 NT: Hydrocarbons

## Organic compounds

BT: Compounds  
 RT: Carbon  
 NT: Carbon compounds  
 Organic semiconductors  
 Volatile organic  
 compounds

## Organic electronics

UF: Paper electronics  
 BT: Electronic equipment





# 2019 IEEE Thesaurus

RT: Synapses	
<i>Organic FETS</i>	<i>Organic thin-film transistors</i>
USE: OFETs	USE: Organic thin film transistors
<i>Organic field effect transistors</i>	<i>Organic-inorganic hybrid materials</i>
USE: OFETs	USE: Organic inorganic hybrid materials
<i>Organic field-effect transistors</i>	<i>Organically modified silicates</i>
USE: OFETs	USE: Organic inorganic hybrid materials
<b>Organic inorganic hybrid materials</b>	<i>Organisational aspects</i>
UF: Inorganic organic hybrid materials	USE: Organizational aspects
Inorganic-organic hybrid materials	<i>Organisational culture</i>
Organic-inorganic hybrid materials	USE: Organizational aspects
Organically modified silicates	<i>Organisational structure</i>
Ormosils	USE: Organizational aspects
BT: Materials	<b>Organisms</b>
RT: Inorganic compounds	BT: Biological systems
Optical materials	NT: Algae
	Animals
<b>Organic light emitting diodes</b>	Archaea
UF: OLED	Fish
Organic light-emitting diodes	Fungi
Polymer led	Mesomycetozoea
BT: Light emitting diodes	Microorganisms
RT: Electroluminescence	Plants (biology)
Molecular electronics	Viruses (medical)
NT: Active matrix organic light emitting diodes	
<i>Organic light-emitting diodes</i>	<b>Organizational aspects</b>
USE: Organic light emitting diodes	UF: Business organisation
	Business organization
<b>Organic materials</b>	Organisational aspects
BT: Materials	Organisational culture
	Organisational structure
<b>Organic semiconductors</b>	Organizational culture
BT: Organic compounds	Organizational
Semiconductor	
materials	structure
NT: Pentacene	BT: Management
	RT: Business process re-engineering
<b>Organic thin film transistors</b>	Industrial communication
UF: OTFT	NT: Business communication
Organic thin-film transistors	Corporate acquisitions
BT: Thin film transistors	Facilities management
	Role transfer
	Scheduling



# 2019 IEEE Thesaurus

Stakeholders			
Team working			
<i>Organizational communication</i>		<b>Orthopedic surgery</b>	
USE: Industrial communication		BT: Surgery	
<i>Organizational culture</i>		<b>Orthotics</b>	
USE: Organizational aspects		BT: Medical treatment	
<i>Organizational structure</i>		RT: Assistive technology	
USE: Organizational aspects		Biomedical engineering	
<b>Organizations</b>		Biomedical equipment	
BT: Business		Medical control	
NT: BNSC			
Companies		systems	
Government			
Sociotechnical systems		Prosthetics	
United Kingdom Space		Sensory aids	
Agency		Wearable robots	
<i>Organobromine compounds</i>		<i>Oscillations</i>	
USE: Bromine compounds		USE: Oscillators	
<i>Organs (biological)</i>		<b>Oscillators</b>	
USE: Biological systems		UF: Oscillations	
<i>Orientation control</i>		BT: Circuits and systems	
USE: Position control		RT: Circuits	
<i>Orientation determination</i>		Damping	
USE: Position measurement		Klystrons	
<i>Orientation measurement</i>		Lasers	
USE: Position measurement		Resonant frequency	
<b>Orifices</b>		Vibrations	
BT: Mechanical products		Digital-controlled	
<i>Ormosils</i>		oscillators	
USE: Organic inorganic hybrid materials		Injection-locked	
<i>Orthogonal frequency division multiple access</i>		Local oscillators	
USE: OFDM		Microwave oscillators	
<i>Orthogonal frequency division multiplexing</i>		Phase noise	
USE: OFDM		Ring oscillators	
<b>Orthopedic procedures</b>		Voltage-controlled	
BT: Medical treatment		oscillators	
		<b>Oscilloscopes</b>	
		UF: Cathode-ray	
		oscilloscopes	
		BT: Instruments	
		RT: Electric variables	
		measurement	
		Test equipment	
		<i>OSHA</i>	
		USE: Occupational safety	
		<i>OSI</i>	
		USE: Open systems	
		<b>Osmium</b>	
		BT: Chemical elements	



# 2019 IEEE Thesaurus

<b>Osmosis</b>	BT: Chemical processes NT: Electro-osmosis	RT: Network topology Transport protocols
<b>Osteoarthritis</b>	BT: Bone diseases	<i>OWA</i> USE: Open wireless architecture
<b>Osteoporosis</b>	BT: Bone diseases RT: Cancellous bone	<b>OWL</b> UF: Web ontology language BT: Markup languages Semantic Web RT: Knowledge representation
<i>OTFT</i> USE: Organic thin film transistors		<b>Oxidation</b> BT: Chemical processes RT: Materials NT: Combustion
<i>Otologic surgery</i> USE: Oncological surgery		<b>Oxygen</b> BT: Chemical elements Gases RT: Pulse oximetry
<b>Out of order</b> UF: 000 BT: Instruction sets		<b>Ozonation</b> UF: Ozone treatment BT: Wastewater treatment RT: Environmental factors Pollution control
<i>Outlier detection</i> USE: Anomaly detection		<i>Ozone generators</i> USE: Discharges (electric)
<b>Output feedback</b> BT: Feedback circuits		<i>Ozone treatment</i> USE: Ozonation
<i>Output power</i> USE: Power generation		<i>Ozonizers</i> USE: Discharges (electric)
<b>Outsourcing</b> BT: Management RT: Crowdsourcing		<i>P-I-N</i> USE: PIN photodiodes
<b>Ovens</b> BT: Home appliances NT: Microwave ovens		<b>P-i-n diodes</b> BT: Semiconductor devices Semiconductor diodes RT: CMOSFET logic devices Electrooptic modulators Vertical cavity surface emitting lasers
<i>Overflow oscillations</i> USE: Finite wordlength effects		<b>P-n junctions</b> BT: Junctions RT: Light emitting diodes
<i>Overhead distribution lines</i> USE: Power distribution lines		
<i>Overhead transmission lines</i> USE: Power transmission lines		
<b>Overlay networks</b> BT: Computer networks		



# 2019 IEEE Thesaurus

	Photodiodes	USE:	Packet radio networks
	Semiconductor diodes		
<i>P1394</i>			<b>Packet radio networks</b>
USE:	IEEE 1394 Standard	UF:	Packet radio
		BT:	Radio communication
<i>P2MP</i>			<b>Packet switching</b>
USE:	Point-to-multipoint communications	BT:	Communication
		RT:	ARPANET
<i>P2P</i>			Data transfer
USE:	Peer-to-peer computing		IEEE 802.3 Standard
			Next generation
<i>P802.11</i>		networking	
USE:	IEEE 802.11 Standard	NT:	Burst switching
			Frame relay
<i>PAAS</i>			Multiprotocol label
USE:	Platform as a service	switching	
			Packet loss
<b>Pacemakers</b>			
BT:	Biomedical equipment	<i>Pacs</i>	
RT:	Cardiology	USE:	Picture archiving and communication systems
<b>Packaging</b>			
BT:	Industry applications	<i>Paediatrics</i>	
RT:	Filling	USE:	Pediatrics
	Leak detection		
	Packaging machines	<b>Page description languages</b>	
	Seals	UF:	Postscript
NT:	Bagging	BT:	Markup languages
	Bottling	RT:	Desktop publishing
	Canning		High level languages
	Encapsulation		
	Food packaging	<b>Paging systems</b>	
	Labeling	BT:	Land mobile radio
	Multichip modules	cellular systems	
	Plastic packaging	RT:	Wireless communication
	Wrapping		
<b>Packaging machines</b>		<b>Pain</b>	
BT:	Production equipment	BT:	Injuries
RT:	Bagging	NT:	Ischemic pain
	Bottling		Neuropathic pain
	Labeling		
	Packaging	<b>Painting</b>	
	Wrapping	BT:	Surface finishing
			Surface treatment
<b>Packet loss</b>		RT:	Coatings
BT:	Loss measurement		Paints
	Packet switching		
RT:	Data communication	<b>Paints</b>	
	Noise measurement	BT:	Chemical products
			Coatings
<i>Packet radio</i>			Materials
		RT:	Ink



# 2019 IEEE Thesaurus

Lacquers					
Painting					
<i>Pair-wise error probability</i>				<i>Paper electronics</i>	
USE: Pairwise error probability				USE: Organic electronics	
<i>Pairwise correlations</i>				<i>Paper industry</i>	
USE: Pairwise error probability				USE: Pulp and paper industry	
<b>Pairwise error probability</b>				<b>Paper making</b>	
UF: Pair-wise error probability				BT: Pulp and paper industry	
BT: Pairwise correlations Probability				RT: Bleaching Paper making machines Paper products Paper pulp Paper technology Pulp manufacturing Spinning machines	
<b>Palladium</b>				<b>Paper making machines</b>	
BT: Metals				BT: Production equipment Pulp and paper industry	
<i>Palletising</i>				RT: Paper making Paper products Paper pulp Paper technology Pulp manufacturing Spinning machines	
USE: Pallets				<b>Paper mills</b>	
<i>Palletizing</i>				BT: Production facilities Pulp and paper industry	
USE: Pallets				RT: Industrial plants Paper products Paper pulp Pulp manufacturing Spinning machines	
<b>Pallets</b>				<b>Paper products</b>	
UF: Palletising Palletizing				BT: Manufactured products	
BT: Materials handling				RT: Paper making Paper making machines Paper mills Paper pulp Paper technology Pulp and paper industry	
RT: Containers Load management				<b>Paper pulp</b>	
<i>Palm print recognition</i>				BT: Manufactured products Materials	
USE: Palmprint recognition				RT: Paper making	
<i>Palmprint identification</i>					
USE: Palmprint recognition					
<b>Palmprint recognition</b>					
UF: Palm print recognition identification					
BT: Biometrics (access control)					
RT: Identification of persons					
<i>Palmtop computers</i>					
USE: Personal digital assistants					
<b>Pancreas</b>					
BT: Digestive system					



# 2019 IEEE Thesaurus

industry	Paper making machines	Concurrency control
	Paper mills	Digital computers
industry	Paper products	Parallel architectures
	Pulp and paper	Parallel languages
industry	Pulp manufacturing	Parallel machines
		Parallel programming
<b>Paper technology</b>		NT: Multiprocessing
	BT: Industry applications	
	RT: Paper making	Multithreading
	Paper making machines	Parallel algorithms
industry	Paper products	Pipeline processing
	Pulp and paper	
<i>PAPR</i>		<i>Parallel processor interconnection</i>
	USE: Peak to average power	USE: Multiprocessor
ratio		interconnection
<i>Paraelectric materials</i>		<b>Parallel programming</b>
	USE: Dielectric materials	BT: Programming
<b>Parallel algorithms</b>		RT: Multiprocessing
	BT: Algorithms	systems
	Parallel processing	Parallel languages
<b>Parallel architectures</b>		Parallel processing
	BT: Computer architecture	
	RT: Parallel machines	<b>Parallel robots</b>
	Parallel processing	BT: Robots
	NT: Multicore processing	
<i>Parallel computing</i>		<i>Parallelism</i>
	USE: Parallel processing	USE: Parallel processing
<b>Parallel languages</b>		<b>Paramagnetic materials</b>
	BT: High level languages	BT: Magnetic materials
systems	RT: Multiprocessing	RT: Paramagnetic resonance
	Parallel processing	
	Parallel programming	<b>Paramagnetic resonance</b>
<b>Parallel machines</b>		BT: Magnetic resonance
	BT: Computers	RT: Paramagnetic materials
	RT: Parallel architectures	
	Parallel processing	<b>Parameter estimation</b>
<b>Parallel processing</b>		UF: Parameter
	UF: Array processing	identification
	Parallel computing	BT: Signal analysis
	Parallelism	Statistical analysis
information processing	BT: Computers and	RT: Control systems
	RT: Cluster computing	Power system analysis
		computing
		NT: Spectral analysis
		Amplitude estimation
		Direction-of-arrival
		estimation
		Frequency estimation
		Motion estimation
		Phase estimation
		Time of arrival
		estimation



# 2019 IEEE Thesaurus

<b>Parameter extraction</b>		programming	multiobjective
BT: Electromagnetic		BT: Optimization methods	
measurements		RT: Pareto analysis	
RT: Bipolar transistor		RT: Genetic algorithms	
circuits			
Very large scale		<b>Parietal lobe</b>	
integration		BT: Brain	
<i>Parameter identification</i>		<i>Parity check</i>	
USE: Parameter estimation		USE: Codes	
<i>Parameter uncertainty</i>		<b>Parity check codes</b>	
USE: Uncertain systems		UF: LDPC	
<i>Parametric model</i>		Ldpc codes	
USE: Parametric statistics		Low density parity	
<b>Parametric statistics</b>		check codes	
UF: Parametric model		Parity-check codes	
BT: Statistics		BT: Codes	
<b>Parametric study</b>		RT: Decoding	
BT: Multitasking		NT: Iterative decoding	
RT: Optimization		<i>Parity-check codes</i>	
<b>Parasitic capacitance</b>		USE: Parity check codes	
BT: Capacitance		<b>Parkinson's disease</b>	
<b>Parasitic diseases</b>		BT: Diseases	
BT: Diseases		<i>Parotid</i>	
<b>Parasympathetic nervous system</b>		USE: Salivary glands	
BT: Autonomic nervous		<b>Partial differential equations</b>	
system		BT: Differential equations	
<b>Pareto analysis</b>		RT: Boundary value	
BT: Statistical analysis		problems	
RT: Cause effect analysis		Fourier transforms	
Quality management		NT: Boundary element	
NT: Pareto optimization		methods	
<i>Pareto optimisation</i>		Poisson equations	
USE: Pareto optimization		<b>Partial discharge measurement</b>	
<b>Pareto optimization</b>		BT: Electric variables	
UF: Multi-objective		measurement	
programming		RT: Electrical safety	
Multiattribute		Insulation life	
optimization		Insulation testing	
Multiobjective		Optical fiber sensors	
programming		<b>Partial discharges</b>	
Pareto optimisation		BT: Dielectric breakdown	
Vector optimization		RT: Corona	
		<b>Partial response channels</b>	
		BT: Communication channels	



# 2019 IEEE Thesaurus

<b>Partial response signaling</b>		Stimulated emission
BT:	Digital modulation	
<b>Partial transmit sequences</b>		<b>Particle beams</b>
BT:	OFDM	UF:
<i>Particle accelerator</i>		Accelerator beams
USE:	Linear particle	Neutron beams
accelerator		Proton beams
		BT:
		Beams
		Elementary particles
		RT:
		Colliding beam
		accelerators
		Laser theory
<b>Particle accelerators</b>		Particle accelerators
BT:	Nuclear and plasma	Particle beam handling
sciences		Particle beam
RT:	Colliding beam devices	
	Large Hadron Collider	injection
	Particle beams	measurements
	Voltage multipliers	
NT:	Accelerator magnets	Particle beam optics
	Colliding beam	Storage rings
accelerators		Synchrotrons
	Cyclotrons	NT:
	Electron accelerators	Atomic beams
	Ion accelerators	Electron beams
	Linear accelerators	Ion beams
	Photon collider	
	Plasma accelerators	<b>Particle charging</b>
	Proton accelerators	BT:
	Storage rings	Electrostatic
	Synchrocyclotrons	processes
	Synchrotrons	RT:
		Semiconductor
		detectors
		<b>Particle collisions</b>
<b>Particle beam handling</b>		BT:
BT:	Nuclear and plasma	Elementary particles
sciences		<i>Particle detectors</i>
RT:	Particle beams	USE:
		Radiation detectors
<b>Particle beam injection</b>		
UF:	Injected beams	<b>Particle filters</b>
BT:	Nuclear and plasma	BT:
sciences		Filters
RT:	Particle beams	
<b>Particle beam measurements</b>		<b>Particle measurements</b>
BT:	Measurement	UF:
RT:	Particle beams	Particulate
		measurements
		BT:
		Measurement
		RT:
		Current density
		High energy physics
		instrumentation computing
		Position sensitive
		particle detectors
<b>Particle beam optics</b>		<i>Particle physics</i>
UF:	Ion optics	USE:
BT:	Optics	High energy physics
RT:	Electrodynamics	
	Particle beams	<b>Particle production</b>
NT:	Atom optics	
	Electron optics	





# 2019 IEEE Thesaurus

processes	BT: Electrostatic	RT: Baseband
	RT: Aerosols Spraying	<b>Passivation</b>
		BT: Surface treatment
		RT: Corrosion
<b>Particle scattering</b>		<b>Passive circuits</b>
	BT: Scattering	BT: Circuits
	RT: Scanning electron	
microscopy		<b>Passive filters</b>
		BT: Passive networks
<b>Particle separators</b>		RT: Filters
	UF: Separators	
	BT: Separation processes	<b>Passive microwave remote sensing</b>
	RT: Magnetic separation	BT: Remote sensing
<i>Particle swarm</i>		<b>Passive networks</b>
USE: Particle swarm		BT: Telecommunication
optimization		network topology
		NT: Passive filters
<b>Particle swarm optimization</b>		<b>Passive optical networks</b>
	UF: Particle swarm	UF: PON
	Particle-swarm	Passive-optical-
optimization	Swarm intelligence	network
	Swarm optimization	BT: Optical fiber networks
	BT: Evolutionary	RT: EPON
computation		
	RT: Artificial bee colony	<b>Passive radar</b>
algorithm	Fireworks algorithm	BT: Radar
	Stochastic processes	RT: Radar detection
		Radar imaging
<b>Particle tracking</b>		<b>Passive RFID tags</b>
	BT: Nuclear measurements	BT: RFID tags
	RT: High energy physics	
instrumentation computing	Tracking	<i>Passive-optical-network</i>
		USE: Passive optical
<i>Particle-swarm optimization</i>		networks
USE: Particle swarm		<b>Password</b>
optimization		BT: Access control
		Computer security
<i>Particles (elementary)</i>		RT: Authentication
USE: Elementary particles		
<i>Particulate measurements</i>		<b>Patch antennas</b>
USE: Particle measurements		BT: Antennas
		RT: Microstrip antennas
<b>Partitioning algorithms</b>		<b>Patent law</b>
	BT: Algorithms	BT: Law
<b>Passband</b>		<b>Patents</b>
	BT: Digital communication	BT: Legal factors
	Radio communication	



# 2019 IEEE Thesaurus

RT: Intellectual property US Government agencies	RT: Surface reconstruction
<b>Path planning</b>	<b>Pattern classification</b>
UF: piano mover's problem	UF: Signal classification
BT: Motion control	BT: Decision making
RT: Course correction	RT: Feature extraction
Indoor navigation	Nearest neighbor
Vehicle routing	methods
NT: Trajectory	Neural networks
Trajectory tracking	Pattern recognition
	Support vector
<b>Pathogens</b>	machines
UF: Germs	<b>Pattern clustering</b>
BT: Diseases	BT: Clustering methods
<i>Pathological</i>	RT: Image reconstruction
USE: Pathology	Nearest neighbor
<b>Pathological processes</b>	methods
BT: Pathology	Pattern matching
NT: Cadaver	Signal analysis
Death	Signal detection
	Signal processing
<b>Pathology</b>	<b>Pattern formation</b>
UF: Pathological	BT: Process design
BT: Medical specialties	RT: Chaos
RT: Autopsy	Nonlinear dynamical
NT: Neuropathology	systems
Pathological processes	Nonlinear optics
	Spatiotemporal
<i>Patient diagnosis</i>	phenomena
USE: Medical diagnosis	<b>Pattern matching</b>
<i>Patient identification</i>	BT: Pattern recognition
USE: Medical treatment	RT: Pattern clustering
<b>Patient monitoring</b>	Spatiotemporal
BT: Monitoring	phenomena
RT: Chemotherapy	NT: Image matching
Electronic medical	
records	<b>Pattern recognition</b>
Point of care	UF: Image pattern
<b>Patient rehabilitation</b>	recognition
BT: Medical treatment	BT: Computers and
RT: Rehabilitation	information processing
robotics	RT: Automatic optical
<i>Patient treatment</i>	inspection
USE: Medical treatment	Computer vision
	Feature extraction
<b>Pattern analysis</b>	Feedforward neural
BT: Machine intelligence	networks
	Hidden Markov models
	Learning systems
	Machine vision
	Pattern classification



# 2019 IEEE Thesaurus

analysis	Principal component	derivative control	Proportional
systems	Publish subscribe	derivative control	Proportional plus
	Robot vision systems	derivative control	Proportional-
	Shape	derivative control	Proportional-integral-
phenomena	Spatiotemporal	derivative	Control systems
	Statistical learning	BT:	
	Symbols		
NT:	Active shape model	<i>PDA</i>	
	Activity recognition	USE:	Personal digital
	Character recognition	assistants	
	Clustering methods		
	Data mining	<i>PDAs</i>	
	Face recognition	USE:	Personal digital
	Fingerprint	assistants	
recognition			
	Gesture recognition	<i>PDF</i>	
recognition	Handwriting	USE:	Portable document
		format	
methods	Nearest neighbor		
	Pattern matching	<b>Peace technology</b>	
	Speech recognition	BT:	Social implications of
	Text recognition	technology	
<b>Payloads</b>		<i>Peak signal to noise ratio</i>	
BT:	Military aircraft	USE:	PSNR
	Space technology		
NT:	MODIS	<i>Peak signal-to-noise ratio</i>	
		USE:	PSNR
<i>Pb</i>			
USE:	Lead	<b>Peak to average power ratio</b>	
		UF:	PAPR
<i>PCA</i>			Peak-to-average power
USE:	Principal component	ratio	
analysis		BT:	Peak-to-average ratio
			OFDM
<i>PCG</i>			
USE:	Phonocardiography	<i>Peak-to-average power ratio</i>	
		USE:	Peak to average power
<i>PCM</i>		ratio	
USE:	Phase change materials	<i>Peak-to-average ratio</i>	
		USE:	Peak to average power
<i>PCRAM</i>		ratio	
USE:	Phase change random		
access memory		<b>Pediatrics</b>	
		UF:	Babies
<b>PD control</b>			Baby
UF:	PID control		Child
	Proportional +		Children
derivative control			Infant
			Infants



# 2019 IEEE Thesaurus

	Newborns		<i>Pen test</i>	
	Paediatrics		USE:	Penetration testing
	Toddler			
BT:	Medical specialties		<b>Penetration testing</b>	
RT:	Neonatology		UF:	Pen test
			BT:	Computer security
<i>Peer to peer communications</i>			<b>Pensions</b>	
USE:	Peer-to-peer computing		UF:	Occupational pensions
<i>Peer to peer computing</i>				Personal pensions
USE:	Peer-to-peer computing			Stakeholder pensions
<i>Peer to peer exchange</i>			BT:	State pensions
USE:	Peer-to-peer computing		BT:	Remuneration
<i>Peer to peer network</i>			RT:	Employee welfare
USE:	Peer-to-peer computing			Termination of
<i>Peer-to-peer communications</i>			employment	
USE:	Peer-to-peer computing		<b>Pentacene</b>	
<b>Peer-to-peer computing</b>			BT:	Organic semiconductors
UF:	File sharing			
	P2P		<b>Peptides</b>	
	Peer to peer		BT:	Biochemistry
communications			<b>Perfectly matched layers</b>	
	Peer to peer computing		BT:	Propagation
	Peer to peer exchange		RT:	Finite difference
	Peer to peer network		methods	
	Peer-to-peer			Finite element
communications			analysis	
	Peer-to-peer exchange			Maxwell equations
	Peer-to-peer network		<b>Performance analysis</b>	
BT:	Computer networks		UF:	Dynamic program
	Distributed computing		analysis	
RT:	Cluster computing			Performance index
	Distributed ledger		BT:	Programming
	Workstations		RT:	Optimization
			NT:	Performance gain
<i>Peer-to-peer exchange</i>			<b>Performance evaluation</b>	
USE:	Peer-to-peer computing		BT:	Measurement
<i>Peer-to-peer network</i>			RT:	Benchmark testing
USE:	Peer-to-peer computing		NT:	Key performance
<b>Peltier effect</b>			indicator	
BT:	Thermoelectricity		<b>Performance gain</b>	
<b>Pelvic bones</b>			BT:	Performance analysis
BT:	Bones		<i>Performance index</i>	
<b>Pelvis</b>			USE:	Performance analysis
BT:	Body regions		<b>Performance loss</b>	
			BT:	Computer performance



# 2019 IEEE Thesaurus

## *Performance measurement*

USE: Measurement

## *Performance metrics*

USE: Measurement

## *Performance optimisation*

USE: Optimization

## *Performance optimization*

USE: Optimization

## *Performance related pay*

USE: Incentive schemes

## **Perineum**

BT: Body regions

## *Periodic media*

USE: Nonhomogeneous media

## **Periodic structures**

BT: Materials science and technology

NT: Gratings  
Photonic crystals

## *Peripheral equipment*

USE: Computer peripherals

## **Peripheral nervous system**

BT: Nervous system

## **Permanent magnet generators**

BT: Permanent magnet machines

## **Permanent magnet machines**

UF: Permanent magnet synchronous machines

BT: Electric machines  
Rotating machines

RT: Permanent magnet

motors

Permanent magnets

NT: Permanent magnet

generators

## **Permanent magnet motors**

UF: Permanent magnet synchronous motors

Permanent-magnet

generators

motors

BT: Motors

RT: Permanent magnet

machines

## *Permanent magnet synchronous machines*

USE: Permanent magnet

machines

## *Permanent magnet synchronous motors*

USE: Permanent magnet

motors

## **Permanent magnets**

BT: Magnets

RT: Magnetic gears  
Permanent magnet

machines

Remanence

## *Permanent-magnet generators*

USE: Permanent magnet

motors

## *Permanent-magnet motors*

USE: Permanent magnet

motors

## **Permeability**

UF: Magnetic permeability

BT: Electromagnetic

analysis

RT: Magnetic materials  
Permeability

measurement

## **Permeability measurement**

BT: Magnetic variables

measurement

RT: Permeability

## **Permission**

UF: Access rights

File system

permissions

BT: Computer security

## **Permittivity**

BT: Electric variables

RT: Dielectric constant

Dielectric materials

Permittivity

measurement



# 2019 IEEE Thesaurus

ZigBee

## Permittivity measurement

BT: Dielectric measurement  
RT: Permittivity

## Perpendicular magnetic anisotropy

BT: Magnetic anisotropy

## Perpendicular magnetic recording

UF: Vertical recording  
BT: Magnetic recording  
RT: Disk drives

## Perpendicular recording

USE: Magnetic recording

## Persistent currents

BT: Current  
RT: High-temperature

superconductors

Superconducting

magnets

## Persistent identifiers

BT: Data structures  
RT: Digital systems  
Information retrieval

## Personal area networks

UF: Piconets  
Scatternets  
BT: Radio communication  
RT: Computer networks  
Data communication  
Land mobile radio  
Personal communication

networks

Wireless LAN

ZigBee

NT: Bluetooth  
Body area networks  
Body sensor networks  
Wireless personal area

networks

## Personal communication networks

BT: Communication systems  
RT: Digital systems  
IEEE 802.15 Standard  
Land mobile radio

cellular systems

Location awareness  
Mobile handsets  
Personal area networks

## Personal computers

USE: Microcomputers

## Personal digital assistants

UF: PDA  
PDAs  
Palmtop computers  
BT: Handheld computers

## Personal pensions

USE: Pensions

## Personnel

BT: Human resource  
management  
RT: Appraisal  
Bring your own device  
Education  
Employment  
Equal opportunities  
Management  
Productivity  
Training  
NT: Labor resources

## Personnel monitoring

USE: Radiation monitoring

## Persuasive systems

BT: Decision making  
Social computing  
RT: Behavioral sciences  
Human factors  
Man-machine systems  
Psychology

## Perturbation methods

UF: Perturbation  
techniques  
BT: Approximation methods  
NT: Cavity perturbation  
methods

## Perturbation techniques

USE: Perturbation methods

## Pervasive computing

UF: Everywhere  
Ubicomp  
BT: Computers and  
information processing



# 2019 IEEE Thesaurus

cybernetics	Systems, man, and	Oil pollution
RT: intelligence	Artificial	Oils
	Context awareness	Petrochemicals
	Next generation	Petroleum industry
networking		NT: Hydrocarbons
NT: Ubiquitous computing		
Wearable computers		
<b>Pest control</b>		<b>Petroleum industry</b>
UF: Insect control		UF: Oil industry
Vermin control		BT: Industries
BT: Environmental		RT: Chemical industry
management		Fractionation
RT: Agriculture		Fuel processing
Hazards		
<i>PET</i>		industries
USE: Positron emission		Gas industry
tomography		Natural gas industry
		Offshore installations
		Oil pollution
		Oils
		Petrochemicals
		Petroleum
		Pipelines
		NT: Oil drilling
		Oil refineries
		Well logging
<b>Petascale computing</b>		
BT: Computers and		
information processing		
RT: Supercomputers		
		<i>PFD</i>
		USE: Phase frequency
<b>Petri nets</b>		detector
BT: System analysis and		
design		<i>PGA</i>
RT: Discrete-event systems		USE: Electronics packaging
Modeling		
		<b>pH measurement</b>
<b>Petrochemicals</b>		BT: Chemical analysis
BT: Chemical products		Measurement
Materials		
RT: Chemical industry		
Chemistry		<b>Phantoms</b>
Fuels		BT: Biomedical imaging
Petroleum		RT: Dosimetry
Petroleum industry		Positron emission
Plastic products		tomography
Plastics		Single photon emission
		computed tomography
<i>Petrol</i>		X-ray applications
USE: Petroleum		X-ray detection
		X-ray imaging
<b>Petroleum</b>		
UF: Gasoline		<b>Pharmaceutical technology</b>
Petrol		BT: Chemical technology
BT: Chemical products		RT: Biochemistry
Fuels		Chemistry
RT: Fuel processing		Pharmaceuticals
industries		
		<b>Pharmaceuticals</b>



# 2019 IEEE Thesaurus

BT: Chemical products  
Medical treatment  
RT: Biochemistry  
Chemistry  
Pharmaceutical

technology

NT: Drugs

## Pharynx

BT: Digestive system  
RT: Stomatognathic system

## Phase change materials

UF: PCM  
BT: Materials  
RT: Memory  
Nuclear thermodynamics  
Optical materials  
Phase change memory  
Solar heating

## Phase change memory

BT: Memory  
RT: Phase change materials  
Resistive RAM  
NT: Phase change random

access memory

## Phase change RAM

USE: Phase change random

access memory

## Phase change random access memory

UF: PCRAM  
Phase change RAM  
Phase-change RAM  
Phase-change random

access memory

BT: Phase change memory  
Random access memory

## Phase control

UF: Phase-control  
BT: Power electronics  
RT: Electric variables

control

Optical variables

control

Phase transformers

## Phase detection

BT: Signal detection  
NT: Phase frequency

detector

## Phase distortion

BT: Distortion  
RT: Delay effects

## Phase estimation

BT: Parameter estimation

## Phase frequency detector

UF: PFD  
BT: Phase detection  
RT: Frequency measurement  
Measurement  
Voltage  
Voltage control

## Phase locked loops

UF: PLL  
Phase locked-loops  
Phase-locked loops  
Phase-locked-loops  
BT: Linear feedback

control systems

Signal processing  
RT: Frequency locked loops  
Modulation  
Nonlinear filters

## Phase Locked-Loops

USE: Phase locked loops

## Phase measurement

BT: Measurement  
RT: Acoustic measurements  
Electric variables

measurement

Optical variables

measurement

## Phase modulation

BT: Modulation  
RT: Demodulation  
Electrooptic

modulators

NT: Continuous phase

modulation

Differential phase

shift keying

Phase shift keying

## Phase noise

BT: Noise  
Oscillators  
RT: Time-domain analysis





# 2019 IEEE Thesaurus

## Phase shift keying

UF: PSK  
Phase-shift keying  
Phase-shift-keying  
QPSK  
BT: Phase modulation  
NT: Binary phase shift  
keying  
Quadrature phase shift  
keying

## Phase shifters

BT: Circuits  
RT: Butler matrices  
NT: Phase transformers

## Phase shifting interferometry

BT: Interferometry

## Phase transformations, nuclear

USE: Nuclear phase transformations

## Phase transformers

BT: Phase shifters  
Transformers  
RT: Circuits  
Phase control

## Phase transitions, nuclear

USE: Nuclear phase transformations

## Phase-change RAM

USE: Phase change random access memory

## Phase-change random access memory

USE: Phase change random access memory

## Phase-control

USE: Phase control

## Phase-Locked Loops

USE: Phase locked loops

## Phase-Locked-Loops

USE: Phase locked loops

## Phase-shift keying

USE: Phase shift keying

## Phase-shift-keying

USE: Phase shift keying

## Phased arrays

UF: Antenna phased arrays  
BT: Antenna arrays  
RT: Optical arrays

## Phasor measurement units

UF: PMU  
PMUs  
BT: Electric variables  
measurement

## PHEMTs

UF: Pseudomorphic HEMTs  
BT: HEMTs

## Philosophical considerations

BT: Social implications of technology  
RT: Econophysics  
Ethical aspects  
Quantum mechanics  
Social factors  
Technology  
Technology social factors

## Phishing

BT: Computer security  
Information security  
RT: Malware

## PHM

USE: Prognostics and health management

## Phonetics

BT: Linguistics  
RT: Natural language processing  
Semiotics  
Speech processing  
NT: Acoustic phonetics

## Phonocardiogram

USE: Phonocardiography

## Phonocardiography

UF: PCG  
Phonocardiogram  
BT: Cardiography  
RT: Biomedical monitoring



# 2019 IEEE Thesaurus

	Cardiology		
	Heart rate measurement	<b>Photoconducting devices</b>	
		BT:	Optoelectronic devices
<i>Phonographs</i>		RT:	Photoconducting
USE:	Audio systems	materials	
			Photoconductivity
<b>Phonons</b>			Photodetectors
BT:	Elementary particles		Semiconductor devices
RT:	Acoustics	NT:	Electrophotography
	Crystals		
	Electrons	<b>Photoconducting materials</b>	
	Indium phosphide	UF:	Photoconductors
		BT:	Materials
<b>Phosphorescence</b>		RT:	Photoconducting
BT:	Luminescence	devices	
RT:	Phosphors		Photoconductivity
			Photodetectors
<b>Phosphors</b>			Semiconductor
BT:	Light sources	materials	
RT:	Phosphorescence		
		<b>Photoconductivity</b>	
<b>Phosphorus</b>		UF:	Photocurrent
BT:	Chemical elements	BT:	Conductivity
		RT:	Photoconducting
<b>Photoacoustic effects</b>		devices	
UF:	Optoacoustic effects		Photoconducting
BT:	Spectroscopy	materials	
RT:	Acoustic testing		
	Laser applications	<i>Photoconductors</i>	
	Photothermal effects	USE:	Photoconducting
NT:	Photoacoustic imaging	materials	
<b>Photoacoustic imaging</b>		<i>Photocurrent</i>	
BT:	Biomedical imaging	USE:	Photoconductivity
	Photoacoustic effects		
		<i>Photodarkening</i>	
<b>Photobleaching</b>		USE:	Photochromism
BT:	Photochemistry		
		<i>Photodetector</i>	
<i>Photocathodes</i>		USE:	Photodetectors
USE:	Cathodes		
		<b>Photodetectors</b>	
<b>Photochemistry</b>		UF:	Photodetector
BT:	Chemistry	BT:	Optoelectronic devices
RT:	Water splitting		Radiation detectors
NT:	Photobleaching	RT:	Image sensors
			Infrared detectors
<b>Photochromism</b>			Optical signal
UF:	Photodarkening	detection	
BT:	Photonics		Photoconducting
RT:	Color	devices	
			Photoconducting
<i>Photocomposition</i>		materials	
USE:	Text processing		Photoelectricity



# 2019 IEEE Thesaurus

photodetectors	NT:	Photodiodes Phototransistors Superconducting	Photomicrography
			<i>Photoionisation</i> USE: Ionization
<b>Photodiodes</b>	BT:	Photodetectors	<i>Photoionization</i> USE: Ionization
	RT:	Optical transmitters P-n junctions	<i>Photolithography</i> USE: Lithography
	NT:	Avalanche photodiodes PIN photodiodes	<b>Photoluminescence</b> UF: Electrophotoluminescence BT: Luminescence Optics RT: Judd-Ofelt theory Microcavities
<b>Photoelasticity</b>	BT:	Mechanical factors	<i>Photomagnetic devices</i> USE: Magneto optic devices
	RT:	Optical polarization Piezooptic effects Stress	<i>Photomagnetic effects</i> USE: Magneto optic effects
<b>Photoelectricity</b>	UF:	Photoemission Phototubes	<b>Photometry</b> BT: Geoscience and remote sensing Optical variables measurement RT: Light sources Lighting Radiometry
	BT:	Electricity Electron devices	<i>Photomicrographs</i> USE: Photomicrography
	RT:	Electron emission Photodetectors Photomultipliers Photovoltaic cells	<b>Photomicrography</b> UF: Micrographs Microphotographs Microphotography Photomicrographs BT: Photography
	NT:	Photovoltaic effects	<b>Photomultipliers</b> BT: Vacuum technology RT: Avalanche photodiodes Electron multipliers Photoelectricity
<b>Photoelectron microscopy</b>	UF:	Photoemission electron microscopy	<b>Photon collider</b> BT: Particle accelerators
	BT:	Electron microscopy	<i>Photon crystal fibers</i>
<i>Photoemission</i>	USE:	Photoelectricity	
<i>Photoemission electron microscopy</i>	USE:	Photoelectron microscopy	
<i>Photogalvanic effects</i>	USE:	Photovoltaic effects	
<b>Photography</b>	BT:	Imaging	
	RT:	Cameras Electrophotography Image capture Image storage Optical filters	
	NT:	Cinematography Digital photography Image forensics	



# 2019 IEEE Thesaurus

USE: Photonic crystal  
fibers  
*Photon crystal fibres*  
USE: Photonic crystal  
fibers  
**Photonic band gap**  
UF: Band gap  
Band-gap  
Bandgap  
Photonic bandgap  
BT: Photonic crystals  
RT: Electromagnetic wave  
polarization  
Optical diffraction

*Photonic bandgap*  
USE: Photonic band gap

**Photonic bandgap fibers**  
UF: Photonic bandgap  
fibres  
BT: Photonic crystal  
fibers

*Photonic bandgap fibres*  
USE: Photonic bandgap  
fibers

**Photonic crystal fibers**  
UF: Microstructured fibers  
Microstructured fibres  
Photon crystal fibers  
Photon crystal fibres  
Photonic crystal  
fibres  
Photonic-crystal  
fibers  
Photonic-crystal  
fibres  
BT: Photonic crystals  
NT: Holey fibers  
Photonic bandgap  
fibers

*Photonic crystal fibres*  
USE: Photonic crystal  
fibers

**Photonic crystals**  
UF: 2-D photonic crystals  
2D photonic crystals

Photonic crystal  
fibers  
Two dimensional  
photonic crystals  
Two-dimensional  
photonic crystals  
BT: Periodic structures  
RT: Microwave devices  
Nonlinear optics  
Optical materials  
Optical waveguides  
Spontaneous emission  
NT: Photonic band gap  
Photonic crystal  
fibers

*Photonic crystal fibers*  
USE: Photonic crystals

**Photonic integrated circuits**  
BT: Integrated circuits

*Photonic metamaterials*  
USE: Optical metamaterials

*Photonic-crystal fibers*  
USE: Photonic crystal  
fibers

*Photonic-crystal fibres*  
USE: Photonic crystal  
fibers

**Photonics**  
BT: Lasers and  
electrooptics  
RT: Electromagnetic  
metamaterials  
Epitaxial growth  
Silicon devices  
Synapses  
NT: Biophotonics  
Microwave photonics  
Nanophotonics  
Photochromism  
Photothermal effects  
Silicon photonics  
Spontaneous emission

**Photoplethysmography**  
BT: Biomedical measurement

**Photoreceptors**  
BT: Neurons



# 2019 IEEE Thesaurus

<b>Photorefractive effect</b>	NT: Shunts (electrical)
BT: Nonlinear optics	<i>Photovoltaic power systems</i>
RT: Birefringence	USE: Photovoltaic systems
Optical refraction	<b>Photovoltaic systems</b>
Photorefractive materials	UF: Photovoltaic power systems
Refractive index	BT: Solar power generation
<b>Photorefractive materials</b>	RT: Hybrid power systems
BT: Optical materials	Photovoltaic cells
RT: Birefringence	Photovoltaic effects
Holography	Water pumps
Optical mixing	NT: Building integrated photovoltaics
Optical refraction	Fill factor (solar cell)
Photorefractive effect	Solar panels
<i>Photoresists</i>	<i>Phylogenetic tree</i>
USE: Resists	USE: Phylogeny
<b>Photothermal effects</b>	<i>Phylogenetics</i>
UF: Optothermal effects	USE: Phylogeny
Thermal wave imaging	<b>Phylogeny</b>
BT: Photonics	UF: Cladistics
RT: Photoacoustic effects	Phylogenetic tree
<b>Photothyristors</b>	Phylogenetics
UF: Optothyristors	BT: Evolution (biology)
BT: Thyristors	<b>Physical design</b>
RT: Optical switches	BT: System analysis and design
<b>Phototransistors</b>	Systems engineering and theory
BT: Photodetectors	RT: Integrated circuit layout
Transistors	<i>Physical distribution management</i>
RT: Optoelectronic devices	USE: Logistics
Radiation detectors	<b>Physical layer</b>
<i>Phototubes</i>	BT: Open systems
USE: Photoelectricity	NT: Physical layer security
<b>Photovoltaic cells</b>	<b>Physical layer security</b>
UF: Solar cells	BT: Physical layer
BT: Electron devices	<b>Physical optics</b>
Energy conversion	BT: Optics
RT: Photoelectricity	NT: Optical refraction
Photovoltaic effects	Optical vortices
Photovoltaic systems	
NT: Light trapping	
<b>Photovoltaic effects</b>	
UF: Photogalvanic effects	
BT: Photoelectricity	
RT: Photovoltaic cells	
Photovoltaic systems	



# 2019 IEEE Thesaurus

## Physical theory of diffraction

BT: Electromagnetic diffraction

## Physician

USE: Medical services

## Physics

BT: Science - general

RT: Buoyancy

NT: Acoustics

Astrophysics

Beams

Biophysics

Dark energy

Entropy

Fluid flow

Geophysics

High energy physics

Kinetic theory

Levitation

Lorentz covariance

Mechanical factors

Network theory

(graphs)

Physics education

Quantum mechanics

Solid-state physics

String theory

Thermal factors

Waves

## Physics computing

BT: Computer applications

## Physics education

BT: Engineering education

Physics

## Physiology

BT: Biology

NT: Action potentials

External stimuli

Neuromodulation

## PhysiStimuli

USE: External stimuli

## PI control

UF: PI controller

Proportional +

integral control

control

Proportional-integral

controller

Proportional-integral

Proportional-integral-derivative control

Proportional-integral-derivative controller

BT: Control systems

## PI controller

USE: PI control

## piano mover's problem

USE: Path planning

## Pickling

BT: Surface treatment

RT: Chemistry

## Pico-hydro

USE: Picohydro power

## Picohydro power

UF: Pico-hydro

BT: Hydroelectric power

generation

RT: Appropriate technology

## Piconets

USE: Personal area networks

## Picture archiving and communication systems

UF: Pacs

BT: Image communication

RT: Biomedical

communication

Biomedical computing

Biomedical imaging

## Picture phones

USE: Videophone systems

## Picture processing

USE: Image processing

## Picturephones

USE: Videophone systems

## PID control

USE: PD control

## Piecewise linear approximation



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# 2019 IEEE Thesaurus

techniques	BT: Piecewise linear	Crystals	
		Piezoelectric devices	
		Piezoelectricity	
<b>Piecewise linear techniques</b>		NT: Piezoelectric films	
	BT: Mathematics		
	RT: Control system	<b>Piezoelectric polarization</b>	
analysis		BT: Piezoelectricity	
	Control system		
synthesis		<b>Piezoelectric transducers</b>	
	Difference equations	BT: Transducers	
	Nonlinear control		
systems		<b>Piezoelectricity</b>	
	NT: Piecewise linear	UF: Piezoelectric effects	
approximation		BT: Electricity	
		Ultrasonics,	
<i>Piezoceramics</i>		ferroelectrics, and frequency control	
	USE: Piezoelectric	RT: Electrostriction	
materials		Piezoelectric devices	
		Piezoelectric films	
<b>Piezoelectric actuators</b>		Piezoelectric	
	BT: Actuators	materials	
		Piezoresistance	
<b>Piezoelectric devices</b>		Pyroelectricity	
	BT: Dielectric devices	Stress	
	RT: Acoustic devices	Ultrasonic transducers	
	Acoustoelectric	NT: Piezoelectric effect	
devices		Piezoelectric	
	Nanogenerators	polarization	
	Piezoelectric films		
	Piezoelectric	<i>Piezomagnetic effects</i>	
materials		USE: Magnetomechanical	
	Piezoelectricity	effects	
	Piezoresistive devices		
	Surface acoustic wave	<b>Piezooptic effects</b>	
devices		BT: Acoustooptic effects	
		RT: Photoelasticity	
<b>Piezoelectric effect</b>		Pressure effects	
	BT: Piezoelectricity	Stress	
<i>Piezoelectric effects</i>		<b>Piezoresistance</b>	
	USE: Piezoelectricity	UF: Piezoresistive	
		BT: Electric variables	
<b>Piezoelectric films</b>		Resistance	
	BT: Dielectric films	RT: Piezoelectricity	
	Films	Piezoresistive devices	
	Piezoelectric	Pressure effects	
materials		Stress	
	RT: Piezoelectric devices		
	Piezoelectricity	<i>Piezoresistive</i>	
		USE: Piezoresistance	
<b>Piezoelectric materials</b>			
	UF: Piezoceramics	<b>Piezoresistive devices</b>	
	BT: Dielectric materials	UF: Piezoresistors	
	RT: Acoustic materials	BT: Semiconductor devices	



# 2019 IEEE Thesaurus

RT:	Piezoelectric devices Piezoresistance Pressure measurement	<i>Pipelining</i> USE: Pipeline processing
<i>Piezoresistors</i> USE:	Piezoresistive devices	<i>Piracy (software)</i> USE: Computer crime
<b>Pigmentation</b> BT:	Color Materials science and technology NT: Pigments	<b>Pistons</b> BT: Machine components Mechanical products RT: Bellows Engine cylinders Engines Gaskets Shafts Structural rings
<b>Pigments</b> BT:	Pigmentation	<b>Pitch control (audio)</b> BT: Audio systems Variable speed drives
<i>PIN diodes</i> USE:	PIN photodiodes	<b>Pitch control (position)</b> BT: Mechanical variables control
<i>Pin grid arrays</i> USE:	Electronics packaging	<b>Pituitary gland</b> BT: Glands Nervous system
<b>PIN photodiodes</b> UF:	P-I-N PIN diodes BT: Photodiodes	<b>Pixel</b> BT: Digital images
<i>Pink noise</i> USE:	1/f noise	<i>PLA</i> USE: Programmable logic arrays
<b>Pins</b> BT:	Plugs	<b>Plagiarism</b> BT: Professional communication RT: Copyright protection Notice of Violation Publishing
<i>Pions</i> USE:	Mesons	<i>Planar antennas</i> USE: Planar arrays
<b>Pipeline processing</b> UF:	Computer pipeline processing BT: Parallel processing RT: Multiprocessing systems Systolic arrays	<i>Planar array</i> USE: Planar arrays
<b>Pipelines</b> BT:	Fluid flow RT: Chemical industry Magnetic flux leakage Materials handling Natural gas industry Oils Petroleum industry	<b>Planar arrays</b> UF: Planar antennas Planar array BT: Antenna arrays
		<b>Planar motors</b>





# 2019 IEEE Thesaurus

BT:	Electric motors	USE:	Planetary volcanoes
<b>Planar transmission lines</b>		<b>Planetary volcanoes</b>	
BT:	Transmission lines	UF:	Planetary volcanic activity
RT:	Spurline		Planetary volcano
NT:	Coplanar transmission lines	BT:	Volcanoes
	Finline	<b>Planets</b>	
	Microstrip	UF:	Planetary composition
	Slot lines		Planetary oceans
	Stripline	BT:	Solar system
<b>Planar waveguides</b>		RT:	Extraterrestrial phenomena
BT:	Electromagnetic waveguides	NT:	Earth
RT:	Rectangular waveguides		Jupiter
<i>Planarisation</i>			Mars
USE:	Planarization		Mercury (planets)
<b>Planarization</b>			Pluto
UF:	Chemical mechanical planarisation		Saturn
	Chemical mechanical planarization		Venus
	Planarisation	<b>Planing</b>	
BT:	Surface treatment	BT:	Machining
RT:	Dielectric films	RT:	Finishing
	Integrated circuits		Surface roughness
<i>Planetary chemistry</i>			Surface treatment
USE:	Astrochemistry	<b>Planning</b>	
<i>Planetary composition</i>		UF:	System planning
USE:	Extraterrestrial measurements AND Planets	BT:	Engineering management
<i>Planetary Landers</i>		RT:	Decision making
USE:	Land transportation AND Space vehicles		Economics
<i>Planetary oceans</i>		NT:	Meeting planning
USE:	Oceans AND Planets		Schedules
<b>Planetary orbits</b>			Strategic planning
BT:	Orbits		Technical planning
<i>Planetary volcanic activity</i>			Technology planning
USE:	Planetary volcanoes	<b>Plants (biology)</b>	
<i>Planetary volcano</i>		BT:	Organisms
		RT:	Life sciences
		NT:	Bamboo
		<i>Plants (industrial)</i>	
		USE:	Industrial plants
		<b>Plasma accelerators</b>	
		BT:	Particle accelerators
			Plasma devices
		<b>Plasma applications</b>	
		BT:	Plasmas



# 2019 IEEE Thesaurus

plasmas  
RT: Low-temperature  
Plasma displays  
Plasma materials  
processing  
NT: Plasma devices  
Plasma immersion ion  
implantation  
Plasma welding  
Tokamaks

## Plasma chemistry

BT: Plasma properties

## Plasma confinement

BT: Plasmas  
NT: Inertial confinement  
Magnetic confinement

## Plasma density

BT: Plasma properties

## Plasma devices

BT: Plasma applications  
RT: Gas discharge devices  
Plasmas  
NT: Plasma accelerators  
Plasma jets  
Tokamaks

## Plasma diagnostics

BT: Plasmas  
RT: Plasma measurements

## Plasma display panels

USE: Plasma displays

## Plasma displays

UF: Plasma display panels  
BT: Image generation  
RT: Plasma applications  
TV

## Plasma immersion ion implantation

BT: Ion implantation  
Plasma applications  
RT: Semiconductor

## impurities

## Plasma jets

BT: Plasma devices  
RT: Metal cutting tools  
Propulsion

## Plasma materials processing

BT: Materials processing  
RT: Plasma applications  
NT: Chemical vapor  
deposition  
Ignition

## Plasma measurements

BT: Measurement  
RT: Plasma diagnostics  
Plasmas

## Plasma properties

BT: Plasmas  
RT: Electron mobility  
Stability analysis  
NT: Dusty plasmas  
Plasma chemistry  
Plasma density  
Plasma sheaths  
Plasma stability  
Plasma temperature  
Plasmons

## Plasma sheaths

BT: Plasma properties

## Plasma simulation

BT: Plasmas  
RT: Modeling  
Numerical simulation  
Tokamaks

## Plasma sources

BT: Plasmas  
RT: Ion implantation  
Ion sources

## Plasma stability

BT: Plasma properties

## Plasma temperature

BT: Plasma properties

## Plasma transport processes

BT: Plasmas

## Plasma waves

BT: Waves  
RT: Plasmas

## Plasma welding

BT: Plasma applications  
RT: Joining processes



# 2019 IEEE Thesaurus

Materials processing		<i>Plastic containers</i>	
Plasmas		USE: Plastic products	
<b>Plasma x-ray sources</b>		<b>Plastic films</b>	
BT:	X-ray imaging	BT:	Films
RT:	X-ray lasers		Plastics
<b>Plasma-assisted combustion</b>		RT:	Plastic insulation
BT:	Combustion		Plastic insulators
	Plasmas	<i>Plastic IC packaging</i>	
<b>Plasmas</b>		USE: Plastic integrated	
BT:	Nuclear and plasma	circuit packaging	
sciences		<b>Plastic insulation</b>	
RT:	Arc discharges	BT:	Insulation
	Discharges (electric)	RT:	Dielectric materials
	Ionization		Plastic films
	Ionosphere		Plastic insulators
	Plasma devices	<b>Plastic insulators</b>	
	Plasma measurements	BT:	Insulators
	Plasma waves	RT:	Fiber reinforced
	Plasma welding	plastics	
NT:	Relativistic effects		Plastic films
plasmas	Atmospheric-pressure		Plastic insulation
	Low-temperature		Plastic packaging
plasmas		<b>Plastic integrated circuit packaging</b>	
	Plasma applications	UF:	Plastic IC packaging
	Plasma confinement	BT:	Integrated circuit
	Plasma diagnostics	packaging	
	Plasma properties	<b>Plastic optical fiber</b>	
	Plasma simulation	BT:	Optical fibers
	Plasma sources		Plastics
	Plasma transport	<b>Plastic packaging</b>	
processes		BT:	Packaging
	Plasma-assisted	RT:	Bagging
combustion			Electronics packaging
<i>Plasmon</i>			Encapsulation
USE:	Plasmons		Integrated circuit
<i>Plasmonic solar cells</i>		packaging	
USE:	Light trapping		Plastic insulators
<i>Plasmonics</i>			Plastics
USE:	Plasmons	<b>Plastic products</b>	
<b>Plasmons</b>		UF:	Plastic bottles
UF:	Plasmon		Plastic containers
	Plasmonics	BT:	Manufactured products
BT:	Plasma properties	RT:	Bottling
<i>Plastic bottles</i>			Chemical industry
USE:	Plastic products		Chemical products



# 2019 IEEE Thesaurus

	Chemistry		<i>PLL</i>	
	Consumer products		USE:	Phase locked loops
	Petrochemicals			
	Plastics		<b>Plug-in hybrid electric vehicles</b>	
	Plastics industry		BT:	Hybrid electric vehicles
			RT:	Charging stations
<b>Plastics</b>			<i>Plugboard</i>	
BT:	Chemical products		USE:	Breadboard
	Materials			
RT:	Petrochemicals		<b>Plugs</b>	
	Plastic packaging		BT:	Connectors
	Plastic products		NT:	Keyways
	Plastics industry			Pins
	Polymers			
	Resins		<i>Plumbago</i>	
NT:	Epoxy resins		USE:	Graphite
	Fiber reinforced			
plastics			<b>Pluto</b>	
	Plastic films		BT:	Planets
	Plastic optical fiber			
<b>Plastics industry</b>			<b>Plutonium</b>	
BT:	Manufacturing		BT:	Chemical elements
industries				
RT:	Chemical industry		<i>pMOSFETs</i>	
	Plastic products		USE:	MOSFET
	Plastics			
<b>Platform as a service</b>			<i>PMU</i>	
UF:	PAAS		USE:	Phasor measurement units
BT:	Cloud computing			
<b>Platform virtualization</b>			<i>PMUs</i>	
BT:	Computers and		USE:	Phasor measurement units
information processing				
RT:	Virtual machine		<i>PNAs</i>	
monitors			USE:	Presence network agents
<b>Plating</b>			<b>Pneumatic actuators</b>	
BT:	Materials processing		BT:	Actuators
NT:	Chrome plating			
<b>Platinum</b>			<b>Pneumatic systems</b>	
BT:	Metals		BT:	Control systems
NT:	Platinum alloys		RT:	Bellows
				Fluidics
<b>Platinum alloys</b>				Mechanical systems
BT:	Platinum		<i>Pnictide superconductors</i>	
RT:	Alloying		USE:	Superconducting materials
<b>Plethysmography</b>				
BT:	Measurement		<i>Pockels readout optical modulator</i>	
	Medical diagnosis			



# 2019 IEEE Thesaurus

USE: Electrooptic  
modulators

## *Podcast*

USE: Digital audio  
broadcasting

## *Poincare group*

USE: Poincare invariance

## **Poincare invariance**

UF: Poincare group  
BT: Transforms

## **Point of care**

BT: Documentation  
Medical services  
RT: Clinical diagnosis  
Patient monitoring  
Smart healthcare

## **Point-to-multipoint communications**

UF: P2MP  
PTMP  
BT: Wireless communication  
RT: Internet  
Internet telephony

## *Poisons*

USE: Toxicology

## *Poisson equation*

USE: Poisson equations

## **Poisson equations**

UF: Poisson equation  
BT: Partial differential  
equations  
RT: Electrostatics

## *Polar cyclones*

USE: Cyclones

## **Polarimetric synthetic aperture radar**

BT: Synthetic aperture  
radar

## **Polarimetry**

UF: Solar polarimetry  
BT: Electromagnetic  
measurements  
RT: Ellipsometry  
Optical retarders

## *Polarisation*

USE: Polarization

## **Polarization**

UF: Circular polarisation  
Circular polarization  
Polarisation  
BT: Electromagnetic  
scattering

## **Polarization mode dispersion**

UF: Polarization-mode  
dispersion  
BT: Optical fiber  
polarization

## **Polarization shift keying**

BT: Optical polarization

## *Polarization-maintaining optical fibers*

USE: Optical fiber  
polarization

## *Polarization-mode dispersion*

USE: Polarization mode  
dispersion

## *Poles & zeros*

USE: Poles and zeros

## **Poles and towers**

UF: Pylons  
Towers  
Wood poles  
BT: Transmission lines  
RT: Power distribution  
lines  
Power transmission  
lines  
NT: Telephone poles

## **Poles and zeros**

UF: Poles & zeros  
Roots  
Zeros  
BT: Transfer functions  
RT: Circuits  
Control systems  
Newton method  
Polynomials

## *Police*

USE: Law enforcement



# 2019 IEEE Thesaurus

## Polishing machines

BT: Production equipment  
RT: Deburring  
Rough surfaces  
Surface finishing  
Surface roughness

## Pollution

BT: Environmental factors  
RT: Contamination  
Design for disassembly  
Environmental

## economics

Green products  
Occupational health  
Pollution control  
Pollution measurement  
Sewage treatment  
Toxicology  
Waste disposal  
NT: Air pollution  
Industrial pollution  
Land pollution  
Oil pollution  
Radioactive pollution  
Thermal pollution  
Urban pollution  
Water pollution

## Pollution control

BT: Environmental

## management

RT: Carbon emissions  
Decontamination  
Electrostatic

## precipitators

Environmental

## monitoring

Greenhouse effect  
Ozonation  
Pollution  
Pollution measurement  
Sewage treatment  
Sludge treatment

## Pollution measurement

BT: Measurement  
RT: Environmental

## monitoring

Pollution  
Pollution control

## Polonium

BT: Chemical elements

## Polycaprolactone

BT: Polymers  
RT: Smart materials

## Polyethylene

BT: Polymers  
NT: Thermoplastic

## polyethylene

## Polyimides

BT: Polymers

## Polymer coatings

USE: Polymer films

## Polymer films

UF: Polymer coatings  
BT: Films  
RT: Dielectric thin films

## Polymer foams

BT: Materials  
RT: Insulation  
Insulators  
Metal foam  
Resins

## Polymer gels

BT: Materials

## Polymer led

USE: Organic light emitting diodes

## Polymers

UF: Electroactive polymers  
BT: Materials  
RT: Colloidal lithography  
Plastics  
NT: Azobenzene  
Liquid crystal

## polymers

Optical polymers  
Polycaprolactone  
Polyethylene  
Polyimides

## Polynomials

BT: Equations  
RT: Poles and zeros

## PON



# 2019 IEEE Thesaurus

USE: Passive optical  
networks

## Porcelain

BT: Ceramics  
RT: Ceramic products  
Ceramics industry

## Porous silicon

BT: Silicon

## Portable computers

UF: Laptops  
Portable PCs  
BT: Microcomputers  
NT: Handheld computers

## Portable document format

UF: PDF  
BT: Document handling  
RT: Document image

processing

## Portable media players

UF: MP3  
Portable Multimedia

players

Portable video players  
iPOD

BT: Audio systems  
Digital communication  
Home automation

RT: Digital audio  
broadcasting  
Tablet computers

## Portable Multimedia players

USE: Portable media players

## Portable PCs

USE: Portable computers

## Portable video players

USE: Portable media players

## Portals

BT: Management information  
systems  
RT: Information retrieval  
Web sites

## Portfolios

UF: Electronic portfolios

BT: Professional  
communication

## Pose estimation

BT: Estimation  
RT: Computer vision

## Position control

UF: Orientation control  
BT: Mechanical variables  
control  
RT: Attitude control  
Capacitive transducers  
Manipulators  
Mechanical guides  
Servosystems  
NT: Nanopositioning

## Position measurement

UF: Attitude determination  
Orientation  
determination  
Orientation  
measurement  
Source location  
BT: Mechanical variables  
measurement  
RT: Direction-of-arrival  
estimation  
Distance measurement  
Gaze tracking  
Geodesy  
Location awareness  
Navigation  
Tracking

## Position sensitive particle detectors

BT: Ionizing radiation  
sensors  
RT: High energy physics  
instrumentation computing  
Nuclear measurements  
Particle measurements  
Semiconductor counters

## Positive train control

BT: Control systems  
Rail transportation  
RT: Feedback  
Railway accidents  
Railway safety

## Positron emission tomography

UF: PET



# 2019 IEEE Thesaurus

BT: Tomography  
RT: Biomedical  
applications of radiation  
imaging Medical diagnostic

Nuclear medicine  
Phantoms  
Tumors

NT: Whole-body PET

## Positrons

BT: Elementary particles

## Possibility theory

BT: Probability  
RT: Fuzzy logic  
Nonlinear dynamical

systems

## Post human

USE: Posthuman

## Post-filtering algorithm

USE: Filtering algorithms

## Post-human

USE: Posthuman

## Post-wall waveguides

USE: Substrate integrated  
waveguides

## Postal services

UF: Mail  
BT: Message systems  
RT: Electronic mail

## Posthuman

UF: Post human  
Post-human  
BT: Systems, man, and  
cybernetics  
RT: Artificial  
intelligence Transhuman

## Postscript

USE: Page description  
languages

## Potassium

BT: Chemical elements

## Potential energy

BT: Energy conservation  
RT: Kinetic energy  
Mechanical energy

## Potential transformers

USE: Voltage transformers

## Potential well

UF: Potential wells  
Quantum confinement  
BT: Energy conversion

## Potential wells

USE: Potential well

## Potentiometers

BT: Meters  
RT: Resistors  
Voltage measurement

## Powders

BT: Coatings  
RT: Ceramics

## Power amplifiers

UF: Radio frequency power  
amplifiers  
Radiofrequency power  
amplifiers  
BT: Amplifiers  
NT: High power amplifiers  
Predistortion

## Power and energy standards

BT: Standards categories

## Power cable insulation

BT: Cable insulation  
RT: Power cables

## Power cables

BT: Cables  
Power transmission  
lines  
RT: Conductors  
Power cable insulation  
Power distribution  
lines  
NT: Underground power  
cables

## Power capacitors

BT: Capacitors  
NT: Supercapacitors



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# 2019 IEEE Thesaurus

<b>Power combiners</b>	RT: Harmonic distortion	
BT: Waveguide components	<b>Power demand</b>	
RT: Microstrip components	UF: Power consumption	
Power dividers	BT: Power supplies	
Stripline components	RT: Power system planning	
	RT: Electricity supply	
<b>Power conditioning</b>	industry	
BT: Power electronics	Energy conservation	
RT: Power conversion	Energy resources	
Pulse width modulation	Load management	
converters	Load modeling	
NT: Power smoothing	Power distribution	
<i>Power consumption</i>	NT: Demand response	
USE: Power demand	Load forecasting	
<b>Power control</b>	<b>Power dissipation</b>	
BT: Electric variables	BT: Circuits	
control	RT: CMOS logic circuits	
RT: Electric current	MOSFET circuits	
control	Nanotechnology	
Power factor	Power transmission	
correction	System-on-chip	
Pulse width modulation	<b>Power distribution</b>	
converters	UF: Distribution of	
	electric power	
<b>Power conversion</b>	BT: Power systems	
BT: Converters	RT: Electricity supply	
RT: Choppers (circuits)	industry	
Maximum power point	Industrial power	
trackers	Power demand	
Nonlinear circuits	Transactive energy	
Power conditioning	NT: Power distribution	
Power electronics	Power distribution	
Power semiconductor	lines	
devices	<b>Power distribution faults</b>	
Power supplies	BT: Power distribution	
Pulse width modulation	<b>Power distribution lines</b>	
converters	UF: Overhead distribution	
Regulators	lines	
Switched systems	BT: Power distribution	
NT: AC-AC converters	RT: Conductors	
AC-DC power converters	Poles and towers	
DC-AC power converters	Power cables	
DC-DC power converters	<i>Power distribution transformers</i>	
Matrix converters	USE: Power transformers	
Power conversion	<b>Power dividers</b>	
harmonics		
Voltage-source		
converters		
<b>Power conversion harmonics</b>		
BT: Power conversion		



# 2019 IEEE Thesaurus

	BT:	Waveguide components		Power generation
	RT:	Microstrip components		Power systems
		Power combiners		
		Stripline components	Power engineering computing	
Power electronics			BT:	Computer applications
	UF:	Electric power		Power engineering
	RT:	High-voltage	RT:	Power system analysis
techniques			computing	
		Matrix converters	Power engineering education	
		Power conversion	BT:	Engineering education
		Power filters	RT:	Power engineering
		Pulse width modulation		
converters			Power exchange	
		Rectifiers	USE:	Power markets
		Resonant inverters	Power factor	
		Switching converters	USE:	Reactive power
converters		Voltage-source		
	NT:	Adiabatic	Power factor correction	
		Converters	BT:	Electric current
		Current limiters	control	
		Gate drivers		Load flow control
		Inverters	RT:	Power control
		Phase control		Power transmission
		Power conditioning		Voltage control
devices		Power semiconductor	Power filters	
switches			UF:	Power line filters
		Snubbers	BT:	Filters
		Three-phase electric	RT:	Power electronics
power			NT:	Spurline
			Power flow	
Power engineering			USE:	Load flow
	BT:	Power engineering and	Power flow analysis	
energy			USE:	Load flow analysis
	RT:	Power engineering	Power flow control	
education			USE:	Load flow control
	NT:	Ferroresonance	Power generation	
		High-voltage	UF:	Generation of electric
techniques			power	
		Power engineering		Output power
computing				Power plants
simulation		Power system		Power stations
Power engineering and energy			BT:	Power engineering and
	RT:	Electrochemical		
devices			RT:	Batteries
	NT:	Electric variables		Fuel cells
control				Generators
		Energy		Microgrids
		Power engineering		



# 2019 IEEE Thesaurus

economics	Power generation	<b>Power harmonic filters</b>	BT: Power system harmonics
	Power supplies	<i>Power harvesting</i>	USE: Energy harvesting
	Pulsed power systems		
	Space power stations		
NT:	Automatic generation	<b>Power industry</b>	UF: Electric utilities
control	Cogeneration	BT: Industries	RT: Offshore installations
	Distributed power		Power system faults
generation	Geothermal power		Telecontrol equipment
generation	Hydroelectric power	NT: Electrical equipment	
generation	Magnetohydrodynamic	industry	Electricity supply
power generation	Nuclear power	industry	Nuclear facility
generation	Power generation	regulation	Power system
control	Power generation	interconnection	
dispatch	Power generation	<i>Power injection molding</i>	USE: Injection molding
planning	Solar power generation	<i>Power injection moulding</i>	USE: Injection molding
	Trigeneration		
	Turbomachinery	<b>Power integrated circuits</b>	BT: Circuits
	Wind energy generation		Integrated circuits
	Wind power generation	RT: Power semiconductor	
<b>Power generation control</b>		devices	
BT: Automatic control			
	Power generation	<b>Power lasers</b>	BT: Lasers
<b>Power generation dispatch</b>			RT: Power semiconductor
BT: Power generation		devices	
<b>Power generation economics</b>		<b>Power line communications</b>	BT: Transmission lines
BT: Economics			
RT: Power generation		<i>Power line filters</i>	USE: Power filters
NT: Electricity supply			
industry deregulation		<i>Power management</i>	USE: Power system
<b>Power generation planning</b>		management	
BT: Power generation		<b>Power markets</b>	UF: Electricity markets
<b>Power grids</b>			Electricity trading
UF: Electricity grids			Power exchange
BT: Power systems			Power pools
RT: Wind energy			Power trading
integration			
NT: Microgrids			
	Smart grids		



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BT: Power wheeling  
Electricity supply  
industry deregulation  
RT: Power transmission  
Transactive energy

## Power measurement

BT: Electric variables  
measurement  
RT: Wattmeters  
NT: Dynamometers

## Power MOSFET

BT: MOSFET circuits  
RT: Power semiconductor  
devices

## Power outages

USE: Power system  
reliability

## Power overhead lines

BT: Power transmission  
lines  
RT: Railway  
electrification

## Power plants

USE: Power generation

## Power pools

USE: Power markets

## Power quality

UF: Power supply quality  
Voltage sags  
BT: Power supplies  
RT: Electricity supply  
industry  
Power system harmonics  
Power system  
transients

## Power semiconductor devices

BT: Power electronics  
Semiconductor devices  
RT: Power MOSFET  
Power conversion  
Power integrated  
circuits  
Power lasers  
NT: Power transistors

## Power semiconductor switches

BT: Power electronics  
Semiconductor devices  
NT: Bipolar transistors  
Thyristors

## Power smoothing

BT: Power conditioning

## Power spectra

USE: Spectral analysis

## Power stations

USE: Power generation

## Power stations (space)

USE: Space power stations

## Power stations (substations)

USE: Substations

## Power steering

BT: Automotive engineering

## Power supplies

BT: Power systems  
RT: Power conversion  
Power generation  
Pulsed power systems  
Uninterruptible power  
systems  
NT: Battery chargers  
Charging stations  
Current supplies  
Emergency power

## supplies

Inductive charging  
Islanding  
Power demand  
Power quality  
Power system

## restoration

## supplies

Switched mode power  
Traction power  
Umbilical cable

## Power supplies to apparatus

USE: Umbilical cable

## Power supply industry

USE: Electricity supply  
industry



# 2019 IEEE Thesaurus

## *Power supply quality*

USE: Power quality

## **Power system analysis computing**

BT: Computer applications  
Power systems  
RT: Digital simulation  
Modeling  
Parameter estimation  
Power engineering

computing

Software packages

## **Power system control**

BT: Electric variables

control

RT: Control system

security

Power systems

NT: Bidirectional power

flow

Load flow control

SCADA systems

## **Power system dynamics**

BT: Power systems

## **Power system economics**

BT: Power systems

RT: Electricity supply

industry deregulation

Transactive energy

NT: Low-carbon economy

## **Power system faults**

BT: Power systems

RT: Electricity supply

industry

Error correction

Fuzzy set theory

Power industry

Power system

protection

Signal analysis

## **Power system harmonics**

BT: Power systems

RT: Power quality

NT: Power harmonic filters

## **Power system interconnection**

BT: Power industry

RT: Power systems

Power transmission

## **Power system management**

UF: Power management  
Telecommunication

power management

BT: Power systems

RT: Microgrids

Monitoring

Preventive maintenance

NT: Load flow

## **Power system measurements**

BT: Power systems

NT: Meter reading

## **Power system modeling**

BT: Modeling

RT: Power systems

NT: Load modeling

## **Power system planning**

BT: Power systems

RT: Demand-side management

Electricity supply

industry

NT: Power demand

## **Power system protection**

BT: Power systems

Product safety

engineering

RT: Arresters

Circuit breakers

Fuses

Grounding

Power system faults

Power system

transients

Protective relaying

NT: Electrical safety

Substation protection

Surge protection

## **Power system relaying**

BT: Relays

RT: Power systems

Protective relaying

## **Power system reliability**

UF: Power outages

BT: Power systems

RT: Microgrids

Power system stability

Reliability



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<b>Power system restoration</b>		Hybrid power systems
BT: Power supplies	systems	Industrial power
RT: Electricity supply		PSCAD
industry		Power distribution
Power systems		Power grids
		Power supplies
<b>Power system security</b>		Power system analysis
BT: Security	computing	Power system dynamics
RT: Load flow analysis		Power system economics
Power systems		Power system faults
Reactive power control		Power system harmonics
<b>Power system simulation</b>		Power system
BT: Power engineering	management	
RT: Power systems		Power system
	measurements	
<b>Power system stability</b>		Power system planning
BT: Power systems		Power system
RT: Power system	protection	
reliability	reliability	Power system
<b>Power system transients</b>		Power system stability
BT: Electromagnetic		Power transmission
transients		Pulsed power systems
RT: Arresters		Reactive power
Power quality		Substations
Power system		Transformers
protection		Uninterruptible power
NT: Transient analysis	systems	
<b>Power systems</b>	integration	Wind energy
UF: Electric power		
BT: Power engineering and	<i>Power Systems Computer Aided Design</i>	
energy	USE: PSCAD	
RT: Civil engineering	<i>Power trading</i>	
Mechanical power	USE: Power markets	
transmission		
Power system control	<b>Power transformer insulation</b>	
Power system	BT: Power transformers	
interconnection	RT: Insulation	
Power system modeling		
Power system relaying	<b>Power transformers</b>	
Power system	UF: Power distribution	
restoration	transformers	
Power system security	BT: Transformers	
Power system	RT: Transformer cores	
simulation	Windings	
Skin effect	NT: On load tap changers	
Telecontrol equipment	Power transformer	
Time-frequency	insulation	
analysis		
Voltage fluctuations	<b>Power transistors</b>	
NT: Data center power		



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BT:	Power semiconductor devices	USE:	Wearable robots
RT:	Driver circuits	<i>Powertrain</i>	
		USE:	Mechanical power transmission
<b>Power transmission</b>		<i>Praeseodymium</i>	
UF:	Transmission of electric power	USE:	Praseodymium
BT:	Power systems		
RT:	Electric current control	<b>Pragmatics</b>	
	Load flow analysis	BT:	Linguistics
	Magnetic gears		Semiotics
	Power dissipation	RT:	Communication symbols
	Power factor		Context
correction			Natural language
	Power markets	processing	
	Power system		Professional
interconnection		communication	
	Power transmission lines	<b>Praseodymium</b>	
NT:	Common Information Model (electricity)	UF:	Praeseodymium
	Flexible AC transmission systems	BT:	Chemical elements
	HVDC transmission	<b>Pre-college engineering</b>	
	Inductive power transmission	UF:	Precollege engineering
	Static VAR compensators	BT:	Educational programs
	Transmission lines	<b>Preamplifiers</b>	
	Wireless power transmission	BT:	Amplifiers
<b>Power transmission lines</b>		<b>Precision engineering</b>	
UF:	Overhead transmission lines	BT:	Engineering - general
BT:	Transmission lines	RT:	Industrial engineering
RT:	Conductors		Mechanical engineering
	Poles and towers	<b>Precoding</b>	
	Power transmission	BT:	Encoding
	Superconducting transmission lines	<i>Precollege engineering</i>	
NT:	Gas insulated transmission lines	USE:	Pre-college engineering
	Power cables	<b>Predator prey systems</b>	
	Power overhead lines	UF:	Predator-prey models
<i>Power wheeling</i>			Predator-prey systems
USE:	Power markets	BT:	Biology
<i>Powered armor</i>			Mathematics
USE:	Wearable robots	RT:	Chaos
			Differential equations
			Game theory
			Nonlinear dynamical systems
<i>Powered exoskeleton</i>			Stability



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## *Predator-prey models*

USE: Predator prey systems

## *Predator-prey systems*

USE: Predator prey systems

## **Prediction algorithms**

BT: Algorithms

## **Prediction methods**

BT: Artificial intelligence  
RT: Estimation  
Forecasting  
Gaussian processes  
Kalman filters  
Prediction theory  
Signal processing  
Spectral analysis  
Speech processing  
NT: Linear predictive coding  
Predictive coding  
Predictive encoding  
Predictive models

## **Prediction theory**

BT: Statistics  
RT: Artificial intelligence  
Estimation  
Prediction methods

## **Predictive coding**

BT: Prediction methods

## **Predictive control**

UF: Model predictive control  
Model-predictive control  
BT: Process control  
RT: Control engineering

## **Predictive encoding**

BT: Prediction methods

## **Predictive maintenance**

BT: Maintenance engineering

## **Predictive models**

BT: Prediction methods

## **Predistortion**

UF: Inverse distortion  
BT: Power amplifiers  
RT: Nonlinear distortion

## *Prefabricated buildings*

USE: Prefabricated construction

## **Prefabricated construction**

UF: Prefabricated buildings  
BT: Construction  
Construction industry  
RT: Building materials  
Buildings  
Modular construction

## **Prefetching**

BT: Instruction sets

## **Preforms**

BT: Assembly

## **Pregnancy**

UF: Pregnant  
BT: Medical conditions

## **Pregnancy test**

BT: Medical tests

## *Pregnant*

USE: Pregnancy

## **Presence network agents**

UF: PNAs  
BT: Communications technology

## **Presses**

BT: Machine tools  
RT: Dies  
Pressing

## **Pressing**

BT: Materials processing  
RT: Presses

## **Pressure control**

BT: Control systems

## **Pressure effects**

BT: Mechanical factors  
RT: Meteorology





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	Piezooptic effects	UF:	PCA
	Piezoresistance	BT:	Statistical analysis
		RT:	Feature extraction
<b>Pressure gauges</b>			Independent component
BT:	Instruments	analysis	
RT:	Atmospheric		Linear systems
measurements			Operations research
	Density measurement		Pattern recognition
	Fluid flow measurement		Transform coding
	Force measurement		
	Geophysical	<i>Print readers</i>	
measurements		USE:	Character recognition
	Pressure measurement		
	Pressure sensors	<i>Printed circuit boards</i>	
	Torque measurement	USE:	Printed circuits
<b>Pressure measurement</b>			
BT:	Measurement	<b>Printed circuits</b>	
RT:	Piezoresistive devices	UF:	Circuit boards
	Pressure gauges		Printed circuit boards
	Pressure sensors	BT:	Circuits
	Tactile sensors	RT:	Electronics packaging
NT:	Altimetry		Integrated circuit
	Tire pressure	layout	
			Substrates
<b>Pressure sensors</b>			Wiring
BT:	Sensors	NT:	Flexible printed
RT:	Pressure gauges	circuits	
	Pressure measurement		Memory modules
<b>Pressure vessels</b>			
BT:	Mechanical products	<b>Printers</b>	
RT:	Concrete	BT:	Computer peripherals
	Fission reactors	RT:	Printing
	Mechanical engineering	NT:	Laser printers
	Steel		
<b>Preventive maintenance</b>		<b>Printing</b>	
BT:	Maintenance	BT:	Information technology
engineering		RT:	Character generation
RT:	Accident prevention		Ink
	Power system		Lithography
management			Printers
	Reliability		Printing machinery
	Safety	NT:	Publishing
NT:	Condition monitoring		Typesetting
<b>Pricing</b>			Digital printing
BT:	Financial management		Ink jet printing
<b>Primary motor cortex</b>		printing	Teleprinting
BT:	Brain		Three-dimensional
<b>Principal component analysis</b>		<b>Printing machinery</b>	
		UF:	Printing presses
		BT:	Machinery
		RT:	Printing



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## *Printing presses*

USE: Printing machinery

## **Privacy**

BT: Technology social  
factors  
RT: Authorization  
Communication system  
security

Computer security  
Cryptography  
Cyberethics  
Data privacy  
Data protection  
Data security  
Differential privacy  
General Data

## Protection Regulation

Malware  
Trust management  
NT: Eavesdropping

## *Privacy preserving data mining*

USE: Data privacy

## **Privacy-invasive software**

UF: Invasive software  
BT: Software  
RT: Computer crime  
Computer security  
Unsolicited electronic

## mail

NT: Spyware

## *Privatisation*

USE: Privatization

## **Privatization**

UF: Privatisation  
BT: Macroeconomics  
RT: Industrial economics

## **Probabilistic computing**

BT: Computers and  
information processing

## **Probabilistic logic**

BT: Logic  
RT: Mixture models

## **Probability**

BT: Mathematics  
RT: Distribution functions  
Fourier transforms

## detection

NT:  
optimization

## probability

## distribution

## distributions

## **Probability computing**

BT: Computers and  
information processing

## **Probability density function**

BT: Integral equations  
RT: Distribution functions

## **Probability distribution**

BT: Probability  
NT: Exponential

## distribution

## distribution

## distribution

## **Probes**

BT: Instruments

## **Problem-solving**

BT: Cognitive science  
RT: Human factors

## **Process control**

Gamma distribution  
Information geometry  
Maximum likelihood

Monte Carlo methods  
Random processes  
Statistical analysis  
Statistics  
Stochastic processes  
Stochastic systems  
Viterbi algorithm  
Weibull distribution  
Ant colony

Bayes methods  
Error probability  
Forecasting  
Memoryless systems  
Pairwise error

Possibility theory  
Probability

Random variables  
Statistical

Uncertainty

Maxwell-Boltzmann

Nakagami distribution



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automation	BT:	Industrial control	<i>Processors (program)</i>
	RT:	Bleaching	USE: Program processors
		Chemical reactors	
		Continuous production	
		Manufacturing	<b>Procurement</b>
		Process design	BT: Supply chain
		Process modeling	management
		Process planning	RT: Contracts
NT:		Production control	Logistics
		Predictive control	Proposals
		Three-term control	Supply chains
		Two-term control	
<b>Process design</b>			<b>Product codes</b>
	BT:	Design methodology	BT: Codes
	RT:	Chemical engineering	RT: Decoding
		Design for disassembly	Error correction
		Design for quality	Radiofrequency
		Process control	
		Process planning	identification
		Product design	NT: Bar codes
		Service computing	<i>Product customisation</i>
NT:		Pattern formation	USE: Product customization
		Process modeling	
<b>Process modeling</b>			<b>Product customization</b>
	BT:	Modeling	UF: Product customisation
		Process design	BT: Product development
	RT:	Process control	RT: Customer satisfaction
<b>Process planning</b>			Manufactured products
	BT:	Management	Product design
		Production	
		Production management	<b>Product design</b>
		Production planning	BT: Design methodology
	RT:	Process control	RT: Concurrent engineering
		Process design	Design for disassembly
	NT:	Business process	Design for quality
integration			Design tools
		Business process	Group technology
management			Manufactured products
		Cause effect analysis	Process design
			Product customization
			Product development
			Prototypes
			Requirements
<b>Processor scheduling</b>			<b>Product development</b>
	UF:	Multiprocessor	BT: Crowdsourcing
scheduling			Engineering management
	BT:	Concurrency control	RT: Brand management
		Multiprocessing	Manufactured products
systems			Product design
	RT:	Microprocessors	Quality function
		Optimization methods	
	NT:	Scheduling algorithms	deployment
			Rapid prototyping
			Reverse engineering



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NT: interfaces  management	Virtual prototyping	Group technology	
	Graphical user	Injection molding	
	Product customization	Materials processing	
	Product life cycle	Mechanical products	
	Software product lines	Process planning	
	Time to market	Production control	
<b>Product liability</b>		Production engineering	
BT:	Legal factors	Production equipment	
RT:	Consumer products	Production facilities	
	Product safety	Production management	
	Quality assurance	Production materials	
	Quality management	Production systems	
NT:	Warranties	Productivity	
		Shafts	
		Springs	
		Transfer molding	
<b>Product life cycle management</b>		<b>Production control</b>	
UF:	System life cycle	BT:	Industrial control
BT:	Product development		Production
RT:	Release engineering	RT:	Adaptive scheduling
NT:	Prognostics and health		Cellular manufacturing
			Group technology
			Inventory control
			Manufacturing
			Process control
			Production systems
			Supply chain
<b>Product safety</b>		management	
BT:	Safety	NT:	Continuous production
RT:	Accidents		Lot sizing
	Consumer products		Optimized production
	Product liability		
<b>Product safety engineering</b>		technology	
RT:	Software safety		Scheduling
NT:	Consumer protection		
	Power system		
protection			
	Safety		
	Vehicle crash testing		
<b>Product warranties</b>			
USE:	Warranties		
<b>Product warranty</b>			
USE:	Warranties		
<b>Production</b>			
BT:	Industry applications		
RT:	Containers		
	Wheels		
	Wire drawing		
NT:	Ball milling		
	Compression molding		
	Embossing		
	Food products		
</			



# 2019 IEEE Thesaurus

equipment	Materials handling	BT:	Materials
	Production engineering	RT:	Production
NT:	Applicators		Additives
	Clamps		Cast iron
	Cutting tools		Chemical products
	Fixtures		Hydraulic fluids
	Machine tools	NT:	Production engineering
	Mining equipment		Abrasives
	Molding equipment		Aerospace materials
	Packaging machines		Automotive materials
	Paper making machines		Inhibitors
	Polishing machines		Ink
	Soldering equipment		Joining materials
			Lubricants
			Retardants
<b>Production facilities</b>			
UF:	Factories	<b>Production planning</b>	
	Manufacturing	BT:	Production engineering
facilities			Production management
BT:	Production	RT:	Demand forecasting
RT:	Manufacturing		Lead time reduction
	Warehousing		Optimized production
NT:	Foundries	technology	
	Greenhouses	NT:	Capacity planning
	Industrial facilities		Materials requirements
	Industrial plants	planning	
	Machine shops		Process planning
	Paper mills		
<b>Production management</b>			
UF:	Manufacturing	BT:	Production
management		RT:	Discrete-event systems
BT:	Management		Industrial plants
	Production		Manufacturing
RT:	Continuous improvement		Optimized production
	Continuous production	technology	
	Industrial engineering	NT:	Production control
	Inventory control		Assembly systems
	Lean production		Exhaust systems
	Mass production		Intelligent
	Production engineering	manufacturing systems	
	Productivity		Lean production
	Research and		Manufacturing systems
development management			Steering systems
	Technology management	<b>Productivity</b>	
	Waste management	UF:	Labor productivity
NT:	Control charts		Labour productivity
	Inventory management	BT:	Production
	Lead time reduction	RT:	Business
	Logistics		Human factors
	Process planning		Incentive schemes
	Production planning		Industrial psychology
			Management
			Manufacturing
<b>Production materials</b>			



# 2019 IEEE Thesaurus

	Personnel		Financial management
	Production management		Productivity
	Profitability		
<b>Professional aspects</b>		<b>Progenitor cells</b>	
BT:	Engineering profession	BT:	Cells (biology)
		RT:	Stem cells
<b>Professional communication</b>		<b>Prognostics and health management</b>	
UF:	Technical	UF:	PHM
communication		BT:	Product life cycle
RT:	Collaborative work	management	
	Cooperative		
communication		<i>Program generators</i>	
	Pragmatics	USE:	Automatic programming
	Semantics		
	Semiotics	<b>Program management</b>	
	Syntactics	UF:	Programme management
NT:	Collaboration	BT:	Management
	Communication aids	RT:	Project management
	Communication		Technical management
effectiveness		<b>Program processors</b>	
	Communication symbols	UF:	Assemblers (program)
	Context		Compilers (program)
	Databases		Interpreters (program)
	Global communication		Multi-threaded systems
	Grammar		Multi-threading
	Information analysis		
	Information resources	systems	Multithreaded systems
	Information retrieval		Multithreading systems
	Information science		Processors (program)
	Information services	BT:	System software
	Information systems	RT:	Input-output programs
	Information technology		Manycore processors
	Manuals		Operating systems
	Meetings	NT:	Application specific
	Oral communication	processors	
	Plagiarism		Graphics processing
	Portfolios	units	
	Professional societies		Instruction sets
	Public speaking		Optimizing compilers
	Rhetoric		
	Writing		
<b>Professional societies</b>		<i>Program profiling</i>	
BT:	Professional	USE:	Programming
communication			
<i>Profit sharing schemes</i>		<b>Programmable circuits</b>	
USE:	Incentive schemes	BT:	Circuits
		NT:	Field programmable
<b>Profitability</b>		analog arrays	
BT:	Economics		Programmable logic
RT:	Cost accounting	arrays	
	Econometrics		Programmable logic
		devices	



# 2019 IEEE Thesaurus

## Programmable control

BT: Digital control  
RT: Industrial control  
Manufacturing

## automation

NT: Flow graphs

## Programmable logic arrays

UF: PLA  
BT: Circuits  
Logic arrays  
Logic circuits  
Programmable circuits  
RT: Programmable logic

## devices

## Programmable logic devices

BT: Circuits  
Logic devices  
Programmable circuits  
RT: High level synthesis  
Programmable logic

## arrays

## Programmable read only memory

USE: PROM

## Programme management

USE: Program management

## Programmed instruction

USE: Educational technology

## Programming

UF: Program profiling  
BT: Computer science  
RT: Aerospace and

## electronic systems

Digital computers  
Flowcharts  
Null value  
Programming

## environments

Runtime  
Self-assembly  
Software  
Software debugging  
Software tools  
Structured Query

## Language

NT: Syntactics  
Augmented reality  
Automatic programming  
Concatenated codes

Functional programming  
Granular computing  
Integer linear

## programming

Logic programming  
Microprogramming  
Object oriented

## methods

Object oriented

## programming

Opportunistic software  
systems development  
Parallel programming  
Performance analysis  
Programming profession  
Robot programming

## Programming environments

BT: Software engineering  
RT: Computer aided

## software engineering

Programming  
Software debugging  
Software tools

## Programming Languages

USE: Computer languages

## Programming profession

UF: Computer programming

## profession

BT: Programming  
RT: Employment  
Engineering profession

## Project engineering

BT: Engineering management  
NT: Scheduling  
Turnkey project

## Project management

BT: Management  
RT: Concurrent engineering  
Lead time reduction  
Program management  
Requirements

## engineering

Requirements

## management

Research and

## development management

Scrum (Software

## development)

System integration



# 2019 IEEE Thesaurus

	Technology management		Perfectly matched
NT:	Proposals	layers	
	Turnkey project		Reflection
<b>Projectiles</b>			Scattering
BT:	Weapons		Transient response
<b>Projection algorithms</b>		<b>Propagation constant</b>	
BT:	Algorithms	BT:	Electromagnetic
		propagation	
<b>Projective geometry</b>		<b>Propagation delay</b>	
BT:	Geometry	BT:	Delay effects
<i>Projective shadowing</i>		<i>Propagation loss</i>	
USE:	Shadow mapping	USE:	Propagation losses
<i>projectors (optical)</i>		<b>Propagation losses</b>	
USE:	Optical projectors	UF:	Propagation loss
<b>PROM</b>		BT:	Electromagnetic
UF:	Programmable read only	propagation	
memory		<b>Propellants</b>	
BT:	Read only memory	BT:	Chemical products
NT:	EPROM		
<b>Promethium</b>		<b>Propellers</b>	
BT:	Chemical elements	BT:	Aircraft propulsion
		RT:	Aircraft
<b>Promotion - marketing</b>			Blades
UF:	Sales promotion		Engines
BT:	Marketing management		Impellers
RT:	Public relations		Marine vehicles
			Shafts
<b>Proof of work</b>		<i>Proportional + derivative control</i>	
BT:	Computer security	USE:	PD control
	Protocols		
RT:	Blockchain	<i>Proportional + integral control</i>	
	Denial-of-service	USE:	PI control
attack			
<b>Propagation</b>		<b>Proportional control</b>	
UF:	Wave equations	BT:	Control systems
	Wave propagation		
BT:	Waves	<i>Proportional derivative control</i>	
RT:	Damping	USE:	PD control
	Electromagnetic	<i>Proportional plus derivative control</i>	
waveguides		USE:	PD control
NT:	Attenuation	<i>Proportional-derivative control</i>	
	Electromagnetic	USE:	PD control
propagation		<i>Proportional-integral control</i>	
	Insertion loss	USE:	PI control
propagation	Nonlinear wave		





# 2019 IEEE Thesaurus

## *Proportional-integral controller*

USE: PI control

replacements

Knee joint

## *Proportional-integral-derivative*

USE: PD control

BT:

RT:

Neural prostheses

Prosthesis

Medical services

Assistive technology

Bioceramics

Biological control

## *Proportional-integral-derivative control*

USE: PI control

systems

Biomedical equipment

Medical control

## *Proportional-integral-derivative controller*

USE: PI control

systems

Orthotics

Sensory aids

Wearable robots

Artificial biological

## **Proposals**

UF: Technical proposals

BT: Project management

RT: Contracts

Procurement

Technical requirements

Writing

NT:

organs

Artificial limbs

Prosthetic hand

Prosthetic limbs

Visual prosthesis

## **Propulsion**

BT: Vehicular and wireless technologies

RT: Engines

Plasma jets

Traction motors

Vehicle-to-grid

NT: Aerospace propulsion

Aircraft propulsion

Electromagnetic

launching

Electrothermal

launching

Rockets

## **Protactinium**

BT: Chemical elements

## **Protection**

BT: Safety

RT: Circuit breakers

Fuses

Galvanizing

Grounding

Hazardous areas

Occupational safety

Security

Uninterruptible power

## *Prosencephalon*

USE: Forebrain

systems

NT:

Explosion protection

Lightning protection

Radiation protection

## **Prostate cancer**

BT: Cancer

## **Protection switching**

UF: Automatic protection switching

BT: Optical fiber networks

## *Prosthesis*

USE: Prosthetics

## **Protective clothing**

BT: Clothing

Safety devices

RT:

Clothing industry

Eye protection

Occupational health

Occupational safety

Safety

## **Prosthetic hand**

BT: Prosthetics

## **Prosthetic limbs**

BT: Prosthetics

## **Prosthetics**

UF: Hip joint replacements



# 2019 IEEE Thesaurus

## Protective relaying

UF: Distance relays  
Protective relays  
BT: Relays  
RT: Instrument  
transformers  
Power system  
protection  
Power system relaying

## Protective relays

USE: Protective relaying

## Protein engineering

BT: Biomedical engineering

## Protein sequence

BT: Proteins

## Proteins

BT: Biochemistry  
NT: Protein sequence

## Proteomics

BT: Molecular biomarkers

## Protocols

UF: Communication  
protocols  
BT: Communication systems  
RT: Ad hoc networks  
Bluetooth  
Concurrency control  
Frame relay  
IEEE 802.11 Standard  
IEEE 802.11e Standard  
IEEE 802.11g Standard  
IEEE 802.11n Standard  
IPTV  
Internet of Things  
Local area networks  
Metropolitan area  
networks  
Multicarrier code  
division multiple access  
Software defined  
networking  
TCPIP  
Wide area networks  
NT: Access protocols  
Asynchronous transfer  
mode  
Cryptographic  
protocols

Master-slave  
Multicast protocols  
Multiprotocol label  
switching  
Proof of work  
Routing protocols  
Smart contracts  
Transport protocols  
Wireless application  
protocol  
Zero knowledge proof

## Proton accelerators

BT: Particle accelerators  
RT: Ion accelerators  
Protons

## Proton beam effects

USE: Proton effects

## Proton beams

USE: Particle beams

## Proton effects

UF: Biological effects of  
protons  
BT: Proton beam effects  
Electrothermal effects  
Quantum mechanics  
RT: Elementary particle  
exchange interactions  
Elementary particles  
High energy physics  
instrumentation computing  
Protons  
Radiation effects  
Space vehicles  
Thermal factors  
NT: Proton radiation  
effects  
Single event latchup

## Proton radiation effects

BT: Proton effects  
RT: Bipolar transistors  
Ion radiation effects  
Protons  
Radiation effects  
Semiconductor devices  
Silicon-on-insulator

## Proton therapy

BT: Medical treatment



# 2019 IEEE Thesaurus

RT: Biological effects of radiation

## Protons

BT: Elementary particles  
RT: Cosmic rays  
Ions  
Proton accelerators  
Proton effects  
Proton radiation

effects

## Prototypes

BT: Design methodology  
RT: Laser sintering  
Product design  
Stereolithography  
Virtual prototyping  
NT: Breadboard  
Rapid prototyping

## Proximity effects

UF: Current crowding  
BT: Electromagnetics  
RT: Conductors  
Lithography

## Pry and Bean model

USE: Bean model

## PSCAD

UF: Power Systems Computer

## Aided Design

BT: Design automation  
Power systems  
Software packages

## Pseudobinary semiconductors

USE: Semiconductor materials

## Pseudomorphic HEMTs

USE: PHEMTs

## Pseudonoise coded communication

USE: Spread spectrum communication

## Pseudonoise coded radar

USE: Spread spectrum radar

## Pseudorandom sequences

USE: Random sequences

## PSK

USE: Phase shift keying

## PSNR

UF: Peak signal to noise ratio  
Peak signal-to-noise ratio  
BT: Signal to noise ratio

## pSPICE

USE: SPICE

## PSTN

USE: Communication networks

## Psychiatry

BT: Behavioral sciences  
RT: Medical treatment  
NT: Mental disorders

## Psychoacoustic models

BT: Auditory system  
NT: Masking threshold

## Psychoacoustics

BT: Acoustics  
RT: Auditory system

## Psychology

BT: Behavioral sciences  
RT: Affective computing  
Cognition  
Cognitive science  
Emotion recognition  
Employee welfare  
Persuasive systems  
Social engineering

## (security)

NT: Emotional responses  
Industrial psychology  
Mood  
Neuropsychology  
Psychometric testing

## Psychometric testing

BT: Psychology  
RT: Industrial psychology

## PTMP

USE: Point-to-multipoint communications

## Public domain software



# 2019 IEEE Thesaurus

BT:	Open Access Software	BT:	Government policies
RT:	Copyright protection Open source software	RT:	Public infrastructure
NT:	Python		
<b>Public finance</b>		<b>Public relations</b>	
UF:	Government borrowing Government expenditure	BT:	Management
BT:	Governmental factors	RT:	Customer relationship management
RT:	Financial management Government Macroeconomics		Marketing management Promotion - marketing
<i>Public health</i>		<b>Public speaking</b>	
USE:	Public healthcare	UF:	Speechmaking
		BT:	Oral communication Professional communication
<b>Public healthcare</b>		RT:	Meetings
UF:	Public health	<i>Public switched telephone network</i>	
BT:	Medical services	USE:	Communication networks
		<b>Public transportation</b>	
<b>Public infrastructure</b>		UF:	Subways Taxi Trolley cars Uber
BT:	Asset management	BT:	Transportation
RT:	Electricity supply industry management Environmental Government policies Public policy Rural areas Urban areas Urban planning	RT:	Light rail systems Rail transportation Urban areas
NT:	Critical	<b>Publish subscribe systems</b>	
infrastructure		UF:	Publish-subscribe systems Publish/subscribe systems
<b>Public key</b>		BT:	Message systems
BT:	Cryptography	RT:	Content management Middleware Pattern recognition Queueing analysis
NT:	Public key cryptography		
<b>Public key cryptography</b>		<b>Publish-subscribe</b>	
UF:	Public key	BT:	Distributed information systems
cryptosystems		<i>Publish-subscribe systems</i>	
BT:	Public key	USE:	Publish subscribe systems
NT:	Elliptic curve	<i>Publish/subscribe systems</i>	
cryptography		USE:	Publish subscribe systems
encryption	Identity-based		
<i>Public key cryptosystems</i>		<b>Publishing</b>	
USE:	Public key cryptography		
<b>Public policy</b>			



# 2019 IEEE Thesaurus

BT:	Computer applications	RT:	Digital circuits
RT:	Bibliographies	NT:	Flip-flops
	Copyright protection		
	Digital printing		
	Document handling		
	Guidelines		
	Plagiarism		
	Printing		
	Text processing		
NT:	Bibliometrics		
	Company reports		
	Desktop publishing		
	Electronic publishing		
	Open Access		
	Scientific publishing		
<b>Pulleys</b>			
	BT:	Materials handling	
equipment	RT:	Freight handling	
		Lifting equipment	
		Loading	
<b>Pulp and paper industry</b>			
	UF:	Paper industry	
	BT:	Manufacturing	
industries	RT:	Forestry	
		Paper products	
		Paper pulp	
		Paper technology	
		Pulp manufacturing	
		Spinning machines	
		Wood industry	
NT:		Paper making	
		Paper making machines	
		Paper mills	
<b>Pulp manufacturing</b>			
	BT:	Manufacturing systems	
	RT:	Paper making	
		Paper making machines	
		Paper mills	
		Paper pulp	
		Pulp and paper	
industry		Wood industry	
<b>Pulse amplifiers</b>			
	BT:	Amplifiers	
<b>Pulse circuits</b>			
	UF:	Bistable multivibrator	
	BT:	Circuits	
		Digital circuits	
		Flip-flops	
		Pulse compression methods	
		BT:	Signal processing
		NT:	Optical pulse
		compression	
		Pulse generation	
		UF:	Impulse generation
			Pulse generators
		BT:	Signal generators
		NT:	Optical pulse
		generation	
		Pulse generators	
		USE:	Pulse generation
		Pulse inverters	
		UF:	Logic inverters
		BT:	Inverters
		RT:	Logic circuits
		Pulse measurements	
		UF:	Impulse measurements
		BT:	Measurement
		RT:	Electric variables
		measurement	
		Pulse modulation	
		BT:	Modulation
		RT:	Demodulation
		Pulse oximetry	
		BT:	Instrumentation and
		measurement	
			Noninvasive treatment
		RT:	Biomedical measurement
			Oxygen
			Remote sensing
		Pulse shaping	
		USE:	Pulse shaping methods
		Pulse shaping methods	
		UF:	Pulse shaping
		BT:	Signal processing
		NT:	Optical pulse shaping
		Pulse transformers	
		BT:	Transformers
		Pulse width modulated power converters	



# 2019 IEEE Thesaurus

USE: Pulse width modulation  
converters

DC motors  
DC-DC power converters

## Pulse width modulation

UF: PWM  
Pulsewidth modulation  
Pulsewidth-modulation  
BT: Modulation  
RT: AC generators  
AC machines  
AC motors  
Converters  
DC generators  
DC machines  
DC motors  
Pulse width modulation

converters

NT: Pulse width modulation  
inverters

Space vector pulse  
width modulation

## Pulse width modulation converters

UF: PWM converters  
PWM convertors  
Pulse width modulated  
Pulse width modulation  
Pulsewidth modulation  
Pulsewidth modulation  
BT: Converters  
RT: Power conditioning  
Power control  
Power conversion  
Power electronics  
Pulse width modulation  
Voltage-source

converters

## Pulse width modulation convertors

USE: Pulse width modulation  
converters

## Pulse width modulation inverters

UF: PWM invertors  
Pulse width modulation  
BT: Pulse width modulation  
RT: AC motors  
AC-DC power converters  
Converters

invertors

## Pulse width modulation invertors

USE: Pulse width modulation  
inverters

## Pulsed electroacoustic methods

BT: Acoustoelectric  
effects  
RT: Acoustoelectric  
devices

Charge measurement  
Insulation testing  
Space charge

## Pulsed laser deposition

BT: Chemical vapor  
deposition

## Pulsed power supplies

BT: Pulsed power systems

## Pulsed power systems

BT: Power systems  
RT: Energy storage  
High-voltage

techniques

Power generation  
Power supplies

NT: Pulsed power supplies

## Pulsewidth modulation

USE: Pulse width modulation

## Pulsewidth modulation converters

USE: Pulse width modulation  
converters

## Pulsewidth modulation convertors

USE: Pulse width modulation  
converters

## Pulsewidth-modulation

USE: Pulse width modulation

## Pump lasers

BT: Lasers

## Pumping of Lasers

USE: Laser excitation

## Pumps

BT: Machinery



# 2019 IEEE Thesaurus

RT:	Bellows	Thermal factors
	Compressors	
	Impellers	
	Turbomachinery	
NT:	Fuel pumps	
	Heat pumps	
	Insulin pumps	
	Micropumps	
	Water pumps	
<b>Punching</b>		
BT:	Materials processing	
RT:	Sheet metal processing	
<b>Purification</b>		
BT:	Cleaning	
RT:	Air cleaners	
	Decontamination	
	Refining	
	Sugar refining	
<b>Pursuit algorithms</b>		
BT:	Algorithms	
<i>PWM</i>		
USE:	Pulse width modulation	
<i>PWM converters</i>		
USE:	Pulse width modulation converters	
<i>PWM convertors</i>		
USE:	Pulse width modulation converters	
<i>PWM invertors</i>		
USE:	Pulse width modulation inverters	
<i>Pylons</i>		
USE:	Poles and towers	
<b>Pyroelectric devices</b>		
BT:	Dielectric devices	
RT:	Pyroelectricity	
<b>Pyroelectricity</b>		
BT:	Electricity	
	Ultrasonics,	
ferroelectrics, and frequency control		
RT:	Ferroelectric materials	
	Piezoelectricity	
	Pyroelectric devices	
<b>Python</b>		
BT:	Computer languages	
	Public domain software	
RT:	Functional programming	
	Object oriented programming	
	Software libraries	
<i>Q factor</i>		
USE:	Q-factor	
<b>Q measurement</b>		
BT:	Electric variables measurement	
RT:	Q-factor	
<b>Q-factor</b>		
UF:	Q factor	
	Quality factor	
BT:	Electric variables	
RT:	Capacitors	
	Q measurement	
<i>QAM</i>		
USE:	Quadrature amplitude modulation	
<i>qbit</i>		
USE:	Qubit	
<i>QCD vacuum</i>		
USE:	Elementary particle vacuum	
<i>QFD</i>		
USE:	Quality function deployment	
<i>QFP</i>		
USE:	Electronics packaging	
<i>QoE</i>		
USE:	Quality of experience	
<i>QoS</i>		
USE:	Quality of service	
<i>Qox</i>		
USE:	Quality of experience	
<i>QPSK</i>		
USE:	Phase shift keying	



# 2019 IEEE Thesaurus

<i>QR codes</i>	BT: Quality management
USE: Bar codes	RT: Contamination
	Coordinate measuring
<i>Quad flat packs</i>	machines
USE: Electronics packaging	Data integrity
	Design for quality
<b>Quadratic programming</b>	Failure analysis
BT: Optimization methods	IEEE 802.11e Standard
	Quality assurance
	Quality function
<b>Quadrature amplitude modulation</b>	deployment
UF: QAM	Reliability
BT: Amplitude modulation	Six sigma
	Total quality
<b>Quadrature phase shift keying</b>	management
BT: Phase shift keying	
NT: Differential	<i>Quality factor</i>
quadrature phase shift keying	USE: Q-factor
<b>Qualifications</b>	<b>Quality function deployment</b>
BT: Training	UF: QFD
RT: Continuing	BT: Quality management
professional development	RT: Concurrent engineering
Standards	Product development
	Quality assurance
<b>Quality assessment</b>	Quality awards
BT: Quality management	Quality control
<b>Quality assurance</b>	<b>Quality management</b>
BT: Quality management	UF: ISO 9000
RT: Consumer protection	BT: Management
Data integrity	RT: Control charts
Design for quality	Customer relationship
IEEE 802.11e Standard	
Product liability	management
Quality awards	Customer satisfaction
Quality control	Design for quality
Quality function	ISO Standards
deployment	Pareto analysis
Six sigma	Product liability
Total quality	Reliability
management	System improvement
NT: Best practices	NT: Quality assessment
	Quality assurance
<b>Quality awards</b>	Quality awards
BT: Quality management	Quality control
RT: Continuous improvement	Quality function
Quality assurance	deployment
Quality function	Total quality
deployment	management
Total quality	<b>Quality of experience</b>
management	UF: QoE
	Qox
<b>Quality control</b>	BT: Communication systems





# 2019 IEEE Thesaurus

	Customer satisfaction	BT:	Quantum well lasers
RT:	Quality of service	RT:	Quantum mechanics
<b>Quality of service</b>		<b>Quantum cellular automata</b>	
UF:	QoS	BT:	Quantum computing
	Quality-of-service		
BT:	Communication systems	<b>Quantum communication</b>	
	Customer satisfaction	BT:	Communication systems
RT:	Conformance testing	RT:	Channel capacity
	IEEE 802.11e Standard		Information theory
	IP networks		Optical fiber
	Next generation	communication	Teleportation
networking			
	Quality of experience	<b>Quantum computing</b>	
	Spatial diversity	BT:	Computers and
computing	Telecommunication	information processing	
NT:	Admission control		Electron devices
		NT:	Quantum cellular
<i>Quality-of-service</i>		automata	
USE:	Quality of service		Qubit
<i>Quantisation</i>		<i>Quantum confinement</i>	
USE:	Quantization (signal)	USE:	Potential well
<b>Quantization (signal)</b>		<b>Quantum cryptography</b>	
UF:	Quantisation	BT:	Cryptography
	Quantization effects		Quantum mechanics
	Quantization errors		
	Signal quantisation	<i>Quantum dash</i>	
	Signal quantization	USE:	Quantum dots
BT:	Signal processing		
RT:	Analog-digital	<b>Quantum dot lasers</b>	
conversion		UF:	Quantum-dot lasers
	Data compression	BT:	Semiconductor lasers
	Encoding	RT:	Quantum dots
	Finite wordlength		Quantum mechanics
effects			Quantum well lasers
	Signal sampling	<b>Quantum dots</b>	
NT:	Vector quantization	UF:	Quantum dash
			Quantum-dot
<i>Quantization effects</i>			Quantum-dots
USE:	Quantization (signal)	BT:	Semiconductor devices
		RT:	Nanocrystals
<i>Quantization errors</i>			Quantum dot lasers
USE:	Quantization (signal)		Quantum mechanics
<b>Quantum capacitance</b>		<b>Quantum entanglement</b>	
BT:	Capacitance	UF:	Entangled states
	Quantum mechanics	BT:	Quantum mechanics
RT:	CNTFETs	RT:	Teleportation
<b>Quantum cascade lasers</b>		<b>Quantum mechanics</b>	
UF:	Cascade lasers		



# 2019 IEEE Thesaurus

considerations	UF:	Quantum theory	UF:	Quantum-well lasers
	BT:	Physics	BT:	Lasers
	RT:	Laser theory		Quantum well devices
		Nanotechnology		Semiconductor devices
		Philosophical		Semiconductor lasers
				Solid lasers
		Quantum cascade lasers	RT:	Quantum dot lasers
		Quantum dot lasers		Quantum mechanics
		Quantum dots		Quantum wells
		Quantum well devices		Semiconductor optical
theory		Quantum well lasers		
		Resonant frequency	amplifiers	Surface emitting
		Solid-state physics	lasers	Two dimensional hole
		String theory	gas	
	NT:	Density functional	NT:	Quantum cascade lasers
		Lagrangian functions		
		Proton effects	<b>Quantum wells</b>	
		Quantum capacitance	UF:	Semiconductor quantum
		Quantum cryptography	wells	
		Quantum entanglement	BT:	Electrons
mechanics		Relativistic quantum		Quantum well devices
		Schrodinger equation	RT:	Quantum well lasers
		Stationary state		Surface emitting
		Teleportation	lasers	Two dimensional hole
		Tunneling	gas	
			<i>Quantum-dot</i>	
			USE:	Quantum dots
			<i>Quantum-dot Lasers</i>	
<i>Quantum teleportation</i>			USE:	Quantum dot lasers
		USE:		
		Teleportation		
<i>Quantum theory</i>				
		USE:		
		Quantum mechanics		
<i>Quantum vacuum</i>				
		USE:		
		Elementary particle		
vacuum				
			<i>Quantum-dots</i>	
			USE:	Quantum dots
			<i>Quantum-well devices</i>	
			USE:	Quantum well devices
<b>Quantum well devices</b>				
		UF:		
		Quantum-well devices		
		Quantumwell devices		
		BT:		
		Electron devices		
		RT:		
		Electrooptic		
modulators				
		Quantum mechanics		
		Resonant tunneling		
devices				
		Tunneling		
		NT:		
		Quantum well lasers		
		Quantum wells		
		Two dimensional hole		
gas				
			<b>Quasi-doping</b>	
<b>Quantum well lasers</b>				



# 2019 IEEE Thesaurus

BT: Semiconductor device  
manufacture  
RT: Semiconductor device  
doping

*Quasi-resonant inverters*  
USE: Resonant inverters

*Quasi-resonant invertors*  
USE: Resonant inverters

**Quaternions**  
BT: Mathematics

**Qubit**  
UF: qbit  
BT: Quantum computing

*Query evaluation*  
USE: Query processing

*Query Languages*  
USE: Database languages

*Query optimisation*  
USE: Query processing

*Query optimization*  
USE: Query processing

*Query pipeline*  
USE: Query processing

*Query process*  
USE: Query processing

**Query processing**  
UF: Query evaluation  
Query optimisation  
Query optimization  
Query pipeline  
Query process  
Query routing  
BT: Database systems  
RT: Linked data  
NoSQL databases  
Semantic search

*Query routing*  
USE: Query processing

**Queueing analysis**  
UF: Queueing theory  
BT: Traffic control

RT: Publish subscribe  
systems  
Scheduling

*Queueing theory*  
USE: Queueing analysis

**Rabbits**  
BT: Animals

*Rad hardened*  
USE: Radiation hardening  
(electronics)

*Rad-hard*  
USE: Radiation hardening  
(electronics)

**Radar**  
UF: Microwave radar  
BT: Aerospace and  
electronic systems  
Geoscience and remote  
sensing

RT: Microwave technology  
Radar detection  
Radar scattering  
NT: Airborne radar  
Bistatic radar  
Cognitive radar  
Doppler radar  
Ground penetrating

radar  
High frequency radar  
Laser radar  
Meteorological radar  
Millimeter wave radar  
Multistatic radar  
Passive radar  
Radar applications  
Radar clutter  
Radar cross-sections  
Radar equipment  
Radar theory  
Spaceborne radar  
Spread spectrum radar  
Synthetic aperture

radar  
Ultra wideband radar

**Radar antennas**  
BT: Antennas

**Radar applications**



# 2019 IEEE Thesaurus

techniques  
 BT: Radar  
 RT: Oceanographic  
 NT: Radar countermeasures  
 Radar detection  
 Radar imaging  
 Radar measurements  
 Radar polarimetry  
 Radar remote sensing  
 Radar tracking

## Radar clutter

BT: Radar  
 RT: Jamming

## Radar countermeasures

BT: Electronic warfare  
 Radar applications  
 RT: Adaptive arrays  
 Electronic

## countermeasures

Jamming  
 Spread spectrum radar

## Radar cross section

USE: Radar cross-sections

## Radar cross sections

USE: Radar cross-sections

## Radar cross-section

USE: Radar cross-sections

## Radar cross-sections

UF: Radar cross section  
 Radar cross sections  
 Radar cross-section  
 BT: Radar  
 Radar measurements  
 Reflection

## Radar detection

BT: Radar applications  
 Signal detection  
 RT: Ground penetrating

## radar

Passive radar  
 Radar  
 Ultra wideband radar

## Radar equipment

BT: Radar

## Radar imaging

BT: Radar applications  
 RT: Ground penetrating  
 radar  
 Landmine detection  
 Meteorological radar  
 Passive radar  
 Remote sensing  
 Synthetic aperture  
 radar  
 Ultra wideband radar

## Radar interferometry

BT: Interferometry  
 NT: Synthetic aperture

## radar interferometry

## Radar measurements

BT: Radar applications  
 RT: Remote sensing  
 NT: Radar cross-sections

## Radar meteorology

USE: Meteorological radar

## Radar polarimetry

UF: SAR imaging  
 Synthetic aperture

## radar imaging

BT: Radar applications

## Radar remote sensing

BT: Radar applications  
 RT: Spaceborne radar

## Radar scattering

BT: Electromagnetic  
 scattering  
 RT: Radar

## Radar signal processing

BT: Signal processing

## Radar theory

BT: Radar

## Radar tracking

BT: Radar applications  
 RT: Target tracking

## Radial basis function networks

UF: RBF networks  
 Radial basis function

## neural networks

BT: Neural networks



# 2019 IEEE Thesaurus

intelligence	RT: Artificial	UF: Irradiation	BT: Nuclear and plasma sciences
	Computer networks		
	Cybernetics	RT: Biomedical applications of radiation	
	Interpolation	Brachytherapy	
<i>Radial basis function neural networks</i>		High energy physics	
USE: Radial basis function networks		instrumentation computing	
		Proton effects	
<i>Radiation counters</i>		Proton radiation	
USE: Radiation detectors		effects	
<i>Radiation detection</i>			Radiation monitoring
USE: Radiation detectors			Radiation protection
			Safety
<b>Radiation detector circuits</b>		NT: Biological effects of radiation	
BT: Circuits			Gamma-ray effects
RT: Counting circuits			Ion radiation effects
Radiation detectors			Neutron radiation
		effects	
<b>Radiation detectors</b>			Scintillators
UF: Counters			Single event latchup
Particle detectors			Space radiation
Radiation counters			Terahertz radiation
Radiation detection			Total ionizing dose
Ratemeters			
BT: Ionizing radiation		<b>Radiation hardening (electronics)</b>	
sensors		UF: Rad hardened	
		Rad-hard	
RT: Atomic measurements		BT: Electronic equipment	
Dosimetry		manufacture	
Nuclear measurements		sciences	Nuclear and plasma
Phototransistors		RT: Ionizing radiation	
Radiation detector		Satellite	
circuits		communication	
			Total ionizing dose
	Radiation monitoring		
	Spectroscopy	<b>Radiation imaging</b>	
	X-ray detectors	BT: Imaging	
NT: Bolometers		RT: Biomedical imaging	
Gamma-ray detectors			
Infrared detectors			
Photodetectors			
Semiconductor			
radiation detectors		<b>Radiation monitoring</b>	
	Silicon radiation	UF: Health physics	
detectors		Personnel monitoring	
		BT: Monitoring	
		Nuclear and plasma	
<b>Radiation dosage</b>		sciences	
BT: Radiation monitoring		RT: Dosimetry	
		Radiation detectors	
<i>Radiation dosimetry</i>		Radiation effects	
USE: Dosimetry		Radiation protection	
		Radioactive pollution	
<b>Radiation effects</b>			



# 2019 IEEE Thesaurus

instrumentation	Reactor	Telecommunication
NT: Radiation dosage		services
<i>Radiation pattern</i>		<b>Radio access technologies</b>
USE: Antenna radiation		BT: Communication networks
patterns		<b>Radio astronomy</b>
<b>Radiation protection</b>		UF: Radio telescopes
UF: Radiation shielding		BT: Antennas and
Radiological		propagation
protection		RT: Astronomy
BT: Protection		Reflector antennas
Radiation safety		Telescopes
RT: Biological effects of		
radiation		<b>Radio broadcasting</b>
Contamination		BT: Broadcasting
Dosimetry		Radio communication
Fission reactors		RT: Digital multimedia
Radiation effects		broadcasting
Radiation monitoring		NT: Frequency modulation
Radioactive pollution		Radio networks
		<b>Radio communication</b>
<b>Radiation safety</b>		BT: Communication systems
BT: Nuclear and plasma		RT: Bandwidth
sciences		Convolutional codes
Safety		Cross layer design
NT: Radiation protection		Diversity methods
		Film bulk acoustic
<i>Radiation shielding</i>		resonators
USE: Radiation protection		IEEE 802.11 Standard
		IEEE 802.11g Standard
<i>Radiation therapy</i>		IEEE 802.11n Standard
USE: Biomedical		IEEE 802.15 Standard
applications of radiation		MIMO communication
		Mobile communication
<b>Radiative recombination</b>		NOMA
BT: Spontaneous emission		Radio access networks
RT: Semiconductor		Radio communication
materials		equipment
		Radio propagation
<i>Radiators (automotive)</i>		SIMO communication
USE: Automotive components		SISO communication
		Wireless LAN
<b>Radio access networks</b>		NT: Baseband
UF: RAN		Bluetooth
BT: Telecommunications		Indoor radio
RT: 3G mobile		communication
communication		Land mobile radio
4G mobile		Millimeter wave
communication		communication
Land mobile radio		Near field
Radio communication		communication
		Packet radio networks



# 2019 IEEE Thesaurus

	Passband	USE:	Radiofrequency
	Personal area networks		identification
	Radio broadcasting		
	Radio communication		<i>Radio frequency integrated circuits</i>
countermeasures		USE:	Radiofrequency
	Radio frequency		integrated circuits
	Radio link		
	Radio spectrum		<i>Radio frequency interference</i>
management		USE:	Radiofrequency
	Satellite		interference
communication			
	Satellite ground		<i>Radio frequency power amplifiers</i>
stations		USE:	Power amplifiers
	Software radio		
	ZigBee		<i>Radio interference</i>
		USE:	Electromagnetic
<b>Radio communication countermeasures</b>			interference
BT:	Communication system		
security			<b>Radio interferometry</b>
	Radio communication	UF:	Radiowave
RT:	Adaptive arrays		interferometry
	Electronic	BT:	Interferometry
countermeasures			
	Electronic warfare		<i>Radio LAN</i>
	Jamming	USE:	Wireless LAN
	Spread spectrum		
communication			<b>Radio link</b>
		BT:	Radio communication
<b>Radio communication equipment</b>		RT:	Transport protocols
BT:	Communication		
equipment			<b>Radio navigation</b>
	Antennas	UF:	Loran
	Radio communication	BT:	Navigation
	Telephone equipment	RT:	Air traffic control
NT:	Base stations		Indoor navigation
	Ham radios		Satellite navigation
	Land mobile radio		
equipment		systems	
			Transponders
	Radio transceivers		
	Transponders		<b>Radio networks</b>
		BT:	Radio broadcasting
<b>Radio control</b>			
BT:	Control systems		<b>Radio propagation</b>
<b>Radio frequency</b>		BT:	Electromagnetic
UF:	RF		propagation
	Radio-frequency	RT:	Fading channels
	Radiofrequency		Multipath channels
			Radio communication
BT:	Radio communication		Radiowave propagation
RT:	Light fidelity		Rayleigh channels
	Wireless fidelity		
NT:	High frequency		<i>Radio receivers</i>
		USE:	Receivers

*Radio frequency identification*



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# 2019 IEEE Thesaurus

## *Radio resource management*

USE: Resource management

## **Radio spectrum management**

UF: Frequency allocation  
Spectrum management

BT: Radio communication

RT: Communication

standards

NT: Direct sequence spread

spectrum communication

White spaces

## *Radio telescopes*

USE: Radio astronomy

## **Radio transceivers**

BT: Radio communication

equipment

Transceivers

NT: Dynamic spectrum

access

## **Radio transmitters**

BT: Transmitters

## *Radio-frequency*

USE: Radio frequency

## *Radio-frequency identification*

USE: Radiofrequency

identification

## *Radio-frequency interference*

USE: Radiofrequency

interference

## **Radioactive decay**

BT: Radioactive materials

## *Radioactive label*

USE: Radiotracer

## **Radioactive materials**

UF: Alphavoltaic power

sources

Betavoltaic power

sources

Radioisotopes

BT: Materials

RT: Isotopes

Neutrino sources

Occupational health

Occupational safety

Radioactive pollution

Safety

NT: Nuclear fuels

Radioactive decay

Radioactive waste

## **Radioactive pollution**

UF: Nuclear wastes

BT: Pollution

RT: Hazardous areas

Incineration

Industrial pollution

Land pollution

Radiation monitoring

Radiation protection

Radioactive materials

Radioactive waste

Radioactive waste

disposal

Safety

Waste materials

## *Radioactive tracer*

USE: Radiotracer

## **Radioactive waste**

BT: Radioactive materials

Waste materials

RT: Hazardous areas

Hazardous materials

Incineration

Materials handling

Nuclear facility

regulation

Nuclear fuels

Radioactive pollution

Waste disposal

Waste management

NT: Radioactive waste

disposal

## **Radioactive waste disposal**

BT: Radioactive waste

Waste disposal

RT: Incineration

Materials handling

Radioactive pollution

Vitrification

Waste handling

## *Radiofrequency*

USE: Radio frequency

## **Radiofrequency amplifiers**



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# 2019 IEEE Thesaurus

UF: Radiofrequency power  
amplifiers  
BT: Amplifiers

## Radiofrequency identification

UF: RFID  
Radio frequency  
identification  
Radio-frequency  
identification

BT: Sensor systems and  
applications

RT: Internet of Things  
Product codes  
Radiofrequency

integrated circuits

NT: RFID tags

## Radiofrequency integrated circuits

UF: RFIC  
Radio frequency  
integrated circuits

BT: Integrated circuits

RT: MIMICs

MMICs

Radiofrequency

identification

## Radiofrequency interference

UF: Radio frequency  
interference  
Radio-frequency  
interference

BT: Electromagnetic  
interference

RT: Superconducting

filters

*Radiofrequency micro-electro-mechanical  
systems*

USE: Radiofrequency  
microelectromechanical systems

*Radiofrequency micro-electromechanical  
systems*

USE: Radiofrequency  
microelectromechanical systems

## Radiofrequency microelectromechanical systems

UF: RF micro-electro-  
mechanical systems  
RF  
microelectromechanical systems

Radiofrequency micro-  
electro-mechanical systems

Radiofrequency micro-  
electromechanical systems

BT: Microelectromechanical  
systems

*Radiofrequency power amplifiers*

USE: Power amplifiers AND  
Radiofrequency  
amplifiers

## Radiographic image enhancement

BT: Biomedical image  
processing

## Radiography

BT: Imaging

RT: Biomedical

applications of radiation

Medical diagnosis

Nuclear imaging

X-ray detection

X-ray imaging

NT: Diagnostic radiography

## Radioisotope thermoelectric generators

BT: Atomic batteries

*Radioisotopes*

USE: Radioactive materials

*Radiological protection*

USE: Radiation protection

## Radiology

BT: Biomedical image  
processing

NT: Neuroradiology

## Radiometers

BT: Meters

Radiometry

NT: Spectroradiometers

## Radiometry

BT: Electromagnetic  
measurements

Geoscience and remote  
sensing

RT: Imaging

Photometry

Remote sensing



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# 2019 IEEE Thesaurus

measurement	Temperature	NT:	Rail to rail
NT:	Microwave radiometry	amplifiers	Rail to rail inputs
	Radiometers		Rail to rail outputs
<b>Radiotracer</b>		<b>Rail to rail outputs</b>	
UF:	Radioactive label	UF:	RRO
	Radioactive tracer	BT:	Rail to rail operation
BT:	Chemical compounds	RT:	Nonlinear circuits
			Rail to rail
<i>Radiowave interferometry</i>		amplifiers	
USE:	Radio interferometry	<i>Rail traffic</i>	
		USE:	Rail transportation
<b>Radiowave propagation</b>		<b>Rail transportation</b>	
BT:	Electromagnetic	UF:	Rail line
propagation			Rail lines
RT:	Radio propagation		Rail traffic
			Rail ways
<b>Radium</b>			Railways
BT:	Chemical elements	BT:	Land transportation
		RT:	Block signalling
<b>Radomes</b>			Land vehicles
BT:	Antenna accessories		Magnetic levitation
			Public transportation
<b>Radon</b>			High-speed rail
BT:	Chemical elements	NT:	
<i>Rail line</i>		transportation	
USE:	Rail transportation		Light rail systems
			Positive train control
<i>Rail lines</i>			Railway communication
USE:	Rail transportation		Railway
		electrification	
<b>Rail to rail amplifiers</b>		<i>Rail ways</i>	
BT:	Rail to rail operation	USE:	Rail transportation
RT:	Amplifiers		
	MODFET circuits	<b>Railguns</b>	
	MOSFET circuits	BT:	Electromagnetic
	Rail to rail inputs	launching	
	Rail to rail outputs	RT:	Rails
<b>Rail to rail inputs</b>		<b>Rails</b>	
UF:	RRI	BT:	Structural shapes
BT:	Rail to rail operation	RT:	Flanges
RT:	Nonlinear circuits		Railguns
	Rail to rail		
amplifiers		<b>Railway accidents</b>	
<b>Rail to rail operation</b>		UF:	Derailments
BT:	Circuits	BT:	Accidents
RT:	Amplifiers	RT:	Positive train control
	CMOSFET circuits		Railway engineering
	MODFET circuits		Railway safety
	MOSFET circuits		



# 2019 IEEE Thesaurus

## *Railway bridges*

USE: Structural panels

## **Railway communication**

BT: Rail transportation  
Telecommunications  
NT: Block signalling

## **Railway electrification**

BT: Rail transportation  
RT: Power overhead lines

## **Railway engineering**

BT: Civil engineering  
RT: Railway accidents  
NT: Railway safety

## **Railway safety**

BT: Railway engineering  
RT: Positive train control  
Railway accidents  
Safety devices

## *Railways*

USE: Rail transportation

## **Rain**

BT: Meteorology  
RT: Floods  
Monsoons

## *Rain fades*

USE: Rain fading

## **Rain fading**

UF: Rain fades  
BT: Interference

## **RAKE receivers**

BT: Receivers  
RT: Signal to noise ratio

## *Raleigh fading*

USE: Rayleigh channels

## *Raleigh fading channels*

USE: Rayleigh channels

## *RAM*

USE: Random access memory

## *Raman effect*

USE: Raman scattering

## **Raman scattering**

UF: Raman effect  
Raman spectroscopy  
BT: Electromagnetic  
scattering  
Nonlinear optics

## *Raman spectroscopy*

USE: Raman scattering

## *RAN*

USE: Radio access networks

## **AND**

Regional area networks

## *Random access communication*

USE: Multiaccess  
communication

## **Random access memory**

UF: RAM  
Random access storage  
BT: Memory  
NT: DRAM chips  
Phase change random  
access memory

Resistive RAM  
SDRAM  
SRAM cells  
SRAM chips

## *Random access storage*

USE: Random access memory

## **Random media**

UF: Turbulent media  
BT: Media  
RT: Chaos  
Nonhomogeneous media

## **Random number generation**

BT: Cryptography  
RT: Random sequences  
Stochastic processes  
White noise

## **Random processes**

BT: Mathematics  
RT: Algorithms  
Probability  
Signal processing  
Statistical analysis  
Time series analysis  
NT: Brownian motion



# 2019 IEEE Thesaurus

## Random sequences

UF: Pseudorandom sequences  
BT: Sequences  
RT: Cryptography  
Random number

generation

## Random variables

BT: Probability  
RT: Stochastic processes  
Stochastic systems

## Ranging

USE: Distance measurement

## Ranking (statistics)

BT: Statistics  
RT: Information retrieval  
Ontologies  
Search methods  
Semantic Web  
Vocabulary

## Ransomware

BT: Malware

## Rapid prototyping

BT: Prototypes  
RT: CAD/CAM  
Design methodology  
Manufacturing

processes

Product development  
Software engineering  
Three-dimensional

printing

Virtual prototyping

## Rapid thermal annealing

BT: Annealing  
RT: Semiconductor devices

## Rapid thermal processing

BT: High-temperature  
techniques  
RT: Heating systems

## Rare earth metals

BT: Metals

## Rate distortion

USE: Rate-distortion

## Rate distortion theory

BT: Information theory  
RT: Audio coding  
Channel coding  
Channel spacing  
Distortion  
Image coding  
Signal analysis  
Signal processing  
Source coding  
Speech coding  
Video coding  
NT: Channel rate control

## Rate-distortion

UF: Rate distortion  
BT: Information theory  
RT: Data compression

## Ratemeters

USE: Radiation detectors

## Rats

BT: Animals

## Raw materials

BT: Materials  
RT: Mining industry

## Ray tracing

UF: Ray-tracing  
BT: Geometrical optics  
Optics  
RT: Computer graphics  
Stray light

## Ray-tracing

USE: Ray tracing

## Rayleigh channels

UF: Raleigh fading  
Raleigh fading

channels

Rayleigh-fading  
BT: Fading channels  
RT: Radio propagation

## Rayleigh scattering

BT: Electromagnetic  
scattering

## Rayleigh-Benard convection

USE: Convection



# 2019 IEEE Thesaurus

## *Rayleigh-fading*

USE: Rayleigh channels

UF: Readability formulas

Readability tests

BT: Writing

## *RBF networks*

USE: Radial basis function networks

## *Readability tests*

USE: Readability metrics

## *RDF*

USE: Resource description framework

## **Readout electronics**

BT: Displays

RT: Detectors

SQUIDs

## *Re-configurable devices*

USE: Reconfigurable devices

## *Real time*

USE: Real-time systems

## **Reachability analysis**

BT: Graph theory

## *Real time control*

USE: Real-time systems

## **Reactive power**

UF: Power factor

VAR

BT: Power systems

RT: Reactive power control

Static VAR

## *Real time monitoring*

USE: Real-time systems

compensators

## *Real time processing*

USE: Real-time systems

## **Reactive power control**

BT: Electric variables

control

RT: Power system security

Reactive power

Voltage control

## *Real time systems*

USE: Real-time systems

## *Real-time control*

USE: Real-time systems

## **Reactor instrumentation**

BT: Nuclear and plasma

sciences

RT: Radiation monitoring

## *Real-time monitoring*

USE: Real-time systems

## *Reactors*

USE: Inductors

## *Real-time processing*

USE: Real-time systems

## **Read only memory**

UF: ROM

BT: Memory

RT: Read-write memory

NT: PROM

## **Real-time systems**

UF: Real time

Real time control

Real time monitoring

Real time processing

Real time systems

Real-time control

Real-time monitoring

Real-time processing

BT: Computers and

information processing

RT: Control systems

Endomicroscopy

Hardware-in-the loop

## **Read-write memory**

BT: Memory

RT: Read only memory

simulation

High energy physics

instrumentation computing

## *Readability formulas*

USE: Readability metrics

## **Readability metrics**



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# 2019 IEEE Thesaurus

systems	Networked control	BT:	Computer architecture
NT:	Telexistence	<b>Reconfigurable devices</b>	
	WebRTC	UF:	Re-configurable
<i>Reasoning</i>		devices	
USE:	Cognition AND	BT:	Hardware
	Cognitive systems	RT:	Field programmable
<b>Reasoning about programs</b>		gate arrays	
UF:	Type interference	<b>Reconfigurable logic</b>	
BT:	Software engineering	BT:	Logic design
<i>Rebreathers</i>		<i>Reconfigurable radio</i>	
USE:	Rebreathing equipment	USE:	Software radio
<b>Rebreathing equipment</b>		<b>Reconnaissance</b>	
UF:	Rebreathers	BT:	Military communication
BT:	Underwater equipment		Security
<i>Receive antennas</i>		RT:	Remote sensing
USE:	Receiving antennas		Surveillance
<b>Received signal strength indicator</b>		<i>Reconstruction algorithm</i>	
UF:	RSSI	USE:	Reconstruction
BT:	Communication system	algorithms	
signaling	Signal processing	<b>Reconstruction algorithms</b>	
<b>Receivers</b>		UF:	Reconstruction
UF:	Radio receivers	algorithm	
BT:	Communication		Reconstruction methods
equipment		BT:	Tomography
RT:	Demodulation	<i>Reconstruction methods</i>	
	Signal detection	USE:	Reconstruction
NT:	Optical receivers	algorithms	
	RAKE receivers	<b>Recording</b>	
	Receiving antennas	BT:	Signal processing
<b>Receiving antennas</b>		RT:	Memory
UF:	Receive antennas	NT:	Audio recording
BT:	Antennas		Digital recording
	Receivers		Disk recording
RT:	Spatial diversity		Magnetic recording
	Transmitting antennas		Optical recording
<b>Receptor (biochemistry)</b>			Video recording
BT:	Biochemistry	<b>Recruitment</b>	
<b>Recommender systems</b>		BT:	Human resource
UF:	Music recommendation	management	
BT:	Information filtering	RT:	Equal opportunities
			Job specification
			Labor resources
<b>Reconfigurable architectures</b>		<b>Rectangular waveguides</b>	



# 2019 IEEE Thesaurus

BT: Electromagnetic  
waveguides  
RT: Planar waveguides

## Rectennas

BT: Antennas  
Microwave  
communication

## Rectifiers

BT: Circuits  
RT: Bridge circuits  
Power electronics  
Voltage multipliers

## Rectifying circuits

BT: AC-DC power converters

## Recurrent neural nets

USE: Recurrent neural  
networks

## Recurrent neural networks

UF: RNN  
Recurrent neural nets  
BT: Neural networks  
NT: Hopfield neural  
networks

## Recursive estimation

BT: Bayes methods  
RT: Least squares  
approximation

## Recycle

USE: Recycling

## Recycling

UF: Recycle  
BT: Environmental  
management

## Red blood cells

BT: Blood

## Reduced instruction set computing

UF: RISC  
BT: Instruction sets

## Reduced order model

USE: Reduced order systems

## Reduced order systems

UF: Model reduction

BT: Reduced order model  
Reduced-order model  
Reduced-order systems  
Systems engineering  
and theory  
RT: Estimation  
Simulation

## Reduced-order model

USE: Reduced order systems

## Reduced-order systems

USE: Reduced order systems

## Redundancy

BT: Fault tolerance  
RT: Codes  
Reliability

## Redundancy (employment)

USE: Termination of  
employment

## Reed Solomon codes

USE: Reed-Solomon codes

## Reed-Solomon codes

UF: Reed Solomon codes  
BT: Error correction codes

## Refining

BT: Materials processing  
RT: Chemical technology  
Cleaning  
Purification  
Smelting  
Sugar refining

## Reflectance

USE: Reflectivity

## Reflection

BT: Propagation  
RT: Mirrors  
Scattering  
NT: Acoustic reflection  
Backscatter  
Electromagnetic

## reflection

Fresnel reflection  
Radar cross-sections

## Reflection coefficient



# 2019 IEEE Thesaurus

BT: Optical variables  
measurement  
Waveguide  
discontinuities  
RT: Amplitude estimation

## Reflective binary codes

UF: Gray codes  
Grey codes  
BT: Binary codes

## Reflectivity

UF: Reflectance  
BT: Waves  
RT: Geometrical optics  
Light trapping  
Optical reflection  
Sonar detection  
Telecommunications

## Reflectometry

BT: Measurement  
RT: Electromagnetic

measurements

reflection

Electromagnetic  
Optical reflection  
Optical variables

measurement

## Reflector antennas

BT: Antennas  
RT: Aperture antennas  
Radio astronomy

## Reflow soldering

BT: Soldering

## Refractive index

UF: Refractivity  
BT: Optical variables  
measurement  
RT: Birefringence  
Dispersion  
Gain measurement  
Laser beams  
Metamaterials  
Optical refraction  
Photorefractive effect  
Semiconductor device  
measurement  
Semiconductor lasers

*Refractivity*

USE: Refractive index

## *Refractoring*

USE: Code refractoring

## Refrigerants

BT: Coolants  
RT: Heat pumps  
Space cooling

## Refrigeration

BT: Cooling

## Refrigerators

BT: Home appliances  
Home automation

## *Refuse*

USE: Waste materials

## *Refuse incineration*

USE: Incineration

## Regeneration engineering

BT: Tissue engineering

## Regional area networks

UF: RAN  
BT: Communication systems  
RT: IEEE 802.22 Standard  
Local area networks  
Metropolitan area

networks

Wireless communication  
WRAN

NT:

## Registers

BT: Memory  
NT: Shift registers

## Regression analysis

BT: Statistical analysis  
RT: Correlation  
coefficient

Econometrics  
Nearest neighbor

methods

NT: Linear regression  
Multivariate

regression

## Regression tree analysis

BT: Decision trees





# 2019 IEEE Thesaurus

## Regulators

BT: Control equipment  
RT: Current control  
Electric variables

control

Power conversion  
Voltage control

Microrelays

Power system relaying  
Protective relaying  
Relay networks

(telecommunications)

Road side unit

## Rehabilitation robotics

UF: Assistive robotics  
BT: Medical robotics  
Robots  
RT: Assistive technology  
Patient rehabilitation

## Release engineering

UF: Releng  
BT: Software engineering  
RT: Product life cycle  
management  
Software development  
management  
Source coding

## Reinforcement learning

BT: Machine learning

*Releng*

USE: Release engineering

## Relational databases

BT: Databases  
RT: Structured Query

Language

Triples (Data

structure)

## Reliability

UF: Reliability management  
System reliability  
RT: Aging  
Dependability  
management

## Relativistic effects

BT: Nuclear physics  
RT: Electron beams  
Free electron lasers  
Klystrons  
Magnetrons  
Masers  
Plasmas  
NT: Optical flow

Electron traps  
Failure analysis  
Life testing  
Power system

reliability

## Relativistic quantum mechanics

BT: Quantum mechanics

Preventive maintenance  
Quality control  
Quality management  
Redundancy  
Risk analysis  
System improvement  
System recovery  
Thermal management  
Availability  
Fault diagnosis  
Fault tolerance  
Fluctuations  
Integrated circuit

## Relaxation methods

BT: Numerical analysis  
RT: Simulated annealing

NT:

## Relaxor ferroelectrics

BT: Ferroelectric

materials

reliability

## Relay networks (telecommunications)

BT: Communication networks  
Relays

Maintenance  
Maldistribution  
Materials reliability  
Reliability

engineering

## Relays

BT: Switchgear  
RT: Switching circuits  
NT: Digital relays

Reliability theory  
Robustness  
Semiconductor device  
Software reliability





# 2019 IEEE Thesaurus

*Remotely guided vehicles*

USE: Unmanned vehicles

*Remotely operated automobiles*

USE: Unmanned vehicles

*Remotely operated cars*

USE: Unmanned vehicles

*Remotely operated vehicles*

USE: Unmanned vehicles

## **Remuneration**

BT: Human resource  
management

RT: Employee welfare

NT: Incentive schemes  
Pensions

*Renal calculi*

USE: Kidney stones

## **Rendering (computer graphics)**

BT: Computer graphics

*Renewable energy*

USE: Renewable energy  
sources

*Renewable energy resources*

USE: Renewable energy  
sources

## **Renewable energy sources**

UF: Renewable energy  
Renewable energy  
resources

BT: Renewable-energy  
Energy conservation  
Environmental

management  
RT: Low-carbon economy  
Wave power  
NT: Biomass

*Renewable-energy*

USE: Renewable energy  
sources

*Repair*

USE: Maintenance  
engineering

## **Repeaters**

UF: Optical regenerators

BT: Communication  
equipment

*Replica molding*

USE: Soft lithography

*Replica moulding*

USE: Soft lithography

*Report writing*

USE: Writing

## **Representational state transfer**

BT: Software architecture

## **Reproducibility of results**

UF: Reproducible research

BT: Biomedical measurement  
Measurement

*Reproducible research*

USE: Reproducibility of  
results

*Reproductive cloning*

USE: Cloning

## **Requirements engineering**

BT: Systems engineering  
and theory

RT: Product design  
Project management  
Requirements

management

Software engineering  
Stakeholders

NT: Technical requirements

## **Requirements management**

BT: Management  
Systems engineering

and theory  
RT: Project management  
Requirements

engineering

*ReRAM*

USE: Resistive RAM

## **Rescue robots**

BT: Robots

RT: Emergency services  
Hazards



# 2019 IEEE Thesaurus

## Research and development

BT: Engineering - general  
RT: Electrical engineering  
Engineering profession  
Industrial engineering  
International

## collaboration

Laboratories  
Research and

## development management

Reverse engineering  
Science - general  
Technology  
Virtual enterprises  
Virtual manufacturing  
Virtual prototyping

## Research and development management

BT: Engineering management  
Management  
RT: Concurrent engineering  
Engineering profession  
Production management  
Project management  
Research and

## development

Technology management  
Venture capital

NT: Innovation management

## Research initiatives

BT: Engineering management

## Reservoirs

BT: Water resources  
Water storage  
RT: Dams  
Lakes  
Land use planning  
Water

## Residual stress

USE: Residual stresses

## Residual stresses

UF: Residual stress  
BT: Stress

## Resilience

UF: Resiliency  
Resilient systems  
BT: Material properties

## Resiliency

USE: Resilience

## Resilient systems

USE: Resilience

## Resin transfer molding

USE: Transfer molding

## Resin transfer moulding

USE: Transfer molding

## Resins

BT: Materials  
RT: Plastics  
Polymer foams  
NT: Epoxy resins

## Resistance

BT: Electric variables  
RT: Electrical resistance

## measurement

Resistance heating  
Skin effect  
NT: Electric resistance  
Piezoresistance  
Surface resistance  
Thermal resistance  
Viscosity

## Resistance heating

UF: Electric heating  
BT: Heating systems  
RT: Resistance

## Resistive RAM

UF: RRAM  
ReRAM  
BT: Random access memory  
RT: Memristors  
Phase change memory

## Resistive transducers

BT: Transducers

## Resistivity

USE: Conductivity

## Resistivity measurement

USE: Conductivity  
measurement

## Resistors

BT: Electronic components



# 2019 IEEE Thesaurus

RT:	Electrical ballasts	UF:	Quasi-resonant
	Potentiometers	inverters	
NT:	Memristors		Quasi-resonant
	Switched capacitor	invertors	
networks			Resonant invertors
	Varistors	BT:	Inverters
		RT:	Power electronics
<b>Resists</b>			Resonance
UF:	Photoresists	<i>Resonant invertors</i>	
BT:	Materials	USE:	Resonant inverters
<b>Resonance</b>		<b>Resonant tunneling devices</b>	
RT:	Cavity resonators	UF:	Resonant tunnelling
	Dielectric resonator	devices	
antennas			Resonant-tunneling
	Film bulk acoustic	devices	
resonators			Resonant-tunnelling
	Microstrip resonators	devices	
	Optical resonators	BT:	Tunneling
	Resonant inverters	RT:	Quantum well devices
devices	Resonant tunneling		Resonance
	Resonator filters		Single electron
	Resonators	devices	
	Vibrations	<i>Resonant tunnelling devices</i>	
NT:	Ferroresonance	USE:	Resonant tunneling
	Magnetic resonance	devices	
scattering	Resonance light	<i>Resonant-tunneling devices</i>	
	Stochastic resonance	USE:	Resonant tunneling
<i>Resonance frequency</i>		devices	
USE:	Resonant frequency	<i>Resonant-tunnelling devices</i>	
<b>Resonance light scattering</b>		USE:	Resonant tunneling
BT:	Resonance	devices	
	Spectroscopy	<b>Resonator filters</b>	
RT:	Light scattering	BT:	Filters
<i>Resonant circuits</i>		RT:	Resonance
USE:	RLC circuits	<b>Resonators</b>	
<b>Resonant converters</b>		BT:	Amplifiers
BT:	Converters	RT:	Acoustics
<b>Resonant frequency</b>			Resonance
UF:	Resonance frequency		Tuners
BT:	Frequency	NT:	Cavity resonators
RT:	Oscillators	<i>Resource allocation</i>	
	Quantum mechanics	USE:	Resource management
NT:	Magnetic resonance	<b>Resource description framework</b>	
<b>Resonant inverters</b>		UF:	RDF
		BT:	Semantic Web



# 2019 IEEE Thesaurus

<i>Resource distribution</i>	BT: Surface fitting
USE: Resource management	RT: Optimization methods
<b>Resource management</b>	<b>Resumes</b>
UF: Allocation	BT: Writing
Radio resource	<i>Retail price index</i>
management	USE: Economic indicators
Resource allocation	<b>Retardants</b>
Resource distribution	BT: Production materials
Resource sharing	RT: Inhibitors
Resource utilisation	NT: Flame retardants
Resource utilization	<b>Retina</b>
Resources management	UF: Retinal
BT: Management	BT: Eyes
RT: Business process	NT: Retinal vessels
integration	<i>Retinal</i>
Business process	USE: Retina
management	<b>Retinal vessels</b>
Cluster computing	BT: Retina
Environmental	<b>Retinopathy</b>
engineering	BT: Diseases
Forestry	<b>Retirement</b>
Operations research	BT: Human resource
System integration	management
NT: Elastic computing	<b>Reverberation</b>
Network resource	BT: Acoustics
management	<b>Reverberation chambers</b>
Resource	BT: Electromagnetic
virtualization	compatibility
<i>Resource sharing</i>	<b>Reverse engineering</b>
USE: Resource management	BT: Engineering - general
<i>Resource utilisation</i>	RT: Product development
USE: Resource management	Research and
<i>Resource utilization</i>	development
USE: Resource management	<b>Reverse logistics</b>
<b>Resource virtualization</b>	BT: Logistics
BT: Resource management	<b>Reverse osmosis</b>
<i>Resources management</i>	BT: Chemical processes
USE: Resource management	RT: Desalination
<b>Respiratory system</b>	<i>Reverse teaching</i>
UF: Asthma	USE: Education AND
Bronchi	
BT: Anatomy	
NT: Larynx	
Lung	
<b>Response surface methodology</b>	



# 2019 IEEE Thesaurus

	Online services		<b>Rhythm</b>	BT: Music
<b>Reviews</b>	BT: Writing		<i>Ribonucleic acid</i>	USE: RNA
<i>RF</i>	USE: Radio frequency		<b>Ribs</b>	BT: Thorax
<i>RF interference</i>	USE: Electromagnetic interference		<b>Riccati equations</b>	BT: Equations
<i>RF micro-electro-mechanical systems</i>	USE: Radiofrequency microelectromechanical systems		<b>Rician channels</b>	UF: Rician fading Rician fading channels BT: MIMO communication
<i>RF microelectromechanical systems</i>	USE: Radiofrequency microelectromechanical systems		<i>Rician fading</i>	USE: Rician channels
<b>RF signals</b>	BT: Signal processing		<i>Rician fading channels</i>	USE: Rician channels
<i>RFIC</i>	USE: Radiofrequency integrated circuits		<b>Ring generators</b>	BT: Automatic testing Testing
<i>RFID</i>	USE: Radiofrequency identification		<b>Ring lasers</b>	BT: Lasers RT: Gyroscopes NT: Fiber lasers
<b>RFID tags</b>	BT: Radiofrequency identification NT: Active RFID tags Passive RFID tags		<b>Ring oscillators</b>	BT: Oscillators
<b>Rhenium</b>	BT: Chemical elements		<i>Ring resonators</i>	USE: Optical ring resonators
<b>Rheology</b>	BT: Fluid dynamics RT: Viscosity		<i>RISC</i>	USE: Reduced instruction set computing
<b>Rhetoric</b>	BT: Professional communication		<b>Risk analysis</b>	BT: Management RT: Accident prevention Accidents Decision making Occupational health Occupational safety Reliability Safety Technology social factors
<b>Rhodium</b>	BT: Chemical elements			
<i>Rhombencephalon</i>	USE: Hindbrain			



# 2019 IEEE Thesaurus

	NT: Venture capital Fault trees Risk management		RT: Road safety Road vehicles
<i>Risk assessment</i>		<i>Road bridges</i>	
USE: Risk management		USE: Structural panels	
<i>Risk handling</i>		<b>Road safety</b>	
USE: Risk management		BT: Roads	
<b>Risk management</b>		RT: Automated highways Automotive engineering Road accidents Vehicle-to-everything	
UF: Risk mitigation Risk assessment Risk handling Risk minimization Risk reduction		NT: Lane departure warning	
BT: Risk analysis		systems	
RT: Contract management		<b>Road side unit</b>	
<i>Risk minimization</i>		BT: Relays Vehicular ad hoc	
USE: Risk management		networks	
<i>Risk mitigation</i>		<b>Road transportation</b>	
USE: Risk management		UF: Highways	
<i>Risk reduction</i>		BT: Land transportation	
USE: Risk management		RT: Civil engineering Global Positioning	
<b>Rivers</b>		System	
BT: Geoscience		NT: Roads Traffic congestion	
RT: Floods Lakes Sediments Water Water pollution Water resources Wetlands		<b>Road vehicles</b>	
<b>RLC circuits</b>		BT: Land vehicles	
UF: Resonant circuits		RT: Road accidents Roads	
BT: Circuits Tunable circuits and		NT: Automobiles Motorcycles	
devices		<i>ROADMS</i>	
<b>RNA</b>		USE: Optical add-drop	
UF: Ribonucleic acid		multiplexers	
BT: Biological cells		<b>Roads</b>	
<i>RNN</i>		BT: Road transportation	
USE: Recurrent neural		RT: Civil engineering Road vehicles	
networks		NT: Road safety	
<b>Road accidents</b>		<b>Roaming</b>	
BT: Accidents		BT: Wireless communication	
		RT: Dual band GSM	
		<i>Robot automobiles</i>	
		USE: Autonomous automobiles	





# 2019 IEEE Thesaurus

## *Robot cars*

USE: Autonomous automobiles

## **Robot control**

UF: Robotic control  
BT: Control systems  
Robots  
RT: Force control  
Motion planning  
Trajectory tracking  
NT: Robot motion

## **Robot kinematics**

BT: Robots  
NT: Motion analysis

## **Robot learning**

BT: Machine learning  
Robots  
RT: Artificial

intelligence

## **Robot localization**

BT: Motion analysis  
RT: Robot sensing systems

## **Robot motion**

UF: Robotic motion  
BT: Robot control

## *Robot operating systems*

USE: Operating systems

## **Robot programming**

UF: Robotic programming  
Programming  
BT: Robots

## **Robot sensing systems**

UF: Manipulator sensing  
systems  
Mobile robot sensing  
systems  
Robot sensor networks  
BT: Robots  
Sensor systems and  
applications  
RT: Multisensor systems  
Robot localization  
NT: Robot vision systems  
Simultaneous  
localization and mapping  
Tactile sensors

## *Robot sensor networks*

USE: Robot sensing systems

## **Robot vision systems**

UF: Manipulator vision  
systems  
Mobile robot vision  
systems  
BT: Robot sensing systems  
RT: Image sensors  
Imaging  
Intelligent robots  
Object detection  
Object recognition  
Pattern recognition  
Stereo vision  
NT: Visual servoing

## *Robot-assisted surgery*

USE: Surgery

## **Robotic assembly**

UF: Assembly robots  
BT: Assembly systems  
RT: Robotics and  
automation

## *Robotic control*

USE: Robot control

## *Robotic motion*

USE: Robot motion

## *Robotic programming*

USE: Robot programming

## **Robotics and automation**

RT: Image motion analysis  
Robotic assembly  
NT: Animatronics  
Automation  
Autonomous systems  
Multi-robot systems  
Robots

## **Robots**

BT: Robotics and  
automation  
RT: Assembly systems  
Botnet  
Control equipment  
Control systems  
Cybernetics  
Industrial control



# 2019 IEEE Thesaurus

automation	Manufacturing	<b>Rockets</b>	BT:	Propulsion
	Materials handling		RT:	Engines
control	Mechanical variables	<b>Rocks</b>		Ground support
	Mechatronics		BT:	Geology
NT:	Nonlinear systems	<b>Rodents</b>	BT:	Animals
	Servosystems			
	Androids	<b>Roentgenium</b>	BT:	Chemical elements
	Aquatic robots			
	Automata	<b>Role transfer</b>	BT:	Organizational aspects
	Autonomous robots			
	Cognitive robotics	<i>Roller bearings</i>	USE:	Rolling bearings
	Computer vision			
	Educational robots	<b>Rolling bearings</b>	UF:	Roller bearings
	Evolutionary robotics			Rolling contact
	Humanoid robots	bearings		Rolling element
	Intelligent robots		BT:	Mechanical bearings
	Manipulators	bearings	RT:	Ball bearings
	Medical robotics			
	Mobile robots	<i>Rolling contact bearings</i>	USE:	Rolling bearings
	Orbital robotics			
	Parallel robots	<i>Rolling element bearings</i>	USE:	Rolling bearings
	Rehabilitation			
robotics	Rescue robots	<b>Rollover</b>	BT:	Vehicle dynamics
	Robot control			
	Robot kinematics	<i>ROM</i>	USE:	Read only memory
	Robot learning			
	Robot programming	<i>Roof mounted photovoltaics</i>	USE:	Building integrated photovoltaics
	Robot sensing systems			
	Service robots	<i>Roof mounted solar cell arrays</i>	USE:	Building integrated photovoltaics
	Snake robots			
	Soft robotics	<i>Root kit</i>	USE:	Rootkit
	Telerobotics			
	Visual odometry	<b>Root mean square</b>		
	Wearable robots			
<b>Robust control</b>				
	UF:			Active disturbance
rejection control				
	BT:			System analysis and
design				
	RT:			Disturbance observers
<b>Robust stability</b>				
	BT:			Stability
<b>Robustness</b>				
	BT:			Reliability
	RT:			Control systems
				Sensitivity
				Stability
				Uncertain systems



# 2019 IEEE Thesaurus

UF:	Root mean square error		
	Root mean square value		
BT:	Mathematics	<b>Rough sets</b>	
	Statistics	BT:	Set theory
<i>Root mean square error</i>		<b>Rough surfaces</b>	
USE:	Root mean square	BT:	Surfaces
		RT:	Polishing machines
<i>Root mean square value</i>			Surface roughness
USE:	Root mean square		Terrain factors
		NT:	Corrugated surfaces
<b>Rootkit</b>		<b>Round robin</b>	
UF:	Root kit	BT:	Scheduling algorithms
BT:	Malware		
<i>Roots</i>		<b>Roundoff errors</b>	
USE:	Poles and zeros	BT:	Finite wordlength
		effects	
		RT:	Error analysis
<b>Rotating machines</b>			Noise
BT:	Electric machines	<b>Routing</b>	
RT:	Brushes	BT:	Communication systems
	Coils	RT:	Multicast
	DC generators	communication	
	Synchronous motors		Routing protocols
	Windings		Soft switching
NT:	Generators	NT:	Wavelength routing
	Hysteresis motors		
	Induction machines	<b>Routing protocols</b>	
	Induction motors	BT:	Protocols
	Micromotors	RT:	Internet
	Permanent magnet		Land mobile radio
machines			Mobile communication
	Reluctance machines		Multicast protocols
	Servomotors		Multiprotocol label
	Standby generators	switching	
<b>Rotation measurement</b>			Routing
UF:	Rotation		Wireless access points
representation		<i>RPI</i>	
BT:	Mechanical variables	USE:	Economic indicators
measurement			
<i>Rotation representation</i>		<i>RRAM</i>	
USE:	Rotation measurement	USE:	Resistive RAM
<i>Rotational measurement</i>		<i>RRI</i>	
USE:	Velocity control	USE:	Rail to rail inputs
<i>Rotational speed</i>		<i>RRO</i>	
USE:	Velocity control	USE:	Rail to rail outputs
<b>Rotors</b>		<i>RSSI</i>	
BT:	Electric machines	USE:	Received signal
	Machine components	strength indicator	



# 2019 IEEE Thesaurus

<b>Rubber</b>		<i>S/N</i>	USE: Signal to noise ratio
BT: Insulators			
RT: Rubber industry		<i>SaaS</i>	USE: Software as a service
Rubber products			
<b>Rubber industry</b>		<b>Safety</b>	
BT: Manufacturing		BT: Industry applications	
industries		Product safety	
RT: Chemical industry		engineering	
Rubber		RT: Alarm systems	
Rubber products		Control system	
<b>Rubber products</b>		security	
BT: Manufactured products			Electric shock
RT: Hoses			Environmental factors
Rubber			Explosions
Rubber industry			Eye protection
Wastewater treatment			Fires
NT: Tires			Hazardous areas
<b>Rubidium</b>			Occupational health
BT: Chemical elements			Preventive maintenance
<i>Rule based systems</i>			Protective clothing
USE: Knowledge based			Radiation effects
systems		NT: Aerospace safety	Radioactive materials
<b>Runtime</b>			Radioactive pollution
BT: Software engineering			Risk analysis
RT: Programming			Domestic safety
NT: Dynamic compiler			Emergency services
Runtime environment			Explosion protection
<b>Runtime environment</b>			Fire safety
BT: Runtime			Hazards
<b>Runtime library</b>			Health and safety
BT: Formal languages			Marine safety
<b>Rural areas</b>			Product safety
BT: Geography		<b>Safety devices</b>	Protection
RT: Macrocell networks		BT: Safety	Radiation safety
Public infrastructure		RT: Accident prevention	Safety devices
<b>Ruthenium</b>			Safety management
BT: Chemical elements			Vehicle safety
<i>S parameters</i>			
USE: Scattering parameters		NT: Eye protection	
<i>S-parameters</i>			Fire extinguishers
USE: Scattering parameters			Protective clothing
		<i>Safety in the home</i>	
		USE: Domestic safety	



# 2019 IEEE Thesaurus

## Safety management

BT: Management  
Safety  
RT: Dependability

management

## Sagnac interferometers

BT: Interferometry

## Sales promotion

USE: Promotion - marketing

## Saliency detection

BT: Image processing  
RT: Feature detection  
Feature extraction  
Visual systems

## Salinity (geophysical)

BT: Soil measurements  
RT: Geochemistry  
Ocean salinity  
Sea measurements  
Sea surface salinity

## Salivary glands

UF: Parotid  
BT: Glands  
Stomatognathic system

## Samarium

BT: Metals  
NT: Samarium alloys

## Samarium alloys

BT: Samarium

## Sampled data circuits

BT: Circuits

## Sampled data systems

BT: Discrete-time systems

## Sampling methods

BT: Statistics  
RT: Signal sampling  
NT: Compressed sensing  
Nonuniform sampling

## SAN

USE: Storage area networks

## Sandblasting

BT: Surface treatment

RT: Surface roughness

## Sandwich structures

BT: Structural shapes  
RT: Honeycomb structures  
Lightweight structures  
Sheet materials  
Structural panels  
Thin wall structures

## Sanitary engineering

BT: Engineering - general  
RT: Environmental

management

Sewage treatment  
Waste disposal  
Waste management  
Waste materials  
Wastewater  
Wastewater treatment  
Water pollution

## SAR

USE: Specific absorption

rate AND

radar

Synthetic aperture

## SAR imaging

USE: Radar polarimetry

## SAS

USE: Synthetic aperture

sonar

## Satellite antennas

BT: Antennas

## Satellite born radar

USE: Spaceborne radar

## Satellite borne radar

USE: Spaceborne radar

## Satellite broadcasting

UF: DBS  
Direct broadcast

satellites

Satellite broadcasts  
BT: Broadcasting  
Satellite

communication

RT: Global Positioning

System



# 2019 IEEE Thesaurus

## *Satellite broadcasts*

USE: Satellite broadcasting

## **Satellite communication**

UF: Communication

satellites

BT: Communication systems  
Radio communication  
RT: Artificial satellites  
Convolutional codes  
Global Positioning

System

Handover  
Radiation hardening

(electronics)

Transponders  
NT: Downlink  
Satellite broadcasting  
Satellite ground

stations

Uplink

## **Satellite constellations**

BT: Satellite navigation

systems

## **Satellite ground stations**

BT: Communication systems  
Radio communication  
Satellite

communication

RT: Communication

equipment

## **Satellite navigation systems**

BT: Navigation  
RT: Radio navigation  
Time dissemination  
NT: Global Positioning

System

Global navigation

satellite system

Satellite

constellations

## **Satellites**

BT: Solar system  
RT: Artificial satellites  
NT: Geostationary

satellites

Geosynchronous

satellites

Moon

## Small satellites

## *Saturation detection*

USE: Feedback

## *Saturation magnetisation*

USE: Saturation

magnetization

## **Saturation magnetization**

UF: Saturation

magnetisation

BT: Magnetization

processes

## **Saturn**

BT: Planets

## **SAW filters**

BT: Electromechanical

devices

## **Sawing**

BT: Machining

RT: Sawing machines

## **Sawing machines**

BT: Machine tools

RT: Sawing

## **SCADA systems**

UF: Supervisory control  
and data acquisition systems

Supervisory control  
and data-acquisition systems

BT: Control systems  
Power system control  
Supervisory control

RT: Substation automation

## **Scalability**

BT: System analysis and  
design

## **Scalp**

BT: Head

## **Scandium**

BT: Chemical elements

## **Scanning electron microscopy**

UF: SEM

BT: Electron microscopy



# 2019 IEEE Thesaurus

RT: Electron beam  
applications  
Particle scattering

## Scanning microwave microscopy

BT: Microscopy  
RT: Atomic force  
microscopy

## Scanning probe data storage

BT: Memory

## Scanning probe microscopy

BT: Microscopy  
NT: Scanning thermal  
microscopy

## Scanning thermal microscopy

BT: Scanning probe  
microscopy

## Scattering

UF: Backscattering  
Wave scattering  
BT: Propagation  
RT: Reflection  
Scattering parameters  
NT: Acoustic scattering  
Brillouin scattering  
Electromagnetic  
scattering  
Light scattering  
Particle scattering

## Scattering parameters

UF: S parameters  
S-parameters  
BT: System analysis and  
design  
RT: Circuits  
Scattering

## Scatternets

USE: Personal area networks

## Scene analysis

USE: Image analysis

## Scene classification

USE: Image analysis

## Schedules

BT: Planning  
RT: Scheduling

## Scheduling

BT: Organizational aspects  
Production control  
Project engineering  
RT: Materials requirements  
planning  
Queueing analysis  
Schedules  
Statistics  
Synchronization  
NT: Adaptive scheduling  
Dynamic scheduling  
Job shop scheduling  
Single machine  
scheduling

## Scheduling algorithms

BT: Optical fiber  
communication  
NT: Processor scheduling  
Round robin

## Scholarships

BT: Educational programs

## Schools

USE: Educational  
institutions

## Schottky barriers

UF: Schottky contacts  
BT: Semiconductor-metal  
interfaces  
RT: MESFETs  
Schottky diodes

## Schottky contacts

USE: Schottky barriers

## Schottky diode

USE: Schottky diodes

## Schottky diodes

UF: Schottky diode  
BT: Semiconductor devices  
Semiconductor diodes  
RT: Schottky barriers  
Semiconductor-metal  
interfaces

## Schottky FETs

USE: MESFETs



# 2019 IEEE Thesaurus

## *Schottky gate FET*

USE: Schottky gate field  
effect transistors

## **Schottky gate field effect transistors**

UF: Schottky gate FET  
BT: Field effect  
transistors

## **Schrodinger equation**

BT: Quantum mechanics  
RT: Electrons

## **Science - general**

RT: Econophysics  
Neurophysiology  
Research and

development

NT: STEM  
Astronomy  
Biology  
Chemistry  
Electricity  
Geoscience  
History  
Life sciences  
Metrology  
Neuroscience  
Physics  
Sociology  
Thermodynamics

## *science technology engineering and math*

USE: STEM

## *Science technology engineering mathematics*

USE: STEM

## *science, technology, engineering, and math*

USE: STEM

## **Scientific computing**

UF: Computational science  
BT: Computer applications

## **Scientific publishing**

BT: Publishing

## **Scintillation counters**

BT: Measurement

Nuclear and plasma  
sciences

NT: Solid scintillation  
detectors

## **Scintillators**

BT: Radiation effects  
RT: Luminescence

## *SCM supply chains*

USE: Supply chain  
management

## *Scooters*

USE: Motorcycles

## *SCR*

USE: Thyristors

## *Screws*

USE: Fasteners

## *Scrubbers*

USE: Materials handling

## **Scrum (Software development)**

BT: Agile software  
development  
RT: Feedback  
Project management  
Software development  
management

## *SDH*

USE: Synchronous digital  
hierarchy

## *SDHTs*

USE: MODFETs

## *SDN*

USE: Software defined  
networking

## **SDRAM**

UF: Synchronous DRAM  
Synchronous dynamic  
random access memory  
BT: Random access memory

## *Sea animals*

USE: Marine animals

## **Sea coast**





# 2019 IEEE Thesaurus

BT:	Oceans	<i>Sea surface temperature</i>	USE:	Ocean temperature
<b>Sea floor</b>				
UF:	Seafloor	<i>Sea vegetation</i>	USE:	Marine vegetation
BT:	Oceans			
RT:	Sediments	<i>Seafloor</i>	USE:	Sea floor
NT:	Sea floor roughness			
<b>Sea floor roughness</b>		<i>Sealants</i>	USE:	Sealing materials
BT:	Sea floor			
<b>Sea ice</b>		<b>Sealing materials</b>		
BT:	Ice	UF:	Sealants	
RT:	Oceans	BT:	Joining materials	
		RT:	Seals	
<b>Sea level</b>		<b>Seals</b>		
BT:	Oceans	BT:	Mechanical products	
RT:	Ocean circulation	RT:	Packaging	
<b>Sea measurements</b>			Sealing materials	
UF:	Current measurement		Structural rings	
(water)		NT:	Gaskets	
BT:	Geophysical		Hermetic seals	
measurements		<b>Seaports</b>		
RT:	Oceans	UF:	Sea ports	
	Remote sensing	BT:	Industrial facilities	
	Salinity (geophysical)		Transportation	
	Sonar measurements	RT:	Marine transportation	
NT:	Geoacoustic inversion		Marine vehicles	
<i>Sea ports</i>		<b>Search engines</b>		
USE:	Seaports	BT:	Information retrieval	
<b>Sea state</b>		<b>Search methods</b>		
BT:	Measurement	BT:	Information retrieval	
	Ocean waves	RT:	Genetic algorithms	
RT:	Marine navigation		Gradient methods	
	Sea surface roughness		Nearest neighbor	
<b>Sea surface</b>		methods		
BT:	Oceans		Optimization methods	
RT:	Surface waves		Ranking (statistics)	
	Wind	NT:	Keyword search	
NT:	Sea surface roughness		Metasearch	
	Sea surface salinity		Search problems	
<b>Sea surface roughness</b>			Semantic search	
BT:	Sea surface		Web search	
RT:	Sea state	<b>Search problems</b>		
<b>Sea surface salinity</b>		BT:	Search methods	
BT:	Sea surface	RT:	Artificial bee colony	
RT:	Salinity (geophysical)	algorithm		



# 2019 IEEE Thesaurus

<i>Seat belts</i>			
USE:	Belts	security	Capability-based
<i>Sebaceous glands</i>			Computer security
USE:	Sebaceous glands	security	Control system
<b>Sebaceous glands</b>			Cryptography
UF:	Sebaceous glands		Data security
BT:	Glands		Digital signatures
	Skin		Information security
<b>Second Life</b>			Network security
BT:	Social network		Power system security
services			Reconnaissance
			Security management
			Terrorism
			Watermarking
<i>Secondary cells</i>		<b>Security management</b>	
USE:	Batteries	BT:	Management
			Security
<i>Secondary electron emission</i>			
USE:	Electron emission	<i>Security of data</i>	
		USE:	Data security
<b>Secondary generated hot electron injection</b>			
UF:	Secondary generated	<b>Sediments</b>	
hot-electron injection		UF:	Mud
BT:	Hot carrier injection	BT:	Geoscience
		RT:	Lakes
<i>Secondary generated hot-electron injection</i>			Rivers
USE:	Secondary generated		Sea floor
hot electron injection			Soil
<i>Secondary ion emission</i>		<i>Seebeck effect</i>	
USE:	Ion emission	USE:	Thermoelectricity
<b>Secure storage</b>		<b>Seismic measurements</b>	
BT:	Material storage	UF:	Seismic visualization
RT:	Security	BT:	Geophysical
		measurements	
		RT:	Acoustic measurements
<b>Security</b>			Seismology
BT:	Industry applications	<i>Seismic retrofitting</i>	
RT:	Anti-virus software	USE:	Earthquake engineering
	Biometrics (access		
control)		<i>Seismic visualization</i>	
	Bring your own device	USE:	Seismic measurements
	Business continuity		
	Identification of	<b>Seismic waves</b>	
persons		BT:	Waves
	Malware	RT:	Acoustic waves
	Protection		Earthquakes
	Secure storage		Elastodynamics
	Surveillance		Explosions
NT:	Access control		Seismology
	Alarm systems		



# 2019 IEEE Thesaurus

BT: Cognition

## Self-driving automobiles

USE: Autonomous automobiles

*Self-driving car*

USE: Autonomous automobiles

## Self-dynamic voltage scaling

USE: Dynamic voltage

## Self-organizing feature maps

UF: Kohonen maps  
SOM  
Self organising

feature maps

Self organizing

feature maps

## Self organizing maps

## Self-organizing maps

BT: Artificial neural

networks

RT:      Feedforward neural

networks

## Knowledge acquisition

## Self-organizing maps

USE: Self-organizing

feature maps

## Self-organizing networks

UF: Self organizing

networks

BT: Wireless networks

## Self-replicating machines

UF: Self replicating

BT: Nanotechnology

## Self-study courses

BT: Educational programs

### Self-testing

USE: Built-in self-test

## Self-tuning regulators

USE: Adaptive control

SEM

USE: Scanning electron

microscopy



# 2019 IEEE Thesaurus

## Semantic search

BT: Search methods  
Semantics  
RT: Context awareness  
Natural language  
processing  
Ontologies  
Query processing  
Semantic Web

## Semantic technology

BT: Information technology  
Semantics  
RT: Data models  
Encoding  
Natural language  
processing  
Semantic Web

## Semantic triple

USE: Triples (Data structure)

## Semantic Web

BT: Internet  
RT: Artificial intelligence  
Content management  
Data models  
Distributed computing  
Document handling  
Knowledge management  
Linked data  
Markup languages  
Ontologies  
Ranking (statistics)  
Semantic search  
Semantic technology  
NT: OWL  
Resource description

## framework

## Semantics

BT: Semiotics  
RT: Natural language  
processing  
Professional  
communication  
Sign language  
NT: Semantic search  
Semantic technology

## Semi-insulating materials

USE: Semiconductor materials

## Semi-supervised Learning

USE: Semisupervised learning

## Semiconductivity

BT: Conductivity  
Electron devices  
RT: Charge carriers

## Semiconductor alloys

USE: Semiconductor materials

## Semiconductor charge carriers

USE: Charge carrier processes

## Semiconductor controlled rectifiers

USE: Thyristors

## Semiconductor counters

UF: Junction detectors  
BT: Semiconductor devices  
RT: Position sensitive particle detectors

## Semiconductor detectors

BT: Detectors  
Semiconductor devices  
RT: Absorption  
Particle charging

## Semiconductor device breakdown

BT: Failure analysis  
RT: Semiconductor device reliability  
Semiconductor device testing  
Tolerance analysis

## Semiconductor device doping

UF: Semiconductor doping  
BT: Semiconductor device manufacture  
RT: Doping  
Quasi-doping  
Semiconductor materials

## Semiconductor device manufacture



# 2019 IEEE Thesaurus

BT:	Electronic equipment		Semiconductor device
manufacture		modeling	
RT:	Fiducial markers		
	Gettering	<b>Semiconductor device packaging</b>	
	Ion implantation	BT:	Components, packaging, and manufacturing technology
	Microassembly	RT:	Integrated circuit
	Micromachining	packaging	
	Nanotechnology		Semiconductor devices
	Self-assembly		
	Semiconductor devices	<b>Semiconductor device reliability</b>	
	Surface cleaning	BT:	Reliability
	Surface contamination	RT:	Semiconductor device
NT:	Diffusion processes	breakdown	
	Flip-chip devices		Semiconductor device
	High-k gate	measurement	
dielectrics			
	Quasi-doping	<b>Semiconductor device testing</b>	
	Semiconductor device	BT:	Testing
doping		RT:	Semiconductor device
	Semiconductor	breakdown	
epitaxial layers			Semiconductor device
	Semiconductor growth	measurement	
	Silicidation		
	Wafer bonding		
<b>Semiconductor device measurement</b>		<b>Semiconductor devices</b>	
BT:	Measurement	UF:	SIS devices
RT:	Refractive index	(semiconductor)	
	Semiconductor device		Semiconductor-insulator-semiconductor devices
noise		BT:	Electron devices
	Semiconductor device	RT:	Contacts
reliability			Epitaxial growth
	Semiconductor device		Field effect
testing		transistors	
			Heterojunction bipolar
<b>Semiconductor device modeling</b>		transistors	
UF:	Semiconductor device		Hot carriers
models			Integrated circuits
BT:	Modeling		Molecular beam
	Semiconductor devices	applications	
RT:	Semiconductor device		Photoconducting
noise		devices	
			Proton radiation
<i>Semiconductor device models</i>		effects	
USE:	Semiconductor device		Rapid thermal
modeling		annealing	
			Semiconductor device
<b>Semiconductor device noise</b>		manufacture	
BT:	Semiconductor devices		Semiconductor device
RT:	Integrated circuit	packaging	
noise			Silicon-on-insulator
	Semiconductor device		Varistors
measurement		NT:	Flip-chip devices
			Gunn devices



# 2019 IEEE Thesaurus

	Hall effect devices	USE:	Electronics industry
	Junctions		
	MIS devices	<b>Semiconductor epitaxial layers</b>	
	MONOS devices	UF:	Silicon epitaxial
	P-i-n diodes	layers	
	Piezoresistive devices	BT:	Semiconductor device
devices	Power semiconductor	manufacture	
		RT:	Bipolar transistors
switches	Power semiconductor		
	Quantum dots	<b>Semiconductor films</b>	
	Quantum well lasers	BT:	Films
	SONOS devices	RT:	Buffer layers
	Schottky diodes		Dielectric thin films
	Semiconductor counters		Magnetic field induced
	Semiconductor	strain	
detectors			Semiconductor growth
	Semiconductor device		Semiconductor
modeling		materials	
	Semiconductor device		Thick films
noise			Thin films
	Semiconductor diodes	<b>Semiconductor growth</b>	
	Semiconductor lasers	BT:	Semiconductor device
	Semiconductor	manufacture	
waveguides		RT:	Buffer layers
	Semiconductor-		Crystal growth
insulator interfaces			Epitaxial layers
	Silicon devices		Semiconductor films
	Superluminescent		Semiconductor
diodes		materials	
lasers	Surface emitting		
	Thermistors	<b>Semiconductor impurities</b>	
	Transistors	BT:	Impurities
		RT:	Charge carrier
		processes	
<b>Semiconductor diodes</b>			Plasma immersion ion
BT:	Semiconductor devices	implantation	
RT:	Diodes		Semiconductor
	Magnetic field induced	materials	
strain			
	P-n junctions	<i>Semiconductor industry</i>	
NT:	P-i-n diodes	USE:	Electronics industry
	Schottky diodes		
	Semiconductor-metal	<b>Semiconductor laser arrays</b>	
interfaces		BT:	Semiconductor lasers
	Superluminescent		
diodes		<b>Semiconductor lasers</b>	
	Varactors	UF:	Injection lasers
			Junction lasers
<i>Semiconductor doping</i>			Laser diodes
USE:	Semiconductor device	BT:	Lasers
doping			Semiconductor devices
			Solid lasers
<i>Semiconductor electronics industry</i>			



# 2019 IEEE Thesaurus

applications	RT: Molecular beam	materials	III-V semiconductor
	Optical transmitters		Indium gallium
	Refractive index	arsenide	Indium phosphide
NT:	Laser tuning		Magnetic
	Quantum dot lasers	semiconductors	Organic semiconductors
	Quantum well lasers		Semiconductor
	Semiconductor laser		
arrays		superlattices	Silicon
amplifiers	Semiconductor optical		Silicon germanium
	Surface emitting		Substrates
lasers			Wide band gap
		semiconductors	
<b>Semiconductor materials</b>		<b>Semiconductor memory</b>	
UF:	Pseudobinary	BT:	Memory
semiconductors		RT:	Integrated circuits
	Semi-insulating		
materials		<b>Semiconductor nanostructures</b>	
	Semiconductor alloys	BT:	Nanostructures
BT:	Materials		
RT:	Acoustoelectric	<b>Semiconductor nanotubes</b>	
effects		BT:	Nanotubes
	Charge carriers		
	Conducting materials	<b>Semiconductor optical amplifiers</b>	
	Crystals	UF:	SOA
	Excitons	BT:	Optical amplifiers
	High-k dielectric		Semiconductor lasers
materials		RT:	Optical transmitters
	Photoconducting		Quantum well lasers
materials			
	Radiative	<b>Semiconductor process modeling</b>	
recombination		BT:	Modeling
	Semiconductor device	RT:	Circuit simulation
doping			
	Semiconductor films	<i>Semiconductor quantum wells</i>	
	Semiconductor growth	USE:	Quantum wells
	Semiconductor		
impurities		<b>Semiconductor radiation detectors</b>	
	Semiconductor thin	BT:	Radiation detectors
films			
	Silicon compounds	<b>Semiconductor superlattices</b>	
	Tunneling	BT:	Semiconductor
NT:	Amorphous	materials	Superlattices
semiconductors			
	Deep level transient	<b>Semiconductor thin films</b>	
spectroscopy		BT:	Thin films
	Elemental	RT:	Epitaxial growth
semiconductors			Gallium
	Gallium		Germanium
	Gallium arsenide		
	Germanium		
	II-VI semiconductor		
materials			



# 2019 IEEE Thesaurus

materials	Semiconductor	Phonetics
	Silicon	Professional
<b>Semiconductor waveguides</b>		communication
BT: Semiconductor devices		NT: Pragmatics
		Semantics
		Syntactics
<b>Semiconductor-insulator interfaces</b>		<b>Semisupervised learning</b>
BT: Semiconductor devices		UF: Semi-supervised
RT: CMOSFETs		learning
MIM devices		BT: Learning systems
MIS devices		RT: Supervised learning
MOS devices		Unsupervised learning
Silicon-on-insulator		
<i>Semiconductor-insulator-semiconductor devices</i>		<b>Senior citizens</b>
USE: Semiconductor devices		UF: Elderly
		BT: Social groups
<b>Semiconductor-metal interfaces</b>		RT: Aging
UF: Metal-semiconductor		Assisted living
interfaces		Geriatrics
BT: Semiconductor diodes		Gerontology
RT: Magnetic field induced		
strain		<i>Sense and avoid</i>
Schottky diodes		USE: Collision avoidance
NT: Schottky barriers		
<i>Semicustom integrated circuits</i>		<b>Sense organs</b>
USE: Application specific		BT: Anatomy
integrated circuits		NT: Ear
		Eyes
<b>Seminars</b>		Multisensory
BT: Educational programs		integration
NT: Webinars		Nose
		Olfactory bulb
<i>Semiology</i>		Taste buds
USE: Semiotics		Visual systems
<i>Semiosis</i>		<b>Sensitivity</b>
USE: Semiotics		BT: Measurement
		RT: Circuit analysis
<i>Semiotic studies</i>		Control systems
USE: Semiotics		Robustness
		Tolerance analysis
		NT: Sensitivity analysis
<b>Semiotics</b>		<b>Sensitivity analysis</b>
UF: Semiology		BT: Sensitivity
Semiosis		
Semiotic studies		<b>Sensitivity and specificity</b>
BT: Communication symbols		BT: Biomedical measurement
RT: Communication symbols		Medical diagnosis
Linguistics		
Natural language		<b>Sensor arrays</b>
processing		BT: Arrays





# 2019 IEEE Thesaurus

applications	Sensor systems and	biological sensors	Chemical and
NT:	Sensor fusion	sensors	Electromechanical
<b>Sensor fusion</b>			Force sensors
BT:	Sensor arrays		Infrared sensors
RT:	Kalman filters		Intelligent sensors
	Multimodal sensors		Intracranial pressure
NT:	Multisensor systems	sensors	Ionizing radiation
<b>Sensor phenomena and characterization</b>		sensors	Magnetic sensors
BT:	Sensors		Mechanical sensors
<b>Sensor systems</b>			Multimodal sensors
BT:	Aerospace and		Nanosensors
electronic systems	Sensor systems and		Optical sensors
applications		photonic sensors	Optoelectronic and
RT:	Navigation		Pressure sensors
NT:	Activity recognition		Sensor phenomena and
	Gunshot detection	characterization	Sensor systems and
systems		applications	Thermal sensors
<b>Sensor systems and applications</b>			Thick film sensors
BT:	Sensors		Thin film sensors
NT:	Detectors		Vision sensors
	Electric sensing		Wearable sensors
devices			
	Leak detection		
identification	Radiofrequency	<i>Sensors (image)</i>	
		USE:	Image sensors
	Robot sensing systems	<b>Sensory aids</b>	
	Sensor arrays	BT:	Medical services
	Sensor systems	RT:	Assistive technology
			Biomedical equipment
<b>Sensorless control</b>			Orthotics
BT:	Control systems		Prosthetics
RT:	AC machines		
	DC machines	NT:	Hearing aids
	Drives		
	Induction motors	<b>Sentiment analysis</b>	
	Inductive power	BT:	Computational
transmission		linguistics	
	Motor drives		Natural language
	Motors	processing	
		RT:	Emotion recognition
<b>Sensors</b>			Information analysis
UF:	Sun sensors	<b>Separation processes</b>	
RT:	Capacitive transducers	BT:	Materials science and
	Magnetostrictive	technology	
devices		NT:	Fractionation
	Wireless sensor		Particle separators
networks			
NT:	Acoustic sensors		



# 2019 IEEE Thesaurus

## *Separators*

USE: Particle separators

## *September 11*

USE: Terrorism

## *Sequence analysis*

USE: Sequences

## **Sequences**

UF: Digital sequences  
Sequence analysis  
BT: Mathematics  
RT: Codes  
NT: Binary sequences  
Random sequences

## *Sequencing*

USE: Sequential analysis

## **Sequential analysis**

UF: Sequencing  
BT: System analysis and  
design  
NT: Zero correlation zone

## **Sequential circuits**

UF: Sequential logic  
circuits  
BT: Circuits

## **Sequential diagnosis**

BT: System analysis and  
design

## *Sequential logic circuits*

USE: Sequential circuits

## *Sequential production*

USE: Flow production  
systems

## *Serious games*

USE: Games

## **Servers**

BT: Client-server systems  
RT: Network function  
virtualization  
NT: Web servers

## *Service composability*

USE: Interoperability

## **Service computing**

BT: Information technology  
RT: Business  
Cloud computing  
Process design  
Service-oriented

## architecture

Service-oriented  
systems engineering  
Web services

## *Service oriented architecture*

USE: Service-oriented  
architecture

## **Service robots**

BT: Robots  
RT: Home automation  
Manipulators  
Mobile robots  
Wearable robots

## **Service-oriented architecture**

UF: SOA  
Service oriented  
architecture  
Service-oriented  
architectures  
BT: Web services  
RT: Service computing  
Service-oriented  
systems engineering

## *Service-oriented architectures*

USE: Service-oriented  
architecture

## **Service-oriented systems engineering**

UF: SOSE  
BT: Systems engineering  
and theory  
RT: Formal specifications  
Service computing  
Service-oriented  
architecture  
Software engineering

## *Servo control*

USE: Servosystems

## *Servo-control*

USE: Servosystems

## **Servomechanisms**



# 2019 IEEE Thesaurus

BT:	Servomotors	BT:	Markup languages
RT:	Actuators		
	Manipulators		
<b>Servomotors</b>		<b>Shadow mapping</b>	
UF:	Servos	UF:	Projective shadowing
BT:	Motors		Shadowing
	Rotating machines	BT:	Computer graphics
	Servosystems	RT:	Three-dimensional
NT:	Servomechanisms	displays	
<i>Servos</i>		<i>Shadowing</i>	
USE:	Servomotors	USE:	Shadow mapping
<b>Servosystems</b>		<b>Shafts</b>	
UF:	Servo control	BT:	Machine components
	Servo-control		Production
BT:	Control equipment	RT:	Couplings
RT:	Actuators		Gears
	Manipulators		Machine tool spindles
	Motion control		Mechanical power
	Motor drives	transmission	
	Position control		Mechanical splines
	Robots		Pistons
	Velocity control		Propellers
NT:	Servomotors	NT:	Torque converters
			Camshafts
<b>Set theory</b>		<b>Shape</b>	
BT:	Algebra	BT:	Graphics
	Mathematics	RT:	Geometry
RT:	Boolean algebra		Pattern recognition
	Maximum likelihood		Shape control
estimation			Shape measurement
NT:	Fuzzy set theory	<b>Shape control</b>	
	Fuzzy sets	BT:	Mechanical variables
	Rough sets	control	
<i>SEU</i>		RT:	Shape
USE:	Single event upsets	<b>Shape measurement</b>	
<b>Sewage treatment</b>		BT:	Measurement
BT:	Waste handling	RT:	Shape
RT:	Pollution		
	Pollution control	<b>Shape memory alloys</b>	
	Sanitary engineering	BT:	Alloying
	Sludge treatment	RT:	Actuators
	Water pollution	<i>Shape memory material</i>	
<i>SF6</i>		USE:	Smart materials
USE:	Sulfur hexafluoride	<i>Shape memory technology</i>	
		USE:	Smart materials
<b>SGML</b>		<b>Share prices</b>	
UF:	Standard Generalized	BT:	Economic indicators
Markup Language			



# 2019 IEEE Thesaurus

<i>Shared Ledger</i>	BT: Suspensions (mechanical systems)
USE: Distributed ledger	RT: Automotive components Damping Springs Vibration control
<b>Sharing economy</b>	
BT: Economics	
<b>Shearing</b>	<b>Shock waves</b>
BT: Materials processing	BT: Waves
RT: Sheet metal processing	RT: Aerodynamics Seismic waves
<b>Sheet materials</b>	<i>Shoe manufacture</i>
BT: Materials	USE: Footwear industry
RT: Structural shapes	
RT: Sandwich structures	<i>Shoes</i>
RT: Sheet metal processing	USE: Footwear
RT: Structural panels	
RT: Thin wall structures	<i>Short circuit currents</i>
<b>Sheet metal processing</b>	USE: Short-circuit currents
BT: Manufacturing systems	
RT: Blanking	<b>Short-circuit currents</b>
RT: Embossing	UF: Short circuit currents
RT: Punching	BT: Current
RT: Shearing	
RT: Sheet materials	<b>Shortest path problem</b>
<i>Shewhart charts</i>	UF: Shortest-path-problem
USE: Control charts	BT: Graph theory
<b>Shift registers</b>	<i>Shortest-path-problem</i>
BT: Registers	USE: Shortest path problem
RT: Logic circuits	
NT: Linear feedback shift registers	<b>Shoulder</b>
	BT: Extremities
	NT: Axilla
<b>Shipbuilding industry</b>	<b>Shunts (electrical)</b>
UF: Boat building industry	BT: Electric current
BT: Manufacturing industries	control
RT: Construction industry	Photovoltaic effects
<i>Ships</i>	<i>Si</i>
USE: Marine vehicles	USE: Silicon
<i>Shock</i>	<i>SiC</i>
USE: Electric shock	USE: Silicon carbide
<b>Shock (mechanics)</b>	<i>Sick pay</i>
BT: Mechanical factors	USE: Employee welfare
<b>Shock absorbers</b>	<i>Side channel attacks</i>
UF: Dampers	USE: Side-channel attacks
	<b>Side-channel attacks</b>



# 2019 IEEE Thesaurus

UF:	Side channel attacks		
BT:	Cryptography		
<i>SiGe</i>		<b>Signal denoising</b>	
		UF:	Signal de-noising
		BT:	Signal reconstruction
USE:	Silicon germanium	RT:	Signal resolution
			Signal restoration
<i>Sigma delta</i>			Signal to noise ratio
USE:	Sigma-delta modulation		
<b>Sigma-delta modulation</b>		<b>Signal design</b>	
UF:	Delta sigma	BT:	Signal processing
	Sigma delta		
BT:	Delta modulation	<b>Signal detection</b>	
<b>Sign language</b>		UF:	Detection (signal)
BT:	Gesture recognition	BT:	Signal processing
RT:	Assistive technology	RT:	Blind source
	Deafness	separation	
	Semantics		Channel estimation
<b>Signal analysis</b>			Correlators
UF:	Waveform analysis		Decision making
BT:	Signal processing		Demodulation
RT:	Autocorrelation		Pattern clustering
	Blind source		Receivers
separation			Signal resolution
	Frequency-domain	estimation	Source separation
analysis		NT:	Time of arrival
	Pattern clustering	detection	
	Power system faults		Acoustic signal
	Rate distortion theory		Motion detection
	Signal resolution		Multiuser detection
	Speech analysis	detection	Optical signal
	Total harmonic		Phase detection
distortion			Radar detection
	Transient analysis	<i>Signal estimation</i>	
	Wavelet transforms	USE:	Estimation
NT:	Discrete-event systems	<i>Signal flow graphs</i>	
	Harmonic analysis	USE:	Flow graphs
	Parameter estimation	<b>Signal generators</b>	
	Signal mapping	UF:	Function generators
	Spectral analysis		Waveform generators
<i>Signal classification</i>		BT:	Signal processing
USE:	Pattern classification	NT:	Noise generators
<i>Signal constellation</i>			Pulse generation
USE:	Constellation diagram	<b>Signal integrity</b>	
<i>Signal de-noising</i>		BT:	Signal processing
USE:	Signal denoising	<b>Signal mapping</b>	
<i>Signal decomposition</i>		BT:	Signal analysis
USE:	Signal resolution		



# 2019 IEEE Thesaurus

## Signal processing

UF: Vibrational signal  
processing  
RT: Analog processing  
circuits  
Antennas and  
propagation  
Band-pass filters  
Bandwidth  
Biomedical computing  
Bit rate  
Correlators  
Data processing  
Decoding  
Deconvolution  
Digital signal  
processors  
Discrete Fourier  
transforms  
Empirical mode  
decomposition  
Encoding  
Estimation  
Estimation theory  
Feature extraction  
Fourier series  
Gaussian noise  
Independent component  
analysis  
Matrix decomposition  
Pattern clustering  
Prediction methods  
Random processes  
Rate distortion theory  
Stability analysis  
Structure from motion  
Synapses  
System-on-chip  
Transforms  
Transversal filters  
Vectors  
Wavelet transforms  
NT: Acoustic signal  
processing  
Adaptive signal  
processing  
Amplifiers  
Array signal  
processing  
Attenuators  
Chirp  
Convolution  
Decorrelation

processing

processing

signal processing

processing

conversion

methods

processing

strength indicator

Digital signal

Dispersion

Distortion

Error correction

Fading channels

Filters

Frequency locked loops

Geophysical signal

Limiting

Modulation

Multidimensional

Noise

Optical signal

Optical wavelength

Phase locked loops

Pulse compression

Pulse shaping methods

Quantization (signal)

RF signals

Radar signal

Received signal

Recording

Signal analysis

Signal design

Signal detection

Signal generators

Signal integrity

Signal reconstruction

Signal resolution

Signal restoration

Signal sampling

Signal synthesis

Source separation

Spectrogram

Tracking loops

## Signal processing algorithms

BT: Algorithms

## Signal quantisation

USE: Quantization (signal)

## Signal quantization

USE: Quantization (signal)

## Signal reconstruction



# 2019 IEEE Thesaurus

BT:	Signal processing	<i>Signal-to-noise ratio</i>	
RT:	Inverse problems	USE:	Signal to noise ratio
	Signal sampling		
	Signal to noise ratio	<i>Signal-to-noise-ratio</i>	
NT:	Signal denoising	USE:	Signal to noise ratio
<b>Signal representation</b>		<i>Signaling block systems</i>	
BT:	Modeling	USE:	Block signalling
RT:	Approximation methods		
	Wavelet transforms	<i>Signaling systems</i>	
		USE:	Communication system
<b>Signal resolution</b>		signaling	
UF:	Signal decomposition	<i>Signalling block systems</i>	
BT:	Signal processing	USE:	Block signalling
RT:	Array signal		
processing		<i>Signature detection</i>	
	Signal analysis	USE:	Handwriting
	Signal denoising	recognition	
	Signal detection		
	Spectral analysis	<i>Signature verification</i>	
NT:	Diversity reception	USE:	Handwriting
<b>Signal restoration</b>		recognition	
BT:	Signal processing		
RT:	Deconvolution	<i>Silica</i>	
	Distortion	USE:	Silicon compounds
	Signal denoising		
<b>Signal sampling</b>		<b>Silicidation</b>	
BT:	Signal processing	BT:	Semiconductor device
RT:	Quantization (signal)	manufacture	
	Sampling methods	<b>Silicides</b>	
	Signal reconstruction	BT:	Silicon compounds
<i>Signal separation</i>		<b>Silicon</b>	
USE:	Source separation	UF:	Si
<b>Signal synthesis</b>			Silicon materials
BT:	Signal processing		Siliconization
RT:	Speech synthesis	BT:	Semiconductor
		materials	
		RT:	Amorphous
<b>Signal to noise ratio</b>		semiconductors	
UF:	S/N		Elemental
	SNR	semiconductors	
	Signal-to-noise ratio		Epitaxial growth
	Signal-to-noise-ratio		Semiconductor thin
BT:	Noise	films	
RT:	Filters		Silicon compounds
	Noise figure		Silicon devices
	RAKE receivers		Silicon germanium
	Signal denoising		Silicon-on-insulator
	Signal reconstruction	NT:	Amorphous silicon
NT:	PSNR		Porous silicon
			Silicon alloys



# 2019 IEEE Thesaurus

	Silicon photonics	Silicon
		Silicon-on-insulator
<b>Silicon alloys</b>		Substrates
BT:	Silicon	Transistors
RT:	Alloying	
NT:	Germanium silicon	
alloys		<i>Silicon materials</i>
		USE: Silicon
<b>Silicon carbide</b>		<b>Silicon nitride</b>
UF:	SiC	BT: Nitrogen
BT:	Silicon compounds	Silicon compounds
<b>Silicon compiler</b>		<i>Silicon on insulator</i>
BT:	Computer aided	USE: Silicon-on-insulator
manufacturing		
RT:	Integrated circuit	<i>Silicon on insulator technology</i>
manufacture		USE: Silicon-on-insulator
<b>Silicon compounds</b>		<b>Silicon on sapphire</b>
UF:	Silica	UF: Silicon-on-sapphire
	Silicon dioxide	BT: CMOS technology
BT:	Compounds	Silicon-on-insulator
RT:	Critical current	RT: Substrates
density		
	Semiconductor	<b>Silicon photonics</b>
materials		BT: Photonics
	Silicon	Silicon
	Wide band gap	RT: Optical fiber
semiconductors		communication
NT:	Silicides	
	Silicon carbide	<b>Silicon radiation detectors</b>
	Silicon nitride	BT: Radiation detectors
<i>Silicon controlled rectifiers</i>		RT: Ionizing radiation
USE:	Thyristors	
<b>Silicon devices</b>		<b>Silicon-on-insulator</b>
BT:	Semiconductor devices	UF: SOI
RT:	Doping	SOS (silicon on
	Photonics	sapphire)
	Silicon	Silicon on insulator
<i>Silicon dioxide</i>		Silicon on insulator
USE:	Silicon compounds	technology
<i>Silicon epitaxial layers</i>		technology
USE:	Semiconductor	BT: Circuits
epitaxial layers		RT: Double-gate FETs
		Integrated circuits
		Interface states
<b>Silicon germanium</b>		Junctionless nanowire
UF:	SiGe	transistors
BT:	Semiconductor	Proton radiation
materials		effects
		Semiconductor devices
		Semiconductor-
RT:	Germanium	insulator interfaces





# 2019 IEEE Thesaurus

	Silicon		Matlab
	Silicon germanium		Monte Carlo methods
	Thin film circuits		Numerical simulation
NT:	Silicon on sapphire		Reduced order systems
<i>Silicon-on-insulator technology</i>		NT:	Computer simulation
USE:	Silicon-on-insulator		Digital simulation
<i>Silicon-on-sapphire</i>			Hardware-in-the loop
USE:	Silicon on sapphire		Medical simulation
<i>Silicon-oxide-nitride-oxide-silicon</i>			Systems simulation
USE:	SONOS devices		<i>Simulation Program with Integrated Circuit Emphasis</i>
<i>Siliconization</i>		USE:	SPICE
USE:	Silicon		<i>Simulation results</i>
<b>Silver</b>		USE:	Simulation
UF:	Ag		<b>Simultaneous localization and mapping</b>
BT:	Metals	UF:	SLAM
		BT:	Robot sensing systems
<b>SIMO communication</b>			<i>Single atom lasers</i>
UF:	Single input multiple output systems	USE:	Atom lasers
BT:	Communication systems		<b>Single electron devices</b>
RT:	Antenna arrays	BT:	Circuits and systems
	Diversity reception		Electron devices
	Feedback	RT:	Nanoscale devices
	MIMO communication		Nanotechnology
	MISO communication		Resonant tunneling
	Optical materials		devices
	Radio communication	NT:	Single electron memory
	SISO communication		Single electron transistors
<b>Simple object access protocol</b>			<b>Single electron memory</b>
UF:	SOAP	BT:	Single electron devices
BT:	Web services	NT:	Hetero-nanocrystal memory
<b>Simulated annealing</b>			<b>Single electron transistors</b>
BT:	Mathematics	UF:	Single-electron transistors
	Optimization methods	BT:	Single electron devices
RT:	Annealing		<b>Single event latchup</b>
	Monte Carlo methods	BT:	Proton effects
	Relaxation methods		Radiation effects
<b>Simulation</b>			<b>Single event transients</b>
UF:	Simulation results	BT:	Ionization
BT:	Modeling		
RT:	Application		
virtualization	Computer aided analysis		
	Computer graphics		
	Emulation		



# 2019 IEEE Thesaurus

<b>Single event upsets</b>	BT: Total quality management
UF: SEU	RT: Quality assurance
BT: Ionization	RT: Quality control
<i>Single input multiple output systems</i>	<b>Size control</b>
USE: SIMO communication	BT: Mechanical variables control
<i>Single input single output systems</i>	RT: Thickness control
USE: SISO communication	<b>Size measurement</b>
<b>Single machine scheduling</b>	BT: Measurement
BT: Scheduling	RT: Area measurement
RT: Optimization methods	Length measurement
<b>Single photon emission computed tomography</b>	Thickness measurement
UF: SPECT	Volume measurement
BT: Computed tomography	NT: Functional point analysis
RT: Cancer	<b>Skeleton</b>
Collimators	BT: Musculoskeletal system
Phantoms	NT: Bones
Tumors	Joints
<i>Single-electron transistors</i>	Spine
USE: Single electron transistors	Thorax
<i>Single-wall carbon nanotubes</i>	<b>Skin</b>
USE: Carbon nanotubes	BT: Integumentary system
<b>Singular value decomposition</b>	NT: Dermis
BT: Matrices	Epidermis
<i>SIS devices (semiconductor)</i>	Sebaceous glands
USE: Semiconductor devices	Sweat glands
<i>SIS devices (superconductor)</i>	<b>Skin cancer</b>
USE: Superconducting devices	UF: Basal cell carcinoma
<b>SISO communication</b>	BT: Cancer
UF: Single input single output systems	NT: Melanoma
BT: Communication systems	<b>Skin effect</b>
RT: Antenna arrays	BT: Current density
Diversity reception	RT: Conductors
MIMO communication	Power systems
MISO communication	Resistance
Radio communication	System analysis and design
SIMO communication	<b>Skin neoplasms</b>
Transmitters	BT: Neoplasms
<b>Six sigma</b>	<b>Skull</b>
	BT: Head
	RT: Bones
	<b>Skyrmions</b>



# 2019 IEEE Thesaurus

	BT:	Solitons		BT:	Planar transmission lines
<b>Slabs</b>				NT:	Slot line components
	BT:	Structural shapes			<i>Slotline</i>
<b>Slag</b>				USE:	Slot lines
	BT:	Industrial waste			<i>Slotline components</i>
	RT:	Fly ash		USE:	Slot line components
		Waste disposal			
		Waste management			
<i>SLAM</i>				<b>Slow light</b>	
	USE:	Simultaneous		BT:	Light sources
localization and mapping				RT:	Velocity measurement
<i>SLD</i>				<b>Sludge treatment</b>	
	USE:	Superluminescent		UF:	Activated sludge
diodes				process	
<b>Sleep</b>				BT:	Waste handling
	BT:	Brain		RT:	Pollution control
	NT:	Sleep apnea			Sewage treatment
					Wastewater
					Wastewater treatment
<b>Sleep apnea</b>				<b>Slurries</b>	
	UF:	Sleep apnoea		BT:	Waste materials
		Snore activity		RT:	Industrial waste
		Snore signals			
		Snoring			
	BT:	Medical conditions		<b>Small business technology transfer</b>	
		Sleep		BT:	Technology transfer
<i>Sleep apnoea</i>					
	USE:	Sleep apnea		<i>Small cell networks</i>	
				USE:	Microcell networks
<i>Slideways (mechanical)</i>				<b>Small satellites</b>	
	USE:	Mechanical guides		UF:	Microsatellites
					Miniaturized
<b>Sliding mode control</b>				satellites	
	UF:	Sliding-mode control			Nanosatellites
	BT:	Control systems			Smallsats
				BT:	Satellites
				NT:	CubeSat
<i>Sliding-mode control</i>					
	USE:	Sliding mode control		<i>Smallsats</i>	
				USE:	Small satellites
<b>Slot antennas</b>				<b>SMAP mission</b>	
	BT:	Antennas		UF:	Soil Moisture Active
<b>Slot line components</b>				Passive mission	
	UF:	Slotline components		BT:	Soil moisture
	BT:	Slot lines			
<b>Slot lines</b>				<i>Smart actuators</i>	
	UF:	Slotline		USE:	Intelligent actuators
				<b>Smart buildings</b>	



# 2019 IEEE Thesaurus

BT:	Buildings		Smart power grids
<b>Smart cameras</b>		BT:	Power grids
BT:	Cameras	RT:	Cyber-physical systems
	Computer vision		Energy informatics
RT:	Distributed vision		Microgrids
networks			Smart meters
		NT:	Transactive energy
<b>Smart cards</b>			Vehicle-to-grid
BT:	User interfaces	<i>Smart health</i>	
RT:	Access control	USE:	Smart healthcare
	Data processing		
<b>Smart cities</b>		<b>Smart healthcare</b>	
BT:	Intelligent structures	UF:	Smart health
	Urban areas		Smart medical services
RT:	Buildings	BT:	Medical services
	Construction industry	RT:	Electronic healthcare
	Cyber-physical systems		Point of care
	Energy informatics		Smart devices
<i>Smart clothing</i>		<b>Smart homes</b>	
USE:	Smart textiles	BT:	Buildings
			Home automation
<b>Smart contracts</b>		<b>Smart manufacturing</b>	
BT:	Contracts	UF:	Smart factories
	Protocols	BT:	Manufacturing
		RT:	Intelligent
<b>Smart devices</b>		manufacturing systems	
BT:	Electronic equipment		Smart devices
	Wireless communication		Smart materials
RT:	Smart glasses	<b>Smart materials</b>	
	Smart healthcare	UF:	Shape memory material
	Smart manufacturing		Shape memory
<i>Smart elastomers</i>		technology	
USE:	Dielectric elastomers	BT:	Materials
		RT:	Austenite
<i>Smart fabrics</i>			Azobenzene
USE:	Smart textiles		Dielectric elastomers
			Martensite
<i>Smart factories</i>			Metamaterials
USE:	Smart manufacturing		Polycaprolactone
			Smart manufacturing
<i>Smart garments</i>			Smart transportation
USE:	Smart textiles	NT:	Biomimetic materials
			Smart textiles
<b>Smart glasses</b>		<i>Smart medical services</i>	
UF:	Smartglasses	USE:	Smart healthcare
BT:	Wearable computers		
RT:	Smart devices	<b>Smart meters</b>	
<b>Smart grids</b>		BT:	Meter reading
UF:	Smart microgrids		



# 2019 IEEE Thesaurus

RT: Automatic meter  
reading

Smart grids

*Smart microgrids*

USE: Smart grids

**Smart phones**

UF: Smartphones

BT: Mobile handsets

RT: Bring your own device

**Smart pixels**

BT: Image processing

RT: Integrated

optoelectronics

Optical switches

*Smart power grids*

USE: Smart grids

*Smart sensors*

USE: Intelligent sensors

*Smart structures*

USE: Intelligent structures

**Smart textiles**

UF: Electronic textiles

Smart clothing

Smart fabrics

Smart garments

BT: Smart materials

RT: Wearable computers

**Smart transportation**

BT: Transportation

RT: Automated highways

Intelligent

transportation systems

Intelligent vehicles

Smart materials

**Smart TV**

BT: TV

RT: Internet

*Smartglasses*

USE: Smart glasses

*Smartphones*

USE: Smart phones

**Smelting**

BT: Materials processing

RT: Blast furnaces

Heat treatment

Melt processing

Metals industry

Refining

*SMES*

USE: Superconducting

magnetic energy storage

**Smoke detectors**

BT: Alarm systems

RT: Domestic safety

Fires

Ionization chambers

Safety devices

ZigBee

*Smoothed particle hydrodynamics*

USE: Fluid flow AND

Hydrodynamics

**Smoothing methods**

BT: Mathematics

**SMOS mission**

UF: Soil moisture and

ocean salinity

Soil moisture and

ocean salinity mission

BT: Ocean salinity

Soil moisture

*SMPS*

USE: Switched mode power

supplies

**SMPTE**

UF: Society of Motion

Picture and Television Engineers

BT: Standards

organizations

**SMPTE Standards**

BT: Standards publications

*Sn*

USE: Tin

*Snake bots*

USE: Snake robots

**Snake robots**



# 2019 IEEE Thesaurus

UF:	Snake bots	NT:	Persuasive systems
	Snakebots		Social intelligence
BT:	Robots		
<i>Snakebots</i>		<b>Social engineering (security)</b>	
USE:	Snake robots	BT:	Information security
		RT:	Human factors
<i>Snore activity</i>			Psychology
USE:	Sleep apnea		Social factors
		<b>Social factors</b>	
<i>Snore signals</i>		BT:	Social implications of
USE:	Sleep apnea	technology	
		RT:	Bio-inspired computing
<i>Snoring</i>			Digital divide
USE:	Sleep apnea		Governmental factors
			International
<b>Snow</b>		collaboration	
BT:	Meteorology		International
RT:	Ice	relations	
			Philosophical
<i>SNR</i>		considerations	
USE:	Signal to noise ratio	(security)	Social engineering
			Social intelligence
<i>SNS devices</i>			Technology planning
USE:	Superconducting	NT:	Demography
devices			Technology social
<b>Snubbers</b>		factors	
BT:	Power electronics	<b>Social groups</b>	
		BT:	Sociology
<i>SOA</i>		NT:	Millennials
USE:	Semiconductor optical		Senior citizens
amplifiers AND			
	Service-oriented	<b>Social implications of technology</b>	
architecture		UF:	Orange technology
<i>SOAP</i>		RT:	Cyberethics
USE:	Simple object access		Digital divide
protocol		NT:	Cultural differences
			Environmental factors
<i>SOC</i>			Ethical aspects
USE:	System-on-chip		Ethics
			Globalization
<i>Soccer</i>			International
USE:	Sports	relations	
			Peace technology
<b>Social computing</b>			Philosophical
BT:	Collaborative work	considerations	
	Internet		Social factors
RT:	Behavioral sciences		Sustainable
	Crowdsourcing	development	
	Social computing		Technology
	Social network		
services		<b>Social intelligence</b>	



# 2019 IEEE Thesaurus

BT:	Behavioral sciences	RT:	Collective intelligence
	Social computing	NT:	Digital divide
	Sociology		Social groups
RT:	Cultural differences		Social intelligence
	Social factors		
<i>Social media services</i>		<b>Sociotechnical systems</b>	
USE:	Social network	UF:	Socio-technical systems
		BT:	Organizations
<b>Social network services</b>		<b>Sockets</b>	
UF:	Social media	BT:	Connectors
	Social networking		
	Social networks	<b>Sodium</b>	
	Social-network	BT:	Chemical elements
BT:	Information retrieval		
RT:	Blogs	<i>Sodium chloride</i>	
	Crowdsourcing	USE:	Chlorine compounds
	Electronic mail		
	Internet	<b>Soft electronics</b>	
	Social computing	BT:	Electronic equipment
	Web sites	RT:	Flexible electronics
NT:	Computer mediated communication		Inorganic materials
	Facebook		Wearable computers
	Flickr		
	LinkedIn	<b>Soft lithography</b>	
	MySpace	UF:	Microcontact printing
	Second Life		Replica molding
	Twitter		Replica moulding
	YouTube	BT:	Lithography
		RT:	Nanolithography
<i>Social networking services</i>			Nanopatterning
USE:	Social network	<b>Soft magnetic materials</b>	
		BT:	Magnetic materials
<i>Social networks services</i>		<b>Soft robotics</b>	
USE:	Social network	UF:	Soft robots
		BT:	Robots
<i>Social-network services</i>		<i>Soft robots</i>	
USE:	Social network	USE:	Soft robotics
<i>Society of Motion Picture and Television Engineers</i>		<i>Soft switch</i>	
USE:	SMPTE	USE:	Soft switching
<i>Socio-technical systems</i>		<b>Soft switching</b>	
USE:	Sociotechnical systems	UF:	Soft switch
			Softswitch
<b>Sociology</b>		BT:	Telecommunication computing
BT:	Science - general	RT:	Routing



# 2019 IEEE Thesaurus

## Softening

UF: Softening  
(metallurgical)  
BT: Materials processing  
RT: Annealing

## *Softening (metallurgical)*

USE: Softening

## *Softswitch*

USE: Soft switching

## Software

UF: Computer software  
On-demand software  
BT: Computers and  
information processing  
RT: Algorithms  
Computer languages  
Computer science  
Courseware  
Documentation  
Enterprise resource

## planning

Firewalls (computing)  
Geospatial analysis  
Microprogramming  
Programming  
Software engineering  
Software protection  
Software standards  
NT: Anti-virus software  
Application software  
Embedded software  
Malware  
Middleware  
Open source software  
Optical character

## recognition software

## software

Privacy-invasive  
Public domain software  
Software agents  
Software as a service  
Software debugging  
Software maintenance  
Software packages  
Software performance  
Software quality  
Software reusability  
Software safety  
Software systems  
Software tools  
System software

## Software agents

BT: Software  
RT: Artificial  
intelligence  
Computer applications  
Distributed computing  
Intelligent systems  
Knowledge based  
systems  
Learning systems  
Mobile agents  
NT: Agent-based modeling  
Autonomous agents  
Botnet  
Intelligent agents

## Software algorithms

BT: Algorithms

## Software architecture

BT: Software engineering  
RT: Distributed computing  
NT: Client-server systems  
Dew computing  
Microarchitecture  
Representational state

## transfer

## Software as a service

UF: On demand software  
On-demand software  
SaaS  
Software-as-a-service  
BT: Software  
RT: Cloud computing  
Information processing

## Software debugging

BT: Software  
RT: Programming  
Programming

## environments

NT: Software design

## Software defined networking

UF: SDN  
BT: Computer networks  
RT: Application

## programming interfaces

Cloud computing  
Computer network

## management

Distributed processing





# 2019 IEEE Thesaurus

virtualization systems	Intelligent networks	Computer aided
	Mobile computing	software engineering
	Network function	Formal verification
		Programming
	Network operating	environments
	Operating systems	Reasoning about
	Protocols	Release engineering
	Virtual machining	Runtime
	Virtualization	Software architecture
<i>Software defined radio</i>		Software libraries
	USE: Software radio	Software product lines
<b>Software design</b>		<b>Software libraries</b>
engineering	BT: Software debugging	BT: Libraries
	RT: Web design	Software engineering
	NT: Model driven	RT: Algorithms
		Matlab
	Usability	Object oriented
		programming
<b>Software development management</b>		Python
development)	BT: Engineering management	Software reusability
	RT: Release engineering	
	Scrum (Software	
	Software product lines	
development	NT: Agile software	
	Model-driven	
<i>Software documentation</i>		<b>Software maintenance</b>
	USE: Documentation	BT: Software
		RT: Software product lines
<b>Software engineering</b>		<b>Software measurement</b>
information processing	BT: Computers and	BT: Measurement
	RT: Code refractoring	
	Functional point	
	Rapid prototyping	
analysis	Requirements	
	Service-oriented	
engineering	Software	
	Static analysis	
	Systems Modeling	
	Visual BASIC	
systems engineering	NT: Capability maturity	
Language		<b>Software packages</b>
model		BT: Software
		RT: Computer applications
		Power system analysis
		computing
		NT: EMTDC
		PSCAD
		SPICE
		<b>Software performance</b>
		BT: Software
		RT: Algorithmic efficiency
		Capability maturity
		model
		<i>Software piracy</i>
		USE: Computer crime
		<b>Software product lines</b>
		BT: Product development
		Software engineering
		RT: Software development
		management
		Software maintenance



# 2019 IEEE Thesaurus

## Software protection

BT: Copyright protection  
Legal factors  
RT: Digital rights  
management  
Intellectual property  
Software

## Software prototyping

BT: System analysis and  
design

## Software quality

BT: Software  
RT: Algorithmic efficiency

## Software radio

UF: Reconfigurable radio  
Software defined radio  
Software-defined radio  
BT: Mobile communication  
Radio communication  
RT: Code division  
multiplexing  
Land mobile radio  
Land mobile radio  
cellular systems  
Telecommunication  
computing  
Transceivers

## Software reliability

BT: Reliability

## Software reusability

UF: Software reuse  
BT: Software  
RT: Capability maturity  
model  
Object oriented  
programming  
Software libraries

## Software reuse

USE: Software reusability

## Software reviews

BT: IEEE indexing

## Software safety

BT: Software  
RT: Product safety  
engineering

## Software standards

BT: Standards categories  
RT: ISO  
ISO Standards  
Software

## Software systems

BT: Software

## Software testing

BT: Testing  
NT: Combinatorial testing  
Fuzzing

## Software tools

BT: Software  
RT: Computer aided  
software engineering  
Programming  
Programming  
environments  
Visual BASIC  
NT: Authoring systems

## Software-as-a-service

USE: Software as a service

## Software-defined radio

USE: Software radio

## SOI

USE: Silicon-on-insulator

## Soil

BT: Geoscience  
RT: Earth  
Sediments  
Soil measurements  
Soil pollution  
NT: Soil moisture  
Soil properties  
Soil texture

## Soil measurements

BT: Measurement  
RT: Geophysical  
measurements  
Moisture measurement  
Remote sensing  
Soil  
NT: Salinity (geophysical)

## Soil moisture



# 2019 IEEE Thesaurus

BT: Soil	USE: Polarimetry
NT: SMAP mission	
SMOS mission	
<i>Soil Moisture Active Passive mission</i>	<b>Solar power generation</b>
USE: SMAP mission	UF: Solar generation
	BT: Power generation
<i>Soil moisture and ocean salinity</i>	RT: Building integrated
USE: SMOS mission	photovoltaics
	Solar energy
<i>Soil moisture and ocean salinity mission</i>	Solar powered vehicles
USE: SMOS mission	NT: Maximum power point
	trackers
<b>Soil pollution</b>	Photovoltaic systems
BT: Land pollution	Solar panels
RT: Agriculture	
Soil	
<b>Soil properties</b>	<b>Solar powered vehicles</b>
BT: Soil	BT: Electric vehicles
	RT: Battery powered
<b>Soil texture</b>	vehicles
BT: Soil	Energy storage
	Solar power generation
<i>Solar cells</i>	Traction motors
USE: Photovoltaic cells	Vehicle-to-grid
<b>Solar cooling</b>	<b>Solar radiation</b>
BT: Cooling	BT: Extraterrestrial
	phenomena
<b>Solar energy</b>	RT: Solar energy
BT: Energy resources	Space radiation
RT: Maximum power point	
trackers	<b>Solar system</b>
Solar heating	BT: Astronomy
Solar power generation	NT: Kuiper belt
Solar radiation	Planets
	Satellites
<i>Solar generation</i>	Sun
USE: Solar power generation	<i>Solder joints</i>
	USE: Soldering
<b>Solar heating</b>	<b>Soldering</b>
BT: Energy conversion	UF: Solder joints
Heating systems	BT: Assembly
RT: Phase change materials	Fabrication
Solar energy	Joining processes
Space heating	RT: Bonding processes
	Manufacturing
<b>Solar panels</b>	Materials processing
BT: Photovoltaic systems	Soldering equipment
Solar power generation	NT: Brazing
	Flip chip solder
<i>Solar polarimetry</i>	joints
	Reflow soldering
	<b>Soldering equipment</b>



# 2019 IEEE Thesaurus

BT:	Production equipment	NT:	Circuit subsystems
RT:	Joining materials		Circuit theory
	Joining processes		FET circuits
	Soldering		Gate leakage
			Solid state circuit
<i>Solderless breadboard</i>		design	
USE:	Breadboard		Transistors
<b>Solenoids</b>		<i>Solid state lasers</i>	
BT:	Magnetic devices	USE:	Solid lasers
RT:	Switches		
	Transducers	<b>Solid state lighting</b>	
<b>Solid lasers</b>		UF:	Solid-state lighting
UF:	Color center lasers	BT:	Lighting
	Solid state lasers		
	Solid-state lasers	<i>Solid-state batteries</i>	
BT:	Lasers	USE:	Solid state batteries
RT:	Thermal lensing		
	Thermooptical devices	<i>Solid-state circuit design</i>	
NT:	Microchip lasers	USE:	Solid state circuit
	Quantum well lasers	design	
	Semiconductor lasers	<i>Solid-state circuits</i>	
	Surface emitting	USE:	Solid state circuits
lasers			
<b>Solid modeling</b>		<i>Solid-state Lasers</i>	
BT:	Modeling	USE:	Solid lasers
RT:	Solid-state physics		
	Virtual reality	<i>Solid-state lighting</i>	
		USE:	Solid state lighting
<i>Solid oxide electrolyzer cells</i>		<b>Solid-state physics</b>	
USE:	Fuel cells	BT:	Physics
		RT:	Materials science and
<b>Solid scintillation detectors</b>		technology	
BT:	Scintillation counters		Quantum mechanics
RT:	Energy resolution		Solid modeling
	Medical diagnostic		
imaging		<b>Solids</b>	
	Spectroscopy	BT:	Materials
		RT:	Crystals
<b>Solid state batteries</b>			Materials science and
UF:	Solid-state batteries	technology	
BT:	Batteries	NT:	Young's modulus
<b>Solid state circuit design</b>		<b>Solitons</b>	
UF:	Solid-state circuit	BT:	Waves
design		NT:	Optical solitons
			Skyrmions
BT:	Solid state circuits	<b>Solution design</b>	
RT:	Circuit synthesis	BT:	Systems engineering
<b>Solid state circuits</b>		and theory	
UF:	Solid-state circuits		
RT:	Circuits and systems		



# 2019 IEEE Thesaurus

## Solvents

BT: Chemical processes  
RT: Methanol

## SOM

USE: Self-organizing  
feature maps

## Soma

UF: Somata  
BT: Neurons  
RT: Brain

## Somata

USE: Soma

## Sonar

BT: Aerospace and  
electronic systems  
RT: Acoustic arrays  
Chirp modulation  
Ultrasonic transducers  
NT: Sonar applications  
Sonar equipment  
Synthetic aperture  
sonar

## Sonar applications

BT: Sonar  
RT: Sonar navigation  
NT: Sonar detection  
Sonar measurements

## Sonar detection

BT: Acoustic signal  
detection  
RT: Sonar applications  
Reflectivity

## Sonar equipment

UF: Hydrophones  
BT: Sonar

## Sonar measurements

BT: Sonar applications  
RT: Remote sensing  
Sea measurements

## Sonar navigation

BT: Navigation  
RT: Sonar applications

## SONET

UF: Synchronous optical  
network

BT: Communication  
standards

Digital communication  
ETSI Standards  
Optical fiber

communication

RT: Asynchronous transfer  
mode

Synchronous digital

hierarchy

Transport protocols

## Sonification

BT: Audio systems  
Information processing

## Sonogram

BT: Ultrasonography  
RT: Spectrogram

## SONOS devices

UF: Silicon-oxide-nitride-  
oxide-silicon  
BT: Semiconductor devices

## Sorting

BT: Data handling  
RT: Merging

## SOS (*silicon on sapphire*)

USE: Silicon-on-insulator

## SOSE

USE: Service-oriented  
systems engineering

## Sound systems

USE: Audio systems

## Source coding

BT: Data compression  
Encoding  
Information theory  
RT: Rate distortion theory  
Release engineering

## Source location

USE: Position measurement

## Source separation

UF: Signal separation  
BT: Signal processing



# 2019 IEEE Thesaurus

RT: Adaptive signal  
detection

Array signal  
processing

NT: Signal detection  
Blind source  
separation

**South America**  
BT: Continents

**South Pole**  
BT: Antarctica

*Space based radar*  
USE: Spaceborne radar

*Space born radar*  
USE: Spaceborne radar

**Space charge**  
BT: Charge carrier  
processes

Electrostatic  
processes

RT: Pulsed electroacoustic  
methods

Vacuum technology

**Space communications**  
BT: Telecommunications  
NT: Deep-space  
communications

**Space cooling**  
BT: Cooling  
RT: Buildings  
Coolants  
Refrigerants

**Space debris**  
UF: Orbital debris  
Space junk  
Space waste  
BT: Space technology

*Space diversity*  
USE: Spatial diversity

**Space exploration**  
UF: Space travel  
BT: Space technology  
RT: NASA

NT: Interplanetary  
exploration

Space missions

*Space habitats*  
USE: Buildings AND  
Space technology

**Space heating**  
BT: Heating systems  
RT: Building services  
Gas appliances  
Solar heating  
Temperature control  
Vents

*Space junk*  
USE: Space debris

*Space measurements*  
USE: Extraterrestrial  
measurements

**Space missions**  
BT: Space exploration  
RT: Interplanetary  
exploration

NASA

*Space phenomena*  
USE: Extraterrestrial  
phenomena

**Space power stations**  
UF: Power stations (space)  
BT: Space stations  
RT: Power generation

**Space radiation**  
BT: Radiation effects  
RT: Ionization  
Solar radiation

**Space shuttles**  
BT: Space vehicles  
RT: Aerospace safety

**Space stations**  
BT: Artificial satellites  
NT: International Space  
Station

Space power stations

## Space technology



# 2019 IEEE Thesaurus

UF:	Space habitats	Decoding
BT:	Aerospace engineering	
RT:	Artificial satellites	<i>Spaceborn radar</i>
	Extraterrestrial	USE: Spaceborne radar
phenomena		
	Field programmable	<b>Spaceborne radar</b>
analog arrays		UF: Satellite born radar
	NASA	Satellite borne radar
	Space vehicles	Space based radar
NT:	Payloads	Space born radar
	Space debris	Spaceborn radar
	Space exploration	BT: Radar
<i>Space travel</i>		RT: Radar remote sensing
USE:	Space exploration	Synthetic aperture
		radar
<b>Space vector pulse width modulation</b>		<i>Spacecraft materials</i>
UF:	SVPWM	USE: Aerospace materials
BT:	Pulse width modulation	
RT:	AC motors	<i>Spacial indices</i>
	Converters	USE: Spatial indexes
	DC motors	
<i>Space vehicle electronics</i>		<i>Spam</i>
USE:	Aerospace electronics	USE: Unsolicited electronic
		mail
<i>Space vehicle instrumentation</i>		<i>Spamming</i>
USE:	Aerospace electronics	USE: Unsolicited electronic
		mail
<i>Space vehicle navigation</i>		<b>Spark gaps</b>
USE:	Space vehicles	BT: Electromagnetic
		analysis
<b>Space vehicles</b>		RT: Air gaps
UF:	Planetary landers	Electrodes
	Space vehicle	Insulation
navigation		Sparks
BT:	Vehicles	Switches
RT:	Aerospace accidents	
	Aerospace control	<b>Sparks</b>
	Aerospace electronics	BT: Electric breakdown
	Aerospace materials	RT: Spark gaps
	Aerospace safety	
	Artificial satellites	<b>Sparse matrices</b>
	Ground support	UF: Sparse matrix
	Proton effects	BT: Numerical analysis
	Space technology	
NT:	Space shuttles	<i>Sparse matrix</i>
		USE: Sparse matrices
<i>Space waste</i>		
USE:	Space debris	<b>Spatial augmented reality</b>
		BT: Augmented reality
<b>Space-time codes</b>		<b>Spatial coherence</b>
BT:	Codes	
RT:	Channel coding	



# 2019 IEEE Thesaurus

BT: Image processing	BT: Special sections
<b>Spatial databases</b>	BT: IEEE indexing
BT: Databases	<i>Special sections</i>
<b>Spatial diversity</b>	USE: Special issues and sections
UF: Antenna diversity	<b>Specific absorption rate</b>
Space diversity	UF: SAR
BT: Communication systems	BT: Electromagnetic interference
Wireless communication	
RT: Antennas	<b>Specification languages</b>
Quality of service	BT: Computer languages
Receiving antennas	NT: Domain specific languages
<b>Spatial filters</b>	Unified modeling language
BT: Filters	
<b>Spatial indexes</b>	<b>Speckle</b>
UF: Spacial indices	BT: Optical noise
BT: Indexes	RT: Optical interferometry
<b>Spatial resolution</b>	Optical scattering
BT: Image resolution	
RT: Image quality	<i>SPECT</i>
<i>Spatio-temporal phenomena</i>	USE: Single photon emission computed tomography
USE: Spatiotemporal phenomena	
<b>Spatiotemporal phenomena</b>	<b>Spectral analysis</b>
UF: Spatio-temporal phenomena	UF: Power spectra
BT: Chaos	Spectral domain
RT: Nonlinear dynamical systems	Spectral-domain
Pattern formation	Spectrum analysis
Pattern matching	Spectrum estimation
Pattern recognition	BT: Signal analysis
	RT: Direction-of-arrival estimation
<b>Speaker recognition</b>	Estimation
BT: Identification of persons	Frequency estimation
RT: Biometrics (access control)	Harmonic analysis
Speech	Parameter estimation
Speech recognition	Prediction methods
Viterbi algorithm	Signal resolution
<i>Special issues</i>	Spectroscopy
USE: Special issues and sections	Speech analysis
<b>Special issues and sections</b>	Time series analysis
UF: Special issues	Transforms
	NT: Infrared spectra
	Judd-Ofelt theory
	Spectroradiometers
	<i>Spectral domain</i>
	USE: Spectral analysis





# 2019 IEEE Thesaurus

## Spectral efficiency

UF: Bandwidth efficiency  
BT: Channel allocation  
Measurement  
RT: Bandwidth  
Information processing

Kirchhoff's Law  
MERIS  
Mass spectroscopy  
Neutron spin echo  
Photoacoustic effects  
Resonance light

## Spectral shape

BT: Acoustics

## Spectral waterfall

USE: Spectrogram

## Spectral-domain

USE: Spectral analysis

## Spectrogram

UF: Spectral waterfall  
Voice print  
Voicegram  
Voiceprint  
BT: Signal processing  
RT: Sonogram

## Spectrometry

USE: Spectroscopy

## Spectroradiometers

BT: Radiometers  
Spectral analysis  
NT: MODIS

## Spectroscopy

UF: Spectrometry  
BT: Measurement  
RT: Atomic measurements  
Bandwidth  
Fourier series  
Infrared spectra  
Nuclear measurements  
Radiation detectors  
Solid scintillation

## detectors

Spectral analysis  
Thermoreflectance

## imaging

NT: Deep level transient

## spectroscopy

Electrochemical

## impedance spectroscopy

Electron paramagnetic

## resonance

Fourier transform

## infrared spectroscopy

scattering

## Spectrum analysis

USE: Spectral analysis

## Spectrum estimation

USE: Spectral analysis

## Spectrum management

USE: Radio spectrum  
management

## Speech

BT: Oral communication  
RT: Speaker recognition

## Speech activity detection

USE: Voice activity  
detection

## Speech analysis

BT: Speech recognition  
RT: Cepstral analysis  
Frequency estimation  
Signal analysis  
Spectral analysis  
Speech coding  
Speech synthesis

## Speech codecs

BT: Codecs  
Communication  
equipment  
RT: Decoding  
Speech coding  
Vocoders

## Speech coding

BT: Encoding  
Information theory  
RT: Audio coding  
Rate distortion theory  
Speech analysis  
Speech codecs  
Vector quantization  
Vocoders  
Voice activity

## detection



# 2019 IEEE Thesaurus

## *Speech communication*

USE: Oral communication

## *Speech detection*

USE: Voice activity

## *detection*

## **Speech enhancement**

BT: Speech processing

RT: Hearing aids  
Speech recognition

## **Speech processing**

BT: Acoustic signal

## *processing*

RT: Delay estimation  
Phonetics  
Prediction methods  
NT: Human voice  
Speech enhancement  
Speech synthesis  
Voice activity

## *detection*

## **Speech recognition**

BT: Identification of

## *persons*

RT: Pattern recognition  
Cepstral analysis  
Emotion recognition  
Feature extraction  
Speaker recognition  
Speech enhancement  
Voice activity

## *detection*

NT: Automatic speech

## *recognition*

Speech analysis

## **Speech synthesis**

UF: Synthetic speech  
Voice response systems

BT: Speech processing

RT: Biomedical equipment  
Signal synthesis  
Speech analysis  
Voice activity

## *detection*

## *Speechmaking*

USE: Public speaking

## *Speed control*

USE: Velocity control

## *Speed measurement*

USE: Velocity measurement

## **SPICE**

UF: Simulation Program  
with Integrated Circuit Emphasis  
pSPICE

BT: Software packages

RT: Circuit analysis  
Design automation  
Integrated circuits

## *Spin injection*

USE: Spin polarized

## *transport*

## *Spin polarised transport*

USE: Spin polarized

## *transport*

## **Spin polarized transport**

UF: Spin injection  
Spin polarised

## *transport*

BT: Magnetoelectronics  
RT: Magnetic tunneling  
Magnetoresistance

## **Spin valves**

BT: Magnetic sensors

RT: Hysteresis

## *Spin-dependent tunneling*

USE: Magnetic tunneling

## *Spin-dependent tunnelling*

USE: Magnetic tunneling

## **Spinal cord**

BT: Nervous system

NT: Cerebrospinal fluid  
Spinal cord injury

## *Spinal cord injuries*

USE: Spinal cord injury

## **Spinal cord injury**

UF: Spinal cord injuries

BT: Spinal cord

RT: Neurological diseases

## *Spinal cord stimulation*



# 2019 IEEE Thesaurus

USE:	Electrical stimulation	UF:	Split-gate flash memory cells
<i>Spindle bearings</i>		BT:	Flash memory cells
USE:	Machine tool spindles		<i>Split-gate flash memory cells</i>
<b>Spine</b>		USE:	Split gate flash memory cells
BT:	Nervous system Skeleton		<i>SPO</i>
<i>Spinelectronics</i>		USE:	Triples (Data structure)
USE:	Spintronics		<b>Spontaneous emission</b>
<b>Spinning</b>		UF:	Superradiance
BT:	Textile technology	BT:	Photonics
RT:	Spinning machines Textile fibers	RT:	Microcavities Photonic crystals
<b>Spinning machines</b>		NT:	Radiative recombination
BT:	Textile machinery		<b>Sports</b>
RT:	Paper making Paper making machines Paper mills Pulp and paper	UF:	Baseball Football Hockey Soccer Swimming Tennis
industry	Spinning Textile industry Textiles	BT:	Entertainment industry
<b>Spintronics</b>		RT:	Games Sports equipment
UF:	Fluxtronics Spinelectronics		<b>Sports equipment</b>
BT:	Magnetoelectric	BT:	Manufactured products
effects		RT:	Bicycles Sports
<b>Spirals</b>			<b>Spot welding</b>
BT:	Mathematics	BT:	Welding
<b>Splicing</b>			<b>Spraying</b>
UF:	Cable splicing Fusion splicing	BT:	Surface finishing
BT:	Joining processes	RT:	Aerosols Coatings Liquids Particle production Surface charging
RT:	Optical fiber cables Transmission lines	NT:	Thermal spraying
<i>Spline functions</i>			<b>Spread spectrum communication</b>
USE:	Splines (mathematics)	UF:	Frequency hop communication
<b>Splines (mathematics)</b>			Frequency-hop communication
UF:	B-Spline Spline functions		Multi-hop
BT:	Numerical analysis		
RT:	Curve fitting		
<b>Split gate flash memory cells</b>			



# 2019 IEEE Thesaurus

	Multihop		Two dimensional
	Pseudonoise coded	displays	
communication			
BT:	Digital communication	<i>Spur gears</i>	
RT:	3G mobile	USE:	Gears
communication			
	4G mobile	<b>Spurline</b>	
communication		BT:	Power filters
	Bluetooth	RT:	Planar transmission
	Channel estimation	lines	
	Chirp modulation	NT:	Spurline components
	Code division		
multiplexing		<b>Spurline components</b>	
	Electronic	BT:	Spurline
countermeasures			
	Electronic warfare	<i>Sputter deposition</i>	
	Multicarrier code	USE:	Sputtering
division multiple access			
	Multiuser detection	<b>Sputter etching</b>	
	Radio communication	BT:	Sputtering
countermeasures		RT:	Cardiography
	Time division		
synchronous code division multiple access		<b>Sputtering</b>	
	Ultra wideband	UF:	Sputter deposition
communication			Thin film deposition
		BT:	Materials preparation
		RT:	Coatings
<b>Spread spectrum radar</b>			Films
UF:	Frequency hop radar		Magnetrons
	Pseudonoise coded	NT:	Sputter etching
radar			
BT:	Radar	<b>Spyware</b>	
RT:	Chirp modulation	BT:	Privacy-invasive
	Electronic	software	
countermeasures			
	Electronic warfare	<i>SQL</i>	
	Radar countermeasures	USE:	Structured Query
		Language	
<b>Spreadsheet programs</b>		<b>SQL injection</b>	
UF:	Microsoft Excel	BT:	Computer crime
BT:	Data processing		Information security
<b>Springs</b>			
BT:	Mechanical products	<b>SQUID magnetometers</b>	
	Production	BT:	Magnetometers
RT:	Shock absorbers	RT:	Magnetic fields
	Suspensions		
(mechanical systems)		<b>SQUIDS</b>	
	Wires	UF:	Superconducting
<b>Sprites (computer)</b>		quantum interference devices	
BT:	Computer graphics	BT:	Superconducting
RT:	Three-dimensional	devices	
displays		RT:	Readout electronics



# 2019 IEEE Thesaurus

<i>Sr</i>		RT:	Decision making	
	USE:	Strontium	Requirements	
		engineering		
<i>SRAM</i>			Strategic planning	
	USE:	SRAM chips		
		<i>Standard Generalized Markup Language</i>		
<b>SRAM cells</b>		USE:	SGML	
	BT:	Random access memory		
		<b>Standardization</b>		
<b>SRAM chips</b>		BT:	Engineering - general	
	UF:	SRAM	RT:	IEC
	BT:	Random access memory		ISO
	RT:	CMOS memory circuits		ISO Standards
			NT:	Formal specifications
<b>Stability</b>				Guidelines
	BT:	Reliability		Standards
	RT:	Asymptotic stability		
		Control systems		
		Damping	<b>Standards</b>	
		Lyapunov methods	BT:	Standardization
		Predator prey systems	RT:	Conformance testing
		Robustness		IEC
	NT:	Circuit stability		ISO
		Robust stability		International
		Stability analysis	collaboration	
		Thermal stability		Open systems
				Qualifications
			NT:	Standards categories
<b>Stability analysis</b>				Standards
	BT:	Stability	organizations	
	RT:	Algorithms		Standards publications
		Differential equations		
		Laser stability		
		Plasma properties	<b>Standards categories</b>	
		Signal processing	BT:	Standards
		System analysis and	NT:	Communication
design			standards	
	NT:	Stability criteria		International Atomic
			Time	
				Measurement standards
<b>Stability criteria</b>				Military standards
	BT:	Stability analysis		Power and energy
			standards	
				Software standards
<b>Stacking</b>				
	BT:	Material storage		
	RT:	Containers		
		Materials handling	<b>Standards organizations</b>	
		Warehousing	BT:	Standards
			NT:	3GPP
<i>Stakeholder pensions</i>				ANSI
	USE:	Pensions		ASA
				DMTF
				ETSI
<b>Stakeholders</b>				IEC
	BT:	Customer relationship		IEEE Standards
management			Association	
		Organizational aspects		ISO



# 2019 IEEE Thesaurus

Consortium

- ITU
- NACE International
- NFPA
- NIST
- Open Geospatial
- SMPTE
- W3C

## Standards publications

- BT: Standards
- NT: 3GPP Standards
- ANSI Standards
- ASA Standards
- DMTF Standards
- ETSI Standards
- IEC Standards
- IEEE Standards
- ISO Standards
- ITU Standards
- NACE Standards
- NISO Standards
- NIST Standards
- SMPTE Standards
- W3C Standards

## Standby generators

generators

- UF: Emergency power
- BT: Generators
- Rotating machines
- RT: Emergency power

supplies

## Standby power supplies

supplies

- USE: Emergency power

## Stark effect

- BT: Electrooptic effects

## Starter motors (automotive)

- USE: Automotive components

## STATCOM

compensators

- UF: Static compensator
- BT: Static VAr

## State estimation

- BT: Estimation
- RT: Control systems
- NT: Observers

## State feedback

- BT: Linear feedback control systems

## State of charge

- BT: Battery chargers

## State pensions

- USE: Pensions

## State space theory

- USE: State-space methods

## State-space methods

- UF: State space theory
- State-space model
- BT: Control system analysis
- RT: Time-domain analysis

## State-space model

- USE: State-space methods

## Static analysis

- UF: Static projection
- Statis scoring
- BT: Statistical analysis
- System analysis and design
- RT: Model checking
- Software engineering

## Static compensator

- USE: STATCOM

## Static converters

converters

- USE: Static power

## Static induction transistors

- BT: Transistors

## Static power converters

- UF: Static converters
- BT: Converters

## Static projection

- USE: Static analysis

## Static VAr compensators

- UF: SVC
- BT: Power transmission
- RT: Reactive power
- NT: STATCOM



# 2019 IEEE Thesaurus

<b>Stationary state</b>	UF:	Ground state	NT:	Weibull distribution
	BT:	Quantum mechanics		Adaptive estimation
<i>Statis scoring</i>	USE:	Static analysis	processes	Autoregressive
				Boltzmann distribution
<b>Statistical analysis</b>			coefficient	Correlation
				Correlation
UF:	Statistical testing	reduction	statistics	Covariance matrices
	BT:			Differential privacy
RT:	Measurement errors	analysis	estimation	Dimensionality
	Nearest neighbor			Gamma distribution
methods	Probability	statistics	analysis	Gaussian mixture model
	Random processes			Higher order
NT:	Time series analysis	estimation	statistics	Histograms
	Analysis of variance			Linear discriminant
analysis	Mode matching methods	statistics	estimation	Maximum likelihood
	Monte Carlo methods			Minimax techniques
	Parameter estimation	statistics	estimation	Mixture models
	Pareto analysis			Nonparametric
	Principal component	statistics	estimation	Parametric statistics
	Regression analysis			Prediction theory
<b>Statistical distributions</b>	Static analysis	statistics	estimation	Ranking (statistics)
				Root mean square
BT:	Probability	statistics	estimation	Sampling methods
	Distribution functions			Statistical analysis
NT:	Gaussian distribution	statistics	estimation	Time series analysis
	Weibull distribution			
<b>Statistical learning</b>		statistics	estimation	
BT:	Machine learning	statistics	estimation	
	Pattern recognition			
<i>Statistical testing</i>		statistics	estimation	
USE:	Statistical analysis	statistics	estimation	
<b>Statistics</b>		statistics	estimation	
BT:	Mathematics	statistics	estimation	
	Econometrics			
RT:	Estimation theory	statistics	estimation	
	Extrapolation			
	Fourier transforms	statistics	estimation	
	Information theory			
	Interpolation	statistics	estimation	
	Matrix decomposition			
detection	Maximum likelihood	statistics	estimation	
	Operations research			
	Probability	statistics	estimation	
	Scheduling			



# 2019 IEEE Thesaurus

RT:	Transient analysis	Education courses
<b>Steam engines</b>		Engineering - general
BT:	Heat engines	Mathematics
RT:	Boilers	Science - general
	Water	Technology
<b>Steel</b>		<i>Stem cell research</i>
BT:	Metals	USE: Stem cells
RT:	Pressure vessels	<b>Stem cells</b>
NT:	Martensite	UF: Stem cell research
<b>Steel industry</b>		BT: Biological cells
BT:	Industries	RT: Progenitor cells
<b>Steering systems</b>		<b>Stereo image processing</b>
BT:	Mechanical products	UF: Stereoscopic
	Production systems	BT: Stereo vision
RT:	Automotive components	<b>Stereo vision</b>
	Wheels	UF: Three-dimensional
<b>Steganography</b>		vision
BT:	Message authentication	BT: Imaging
RT:	Cryptography	RT: Image matching
<i>Steiner points</i>		Machine vision
USE:	Steiner trees	Robot vision systems
<b>Steiner trees</b>		NT: Stereo image
UF:	Steiner points	processing
	Steiner vertices	<b>Stereolithography</b>
BT:	Combinatorial	BT: Lithography
mathematics		RT: Laser applications
<i>Steiner vertices</i>		Laser sintering
USE:	Steiner trees	Lasers
<b>Stellar dynamics</b>		Layered manufacturing
BT:	Astrophysics	Manufacturing
NT:	Stellar motion	Prototypes
<b>Stellar motion</b>		<i>Stereophonic systems</i>
BT:	Stellar dynamics	USE: Audio systems
RT:	Orbits (stellar)	<i>Stereoscopic</i>
<b>STEM</b>		USE: Stereo image
UF:	Science technology	processing
engineering mathematics		<b>Sternum</b>
	science technology	BT: Thorax
engineering and math		<b>Stethoscope</b>
	science, technology,	BT: Biomedical equipment
engineering, and math		<b>Stimulated emission</b>
BT:	Educational programs	UF: Optical amplification
RT:	Curriculum development	BT: Particle beam optics
		RT: Lasers





# 2019 IEEE Thesaurus

Masers	BT: Digestive system
<b>Stirling engines</b>	<b>Stomatognathic system</b>
BT: Heat engines	BT: Anatomy
<i>Stochastic distribution</i>	RT: Face
USE: Stochastic processes	Lips
<i>Stochastic prediction</i>	Mouth
USE: Stochastic processes	Pharynx
<b>Stochastic processes</b>	Tongue
UF: Stochastic	NT: Masticatory muscles
distribution	Salivary glands
Stochastic prediction	
Stochastic theory	
BT: Mathematics	
RT: Computational	
electromagnetics	<b>Storage area networks</b>
Diffusion processes	UF: SAN
Particle swarm	BT: Computer networks
optimization	RT: Data storage systems
Probability	Local area networks
Random number	
generation	<b>Storage automation</b>
Random variables	UF: Automated storage and
Viterbi algorithm	retrieval systems
NT: Gaussian processes	BT: Automation
Markov processes	Material storage
	RT: Warehousing
<b>Stochastic resonance</b>	<i>Storage batteries</i>
BT: Resonance	USE: Batteries
<b>Stochastic systems</b>	<i>Storage battery</i>
BT: Systems engineering	USE: Batteries
and theory	<b>Storage management</b>
RT: Control systems	BT: Capacity planning
Probability	Management
Random variables	RT: Memory management
	NT: Digital storage
<i>Stochastic theory</i>	<b>Storage rings</b>
USE: Stochastic processes	BT: Particle accelerators
	RT: Ions
<i>Stock exchanges</i>	Muon colliders
USE: Stock markets	Particle beams
<b>Stock markets</b>	<i>Stored energy</i>
UF: Stock exchanges	USE: Energy storage
BT: Economics	<i>Storm systems</i>
<b>Stokes parameters</b>	USE: Tropical cyclones
BT: Optical polarization	<b>Storms</b>
	BT: Meteorology
<b>Stomach</b>	RT: Lightning
	Monsoons



# 2019 IEEE Thesaurus

## Strain

UF: Deformation  
BT: Mechanical factors  
RT: Elasticity  
Strain control  
Strain measurement  
NT: Tensile strain  
Uniaxial strain

BT: Video streaming  
Communication system  
software  
RT: Data compression  
IEEE 802.11e Standard  
IPTV  
Internet  
MPEG 4 Standard  
MPEG standards  
Multimedia

## Strain based sensors

USE: Capacitive sensors communication

## Strain control

UF: Friction stir  
processing  
BT: Mechanical variables  
control  
RT: Strain

Unicast  
Video coding  
Video signal  
processing  
NT: Video on demand

## Strain gauges

USE: Strain measurement

## Strain measurement

UF: Strain gauges  
BT: Mechanical variables  
measurement  
RT: Micrometers  
Strain

## Streetcars

USE: Light rail systems

## Stress

UF: Mechanical stress  
BT: Mechanical factors  
RT: Magnetomechanical

## effects

Photoelasticity  
Piezoelectricity  
Piezooptic effects  
Piezoresistance  
Stress control  
Stress measurement  
NT: Compressive stress  
Internal stresses  
Residual stresses  
Tensile stress

## Strain sensors

USE: Capacitive sensors

## Strategic planning

BT: Planning  
RT: Analytic hierarchy  
process  
Business intelligence  
Decision making  
Information systems  
Stakeholders

## Stress (psychological)

USE: Human factors

## Stress control

BT: Mechanical variables  
control  
RT: Stress

## Stratified media

USE: Nonhomogeneous media

## Stratosphere

USE: Terrestrial atmosphere

## Stress measurement

BT: Mechanical variables  
measurement  
RT: Stress

## Stray light

BT: Light sources  
Optics  
RT: Ray tracing

## String theory

BT: Physics  
RT: Quantum mechanics

## Streaming media

UF: Media streaming

## String vacuum



# 2019 IEEE Thesaurus

USE: Elementary particle  
vacuum

NT: Offshore installations

## Stripboard circuit

UF: Veroboard  
BT: Electronic circuits

## Stripline

BT: Planar transmission  
lines  
NT: Transmission lines  
Stripline components

## Stripline components

BT: Stripline  
RT: Power combiners  
Power dividers

## Strips

BT: Structural shapes

## Stroke (medical condition)

BT: Medical conditions

## Strontium

UF: Sr  
BT: Metals  
NT: Strontium compounds

## Strontium compounds

BT: Strontium  
RT: Alloying

## Structural beams

UF: Cantilever beams  
Girders  
BT: Structural shapes  
RT: Building materials

## Structural discs

UF: Disks (structures)  
BT: Structural shapes

## Structural engineering

UF: Structural parameter  
Structural stability  
BT: Civil engineering  
RT: Architecture  
Bridges  
Construction  
Flexible structures  
Floods  
Intelligent structures  
Mechanical factors

## Structural panels

UF: Railway bridges  
Road bridges  
Suspension bridges  
BT: Structural shapes  
RT: Honeycomb structures  
Sandwich structures  
Sheet materials  
Structural plates  
Thin wall structures

## Structural parameter

USE: Structural engineering

## Structural plates

BT: Electronic components  
Structural shapes  
RT: Flanges  
Structural panels  
Wheels

## Structural rings

UF: O-rings  
BT: Structural shapes  
RT: Engine cylinders  
Mechanical products  
Pistons  
Seals

## Structural rods

BT: Structural shapes

## Structural shapes

BT: Mechanical products  
NT: Bars  
Bridges  
Ducts  
Flexible structures  
Honeycomb structures  
Lightweight structures  
Rails  
Sandwich structures  
Sheet materials  
Slabs  
Strips  
Structural beams  
Structural discs  
Structural panels  
Structural plates  
Structural rings  
Structural rods  
Structural shells



# 2019 IEEE Thesaurus

Thin wall structures	USE:	Underwater technology
Wires		
<b>Structural shells</b>		<i>Submarines</i>
BT: Structural shapes	USE:	Underwater vehicles
RT: Thin wall structures		<i>Submersibles</i>
	USE:	Underwater vehicles
<i>Structural stability</i>		
USE: Structural engineering		<b>Submillimeter wave circuits</b>
	BT:	Circuits
<b>Structure from motion</b>		Submillimeter wave
BT: Image processing	technology	
RT: Motion control	RT:	Analog circuits
Signal processing		Submillimeter wave
Three-dimensional	devices	
displays		Submillimeter wave
Two dimensional	filters	
displays	NT:	Submillimeter wave
	integrated circuits	
<b>Structured Query Language</b>		<b>Submillimeter wave communication</b>
UF: SQL	BT:	Communication systems
BT: Database languages		Submillimeter wave
RT: Programming	technology	
Relational databases		
<i>Student engineers</i>		<b>Submillimeter wave devices</b>
USE: Engineering students	UF:	Submillimeter wave
	systems	
<b>Student experiments</b>	BT:	Submillimeter wave
BT: Engineering education	technology	
RT: Laboratories	RT:	Submillimeter wave
	circuits	
<b>Style sheet languages</b>		Submillimeter wave
BT: Computer languages	integrated circuits	
NT: Cascading style sheets	NT:	Submillimeter wave
	filters	
<i>Sub-mm wave filters</i>		<b>Submillimeter wave filters</b>
USE: Submillimeter wave	UF:	Sub-mm wave filters
filters		Submillimetre wave
<i>Sub-sea cables</i>	filters	
USE: Underwater cables	BT:	Submillimeter wave
	devices	
<b>Subcontracting</b>	RT:	Submillimeter wave
BT: Contracts	circuits	
<i>Subject predicate object</i>		<b>Submillimeter wave integrated circuits</b>
USE: Triples (Data	BT:	Integrated circuits
structure)		Submillimeter wave
<i>Submarine cables</i>	circuits	
USE: Underwater cables		Submillimeter wave
	technology	
<i>Submarine technology</i>	RT:	Analog integrated
	circuits	





# 2019 IEEE Thesaurus

## *Subthreshold Leakage*

USE: Subthreshold current

## **Subtraction techniques**

BT: Image analysis  
RT: Biomedical image

## processing

## *Subways*

USE: Public transportation

## *Sucrose*

USE: Sugar

## **Sufficient conditions**

BT: Logic

## **Sugar**

UF: Glucose  
Sucrose  
BT: Agricultural products  
Food products  
RT: Sugar industry  
Sugar refining

## **Sugar industry**

BT: Industries  
RT: Food industry  
Food products  
Sugar  
NT: Sugar refining

## **Sugar refining**

BT: Sugar industry  
RT: Food industry  
Food products  
Food technology  
Purification  
Refining  
Sugar

## **Sulfur**

UF: Sulphur  
BT: Chemical elements  
NT: Sulfur compounds

## **Sulfur compounds**

UF: Sulphur compounds  
BT: Sulfur

## **Sulfur hexafluoride**

UF: SF<sub>6</sub>  
BT: Gas insulation

## *Sulphur*

USE: Sulfur

## *Sulphur compounds*

USE: Sulfur compounds

## **Sum product algorithm**

UF: Sum-product algorithm  
BT: Iterative algorithms

## *Sum-product algorithm*

USE: Sum product algorithm

## **Summing circuits**

BT: Circuits  
RT: Analog computers

## **Sun**

BT: Solar system

## *Sun sensors*

USE: Sensors

## *Super earths*

USE: Extrasolar planets

## *Super hi-vision*

USE: UHDTV

## **Supercapacitors**

UF: Electrical double  
layer capacitors  
BT: Ultracapacitors  
Electrochemical  
devices  
RT: Energy storage  
Power capacitors  
Capacitance  
Capacitance  
measurement  
Electrolytes

## **Supercomputers**

BT: Computers  
RT: Petascale computing

## **Superconducting cables**

BT: Superconducting  
transmission lines  
RT: Superconducting coils  
Superconducting  
magnets

## **Superconducting coils**



# 2019 IEEE Thesaurus

BT:	Coils	RT:	High-temperature
devices	Superconducting	superconductors	Superconducting
RT:	Superconducting cables	devices	Surface impedance
magnets	Superconducting		Surface resistance
<b>Superconducting device noise</b>			Thick films
BT:	Noise	NT:	Thin films
RT:	Superconducting	films	Superconducting thin
devices			
<b>Superconducting devices</b>		<b>Superconducting filters</b>	
UF:	Josephson devices	BT:	Filters
SIS devices		RT:	Radiofrequency
(superconductor)		interference	
SNS devices		<i>Superconducting infrared detectors</i>	
Superconductor-		USE:	Superconducting
insulator-superconductor devices		photodetectors	
Superconductor-normal-			
superconductor devices		<b>Superconducting integrated circuits</b>	
BT:	Superconductivity	BT:	Integrated circuits
RT:	Cryogenic electronics		Superconductivity
High-temperature		<i>Superconducting junction devices</i>	
superconductors	Superconducting device	USE:	Josephson junctions
noise			
	Superconducting films	<b>Superconducting logic circuits</b>	
	Thermal factors	BT:	Logic circuits
NT:	Josephson junctions	<i>Superconducting magnet energy storage</i>	
SQUIDs		USE:	Superconducting
Superconducting coils		magnetic energy storage	
Superconducting			
magnets	Superconducting	<b>Superconducting magnetic energy storage</b>	
microwave devices	Superconducting	UF:	SMES
photodetectors		Superconducting magnet	
		energy storage	
<b>Superconducting epitaxial layers</b>		BT:	Energy storage
BT:	Epitaxial layers		Superconductivity
RT:	Superconducting	<b>Superconducting magnets</b>	
materials		BT:	Electromagnets
<i>Superconducting filaments</i>		Superconducting	
USE:	Superconducting	devices	
materials		RT:	Persistent currents
			Superconducting cables
<b>Superconducting filaments and wires</b>			Superconducting coils
BT:	Superconductivity	<b>Superconducting materials</b>	
<b>Superconducting films</b>		UF:	Pnictide
UF:	Superconducting tapes	superconductors	Superconducting
BT:	Superconductivity	filaments	



# 2019 IEEE Thesaurus

	Superconducting wires	NT:	Superconducting cables
BT:	Materials		
	Superconductivity		<i>Superconducting ultraviolet detectors</i>
RT:	Critical current	USE:	Superconducting
density			photodetectors
	Cryogenic electronics		
	Superconducting		<i>Superconducting wires</i>
epitaxial layers		USE:	Superconducting
	Thermal factors		materials
NT:	Granular		
superconductors			<b>Superconductivity</b>
	High-temperature	NT:	Bean model
superconductors			Critical current
	Multifilamentary		density (superconductivity)
superconductors			Flux pinning
	Niobium-tin		Superconducting
	Type II		devices
superconductors			Superconducting
			filaments and wires
<b>Superconducting microwave devices</b>			Superconducting films
BT:	Superconducting		Superconducting
devices			integrated circuits
RT:	Microwave devices		Superconducting
			magnetic energy storage
<b>Superconducting photodetectors</b>			Superconducting
UF:	Superconducting		materials
infrared detectors			Superconducting
	Superconducting		transition temperature
ultraviolet detectors			
BT:	Photodetectors		<i>Superconductor-insulator-superconductor</i>
	Superconducting		<i>devices</i>
devices		USE:	Superconducting
RT:	Infrared detectors		devices
			<i>Superconductor-normal-superconductor</i>
<i>Superconducting quantum interference</i>			<i>devices</i>
<i>devices</i>		USE:	Superconducting
	SQUIDS		devices
<i>Superconducting tapes</i>			
USE:	Superconducting films		<i>Superconductors (high temperature)</i>
		USE:	High-temperature
<b>Superconducting thin films</b>			superconductors
BT:	Superconducting films		
RT:	Thin films		<b>Supercontinuum generation</b>
		BT:	Nonlinear optics
<b>Superconducting transition temperature</b>		RT:	Laser beams
BT:	Superconductivity		Light sources
RT:	High-temperature		Optical fibers
superconductors			
			<b>Superlattices</b>
<b>Superconducting transmission lines</b>		BT:	Crystalline materials
BT:	Transmission lines	NT:	Magnetic superlattices
RT:	Power transmission		Metallic superlattices
lines			Optical superlattices





# 2019 IEEE Thesaurus

superlattices	Semiconductor	management	Business process
<b>Superluminescent diodes</b>			Capacity planning
UF:	SLD		Customer relationship
BT:	Light emitting diodes	management	Electronic commerce
	Light sources		Management information
	Optoelectronic devices	systems	
	Semiconductor devices		Materials requirements
	Semiconductor diodes	planning	
RT:	Lasers		Production control
<b>Superposition calculus</b>		NT:	Supply chains
BT:	Mathematics		Procurement
<i>Superradiance</i>		<b>Supply chains</b>	
USE:	Spontaneous emission	BT:	Logistics
		RT:	Materials requirements
<i>Superstring vacuum</i>		planning	
USE:	Elementary particle		Procurement
vacuum			Supply chain
<b>Supervised learning</b>		management	
BT:	Learning systems	<b>Support vector machine classification</b>	
RT:	Semisupervised	BT:	Support vector
learning		machines	
NT:	Boosting	<b>Support vector machines</b>	
<b>Supervisory control</b>		UF:	SVM
BT:	Control systems		Support vector
NT:	SCADA systems	regression	
<i>Supervisory control and data acquisition systems</i>		BT:	Computation theory
USE:	SCADA systems	RT:	Artificial
		intelligence	
<i>Supervisory control and data-acquisition systems</i>			Feedforward neural
USE:	SCADA systems	networks	
			Pattern classification
<i>Supervisory programs</i>		NT:	Support vector machine
USE:	Operating systems	classification	
		<i>Support vector regression</i>	
<b>Supply and demand</b>		USE:	Support vector
BT:	Economics	machines	
RT:	Microeconomics	<b>Surface acoustic wave devices</b>	
	Utility theory	BT:	Acoustic devices
		RT:	Acoustoelectric
<b>Supply chain management</b>		devices	
UF:	SCM supply chains		Piezoelectric devices
BT:	Management	<b>Surface acoustic waves</b>	
RT:	Business process	UF:	Acoustic surface waves
integration		BT:	Acoustic waves
			Surface waves
			Waves



# 2019 IEEE Thesaurus

## Surface charging

BT: Electrostatic  
processes  
RT: Spraying  
NT: Triboelectricity

## Surface cleaning

BT: Cleaning  
Surface treatment  
RT: Semiconductor device  
manufacture  
Surface contamination

## Surface contamination

BT: Contamination  
RT: Semiconductor device  
manufacture  
Surface cleaning  
Surface treatment

## Surface cracks

BT: Mechanical factors

## Surface discharges

BT: Dielectric breakdown  
RT: Insulator testing

## Surface emitting lasers

BT: Lasers  
Semiconductor devices  
Semiconductor lasers  
Solid lasers  
RT: Laser cavity  
resonators  
Quantum well lasers  
Quantum wells  
NT: Vertical cavity  
surface emitting lasers

## Surface engineering

BT: Materials science and  
technology  
RT: Surface treatment

## Surface finishing

BT: Finishing  
RT: Lapping  
Polishing machines  
NT: Burnishing  
Deburring  
Painting  
Spraying

## Surface fitting

BT: Numerical analysis  
RT: Computational geometry  
Computer graphics  
Curve fitting  
Interpolation  
NT: Response surface  
methodology

## Surface impedance

BT: Surfaces  
RT: High-temperature  
superconductors  
Superconducting films

## Surface morphology

BT: Surfaces  
RT: Surface roughness  
NT: Adsorption

## Surface reconstruction

BT: Visualization  
RT: Pattern analysis

## Surface resistance

BT: Resistance  
Surfaces  
RT: High-temperature  
superconductors  
Superconducting films

## Surface roughness

BT: Surfaces  
RT: Planing  
Polishing machines  
Rough surfaces  
Sandblasting  
Surface morphology

## Surface soil

BT: Surfaces

## Surface states

BT: Energy states  
Surface structures  
NT: Surfactants

## Surface structures

BT: Surfaces  
NT: Surface states

## Surface tension

BT: Surfaces  
RT: Surfactants



# 2019 IEEE Thesaurus

<b>Surface texture</b>			Surface states
BT:	Surfaces	RT:	Surface treatment
			Adsorption
			Surface tension
<b>Surface topography</b>		<b>Surge protection</b>	
BT:	Geometry	BT:	Power system
	Surfaces	protection	
NT:	Nanotopography	RT:	Surges
		NT:	Arresters
<b>Surface treatment</b>		<b>Surgery</b>	
BT:	Surfaces	UF:	Robot-assisted surgery
RT:	Colloidal lithography	BT:	Medical treatment
	Planing	RT:	Biomedical equipment
	Surface contamination		Catheters
	Surface engineering		Endoscopes
NT:	Etching	NT:	Ambulatory surgery
	Finishing		Hepatectomy
	Galvanizing		Laser surgery
	Painting		Microsurgery
	Passivation		Minimally invasive
	Pickling		
	Planarization		
	Sandblasting		
	Surface cleaning		Neurosurgery
	Surfactants		Oncological surgery
			Orthopedic surgery
<b>Surface waves</b>		<b>Surgery oncology</b>	
BT:	Geophysics	USE:	Oncological surgery
RT:	Sea surface		
NT:	Surface acoustic waves		
<b>Surface-mount technology</b>		<b>Surges</b>	
BT:	Integrated circuit	BT:	Electromagnetic
manufacture		transients	
		RT:	Surge protection
<b>Surfaces</b>		<b>Surgical instruments</b>	
BT:	Materials science and	BT:	Biomedical equipment
technology		NT:	Laparoscopes
NT:	Corrosion		
	Corrugated surfaces	<b>Surgical robots</b>	
	Rough surfaces	USE:	Medical robotics
	Surface impedance		
	Surface morphology	<b>Surveillance</b>	
	Surface resistance	BT:	Monitoring
	Surface roughness	RT:	Conformance testing
	Surface soil		Hazardous areas
	Surface structures		Reconnaissance
	Surface tension		Remote sensing
	Surface texture		Security
	Surface topography		Terrorism
	Surface treatment	NT:	Infrared surveillance
			Video surveillance
<b>Surfactants</b>		<b>Suspension bridges</b>	
BT:	Materials		



# 2019 IEEE Thesaurus

USE: Structural panels	<b>Sweat glands</b>
<b>Suspensions (mechanical systems)</b>	BT: Glands
BT: Mechanical systems	Skin
RT: Automotive components	<i>Swimming</i>
Springs	USE: Sports
NT: Shock absorbers	<i>Swimming robots</i>
<i>Sustainability</i>	USE: Aquatic robots
USE: Sustainable development	<b>Switched capacitor circuits</b>
<i>Sustainable design</i>	UF: Switched-capacitor circuit
USE: Green design	BT: Switched circuits
<b>Sustainable development</b>	<b>Switched capacitor networks</b>
UF: Sustainability	UF: Switched-capacitor networks
BT: Environmental management	BT: Resistors
Social implications of technology	RT: Analog circuits
RT: Green computing	Capacitors
<b>SVC</b>	<b>Switched circuits</b>
USE: Static VAr compensators	BT: Circuits
<b>SVM</b>	RT: Telecommunications
USE: Support vector machines	NT: Switched capacitor circuits
<b>SVPWM</b>	<i>Switched mode power supplies</i>
USE: Space vector pulse width modulation	USE: Switched mode power supplies
<b>Swaging</b>	<b>Switched mode power supplies</b>
BT: Materials processing	UF: SMPS
RT: Metal products	Switched mode power
<i>Swarm intelligence</i>	BT: Power supplies
USE: Particle swarm optimization	<b>Switched reluctance motors</b>
<i>Swarm optimization</i>	BT: Reluctance motors
USE: Particle swarm optimization	<b>Switched systems</b>
<b>Swarm robotics</b>	BT: Time-varying systems
UF: Swarm robots	RT: Control systems
BT: Multi-robot systems	Power conversion
<i>Swarm robots</i>	<i>Switched-capacitor circuit</i>
USE: Swarm robotics	USE: Switched capacitor circuits
	<i>Switched-capacitor networks</i>
	USE: Switched capacitor networks
	<b>Switches</b>



# 2019 IEEE Thesaurus

BT:	Control equipment	RT:	Communication
	Electronic components	switching	
RT:	Current control	NT:	Electronic switching
	IEEE 802.3 Standard	systems	
	Solenoids		Switching frequency
	Spark gaps		Switching loss
	Switchgear		Telecommunication
	Switching circuits	switching	
NT:	Contactors	<b>Symbiosis</b>	
	Microswitches	UF:	Symbiotic
	Optical switches	relationships	
<b>Switchgear</b>		BT:	Biological processes
BT:	Control equipment	<i>Symbiotic relationships</i>	
RT:	Current control	USE:	Symbiosis
	Fuses	<b>Symbols</b>	
	Switches	BT:	Graphics
NT:	Circuit breakers	RT:	Huffman coding
	Interrupters		Information retrieval
	Relays		Pattern recognition
<b>Switching circuits</b>		NT:	CAPTCHAs
BT:	Circuits	<b>Symmetric matrices</b>	
RT:	Circuit breakers	UF:	Symmetric matrix
	Digital circuits	BT:	Numerical analysis
	Relays	<i>Symmetric matrix</i>	
	Switches	USE:	Symmetric matrices
NT:	Choppers (circuits)	<b>Sympathetic nervous system</b>	
	Logic circuits	UF:	Sympathetic outflow
	Switching converters	BT:	Autonomic nervous
	Zero current switching	system	
	Zero voltage switching	<i>Sympathetic outflow</i>	
<b>Switching converters</b>		USE:	Sympathetic nervous
BT:	Switching circuits	system	
RT:	Power electronics	<i>Symposia</i>	
	Zero current switching	USE:	Conferences
	Zero voltage switching	<b>Synapses</b>	
<i>Switching convertors</i>		BT:	Nervous system
USE:	Converters	RT:	Artificial
<b>Switching frequency</b>		intelligence	
BT:	Switching systems		Artificial neural
<b>Switching loss</b>		networks	
UF:	Switching losses		Brain
BT:	Switching systems		Communication channels
<i>Switching losses</i>			Computational
USE:	Switching loss	intelligence	
<b>Switching systems</b>			
BT:	Communication systems		



# 2019 IEEE Thesaurus

devices	Electrochemical	<i>Synchronous dynamic random access memory</i>
	Integrated optics	USE: SDRAM
	Neuroinformatics	
	Neuromorphic	<b>Synchronous generators</b>
engineering	Neurons	BT: AC generators
	Neurotransmitters	Synchronous machines
	Organic electronics	RT: Alternators
	Photonics	NT: Reluctance generators
	Signal processing	<b>Synchronous machines</b>
<i>Synaptic transmission</i>		BT: AC machines
USE: Neurotransmitters		NT: Hysteresis motors
<i>Sync</i>		Reluctance machines
USE: Synchronization		Synchronous generators
		Synchronous motors
<b>Synchrocyclotrons</b>		<b>Synchronous motors</b>
BT: Particle accelerators		BT: Synchronous machines
<i>Synchronisation</i>		RT: Rotating machines
USE: Synchronization		NT: Hysteresis motors
		Reluctance motors
<b>Synchronization</b>		<i>Synchronous optical network</i>
UF: Clock synchronization		USE: SONET
Sync		
Synchronisation		<b>Synchrotron radiation</b>
BT: Timing		BT: Synchrotrons
RT: Chaotic communication		RT: Biomedical
Concurrency control		applications of radiation
Frequency locked loops		Light sources
Scheduling		X-rays
Synchronous digital		<b>Synchrotrons</b>
hierarchy		BT: Particle accelerators
Time dissemination		RT: Colliding beam
Tracking loops		accelerators
<b>Synchronous digital hierarchy</b>		Electric fields
UF: SDH		High energy physics
BT: Communication		instrumentation computing
standards		Magnetic fields
Communication systems		Particle beams
ETSI Standards		NT: Synchrotron radiation
RT: Digital communication		Undulators
Optical fiber		
communication		<b>Syngas</b>
SONET		UF: Synthesis gas
Synchronization		Synthetic gas
Transport protocols		BT: Gases
<i>Synchronous DRAM</i>		<b>Syntactics</b>
USE: SDRAM		UF: Syntax
		BT: Semiotics
		RT: Communication symbols



# 2019 IEEE Thesaurus

processing	Grammar	RT: Biological system
	Natural language	modeling
communication	Professional	Computational biology
	Programming	
<i>Syntax</i>		<b>Synthetic fibers</b>
USE: Syntactics		UF: Artificial fibers
		Artificial fibres
		Nylon fiber
		Synthetic fibres
<i>Synthesis gas</i>		BT: Textile fibers
USE: Syngas		
<i>Synthesizers</i>		<i>Synthetic fibres</i>
USE: Synthesizers		USE: Synthetic fibers
<b>Synthesizers</b>		<i>Synthetic gas</i>
UF: Synthesisers		USE: Syngas
BT: Electronic music		
		<i>Synthetic life research</i>
		USE: Synthetic biology
<b>Synthetic aperture radar</b>		<i>Synthetic speech</i>
UF: SAR		USE: Speech synthesis
BT: Radar		
RT: Airborne radar		
	Ground penetrating	
radar		<i>SYSML</i>
	Radar imaging	USE: Systems Modeling
	Spaceborne radar	Language
	Synthetic aperture	
sonar		<i>System analysis</i>
	Ultra wideband radar	USE: System analysis and
NT: Inverse synthetic		design
aperture radar		
	Polarimetric synthetic	
aperture radar		<b>System analysis and design</b>
		UF: Logical decomposition
<i>Synthetic aperture radar imaging</i>		System analysis
USE: Radar polarimetry		System design
		System metrics
		BT: Systems engineering
		and theory
		RT: Configuration
<b>Synthetic aperture radar interferometry</b>		management
BT: Radar interferometry		
		Design methodology
		Flowcharts
<b>Synthetic aperture sonar</b>		Multi-agent systems
UF: SAS		Skin effect
BT: Sonar		Stability analysis
RT: Synthetic aperture		System improvement
radar		System validation
		System verification
		Systems simulation
<b>Synthetic biology</b>		NT: Asymptotic stability
UF: Synthetic life		Control system
research		
BT: Biology		analysis
	Engineering in	
medicine and biology		Diakoptics
		Distributed processing



# 2019 IEEE Thesaurus

networks	Distributed vision	BT:	Systems engineering
	Fault detection	and theory	
	Fault tolerant systems	RT:	Quality management
	Interconnected systems		Reliability
	Large-scale systems		System analysis and
	Lyapunov methods	design	
	Open systems		System testing
	Petri nets	<b>System integration</b>	
	Physical design	BT:	Systems engineering
	Robust control	and theory	
	Scalability	RT:	Enterprise resource
	Scattering parameters	planning	
	Sequential analysis		Integrated
	Sequential diagnosis	manufacturing systems	
	Software prototyping		Project management
	Static analysis		Resource management
	Language	System dynamics	<b>System kernels</b>
System performance		BT:	Kernel
System-level design			Operating systems
Systems Modeling			
Systems modeling		<i>System level design</i>	
Task analysis		USE:	System-level design
Time factors			
<i>System availability</i>		<i>System life cycle management</i>	
USE:		USE:	Product life cycle
Availability		management AND	Technical management
<b>System buses</b>			
BT:	Computer interfaces	<i>System metrics</i>	
<i>System design</i>		USE:	System analysis and
USE:	System analysis and	design	
design		<i>System modeling</i>	
		USE:	Modeling
<b>System dynamics</b>		<b>System of systems</b>	
BT:	System analysis and	BT:	Systems engineering
design		and theory	
RT:	Behavioral sciences	RT:	Complex networks
	Complex networks	NT:	Cyber-physical systems
	Feedback		
	Flow production		
systems		<i>System on chip</i>	
	Timing	USE:	System-on-chip
<b>System identification</b>		<b>System performance</b>	
BT:	Modeling	UF:	Cooperative cache
		BT:	System analysis and
<b>System implementation</b>		design	
BT:	Systems engineering	NT:	Cooperative caching
and theory			
<b>System improvement</b>		<i>System planning</i>	
		USE:	Planning





# 2019 IEEE Thesaurus

## *System privacy management*

USE: Data security

## **System realization**

BT: Systems engineering and theory

## **System recovery**

UF: Deadlocks (computers)  
Error recovery  
(computers)  
BT: Computers and information processing  
RT: Business continuity  
Operating systems  
Reliability  
NT: Checkpointing  
Core dumps  
Debugging

## *System reliability*

USE: Reliability

## *System resilience*

USE: Fault tolerance

## **System software**

BT: Software  
RT: Visual BASIC  
NT: File systems  
Operating systems  
Program processors  
Utility programs

## **System testing**

BT: System validation  
System verification  
Testing  
RT: System improvement  
NT: Model checking

## **System validation**

BT: Systems engineering and theory  
RT: System analysis and design  
NT: System testing

## **System verification**

BT: Systems engineering and theory  
RT: System analysis and design

NT: System testing

## **System-level design**

UF: System level design  
BT: System analysis and design

## *System-on-a-chip*

USE: System-on-chip

## **System-on-chip**

UF: On-chip  
SOC  
System on chip  
System-on-a-chip  
BT: Application specific integrated circuits  
RT: Microcontrollers  
Microprocessors  
Mixed analog-digital integrated circuits  
Power dissipation  
Signal processing  
NT: Lab-on-a-chip  
Network-on-chip

## **Systematics**

UF: Biological systematics  
BT: Biology

## **Systems architecture**

BT: Systems engineering and theory

## **Systems biology**

BT: Biology

## *Systems engineering*

USE: Systems engineering and theory

## **Systems engineering and theory**

UF: Systems engineering  
RT: Aerospace and electronic systems  
Business process integration  
Business process management  
NT: Adaptive systems  
Capability engineering  
Complex systems  
Configuration management



# 2019 IEEE Thesaurus

	Hierarchical systems	BT:	Neuroscience
	Integrated design	RT:	Neural networks
	Interface management		
	Modeling	<b>Systems operation</b>	
systems	Multidimensional	BT:	Systems engineering and theory
	Physical design	<b>Systems simulation</b>	
engineering	Reduced order systems	BT:	Simulation
	Requirements		Systems engineering and theory
management	Requirements	RT:	System analysis and design
systems engineering	Service-oriented		Technical management
	Solution design	<b>Systems support</b>	
	Stochastic systems	BT:	Maintenance
design	System analysis and		Systems engineering and theory
	System implementation	<b>Systems thinking</b>	
	System improvement	BT:	Systems engineering and theory
	System integration		Systems, man, and cybernetics
	System of systems	RT:	Systems, man, and cybernetics
	System realization		
	System validation	<b>Systems, man, and cybernetics</b>	
education	System verification	RT:	Systems thinking
	Systems architecture	NT:	Behavioral sciences
	Systems engineering		Biological control
	Systems operation		Computational
	Systems simulation		Cybernetics
	Systems support		Ergonomics
	Systems thinking		Human factors
	Task analysis		Identification of
	Technical management		Man-machine systems
<b>Systems engineering education</b>			Natural languages
BT:	Engineering education		Pervasive computing
	Systems engineering		Posthuman
and theory			Teleworking
			Transhuman
<b>Systems modeling</b>			User interfaces
BT:	Modeling	<b>Systolic arrays</b>	
	System analysis and	BT:	Multiprocessing
design			
		RT:	Pipeline processing
<b>Systems Modeling Language</b>			
UF:	SYSML	<b>Table lookup</b>	
BT:	Computer languages	UF:	LUT
	System analysis and		
design			
	Modeling		
	Software engineering		
<b>Systems neuroscience</b>			



# 2019 IEEE Thesaurus

	Look-up table		BT:	Takagi-Sugeno model
	Lookup table			
BT:	Data structures	<b>Talbot effect</b>	BT:	Optical imaging
	Image processing		RT:	Interferometry
<b>Tablet computers</b>				Optical interferometry
UF:	Tablet PC	<b>Tantalum</b>	BT:	Chemical elements
BT:	Computers			
RT:	Mobile handsets	<b>Tape casting</b>	BT:	Casting
	Portable media players		RT:	Ceramics
<i>Tablet PC</i>		<i>Target detection</i>		
USE:	Tablet computers		USE:	Object detection
<b>Tachometers</b>		<b>Target recognition</b>	BT:	Object recognition
BT:	Meters			
<i>Tactile feedback</i>		<b>Target tracking</b>	BT:	Tracking
USE:	Tactile sensors		RT:	Control systems
<b>Tactile sensors</b>				Radar tracking
UF:	Tactile feedback	<b>Targeted drug delivery</b>	BT:	Drug delivery
	Touch sensors			
BT:	Robot sensing systems	<b>Task analysis</b>	BT:	Business process
RT:	Pressure measurement			management
	Touch sensitive			System analysis and
screens				design
<b>Tag clouds</b>				Systems engineering
UF:	Word cloud			and theory
BT:	Tagging	<b>Taste buds</b>	BT:	Sense organs
<b>Tagging</b>				
UF:	Hashtag	<i>Taxes</i>	USE:	Finance
BT:	Information retrieval			
RT:	Indexing	<i>Taxi</i>	USE:	Public transportation
	Internet of Things			
NT:	Tag clouds	<b>Taxonomy</b>	BT:	Information retrieval
<i>TAI</i>				
USE:	International Atomic	<i>Taylor expansion</i>	USE:	Taylor series
Time				
<b>Tail</b>		<b>Taylor series</b>	UF:	Taylor expansion
BT:	Animal structures		BT:	Mathematics
<b>Takagi-Sugeno model</b>				
BT:	Fuzzy logic			
RT:	Fuzzy control			
	Fuzzy systems			
NT:	Takagi-Sugeno-Kang			
model				
<b>Takagi-Sugeno-Kang model</b>				



# 2019 IEEE Thesaurus

<i>TCP/IP</i>		<i>Technical data management</i>	
USE:	TCPIP	USE:	Database systems AND Technical management
<i>TCP/IP protocol suite</i>		<b>Technical drawing</b>	
USE:	TCPIP	BT:	Design methodology
<b>TCPIP</b>		RT:	Engineering drawings Graphics
UF:	TCP/IP TCP/IP protocol suite Transmission control protocol-internet protocol Transmission control protocol/internet protocol	<b>Technical management</b>	
BT:	IP networks	UF:	System life cycle management
RT:	Computer networks Data communication Digital communication Internet Protocols Transport protocols		Technical assessment Technical data
<i>TDM</i>		management	Technical risk
USE:	Time division multiplexing	management	
<i>TDSCDMA</i>		BT:	Management Systems engineering
USE:	Time division synchronous code division multiple access	and theory	
<i>Teaching</i>		RT:	Program management Systems simulation
USE:	Education	NT:	Maintenance management Technical planning
<i>Teaching machines</i>			
USE:	Computer aided instruction	<i>Technical manuals</i>	
<b>Team working</b>		USE:	Manuals
BT:	Organizational aspects	<i>Technical meetings</i>	
<b>Teamwork</b>		USE:	Meetings
BT:	Collaboration	<b>Technical planning</b>	
<b>Technetium</b>		BT:	Planning Technical management
BT:	Chemical elements	<i>Technical proposals</i>	
<i>Technical assessment</i>		USE:	Proposals
USE:	Technical management	<i>Technical reports</i>	
<i>Technical communication</i>		USE:	Writing
USE:	Professional communication	<b>Technical requirements</b>	
		BT:	Requirements
		engineering	
		RT:	Proposals
		<i>Technical risk management</i>	
		USE:	Technical management
		<i>Technical textiles</i>	
		USE:	Textile products
		<i>Technical writing</i>	
		USE:	Writing



# 2019 IEEE Thesaurus

*Technician training*

USE: Training

*Technique for order of preference by similarity to ideal solution*

USE: TOPSIS

*Technological forecasting*

USE: Technology forecasting

**Technological innovation**

UF: Innovation

Invention

BT: Technology

RT: Disruptive innovation

Disruptive

technologies

Technology social

factors

**Technology**

BT: Social implications of

technology

RT: Engineering - general

Oil drilling

Philosophical

considerations

Research and

development

STEM

Technology forecasting

Technology planning

NT: Appropriate technology

Disruptive

technologies

Neurotechnology

Technological

innovation

Technology social

factors

Technology transfer

Telepresence

Telexistence

**Technology forecasting**

UF: Futurism

Technological

forecasting

BT: Forecasting

RT: Technology

Technology social

factors

**Technology management**

BT: Management

RT: Data processing

Innovation management

Production management

Project management

Research and

development management

Technology transfer

**Technology planning**

BT: Planning

RT: Social factors

Technology

**Technology social factors**

BT: Social factors

Technology

RT: Philosophical

considerations

Risk analysis

Technological

innovation

NT: Technology forecasting

Privacy

**Technology transfer**

BT: Technology

RT: Technology management

NT: Small business

technology transfer

**Teeth**

UF: Tooth

BT: Mouth

*TEGFETs*

USE: MODFETs

*Telecom*

USE: Telecommunications

*Telecom buffers*

USE: Telecommunication

buffers

*Telecom channels*

USE: Communication channels

*Telecom computing*

USE: Telecommunication

computing

*Telecom congestion control*



# 2019 IEEE Thesaurus

USE: Telecommunication  
congestion control

*Telecom control*

USE: Telecommunication  
control

*Telecom network management*

USE: Telecommunication  
network management

*Telecom network reliability*

USE: Telecommunication  
network reliability

*Telecom network topology*

USE: Telecommunication  
network topology

*Telecom services*

USE: Telecommunication  
services

*Telecom signaling*

USE: Communication system  
signaling

*Telecom switching*

USE: Telecommunication  
switching

*Telecom system signaling*

USE: Communication system  
signaling

*Telecom traffic*

USE: Telecommunication  
traffic

**Telecommunication buffers**

UF: Telecom buffers  
BT: Data communication  
RT: Buffer storage

*Telecommunication channels*

USE: Communication channels

**Telecommunication computing**

UF: Communications  
computing

BT: Telecom computing  
Computer applications  
Telecommunications

RT: 3G mobile  
communication

4G mobile  
communication

Mobile computing  
Quality of service  
Software radio  
TV  
Telecommunication

control  
Telecommunication  
network management

Telegraphy  
Telephony

NT: Internetworking  
Soft switching

**Telecommunication congestion control**

UF: Telecom congestion  
control

BT: Telecommunication  
network topology

NT: Call admission control

**Telecommunication control**

UF: Telecom control  
BT: Communication system  
control  
RT: Telecommunication  
computing

**Telecommunication network management**

UF: Telecom network  
management  
BT: Telecommunication  
network topology  
RT: Management information  
base

Telecommunication  
computing

NT: Mobile nodes  
Network architecture  
Network neutrality  
Network resource

management

**Telecommunication network reliability**

UF: Communication network  
reliability

Telecom network  
reliability

BT: Reliability  
Telecommunication

network topology



# 2019 IEEE Thesaurus

NT: Diversity schemes	RT: Communication system traffic
<b>Telecommunication network topology</b>	<b>Telecommunications</b>
UF: Telecom network topology	UF: Telecom
BT: Telecommunications	BT: Communication systems
RT: Dynamic spectrum access	RT: Convolutional codes
NT: Network topology	Diversity reception
NT: Intelligent networks	Film bulk acoustic resonators
Passive networks	Global Positioning System
Telecommunication congestion control	Helical antennas
Telecommunication network management	Multiaccess
Telecommunication network reliability	communication
Telecommunication traffic	Multicarrier code division multiple access
<i>Telecommunication power management</i>	Multicast
USE: Power system management	communication
<i>Telecommunication security</i>	Next generation
USE: Communication system security	networking
<b>Telecommunication services</b>	conversion
UF: Telecom services	Reflectivity
BT: Telecommunications	Switched circuits
RT: Radio access networks	Telecontrol equipment
NT: Acoustic communication (telecommunication)	NT: Ambient intelligence
<i>Telecommunication signalling</i>	Feedback
USE: Communication system signaling	communications
<i>Telecommunication standards</i>	IP networks
USE: Communication standards	Radio access networks
<b>Telecommunication switching</b>	Railway communication
UF: Telecom switching	Space communications
BT: Switching systems	Telecommunication
<b>Telecommunication traffic</b>	computing
UF: Network traffic	Telecommunication network topology
Telecom traffic	Telecommunication services
Traffic load	Telematics
BT: Telecommunication network topology	<i>Telecommuting</i>
<b>Telecommunication traffic</b>	USE: Teleworking
UF: Network traffic	<b>Teleconferencing</b>
Telecom traffic	UF: Videoconferencing
Traffic load	BT: Communication systems
BT: Telecommunication network topology	RT: Image communication
<b>Telecommunication traffic</b>	Meetings
UF: Network traffic	Office automation
Telecom traffic	<b>Telecontrol equipment</b>
Traffic load	BT: Control equipment
BT: Telecommunication network topology	RT: Communication systems



# 2019 IEEE Thesaurus

	Data communication		
	Power industry	<b>Telephony</b>	
	Power systems	BT:	Communication systems
	Remote handling	RT:	Telecommunication
	Telecommunications	computing	Telephone equipment
<b>Telegraphy</b>			Telephone sets
BT:	Communication systems		Videophone systems
RT:	Telecommunication	<b>Teleportation</b>	
computing		UF:	Quantum teleportation
<b>Telematics</b>		BT:	Quantum mechanics
BT:	Information technology	RT:	Information theory
	Telecommunications		Quantum communication
RT:	Cyberspace		Quantum entanglement
<b>Telemedicine</b>		<b>Telepresence</b>	
BT:	Biomedical	BT:	Human computer
communication		interaction	
RT:	Telepresence	RT:	Technology
<b>Telemetry</b>			Telemedicine
BT:	Aerospace and	<b>Teleprinting</b>	
electronic systems		BT:	Communication systems
	Data communication		Data communication
RT:	Deep-space		Printing
communications		RT:	Digital communication
	Measurement	<b>Telerobotics</b>	
NT:	Biomedical telemetry	BT:	Robots
<b>Teleoperators</b>		RT:	Delay systems
BT:	Telerobotics		Human factors
<b>Telephone equipment</b>			Manipulators
BT:	Communication		Mobile robots
equipment		equipment	Remote handling
RT:	Land mobile radio	NT:	Teleoperators
equipment		<b>Telescopes</b>	
	Radio communication	BT:	Instruments
equipment		RT:	Astronomy
	Telephony		Observatories
NT:	Cellular phones		Radio astronomy
	Telephone sets	<b>Teletext</b>	
	Vocoders	BT:	Communication systems
<b>Telephone poles</b>			Information services
BT:	Poles and towers	RT:	Data communication
<b>Telephone sets</b>			Videotex
UF:	Handsets	<b>Television</b>	
	Subscriber sets	USE:	TV
BT:	Telephone equipment	<b>Teleworking</b>	
RT:	Telephony		
NT:	Mobile handsets		





# 2019 IEEE Thesaurus

UF: Mobile office  
Telecommuting  
Virtual office  
BT: Systems, man, and  
cybernetics

## Telexistence

BT: Human computer  
interaction  
Real-time systems  
Technology

## Tellurium

BT: Chemical elements

## TEM cells

UF: GHZ transverse  
electromagnetic cells  
GTEM cells  
Transverse  
electromagnetic cells  
BT: Test facilities  
RT: Anechoic chambers  
Electromagnetic  
compatibility and interference  
Electromagnetic  
interference  
Electronic equipment  
testing

## Temperature

BT: Thermal factors  
RT: Temperature control  
Temperature  
measurement  
NT: Temperature  
distribution

## Temperature control

BT: Thermal variables  
control  
RT: Space heating  
Temperature  
Thermal factors  
Ventilation  
NT: Cooling  
Heating systems

## Temperature dependence

BT: Thermal factors

## Temperature distribution

BT: Temperature  
RT: Insulators

## Temperature measurement

BT: Thermal variables  
measurement  
RT: Bolometers  
Radiometry  
Temperature  
Temperature sensors  
Thermistors  
Thermoresistivity  
NT: Cryobiology  
Cryogenics  
Cryotherapy  
Global warming  
Kelvin  
Thomson effect

## Temperature sensors

BT: Thermal sensors  
RT: Bragg gratings  
Optical fibers  
Temperature  
measurement  
NT: Transducers  
Thermometers

## Temporal lobe

BT: Brain  
NT: Hippocampus

## Tendons

BT: Musculoskeletal system

## Tennis

USE: Sports

## Tensile strain

BT: Strain  
RT: Tensile stress

## Tensile stress

BT: Stress  
RT: Tensile strain

## Tensors

BT: Mathematics

## Terahertz materials

BT: Materials  
NT: Terahertz  
metamaterials

## Terahertz metamaterials



# 2019 IEEE Thesaurus

BT: Electromagnetic metamaterials	Terahertz materials	BT: Troposphere Geoscience and remote sensing
<b>Terahertz radiation</b>		RT: Atmospheric measurements
BT: Radiation effects RT: Electromagnetic radiation		NT: Geophysics Meteorology Clouds Global warming Ionosphere Magnetosphere
<b>Terbium</b>		
BT: Chemical elements		
<b>Termination of employment</b>		<b>Terrorism</b>
UF: Dismissal (employment) Redundancy (employment)		UF: 9/11 9/11 attack 911 attack September 11 Terrorist
BT: Employment Human resource management		BT: Security RT: Biohazards Surveillance Weapons
RT: Pensions		NT: Bioterrorism Cyber terrorism National security
<b>Terminology</b>		
UF: Definitions Glossaries BT: Information retrieval NT: Dictionaries		
<i>Ternary logic</i>		<i>Terrorist</i>
USE: Multivalued logic		USE: Terrorism
<b>Terrain factors</b>		<b>Test data compression</b>
BT: Interference RT: Earth Multipath channels Rough surfaces		BT: Data compression
<b>Terrain mapping</b>		<b>Test equipment</b>
UF: Topography (earth) BT: Geoscience and remote sensing		BT: Testing RT: Oscilloscopes NT: Automatic test equipment
RT: Earth Geologic measurements Geophysical measurements		<b>Test facilities</b>
Global Positioning System		BT: Testing NT: Anechoic chambers Laboratories Large Hadron Collider Open area test sites TEM cells Wind tunnels
NT: Remote sensing Vegetation mapping Digital elevation models		<i>Test generation</i>
<b>Terrestrial atmosphere</b>		USE: Test pattern generators
UF: Earth atmosphere Stratosphere		<b>Test pattern generators</b>
		UF: Test generation



# 2019 IEEE Thesaurus

BT:	Automatic test pattern	<i>Text classification</i>
generation		USE: Text categorization
<b>Testing</b>		<i>Text messaging</i>
BT:	Industrial electronics Instrumentation and	USE: Electronic messaging
measurement		<b>Text mining</b>
RT:	Cause effect analysis Fault diagnosis Hardware-in-the loop	BT: Data mining RT: Triples (Data structure)
simulation		<b>Text processing</b>
	Inspection Leak detection Maintenance	UF: Photocomposition Word processing
engineering		BT: Data processing RT: Desktop publishing Document handling Office automation Publishing Text recognition Typesetting
	NT: Measurement Aerospace testing Automatic testing Benchmark testing Built-in self-test Circuit testing Conformance testing Electronic equipment	<b>Text recognition</b>
testing	Error analysis Error-free operations Failure analysis Frequency response Impulse testing Insulator testing Integrated circuit	BT: Pattern recognition RT: Character recognition Text processing
testing		<b>Textile fibers</b>
	Life testing Materials testing Optical fiber testing Remaining life	UF: Fibers Textile fibres
assessment		BT: Textiles RT: Cotton Spinning Textile products Textile technology Weaving Wool
testing	Ring generators Semiconductor device	NT: Natural fibers Synthetic fibers Yarn
	Software testing System testing Test equipment Test facilities	<i>Textile fibres</i>
<b>Text analysis</b>		USE: Textile fibers
BT:	Data mining	<b>Textile industry</b>
NT:	Text categorization	BT: Manufacturing industries
<b>Text categorization</b>		RT: Clothing industry Cotton Spinning machines Textile machinery Textile products Textile technology Weaving
UF:	Text classification	
BT:	Text analysis	
RT:	Data analysis	



# 2019 IEEE Thesaurus

## Textile machinery

BT: Machinery  
RT: Needles  
Textile industry  
Textile products  
Textile technology  
Textiles  
NT: Spinning machines

## Textile products

UF: Technical textiles  
BT: Manufactured products  
RT: Textile fibers  
Textile industry  
Textile machinery  
Textile technology  
Textiles

## Textile technology

BT: Industries  
RT: Bleaching  
Textile fibers  
Textile industry  
Textile machinery  
Textile products  
Textiles  
NT: Spinning  
Weaving

## Textiles

BT: Materials  
RT: Spinning machines  
Textile machinery  
Textile products  
Textile technology  
Weaving  
NT: Cotton  
Fabrics  
Textile fibers  
Wool

## TFETs

UF: Tunnel field effect  
transistors  
BT: Field effect  
transistors  
RT: MOSFET

## TFT

USE: Thin film transistors

## Thalamus

BT: Brain

## Thallium

BT: Chemical elements

## Theodolites

BT: Instruments  
RT: Geodesy  
Geologic measurements  
Geophysical  
measurement techniques

## *Theoretical neuroscience*

USE: Computational  
neuroscience

## *Therapy*

USE: Medical treatment

## Thermal analysis

BT: Thermal variables  
control  
NT: Thermomechanical  
processes

## Thermal conductivity

BT: Thermal factors  
RT: Grain boundaries  
Thermal resistance  
NT: Heat transfer

## Thermal decomposition

BT: Thermolysis

## Thermal degradation

BT: Thermolysis

## Thermal energy

BT: Heating systems  
RT: Energy  
Kinetic energy  
Thermal engineering

## Thermal engineering

BT: Engineering - general  
RT: Cooling  
Heat recovery  
Heating systems  
Thermal energy  
Thermal factors  
Thermal variables  
control  
Thermal variables  
measurement



# 2019 IEEE Thesaurus

## Thermal expansion

BT: Thermal factors  
NT: Thermal force

## Thermal factors

UF: High-temperature effects

BT: Physics  
RT: Annealing  
Critical current

## density

Heat treatment  
Proton effects  
Pyroelectricity  
Superconducting

## devices

Superconducting

## materials

Temperature control  
Thermal engineering  
Thermal stability  
Thermal variables

## control

Thermal variables

## measurement

NT: Temperature  
Temperature dependence  
Thermal conductivity  
Thermal expansion  
Thermal management  
Thermal stresses  
Thermoelasticity  
Thermoelectricity  
Thermolysis  
Thermooptic effects  
Thermoresistivity

## Thermal force

BT: Thermal expansion

## Thermal lensing

BT: Thermooptic effects  
RT: Laser beams  
Nonlinear optics  
Optical distortion  
Solid lasers

## Thermal loading

BT: Thermal stresses

## Thermal management

BT: Thermal factors  
RT: Enthalpy  
Reliability

## Thermal management of electronics

BT: Components, packaging, and manufacturing technology

NT: Electronic packaging thermal management

Electronics cooling

## Thermal noise

UF: Johnson Nyquist noise  
BT: Circuit noise  
RT: Conductors

## Thermal plumes

USE: Thermal pollution

## Thermal pollution

UF: Heat islands  
Thermal plumes  
Urban heat islands  
BT: Pollution  
RT: Air pollution  
Global warming  
Industrial pollution  
Marine pollution  
Waste heat  
Water pollution

## Thermal quenching

BT: Cooling

## Thermal resistance

BT: Resistance  
RT: Thermal conductivity

## Thermal sensors

BT: Sensors  
NT: Temperature sensors

## Thermal spraying

BT: Spraying

## Thermal stability

BT: Stability  
RT: Integrated circuit

## reliability

Thermal factors

## Thermal stresses

BT: Thermal factors  
NT: Thermal loading

## Thermal variables control

BT: Control systems



# 2019 IEEE Thesaurus

RT:	Thermal engineering		
	Thermal factors		
NT:	HVAC		
	Temperature control		
	Thermal analysis		
<b>Thermal variables measurement</b>			
BT:	Measurement		
RT:	Calorimetry		
	Thermal engineering		
	Thermal factors		
	Transducers		
NT:	Temperature		
measurement			
<i>Thermal wave imaging</i>			
USE:	Photothermal effects		
<b>Thermionic emission</b>			
BT:	Nuclear and plasma		
sciences			
RT:	Electron emission		
	Ion emission		
	Transmission electron		
microscopy			
	Vacuum arcs		
<i>Thermionic valves</i>			
USE:	Electron tubes		
<b>Thermistors</b>			
BT:	Semiconductor devices		
RT:	Temperature		
measurement			
	Thermoresistivity		
<i>Thermo-mechanics</i>			
USE:	Thermomechanical		
processes			
<i>Thermo-optic effects</i>			
USE:	Thermooptic effects		
<i>Thermo-optical devices</i>			
USE:	Thermooptical devices		
<b>Thermochromism</b>			
BT:	Thermooptic effects		
<b>Thermodynamics</b>			
BT:	Science - general		
NT:	Enthalpy		
	Isobaric		
	Isothermal processes		
<b>Thermoelasticity</b>			
BT:	Thermal factors		
<b>Thermoelectric devices</b>			
BT:	Thermoelectricity		
<i>Thermoelectric effect</i>			
USE:	Thermoelectricity		
<b>Thermoelectric materials</b>			
BT:	Materials		
	Thermoelectricity		
<b>Thermoelectricity</b>			
UF:	Seebeck effect		
	Thermoelectric effect		
BT:	Electricity		
	Energy conversion		
	Thermal factors		
NT:	Electrothermal effects		
	Peltier effect		
	Thermoelectric devices		
	Thermoelectric		
materials			
<b>Thermoforming</b>			
BT:	Manufacturing systems		
<b>Thermoluminescence</b>			
BT:	Luminescence		
<b>Thermolysis</b>			
BT:	Chemical processes		
	Thermal factors		
NT:	Thermal decomposition		
	Thermal degradation		
<b>Thermomechanical processes</b>			
UF:	Thermo-mechanics		
	Thermomechanics		
BT:	Thermal analysis		
<i>Thermomechanics</i>			
USE:	Thermomechanical		
processes			
<b>Thermometers</b>			
BT:	Temperature sensors		
<i>Thermonuclear fusion</i>			
USE:	Fusion reactors		
<b>Thermooptic effects</b>			



# 2019 IEEE Thesaurus

UF: Thermo-optic effects  
 BT: Thermal factors  
 RT: Birefringence  
 Optical propagation  
 Optical reflection  
 Optical refraction  
 Thermo-optical devices  
 NT: Thermal lensing  
 Thermochromism  
 Thermoreflectance

## Thermo-optical devices

UF: Thermo-optical devices  
 BT: Optical devices  
 RT: Integrated optics  
 Optical switches  
 Solid lasers  
 Thermo-optic effects

## Thermoplastic polyethylene

BT: Polyethylene  
 NT: UHMWPE

## Thermoreflectance

BT: Thermo-optic effects

## Thermoreflectance imaging

BT: Optical imaging  
 RT: Spectroscopy

## Thermoresistivity

BT: Thermal factors  
 RT: Temperature  
 measurement  
 Thermistors

## Thermostats

BT: Control equipment

## Thesauri

UF: Thesaurus  
 BT: Knowledge  
 representation  
 RT: Writing  
 Ontologies

## Thesaurus

USE: Thesauri

## Thick film circuits

BT: Circuits  
 Integrated circuits  
 RT: Hybrid integrated  
 circuits

## Thick film devices

BT: Electron devices  
 RT: Thick film circuits  
 Thick films  
 NT: Thick film inductors

## Thick film inductors

BT: Inductors  
 Thick film devices  
 RT: Microstrip components  
 Thick film circuits  
 Thick films

## Thick film sensors

UF: Thick-film sensors  
 BT: Sensors

## Thick films

BT: Films  
 RT: Dielectric films  
 Semiconductor films  
 Superconducting films  
 Thick film devices  
 Thick film inductors

## Thick-film sensors

USE: Thick film sensors

## Thickness control

BT: Mechanical variables  
 control  
 RT: Size control

## Thickness measurement

BT: Mechanical variables  
 measurement  
 RT: Micrometers  
 Size measurement

## Thigh

BT: Extremities

## Thin film circuits

BT: Circuits  
 Integrated circuits  
 RT: Hybrid integrated  
 circuits  
 Silicon-on-insulator  
 Thin film devices  
 Thin film inductors



# 2019 IEEE Thesaurus

## *Thin film deposition*

USE: Sputtering

NT: Thin film inductors  
Buffer layers  
Epitaxial growth  
Semiconductor thin

## Thin film devices

BT: Electron devices

RT: Amorphous

## semiconductors

Doping profiles

Giant

## magnetoresistance

Thin film circuits

Thin films

NT: Film bulk acoustic

## resonators

Thin film inductors

Thin film transistors

## Thin film inductors

BT: Inductors

Thin film devices

RT: Thin film circuits

Thin films

## Thin film sensors

BT: Sensors

## Thin film transistors

UF: TFT

Thin-film transistors

BT: Active matrix

## technology

Field effect

## transistors

Thin film devices

RT: Displays

Liquid crystal devices

NT: Organic thin film

## transistors

## Thin films

BT: Films

RT: Diamond-like carbon

Dielectric films

Epitaxial layers

Magnetic films

Molecular beam

## epitaxial growth

Molecular beams

Self-assembly

Semiconductor films

Superconducting films

Superconducting thin

## films

Thin film devices

films

## Thin wall structures

BT: Structural shapes

RT: Honeycomb structures

Lightweight structures

Sandwich structures

Sheet materials

Structural panels

Structural shells

## Thin-film transistors

USE: Thin film transistors

## Third generation mobile communication

USE: 3G mobile

## communication

## Thomson effect

BT: Temperature

## measurement

## Thorax

BT: Body regions

Skeleton

NT: Ribs

Sternum

## Thorium

BT: Chemical elements

## Three dimensional displays

USE: Three-dimensional

## displays

## Three-dimensional displays

UF: 3-D displays

3-D modeling

3-D modelling

3-D reconstruction

3D displays

3D modeling

3D modelling

3D reconstruction

Three dimensional

## displays

BT: Displays

RT: Shadow mapping

Sprites (computer)

Structure from motion





# 2019 IEEE Thesaurus

NT: Bundle adjustment X3D	BT: Communication channels
<b>Three-dimensional integrated circuits</b>	<i>Throughput (communication systems)</i>
BT: Integrated circuits	USE: Information rates
<b>Three-dimensional printing</b>	<b>Thulium</b>
UF: 3D printing	BT: Chemical elements
Additive manufacturing	<b>Thumb</b>
BT: Manufacturing systems	BT: Fingers
Printing	<b>Thyratrons</b>
RT: Ink jet printing	BT: Electron tubes
Rapid prototyping	RT: Gas discharge devices
<b>Three-dimensional television</b>	<b>Thyristor circuits</b>
BT: TV	BT: Circuits
<i>Three-dimensional vision</i>	RT: Thyristors
USE: Stereo vision	<b>Thyristors</b>
<b>Three-phase electric power</b>	UF: Diacs
BT: Power electronics	SCR
RT: Conductors	Semiconductor
Voltage control	controlled rectifiers
<b>Three-term control</b>	Silicon controlled
BT: Process control	rectifiers
<b>Threshold current</b>	BT: Triacs
BT: Current	BT: Power semiconductor
RT: Electron devices	switches
Lasers	RT: Thyristor circuits
<b>Threshold voltage</b>	NT: Photothyristors
BT: Voltage	<i>Ti</i>
RT: Integrated circuit	USE: Titanium
noise	<b>Tides</b>
MOSFET circuits	BT: Oceans
Transistors	RT: Ocean circulation
NT: Subthreshold current	<b>Tiles</b>
<b>Thresholding (Imaging)</b>	BT: Building materials
BT: Image segmentaton	RT: Ceramic products
RT: Image edge detection	Ceramics
<b>Thrombosis</b>	Floors
BT: Medical conditions	<b>Timbre</b>
<b>Through-silicon vias</b>	BT: Music
UF: TSV	<b>Time complexity</b>
BT: Integrated circuits	BT: Computational
<b>Throughput</b>	complexity
UF: Network throughput	RT: Computational modeling
	<i>Time delay</i>



# 2019 IEEE Thesaurus

USE: Delay effects	BT: System analysis and design
<b>Time difference of arrival</b>	RT: Bang-bang control
UF: Time-difference-of-arrival	NT: Continuous time
BT: Object detection	Discrete-time systems
<b>Time dissemination</b>	Time invariant systems
BT: Time measurement	Time-varying systems
RT: Satellite navigation systems	<i>Time frequency analysis</i>
Synchronization	USE: Time-frequency analysis
<i>Time division multiaccess</i>	<b>Time invariant systems</b>
USE: Time division multiple access	BT: Time factors
<b>Time division multiple access</b>	RT: Differential equations
UF: Time division multiaccess	<b>Time measurement</b>
BT: Multiaccess communication	BT: Measurement
<i>Time division multiplexed</i>	RT: Time-frequency analysis
USE: Time division multiplexing	NT: Watches
<b>Time division multiplexing</b>	NT: Clocks
UF: TDM	Time dissemination
Time division multiplexed	Timing
BT: Multiplexing	<b>Time of arrival estimation</b>
<b>Time division synchronous code division multiple access</b>	UF: TOA estimation
UF: TDSCDMA	Time-of-arrival estimation
BT: Multiaccess communication	BT: Parameter estimation
RT: 3G mobile communication	RT: Array signal processing
4G mobile communication	Direction-of-arrival estimation
Land mobile radio cellular systems	Signal detection
Multicarrier code division multiple access	<b>Time series analysis</b>
Spread spectrum communication	BT: Statistics
<i>Time domain analysis</i>	RT: Autocorrelation
USE: Time-domain analysis	Autoregressive processes
<b>Time factors</b>	Chaotic communication Modeling
	Random processes
	Spectral analysis
	Statistical analysis
	<b>Time sharing computer systems</b>
	UF: Time-sharing computer systems
	Time-sharing systems
	BT: Computers and information processing



# 2019 IEEE Thesaurus

RT: Mainframes	USE: Time sharing computer systems
<b>Time to market</b>	<b>Time-varying channels</b>
BT: Design methodology	BT: Communication channels
Product development	RT: Mobile communication
RT: Concurrent engineering	Wireless LAN
<b>Time varying circuits</b>	<b>Time-varying systems</b>
BT: Circuits	UF: Time varying systems
<i>Time varying systems</i>	BT: Time factors
USE: Time-varying systems	RT: Control systems
<b>Time warp simulation</b>	NT: Switched systems
BT: Discrete event simulation	<b>Timing</b>
<i>Time-difference-of-arrival</i>	BT: Time measurement
USE: Time difference of arrival	RT: Clocks
<b>Time-domain analysis</b>	Logic design
UF: FDTD	System dynamics
Time domain analysis	Timing jitter
BT: Electromagnetic analysis	NT: Bit rate
RT: Phase noise	Delays
State-space methods	Synchronization
Waves	<b>Timing jitter</b>
<b>Time-frequency analysis</b>	BT: Jitter
UF: Time frequency analysis	RT: Timing
BT: Frequency-domain analysis	<b>Tin</b>
RT: Biomedical signal processing	UF: Sn
Fourier transforms	BT: Metals
Frequency measurement	NT: Tin alloys
Image processing	Tin compounds
Power systems	<b>Tin alloys</b>
Time measurement	BT: Tin
Video signal	RT: Alloying
<b>Time-of-arrival estimation</b>	NT: Niobium-tin
USE: Time of arrival estimation	<b>Tin compounds</b>
<i>Time-sharing computer systems</i>	BT: Tin
USE: Time sharing computer systems	<b>Tire pressure</b>
<i>Time-sharing systems</i>	BT: Pressure measurement
	Tires
	<b>Tires</b>
	UF: Tyres
	BT: Mechanical products
	Rubber products
	RT: Automobile manufacture
	Automotive components
	Vehicles
	Wheels



# 2019 IEEE Thesaurus

NT:	Tire pressure		
<b>Tissue damage</b>		<i>Toddler</i>	USE: Pediatrics
BT:	Lesions		
<b>Tissue engineering</b>		<b>Tokamak devices</b>	
UF:	Tissue scaffolds	BT:	Tokamaks
BT:	Biomedical engineering	RT:	Magnetic confinement Toroidal magnetic
RT:	Biological materials Colloidal lithography Diamond-like carbon Genetic engineering	fields	
NT:	Regeneration	<b>Tokamaks</b>	
engineering		BT:	Fusion reactors Plasma applications Plasma devices
<i>Tissue scaffolds</i>		RT:	Magnetic confinement Plasma simulation
USE:	Tissue engineering	NT:	Tokamak devices
<i>Tissues</i>		<b>Token networks</b>	
USE:	Biological tissues	BT:	Communication systems Computer networks Digital systems
<i>Titanates</i>		RT:	Local area networks Metropolitan area
USE:	Titanium compounds	networks	Wide area networks
<b>Titanium</b>			
UF:	Ti	<b>Tokenization</b>	
BT:	Chemical elements Metals	BT:	Data security Natural language
NT:	Titanium alloys Titanium compounds Titanium dioxide Titanium nitride	processing	
<b>Titanium alloys</b>		<b>Tolerance analysis</b>	
BT:	Titanium	UF:	Circuit tolerance
RT:	Alloying	analysis	Tolerating problems
<b>Titanium compounds</b>		BT:	Manufacturing
UF:	Titanates	RT:	Circuit analysis Circuit optimization Semiconductor device
BT:	Titanium	breakdown	Sensitivity
<b>Titanium dioxide</b>			
BT:	Titanium	<i>Tolerating problems</i>	
<b>Titanium nitride</b>		USE:	Tolerance analysis
BT:	Titanium	<i>Tomographic</i>	
<i>TMR</i>		USE:	Tomography
USE:	Tunneling	<b>Tomography</b>	
magnetoresistance		UF:	Tomographic
<i>TOA estimation</i>		BT:	Imaging
USE:	Time of arrival	RT:	Biomedical imaging
estimation			



# 2019 IEEE Thesaurus

Geophysical				Tornados
measurement techniques		BT:		Geoscience
	Image reconstruction			
NT:	Computed tomography	<i>Tornados</i>		
	Electrical capacitance	USE:		Tornadoes
tomography				
	Optical coherence	<b>Toroidal magnetic fields</b>		
tomography		BT:		Magnetic fields
	Positron emission	RT:		Tokamak devices
tomography				
	Reconstruction	<i>Torpedoes</i>		
algorithms		USE:		Missiles
<i>Tomosynthesis</i>				
USE:	Biomedical imaging	<b>Torque</b>		
		BT:		Mechanical factors
<b>Tongue</b>		RT:		Torque control
	Digestive system			Torque converters
BT:				Torque measurement
RT:	Stomatognathic system			
		<b>Torque control</b>		
<b>Tools</b>		BT:		Mechanical variables
	Manufactured products	control		
BT:				
NT:	Hand tools	RT:		Motor drives
				Torque
<i>Tooth</i>				
USE:	Teeth	<b>Torque converters</b>		
		UF:		Torque convertors
<i>Topography (earth)</i>		BT:		Mechanical power
USE:	Terrain mapping	transmission		
		RT:		Automotive components
<b>Topological insulators</b>				Drives
BT:	Insulators			Engines
				Gears
<b>Topology</b>				Shafts
	Mathematics			Torque
BT:				
RT:	Graph theory			
	Morphological	<i>Torque convertors</i>		
operations		USE:		Torque converters
<b>TOPSIS</b>		<b>Torque measurement</b>		
UF:	Technique for order of	UF:		Torque ripple
preference by similarity to ideal		BT:		Mechanical variables
solution		measurement		
	Decision theory	RT:		Pressure gauges
BT:				Torque
RT:	Decision making			Dynamometers
	Fuzzy set theory	NT:		
	Operations research			
	Optimization	<i>Torque ripple</i>		
<i>Tornado</i>		USE:		Torque measurement
USE:	Tornadoes			
		<b>Torso</b>		
<b>Tornadoes</b>		BT:		Body regions
UF:	Tornado	<b>Total harmonic distortion</b>		



# 2019 IEEE Thesaurus

BT:	Distortion measurement	<b>Toy industry</b>	
	Harmonic distortion	BT:	Industries
RT:	Signal analysis		
<b>Total ionizing dose</b>		<b>Toy manufacturing industry</b>	
BT:	Radiation effects	UF:	Toys
RT:	Aerospace electronics	BT:	Manufacturing industries
	Radiation hardening	RT:	Electronics industry
(electronics)			
<b>Total quality management</b>		<i>Toys</i>	
UF:	TQM	USE:	Toy manufacturing industry
BT:	Quality management		
RT:	Business process re-engineering	<i>TQM</i>	
	Design for quality	USE:	Total quality management
	Quality assurance		
	Quality awards	<b>Tracking</b>	
	Quality control	BT:	Motion measurement
NT:	Continuous improvement	RT:	Iterative learning control
	Six sigma		Maximum likelihood estimation
<b>Touch screens</b>			Particle tracking
USE:	Touch sensitive screens		Position measurement
			Tracking loops
<b>Touch sensitive screens</b>			Velocity measurement
UF:	Touch screens	NT:	Object tracking
BT:	Computer displays		Target tracking
RT:	Haptic interfaces		Trajectory tracking
	Tactile sensors		Underwater tracking
			Video tracking
<b>Touch sensors</b>		<b>Tracking loops</b>	
USE:	Tactile sensors	UF:	Delay lock loops
		BT:	Linear feedback control systems
<b>Towers</b>			Signal processing
USE:	Poles and towers	RT:	Modulation
			Synchronization
<b>Town gas</b>			Tracking
USE:	Coal gas		
<b>Toxic chemicals</b>		<b>Traction motors</b>	
BT:	Chemical hazards	BT:	Motors
	Toxicology	RT:	Battery powered vehicles
<b>Toxicology</b>			Fuel cell vehicles
UF:	Poisons		Hybrid electric vehicles
BT:	Hazards		Propulsion
RT:	Chemical hazards		Solar powered vehicles
	Hazardous materials		
	Occupational health	<b>Traction power supplies</b>	
	Pollution	BT:	Power supplies
NT:	Toxic chemicals		



# 2019 IEEE Thesaurus

<i>Tractors</i>		<b>Training</b>	
USE:	Agricultural machinery	UF:	Technician training
		BT:	Education
<i>Trade</i>		RT:	Accreditation
USE:	Business		Continuing education
			Continuing
<i>Trade (international)</i>		professional development	
USE:	International trade		Electronic learning
			Learning management
<b>Trade agreements</b>		systems	
UF:	Free trade		Manuals
	GATT		Mentoring
	General agreement on	NT:	Personnel
tariffs and trade			Certification
BT:	Economics		Industrial training
RT:	Globalization		Management training
	International		On the job training
collaboration			Qualifications
	International trade		Vocational training
<i>Trade unions</i>		<b>Training data</b>	
USE:	Industrial relations	BT:	Data analysis
<b>Trademarks</b>		<b>Trajectory</b>	
BT:	Law	BT:	Path planning
	Legal factors	RT:	Motion control
RT:	Copyright protection		Object tracking
		NT:	Trajectory
<b>Traffic congestion</b>		optimization	
BT:	Road transportation	<b>Trajectory optimization</b>	
RT:	Traffic control	BT:	Optimization
			Trajectory
<b>Traffic control</b>		<b>Trajectory tracking</b>	
UF:	Traffic pattern	BT:	Path planning
	Traffic simulation		Tracking
BT:	Control systems	RT:	Motion control
RT:	Communication systems		Robot control
	Computer network		
management		<i>Trans human</i>	
	Traffic congestion	USE:	Transhuman
NT:	Queueing analysis		
	Vehicle routing	<i>Trans-human</i>	
<i>Traffic Load</i>		USE:	Transhuman
USE:	Telecommunication		
traffic		<b>Transaction databases</b>	
<i>Traffic pattern</i>		BT:	Databases
USE:	Traffic control	NT:	Itemsets
<i>Traffic simulation</i>		<i>Transactive control</i>	
USE:	Traffic control	USE:	Transactive energy
		<b>Transactive energy</b>	



# 2019 IEEE Thesaurus

UF:	Transactive control	NT:	Acoustic transducers
BT:	Energy management		Biomedical transducers
RT:	Power distribution		Capacitive transducers
	Power markets		Chemical transducers
	Power system economics		Inductive transducers
	Smart grids		Piezoelectric
<b>Transceivers</b>		transducers	Resistive transducers
BT:	Communication		Ultrasonic transducer
equipment		arrays	
RT:	Land mobile radio	<i>Transfer function</i>	
equipment		USE:	Transfer functions
	Mobile communication	<b>Transfer functions</b>	
	Mobile handsets	UF:	Transfer function
	Software radio	BT:	Differential equations
NT:	Radio transceivers	RT:	Control systems
<b>Transcoding</b>			Damping
BT:	Encoding		Linear systems
RT:	Data compression	NT:	Poles and zeros
	Image coding	<b>Transfer molding</b>	
	Multimedia	UF:	Resin transfer molding
communication			Resin transfer
	Video coding	moulding	
<b>Transconductance</b>			Transfer moulding
UF:	Mutual conductance	BT:	Production
BT:	Conductivity	<i>Transfer moulding</i>	
RT:	Transconductors	USE:	Transfer molding
<b>Transconductors</b>		<i>Transferred electron devices</i>	
BT:	CMOS integrated	USE:	Gunn devices
circuits		<b>Transform coding</b>	
RT:	Transconductance	UF:	JPEG
<b>Transcranial direct current stimulation</b>			JPEG2000
BT:	Neuroscience		MPEG
	Neurostimulation	BT:	Data compression
<b>Transcranial magnetic stimulation</b>		RT:	Digital photography
BT:	Neuroscience		MPEG standards
	Neurostimulation		Principal component
<b>Transducers</b>		analysis	Vector quantization
BT:	Electronic components	<b>Transformer cores</b>	
RT:	Electric variables	BT:	Magnetic cores
measurement			Magnetic devices
	Measurement	RT:	Power transformers
	Mechanical variables		Transformers
measurement		<i>Transformer oil</i>	
	Solenoids	USE:	Oil insulation
	Temperature sensors		
measurement	Thermal variables		







# 2019 IEEE Thesaurus

## Transmission line antennas

BT: Antennas  
RT: Transmission lines

## Transmission line circuits

USE: Distributed parameter circuits

## Transmission line discontinuities

BT: Transmission lines  
RT: Freight handling  
NT: Waveguide discontinuities

## Transmission line matrix methods

BT: Mathematics  
Numerical analysis

## Transmission line measurements

BT: Electric variables measurement  
RT: Impedance measurement  
Transmission lines

## Transmission line theory

BT: Transmission lines  
RT: Capacitance  
Conductivity  
Crosstalk  
Frequency  
Inductance

## Transmission lines

UF: Transmission-line  
BT: Power transmission  
RT: Baluns  
Circuit noise  
Civil engineering  
Coaxial cables  
Distributed parameter  
Helical antennas  
Splicing  
Transmission line  
Transmission line  
Cables  
Electromagnetic  
Multiconductor  
Planar transmission  
lines

Poles and towers  
Power line

communications  
lines  
Power transmission

Stripline  
Superconducting  
transmission lines  
Transmission line  
discontinuities  
Transmission line  
theory

*Transmission of electric power*  
USE: Power transmission

*Transmission-line*  
USE: Transmission lines

*Transmit antennas*  
USE: Transmitting antennas

## Transmitters

BT: Communication  
equipment  
RT: Linearization  
techniques  
Modulation  
SISO communication  
NT: Auxiliary transmitters  
Diversity methods  
Neurotransmitters  
Optical transmitters  
Radio transmitters  
Transmitting antennas

## Transmitting antennas

UF: Transmit antennas  
BT: Antennas  
Transmitters  
RT: Receiving antennas

## Transponders

BT: Communication  
equipment  
Radio communication  
equipment  
RT: Radio navigation  
Satellite  
communication

## Transport protocols

BT: Protocols  
RT: IP networks



# 2019 IEEE Thesaurus

	Overlay networks	<b>Tree data structures</b>	
	Radio link	BT:	Data structures
	SONET	NT:	Binary trees
	Synchronous digital		
hierarchy		<b>Tree graphs</b>	
	TCPIP	BT:	Graph theory
		RT:	Circuit topology
<b>Transportation</b>		<i>Tree searching</i>	
BT:	Intelligent	USE:	Decision trees
transportation systems		<i>Trees (botanical)</i>	
RT:	Bridges	USE:	Vegetation
	Freight containers		
NT:	Air transportation	<b>Trees - insulation</b>	
	Escalators	UF:	Water trees
	Green transportation	BT:	Insulators
	Land transportation	RT:	Humidity
	Public transportation		Insulation life
	Seaports		Moisture
	Smart transportation		
	Vehicles		
<b>Transportation industry</b>		<i>Trellis codes</i>	
BT:	Industries	USE:	Convolutional codes
<b>Transversal filters</b>		<i>Triacs</i>	
BT:	Filters	USE:	Thyristors
RT:	Digital filters		
	Filtering theory	<b>Triboelectricity</b>	
	Signal processing	BT:	Electricity
<i>Transverse electromagnetic cells</i>			Electrostatic
USE:	TEM cells	processes	
			Surface charging
<i>Traveling salesman</i>		RT:	Nanogenerators
USE:	Traveling salesman	<b>Tribology</b>	
problems		BT:	Motion measurement
<b>Traveling salesman problems</b>		<i>Trigen</i>	
UF:	Traveling salesman	USE:	Trigeneration
	Travelling salesman		
problem		<b>Trigeneration</b>	
BT:	NP-hard problem	UF:	CHCP
			Combined heat, cooling
<b>Traveling wave tubes</b>		and power	
UF:	Travelling wave tubes		Combined heat,
BT:	Electron tubes	cooling, and power	
<i>Travelling salesman problem</i>			Trigen
USE:	Traveling salesman	BT:	Cooling
problems			Heating systems
			Power generation
<i>Travelling wave tubes</i>		RT:	Cogeneration
USE:	Traveling wave tubes	<b>Trigger circuits</b>	
		BT:	Circuits



# 2019 IEEE Thesaurus

## Trions

BT: Electrons

## Triples (Data structure)

UF: SPO  
Semantic triple  
Subject predicate

## object

BT: Triplestore  
Data storage systems  
RT: Database systems  
Information retrieval  
Metasearch  
Relational databases  
Text mining

## Triplestore

USE: Triples (Data structure)

## Tritium batteries

USE: Atomic batteries

## Trojan horses

UF: Trojans  
BT: Malware  
RT: Cyber espionage

## Trojans

USE: Trojan horses

## Trolley cars

USE: Public transportation

## Tropical cyclones

UF: Cyclonic storms  
Storm systems  
Tropical depressions  
Tropical storms  
BT: Cyclones

## Tropical depressions

USE: Tropical cyclones

## Tropical storms

USE: Tropical cyclones

## Troposphere

USE: Terrestrial atmosphere

## Truncation errors

USE: Finite wordlength

## effects

## Trust management

BT: Decision making  
Information security  
RT: Access control  
Computer security  
Cryptography  
Privacy

## Tsunami

BT: Geoscience

## TSV

USE: Through-silicon vias

## Tubes

USE: Electron tubes

## Tumor

USE: Tumors

## Tumor cells

USE: Tumors

## Tumor detection

USE: Tumors

## Tumors

UF: Tumor  
Tumor cells  
Tumor detection  
Tumours  
BT: Medical conditions  
RT: Cancer  
Medical diagnostic

## imaging

Oncology  
Positron emission

## tomography

Single photon emission

## computed tomography

NT: Benign tumors  
Breast tumors  
Colonic polyps  
Lesions  
Malignant tumors

## Tumours

USE: Tumors

## Tunable circuits and devices

BT: Circuits and systems  
Frequency control  
RT: Inductors



# 2019 IEEE Thesaurus

	Tuners	<b>Tunneling magnetoresistance</b>
	Tuning	UF: TMR
NT:	RLC circuits	Tunnelling
	Tuned circuits	magnetoresistance
<b>Tuned circuits</b>		BT: Magnetoresistance
BT:	Tunable circuits and	Tunneling
devices		RT: Magnetoresistive
		devices
<b>Tuners</b>		<i>Tunnelling magnetoresistance</i>
BT:	Instruments	USE: Tunneling
	Tuning	magnetoresistance
RT:	Frequency control	
	Frequency synthesizers	<b>Turbines</b>
	Resonators	BT: Turbomachinery
	Tunable circuits and	RT: Aircraft propulsion
devices		Boilers
		Compressors
<b>Tungsten</b>		Turbogenerators
UF:	Wolfram	Wind energy
BT:	Metals	NT: Hydraulic turbines
		Wind turbines
<b>Tuning</b>		
BT:	Frequency control	<b>Turbo codes</b>
RT:	Tunable circuits and	BT: Channel coding
devices		RT: Error correction
		Viterbi algorithm
NT:	Laser tuning	
	Optical tuning	<i>Turbo generators</i>
	Tuners	USE: Turbogenerators
<i>Tuning forks</i>		
USE:	Vibrations	<b>Turbogenerators</b>
<i>Tunnel effect</i>		UF: Turbo generators
USE:	Tunneling	BT: Turbomachinery
		RT: Turbines
<i>Tunnel field effect transistors</i>		Wind power generation
USE:	TFETs	
<b>Tunneling</b>		<i>Turbomachine blades</i>
UF:	Tunnel effect	USE: Turbomachinery
BT:	Electron devices	
	Quantum mechanics	<b>Turbomachinery</b>
RT:	Quantum well devices	UF: Turbomachine blades
	Semiconductor	BT: Power generation
materials		RT: Blades
NT:	Gate leakage	Compressors
	Josephson effect	Engines
	Magnetic tunneling	Machine components
	Resonant tunneling	Mechanical systems
devices		Pumps
		NT: Turbines
	Tunneling	Turbogenerators
magnetoresistance		
		<i>Turbulent media</i>
		USE: Random media



# 2019 IEEE Thesaurus

## Turing machines

BT: Automata  
RT: Digital computers

## Turning

BT: Machining  
RT: Boring  
Machine tools

## Turnkey project

BT: Project engineering  
Project management

## Tutorials

BT: Educational programs  
IEEE indexing

## TV

UF: Mobile television  
TV broadcasting  
Television  
BT: Communications

## technology

RT: Electronic learning  
Entertainment industry  
HbbTV Standards  
Image communication  
Plasma displays  
TV equipment  
Telecommunication

## computing

UHDTV  
Visual communication  
NT: Analog TV  
Cable TV  
Color TV  
Digital TV  
Mobile TV  
Smart TV  
Three-dimensional

## television

Web TV

## TV broadcasting

USE: TV

## TV equipment

BT: Communication  
equipment  
RT: TV  
Video equipment  
NT: Large screen displays  
TV receivers

## TV interference

BT: Interference  
RT: Echo interference  
Gaussian noise

## TV receivers

BT: TV equipment

## Twitter

UF: Hashtag  
BT: Social network  
services

## Two dimensional displays

UF: 2-D displays  
2D displays  
Two-dimensional

## displays

BT: Displays  
RT: Sprites (computer)  
Structure from motion

## Two dimensional hole gas

UF: 2-d hole gas  
2d hole gas  
BT: Quantum well devices  
RT: Quantum well lasers  
Quantum wells

## Two dimensional photonic crystals

USE: Photonic crystals

## Two-dimensional displays

USE: Two dimensional  
displays

## Two-dimensional electron gas FETs

USE: MODFETs

## Two-dimensional photonic crystals

USE: Photonic crystals

## Two-term control

BT: Process control

## Type II superconductors

BT: Superconducting  
materials  
RT: Flux pinning  
Niobium

## Type interference



# 2019 IEEE Thesaurus

USE: Reasoning about programs

*Type testing*

USE: Conformance testing

**Typesetting**

BT: Text processing

RT: Printing

*Tyres*

USE: Tires

*Uber*

USE: Public transportation

*Ubicomp*

USE: Pervasive computing

**Ubiquitous computing**

UF: Ubiquitous wireless\*

BT: Pervasive computing

RT: Ambient intelligence

NT: Context-aware services

*Ubiquitous wireless\**

USE: Ubiquitous computing

*UDN*

USE: Ultra-dense networks

*UHD*

USE: UHDTV

**UHDTV**

UF: 4K UHD

8K UHD

Super hi-vision

UHD

Ultra HD

Ultra HD TV

Ultra-high definition

TV

Ultra-high definition

television

BT: HDTV

RT: ITU Standards

TV

**UHF antennas**

BT: Antennas

UHF technology

RT: UHF devices

**UHF circuits**

UF: Ultra-high-frequency circuits

BT: Circuits

UHF technology

RT: Analog circuits

NT: UHF integrated circuits

**UHF communication**

UF: Ultra-high-frequency communication

BT: Communication systems

UHF technology

RT: Mobile handsets

**UHF devices**

UF: Ultra-high-frequency devices

BT: UHF technology

RT: UHF antennas

UHF integrated circuits

**UHF integrated circuits**

UF: Ultra-high-frequency integrated circuits

BT: Circuits

Integrated circuits

UHF circuits

UHF technology

RT: Analog integrated circuits

UHF devices

**UHF measurements**

UF: Ultra-high-frequency measurements

BT: Measurement

RT: UHF technology

**UHF propagation**

UF: UHF radio propagation

Ultra-high-frequency propagation

BT: Electromagnetic propagation

RT: Broadband antennas

*UHF radio propagation*

USE: UHF propagation

**UHF technology**



# 2019 IEEE Thesaurus

UF: Ultra-high-frequency  
technology  
BT: Communications  
technology  
RT: UHF measurements  
NT: UHF antennas  
UHF circuits  
UHF communication  
UHF devices  
UHF integrated  
circuits

## UHMWPE

UF: Ultra high molecular  
weight polyethylene  
BT: Thermoplastic  
polyethylene

## UK Space Agency

USE: United Kingdom Space  
Agency

## ULSI

USE: Ultra large scale  
integration

## Ultra HD

USE: UHD TV

## Ultra HD TV

USE: UHD TV

## Ultra high molecular weight polyethylene

USE: UHMWPE

## Ultra large scale integration

UF: ULSI  
BT: Circuits  
Integrated circuits  
Large scale  
integration

## Ultra Low power\*

USE: Low-power electronics

## Ultra violet

USE: Ultraviolet sources

## Ultra wide-band

USE: Ultra wideband  
technology

## Ultra wideband

USE: Ultra wideband  
technology

## Ultra wideband antennas

UF: UWB antennas  
Ultrawideband antennas  
BT: Broadband antennas  
Ultra wideband  
technology  
RT: Ultra wideband radar

## Ultra wideband communication

UF: UWB communication  
Ultrawideband  
communication  
BT: Ultra wideband  
technology  
RT: Broadband  
communication  
Military communication  
Multipath channels  
Spread spectrum  
communication

## Ultra wideband radar

UF: UWB radar  
Ultrawideband radar  
BT: Radar  
Ultra wideband  
technology  
RT: Ground penetrating  
radar  
Radar detection  
Radar imaging  
Synthetic aperture  
radar  
Ultra wideband  
antennas

## Ultra wideband technology

UF: UWB technology  
Ultra wide-band  
Ultra wideband  
Ultra-wide-band  
Ultra-wideband  
Ultrawideband  
Ultrawideband  
technology  
BT: Communications  
technology  
NT: Ultra wideband  
antennas  
Ultra wideband  
communication





# 2019 IEEE Thesaurus

Ultra wideband radar	USE: Ultra wideband technology
<b>Ultra-dense networks</b>	<i>Ultracapacitors</i>
UF: UDN	USE: Supercapacitors
BT: Cellular networks	<b>Ultrafast electronics</b>
Mobile communication	BT: High-speed electronics
RT: 5G mobile communication	<b>Ultrafast optics</b>
Microcell networks	BT: Optics
<i>Ultra-high definition television</i>	<i>Ultrasonic applications</i>
USE: UHDTV	USE: Acoustic applications
<i>Ultra-high definition TV</i>	<i>Ultrasonic devices</i>
USE: UHDTV	USE: Acoustic devices
<b>Ultra-high definition video</b>	<b>Ultrasonic imaging</b>
BT: High definition video	UF: Ultrasonic techniques
<i>Ultra-high-frequency circuits</i>	Ultrasound
USE: UHF circuits	BT: Ultrasonics,
<i>Ultra-high-frequency communication</i>	ferroelectrics, and frequency control
USE: UHF communication	RT: Amniocentesis
<i>Ultra-high-frequency devices</i>	Biomedical imaging
USE: UHF devices	NT: Ultrasonography
<i>Ultra-high-frequency integrated circuits</i>	<i>Ultrasonic techniques</i>
USE: UHF integrated circuits	USE: Ultrasonic imaging
<i>Ultra-high-frequency measurements</i>	<b>Ultrasonic transducer arrays</b>
USE: UHF measurements	BT: Transducers
<i>Ultra-high-frequency propagation</i>	<b>Ultrasonic transducers</b>
USE: UHF propagation	BT: Ultrasonics,
<i>Ultra-high-frequency technology</i>	ferroelectrics, and frequency control
USE: UHF technology	RT: Nondestructive testing
<i>Ultra-low power*</i>	Piezoelectricity
USE: Low-power electronics	Sonar
<i>Ultra-violet</i>	<b>Ultrasonic variables measurement</b>
USE: Ultraviolet sources	BT: Measurement
<i>Ultra-wide-band</i>	<i>Ultrasonics</i>
USE: Ultra wideband technology	USE: Acoustics
<i>Ultra-wideband</i>	<b>Ultrasonics, ferroelectrics, and frequency control</b>
	NT: Ferroelectric materials
	Frequency control
	Piezoelectricity
	Pyroelectricity
	Ultrasonic imaging



# 2019 IEEE Thesaurus

	Ultrasonic transducers	RT:	Control systems
			Linear matrix
<b>Ultrasonography</b>		inequalities	
BT:	Biomedical image		Robustness
processing			Uncertainty
	Ultrasonic imaging		
NT:	Sonogram	<b>Uncertainty</b>	
		BT:	Probability
<i>Ultrasound</i>		RT:	Cognitive science
USE:	Ultrasonic imaging		Fuzzy sets
			Nonlinear dynamical
<b>Ultraviolet sources</b>		systems	
UF:	UV sources		Uncertain systems
	Ultra violet	NT:	Forecast uncertainty
	Ultra-violet		
BT:	Light sources	<i>Underarm</i>	
RT:	Lamps	USE:	Axilla
	Lasers		
<i>Ultrawideband</i>		<i>Underground communication cables</i>	
USE:	Ultra wideband	USE:	Communication cables
technology			
<i>Ultrawideband antennas</i>		<i>Underground object detection</i>	
USE:	Ultra wideband	USE:	Buried object
antennas		detection	
<i>Ultrawideband communication</i>		<i>Underground objects</i>	
USE:	Ultra wideband	USE:	Buried object
communication		detection	
<i>Ultrawideband radar</i>		<b>Underground power cables</b>	
USE:	Ultra wideband radar	BT:	Power cables
<i>Ultrawideband technology</i>		<i>Undersea communication</i>	
USE:	Ultra wideband	USE:	Underwater
technology		communication	
<b>Umbilical cable</b>		<b>Underwater acoustics</b>	
UF:	Power supplies to	BT:	Acoustics
apparatus			
BT:	Power supplies	<i>Underwater autonomous vehicles</i>	
		USE:	Autonomous underwater
<i>UML</i>		vehicles	
USE:	Unified modeling	<b>Underwater cables</b>	
language		UF:	Marine cables
			Sub-sea cables
<i>UMTS</i>			Submarine cables
USE:	3G mobile		Subsea cables
communication		BT:	Cables
			Marine technology
<b>Uncertain systems</b>		<b>Underwater communication</b>	
UF:	Parameter uncertainty	UF:	Undersea communication
BT:	Mathematics	BT:	Communication systems



# 2019 IEEE Thesaurus

Marine technology  
Underwater technology

## Underwater drones

```
USE:    Unmanned underwater
vehicles
```

## Underwater equipment

UF:	Diving equipment
	Flotation devices
BT:	Marine technology
	Underwater technology
RT:	Underwater vehicles
NT:	Rebreathing equipment

## Underwater exploration robots

USE: Unmanned underwater vehicles

## Underwater robots

USE: Unmanned underwater vehicles

## Underwater sensor networks

```
USE:      Wireless sensor
networks
```

## Underwater structures

BT: Marine technology  
Underwater technology

## Underwater technology

```
UF: Submarine technology
BT: Marine technology
RT: Underwater vehicles
NT: Underwater
```

```
communication
Underwater equipment
Underwater structures
```

## Underwater tracking

BT: Tracking

## Underwater vehicles

UF:	Aquatic vehicles
	Submarines
	Submersibles
BT:	Marine vehicles
RT:	Marine technology
	Underwater equipment
	Underwater technology

BT:	Magnetic devices
	Synchrotrons
RT:	Free electron lasers
	X-rays

## Unemployment

BT: Human resource management

## Uniaxial strain

BT:      Strain

## Unicast

```
BT:    Computer networks
RT:    Streaming media
```

## Unified messaging

BT:        Electronic mail  
             Electronic messaging

## Unified modeling language

```
UF:      UML
BT:      Specification
```

```
languages
    RT:      Client-server systems
           Common Information
```

Model (electricity)

Uniform Resource Identifier

USE: Uniform resource locators

## Uniform resource locators

UF:       URL  
          Uniform Resource

```
Identifier
    Uniform resource name
    BT:    Web sites
```

Uniform resource name

USE: Uniform resource locators

## Uninterruptible power systems

BT: Power systems  
RT: Batteries  
Emergency power

- supplies
  - Power supplies
  - Protection

United Kingdom Space Agency

UF: UK Space Agency  
BT: Organizations



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# 2019 IEEE Thesaurus

<i>Units (measurement)</i>		vehicles	Autonomous underwater
USE: Measurement units			
<i>Universal mobile telecommunication service</i>		<b>Unmanned underwater vehicles</b>	
USE: 3G mobile communication		UF: Underwater drones	Underwater exploration
		robots	
		BT: Underwater robots	
<b>Universal motors</b>		BT: Unmanned vehicles	
BT: Motors			
<b>Universal Serial Bus</b>		<b>Unmanned vehicles</b>	
UF: USB		UF: Remotely guided	
BT: Communication standards		vehicles	Remotely operated
Information technology		automobiles	Remotely operated cars
			Remotely operated
<i>Universities</i>		vehicles	
USE: Educational institutions		BT: Intelligent vehicles	
		NT: Unmanned aerial	
		vehicles	
			Unmanned underwater
<b>Unmanned aerial vehicles</b>		vehicles	
UF: Aerial robots			
Micro air vehicles		<i>Unsolicited e-mail</i>	
Unmanned air vehicles		USE: Unsolicited electronic	
Unmanned airborne		mail	
vehicles			
BT: Unmanned vehicles		<b>Unsolicited electronic mail</b>	
RT: Mobile robots		UF: Junk e-mail	
NT: Drones		Junk email	
		Spam	
<i>Unmanned air vehicles</i>		Spamming	
USE: Unmanned aerial		Unsolicited e-mail	
vehicles		Unsolicited email	
		BT: Electronic mail	
<i>Unmanned airborne vehicles</i>		RT: Computer crime	
USE: Unmanned aerial		Office automation	
vehicles		Privacy-invasive	
		software	
<i>Unmanned autonomous cars</i>		<i>Unsolicited email</i>	
USE: Unmanned autonomous		USE: Unsolicited electronic	
vehicles		mail	
<i>Unmanned autonomous vehicle</i>		<b>Unsupervised learning</b>	
USE: Autonomous vehicles		BT: Learning systems	
		RT: Formal concept	
<b>Unmanned autonomous vehicles</b>		analysis	Generative adversarial
UF: Unmanned autonomous		networks	
cars			Semisupervised
BT: Autonomous vehicles		learning	
NT: Autonomous aerial			
vehicles			



# 2019 IEEE Thesaurus

## Uplink

BT: Satellite  
communication

## US activities

USE: IEEE United States  
activities

## Upper bound

BT: Boundary conditions

## US Department of Agriculture

BT: US Government

## Uranium

BT: Chemical elements

## US Department of Commerce

BT: US Government

## Urban areas

UF: Cities and towns  
City  
Metropolitan areas  
Urban environments  
BT: Geography  
RT: Public infrastructure  
Public transportation  
NT: Smart cities  
Urban planning

NT: NIST

NTIA

## US Department of Defense

UF: DoD

BT: US Government

## US Department of Energy

UF: DoE

BT: US Government

## Urban environments

USE: Urban areas

## US Department of Transportation

UF: DOT

BT: US Government

## Urban heat islands

USE: Thermal pollution

## US Government

BT: Government

NT: US Department of

## Urban modeling

USE: Urban planning

## Agriculture

US Department of

## Urban planning

UF: City planning  
Urban modeling  
BT: Urban areas  
RT: Public infrastructure  
NT: Urban policy

## Commerce

US Department of

## Defense

US Department of

## Energy

US Department of

## Transportation

US Government agencies

## Urban policy

BT: Urban planning

US local government

## Urban pollution

BT: Pollution

## US Government agencies

BT: US Government

RT: Patents

NT: FAA

FCC

FDA

NASA

## Urinary calculosis

USE: Kidney stones

## URL

USE: Uniform resource

## locators

## US local government

BT: US Government

## Urogenital system

BT: Anatomy

NT: Bladder

Kidney

## Usability

BT: Software design



# 2019 IEEE Thesaurus

## USB

USE: Universal Serial Bus

## User centered design

UF: User-centered design  
User-centred design  
BT: Design methodology

## User computer interfaces

USE: User interfaces

## User friendliness

USE: Human computer interaction

## User generated content

USE: User-generated content

## User interfaces

UF: Man-machine interfaces  
User computer interfaces  
User-computer interfaces  
BT: Systems, man, and cybernetics  
RT: Adaptive learning  
Ambient intelligence  
Browsers  
Computer interfaces  
Computer peripherals  
Displays  
Gaze tracking  
Web design  
NT: Audio user interfaces  
Brain-computer interfaces  
Data visualization  
Emotion recognition  
Exoskeletons  
Graphical user interfaces  
Human computer interaction  
Human-robot interaction  
Human-vehicle systems  
Smart cards

## User-centered design

USE: User centered design

## User-centred design

USE: User centered design

## User-computer interfaces

USE: User interfaces

## User-created content

USE: User-generated content

## User-generated content

UF: Consumer-generated media  
User generated content  
User-created content  
BT: Data acquisition

## Utility programs

BT: System software

## Utility theory

BT: Mathematics  
RT: Supply and demand

## UV sources

USE: Ultraviolet sources

## UWB antennas

USE: Ultra wideband antennas

## UWB communication

USE: Ultra wideband communication

## UWB radar

USE: Ultra wideband radar

## UWB technology

USE: Ultra wideband technology

## V2G

USE: Vehicle-to-grid

## V2I

USE: Vehicle-to-infrastructure

## V2V

USE: Vehicular ad hoc networks

## V2X

USE: Vehicle-to-everything

## Vaccines



# 2019 IEEE Thesaurus

BT:	Medical services		Hydraulic equipment
			Machine components
<b>Vacuum arc remelting</b>		RT:	Fluid flow control
BT:	Melt processing		Manifolds
		NT:	Microvalves
<b>Vacuum arcs</b>			
BT:	Vacuum breakdown	<b>Vanadium</b>	
RT:	Electron emission	BT:	Chemical elements
	Thermionic emission		
	Vacuum systems	<i>Vanes</i>	
		USE:	Blades
<b>Vacuum breakdown</b>		<i>VANET</i>	
BT:	Dielectric breakdown	USE:	Vehicular ad hoc
RT:	Electron emission	networks	
	Vacuum systems		
NT:	Vacuum arcs	<i>Vapour deposition</i>	
<b>Vacuum electronics</b>		USE:	Chemical vapor
BT:	Vacuum technology	deposition	
<i>Vacuum energy</i>		<i>VAR</i>	
USE:	Elementary particle	USE:	Reactive power
<i>vacuum</i>			
<b>Vacuum systems</b>		<b>Varactors</b>	
BT:	Vacuum technology	BT:	Capacitors
RT:	Bellows		Semiconductor diodes
	Casimir effect	<i>Variable frequency drives</i>	
	Leak detection	USE:	Variable speed drives
	Vacuum arcs		
	Vacuum breakdown	<i>Variable optical attenuators</i>	
NT:	Gettering	USE:	Optical attenuators
<b>Vacuum technology</b>		<i>Variable selection</i>	
BT:	Electron devices	USE:	Input variables
RT:	Field emitter arrays		
	Gettering	<b>Variable speed drives</b>	
	Space charge	UF:	Variable frequency
NT:	Photomultipliers	drives	
	Vacuum electronics	BT:	Drives
	Vacuum systems	RT:	Magnetic gears
			Motor drives
<i>Vacuum tubes</i>		NT:	Pitch control (audio)
USE:	Electron tubes		
<i>VAD</i>		<b>Variable structure systems</b>	
USE:	Voice activity	BT:	Adaptive systems
detection			
<i>Valuation</i>		<b>Varistors</b>	
USE:	Cost accounting	BT:	Resistors
		RT:	Arresters
			Semiconductor devices
<b>Valves</b>		<i>Vascular system</i>	
BT:	Fluid flow	USE:	Circulatory system



# 2019 IEEE Thesaurus

VCO		Forestry	
		Geophysical	
USE:	Voltage-controlled	measurement techniques	
oscillators		Remote sensing	
		Terrain mapping	
VCR		Vegetation	
USE:	Video recording		
VCSEL		Vehicle crash testing	
USE:	Vertical cavity	BT:	Automotive engineering
surface emitting lasers			Product safety
		engineering	
		RT:	Vehicles
Vector optimization		Vehicle detection	
USE:	Pareto optimization	BT:	Automotive engineering
Vector processors		Vehicle driving	
BT:	Microprocessors	BT:	Automotive engineering
Vector quantisation		Vehicle dynamics	
USE:	Vector quantization	BT:	Automotive engineering
Vector quantization		RT:	Hardware-in-the loop
UF:	Vector quantisation	simulation	
BT:	Quantization (signal)		Vehicles
RT:	Codes	NT:	Rollover
	Encoding		
	Image coding	Vehicle routing	
	MPEG 4 Standard	BT:	Traffic control
	Speech coding	RT:	Intelligent vehicles
	Transform coding		Path planning
	Video coding		
Vectors		Vehicle safety	
BT:	Linear algebra	BT:	Automotive engineering
RT:	Eigenvalues and		Safety
eigenfunctions		RT:	Vehicle-to-everything
	Signal processing	NT:	Advanced driver
		assistance systems	
			Lane departure warning
Vegetable oils		systems	
BT:	Oils	Vehicle to vehicle communication	
RT:	Food products	USE:	Vehicular ad hoc
Vegetation		networks	
UF:	Trees (botanical)	Vehicle-to-everything	
BT:	Biology	UF:	V2X
RT:	Forestry	BT:	Communication systems
	Vegetation mapping		Intelligent vehicles
NT:	Crops	RT:	Advanced driver
	Marine vegetation	assistance systems	
Vegetation mapping			On board unit
BT:	Geoscience and remote		Road safety
sensing			Vehicle safety
RT:	Agriculture		





# 2019 IEEE Thesaurus

networks	Vehicular ad hoc	Mobile communication
NT: infrastructure	Vehicle-to-	Vehicle-to-everything
		Vehicles
		Vehicular automation
		NT: Road side unit
<b>Vehicle-to-grid</b>		
UF:	V2G	<b>Vehicular and wireless technologies</b>
BT:	Electric vehicles	UF: Vehicular technologies
	Smart grids	NT: Automotive engineering
RT:	Battery powered	Land mobile radio
vehicles		equipment
	Demand-side management	Navigation
	Distributed power	Propulsion
generation		Vehicles
	Fuel cell vehicles	Wireless sensor
	Hybrid electric	networks
vehicles		<b>Vehicular automation</b>
	Load management	BT: Automation
	Propulsion	RT: Autonomous vehicles
	Solar powered vehicles	Intelligent vehicles
<b>Vehicle-to-infrastructure</b>		Mechatronics
UF: V2I		Mobile robots
BT: Vehicle-to-everything		Multi-agent systems
		Vehicular ad hoc
<i>Vehicle-to-vehicle</i>		networks
USE: Vehicular ad hoc		<i>Vehicular technologies</i>
networks		USE: Vehicular and wireless
<b>Vehicles</b>		technologies
BT: Transportation		<b>Veins</b>
	Vehicular and wireless	BT: Blood vessels
technologies		
RT: Mobile robots		<b>Velocity control</b>
	Tires	UF: Rotational measurement
	Vehicle crash testing	Rotational speed
	Vehicle dynamics	Speed control
	Vehicular ad hoc	BT: Mechanical variables
networks		control
NT: Connected vehicles		RT: Aerospace control
	Intelligent vehicles	Angular velocity
	Land vehicles	Cruise control
	Military vehicles	Motion control
	Space vehicles	Motor drives
<b>Vehicular ad hoc networks</b>		Servosystems
UF: V2V		NT: Angular velocity
	VANET	control
	Vehicle to vehicle	
communication		<b>Velocity measurement</b>
	Vehicle-to-vehicle	UF: Speed measurement
BT: Ad hoc networks		BT: Mechanical variables
RT: Dedicated short range		measurement
communication		RT: Angular velocity



# 2019 IEEE Thesaurus

	Doppler measurement	RT:	Distributed Bragg reflectors
	Flowmeters		P-i-n diodes
	Motion measurement		<i>Vertical cavity surface-emitting lasers</i>
	Slow light	USE:	Vertical cavity surface emitting lasers
	Tracking		<i>Vertical recording</i>
<b>Ventilation</b>		USE:	Perpendicular magnetic recording
BT:	Cooling		<i>Vertical-cavity surface-emitting lasers</i>
RT:	Air conditioning	USE:	Vertical cavity surface emitting lasers
	HVAC		
	Temperature control		
	Vents		
NT:	Fans		
<b>Ventricle system</b>			
BT:	Brain		
<b>Vents</b>		<b>Very high speed integrated circuits</b>	
BT:	Mechanical products	UF:	VHSIC
RT:	Air conditioning	BT:	Integrated circuits
	Buildings		
	Ducts	<b>Very large scale integration</b>	
	Space heating	UF:	VLSI
	Ventilation		Very-large-scale-
	Windows	integration	
<b>Venture capital</b>		BT:	Circuits
BT:	Economics		Integrated circuits
	Financial management		Large scale
RT:	Business continuity	integration	
	Enterprise resource	RT:	Damascene integration
planning			Nanotechnology
	Research and	NT:	Parameter extraction
development management	Risk analysis		Neuromorphics
			Wafer scale
<b>Venus</b>		integration	
BT:	Planets	<i>Very Long instruction word</i>	
<i>Vermin control</i>		USE:	VLIW
USE:	Pest control		<i>Very-high-frequency circuits</i>
<i>Veroboard</i>		USE:	VHF circuits
USE:	Stripboard circuit		<i>Very-high-frequency devices</i>
<b>Vertical cavity surface emitting lasers</b>		USE:	VHF devices
UF:	VCSEL		<i>Very-large-scale-integration</i>
	Vertical cavity	USE:	Very large scale
surface-emitting lasers		integration	
	Vertical-cavity		<i>Very-Long-instruction-word</i>
surface-emitting lasers		USE:	VLIW
BT:	Surface emitting		<b>VHF circuits</b>
lasers		UF:	Very-high-frequency
		circuits	



# 2019 IEEE Thesaurus

BT:	Circuits		
RT:	Analog circuits	<b>Vibrometers</b>	
	Helical antennas	BT:	Meters
	VHF devices	RT:	Vibration measurement
<b>VHF devices</b>		<i>Video annotation</i>	
UF:	Very-high-frequency	USE:	Image annotation
devices		<b>Video codecs</b>	
BT:	Communications	BT:	Codecs
technology			Communication
RT:	VHF circuits	equipment	
<i>VHSIC</i>			Video equipment
USE:	Very high speed	RT:	Decoding
integrated circuits			Image coding
<i>Vibrating bodies</i>			MPEG 4 Standard
USE:	Vibrations		MPEG standards
			Video coding
<b>Vibration control</b>		<b>Video coding</b>	
BT:	Mechanical variables	UF:	Advanced video coding
control			Videocoding
RT:	Damping	BT:	Video signal
	Isolation technology	processing	
	Shock absorbers	RT:	Image coding
	Vibration measurement		MPEG 4 Standard
	Vibrations		MPEG standards
			Rate distortion theory
<b>Vibration measurement</b>			Streaming media
BT:	Mechanical variables		Transcoding
measurement			Vector quantization
RT:	Modal analysis		Video codecs
	Vibration control	NT:	DVD
	Vibrations		High efficiency video
	Vibrometers	coding	
<i>Vibrational signal processing</i>		<b>Video compression</b>	
USE:	Signal processing	BT:	Video signal
<b>Vibrations</b>		processing	
UF:	Mechanical vibrations	RT:	Data compression
	Tuning forks	<b>Video equipment</b>	
	Vibrating bodies	UF:	Camcorders
BT:	Mechanical factors	BT:	Communication
RT:	Acoustic noise	equipment	
	Acoustics	RT:	Consumer electronics
	Damping		TV equipment
	Dynamics		Video recording
	Elastodynamics	NT:	Optical projectors
	Nanogenerators		Video codecs
	Oscillators		Videos
	Resonance	<i>Video games</i>	
	Vibration control	USE:	Games
	Vibration measurement		



# 2019 IEEE Thesaurus

<b>Video on demand</b>	NT: Motion artifacts
BT: Streaming media	Video coding
RT: Broadband	Video compression
communication	<i>Video streaming</i>
broadcasting	USE: Streaming media
<b>Video recording</b>	<b>Video surveillance</b>
UF: VCR	BT: Surveillance
VTR	
BT: Recording	<b>Video tracking</b>
RT: DVD	BT: Image motion analysis
Image storage	Tracking
Video equipment	<i>video-game</i>
NT: High definition video	USE: Games
Videos	<i>Videocoding</i>
Webcams	USE: Video coding
<b>Video reviews</b>	<b>Videoconferences</b>
BT: IEEE indexing	BT: Collaborative tools
<i>Video sequence</i>	<i>Videoconferencing</i>
USE: Video sequences	USE: Teleconferencing
<b>Video sequences</b>	<b>Videophone systems</b>
UF: Video sequence	UF: Picture phones
BT: Computer graphics	Picturephones
RT: Image databases	BT: Communication systems
Image processing	RT: Image communication
Multimedia computing	Telephony
<b>Video sharing</b>	Visual communication
BT: Information retrieval	
RT: Internet	<b>Videos</b>
NT: Facebook	UF: Multimedia products
MySpace	BT: Video equipment
YouTube	Video recording
<b>Video signal processing</b>	<b>Videotex</b>
BT: Multidimensional	UF: Viewdata
signal processing	BT: Communication systems
RT: Authentication	Information services
Firewire	RT: Data communication
Gaze tracking	Teletext
IEEE 1394 Standard	<i>Viewdata</i>
Image annotation	USE: Videotex
Image recognition	<b>Virtual artifact</b>
MPEG 4 Standard	BT: Artificial
MPEG standards	intelligence
Object tracking	Brain
Streaming media	Digital systems
Time-frequency	
analysis	



# 2019 IEEE Thesaurus

Virtual reality		Virtual manufacturing	
Virtual colonoscopy	BT:	Colonoscopy	UF: Digital factories Virtual factories
			BT: Computer applications
Virtual currency	USE:	Online banking	RT: CADCAM Computer integrated
Virtual enterprises			manufacturing Concurrent engineering Research and
	BT:	Computer applications Data processing Economics Operations research	development Virtual enterprises Virtual prototyping Virtual reality
development	RT:	Electronic commerce Internet Research and	NT: Virtual machining
			Virtual office USE: Teleworking
Virtual environments		Virtual manufacturing Virtual reality	Virtual private networks
	BT:	Virtual reality	UF: VPN
base	RT:	Internet of Things Management information	BT: Computer networks Data security Internet Local area networks Wide area networks
	NT:	Virtualization	NT: Extranets
Virtual factories	USE:	Virtual manufacturing	Virtual prototyping
Virtual groups	UF:	Virtual teams	BT: Design methodology RT: Product development Prototypes Rapid prototyping Research and
	BT:	Collaboration	development Virtual machining Virtual manufacturing Virtual reality
Virtual machine monitors	UF:	Hypervisors VMMs	Virtual reality
information processing	BT:	Computers and	
virtualization	RT:	Platform	
Virtual machines	USE:	Virtual machining	
Virtual machining	UF:	Virtual machines	
	BT:	Machining Virtual manufacturing	
networking	RT:	Software defined	
		Virtual prototyping Virtual reality	



# 2019 IEEE Thesaurus

	Virtual environments	<b>Vision defects</b>	
	X reality	UF:	Amblyopia
			Color blindness
<i>Virtual teams</i>			Myopia
USE:	Virtual groups	BT:	Visual systems
<b>Virtualization</b>		<b>Vision sensors</b>	
BT:	Virtual environments	BT:	Sensors
RT:	Software defined	RT:	Image processing
networking		<i>Vision systems (nonbiological)</i>	
	Virtual reality	USE:	Machine vision
<i>Viruses (computer)</i>		<i>Visual</i>	
USE:	Computer viruses	USE:	Visualization
<b>Viruses (medical)</b>		<b>Visual analytics</b>	
BT:	Organisms	BT:	Visualization
NT:	Influenza	RT:	Information
<i>Viruses (microorganisms)</i>		representation	
USE:	Microorganisms	<b>Visual BASIC</b>	
<i>Visa gold</i>		BT:	Computer languages
USE:	Credit cards	RT:	Software engineering
<b>Viscera</b>			Software tools
BT:	Body regions		System software
<b>Viscosity</b>		<b>Visual communication</b>	
BT:	Fluids	BT:	Communication systems
	Measurement	RT:	Image communication
	Resistance		Image resolution
RT:	Navier-Stokes		TV
equations			Videophone systems
	Rheology	<b>Visual databases</b>	
<b>Visible light communication</b>		UF:	Moving object
BT:	Data communication	databases	
	Optical fiber	BT:	Databases
communication		<b>Visual effects</b>	
RT:	Light emitting diodes	BT:	Image generation
	Light fidelity	RT:	Animation
	Lighting		Computer graphics
<i>Vision</i>		<b>Visual odometry</b>	
USE:	IEEE mission and	BT:	Computer vision
vision			Robots
<i>Vision (biological)</i>		<b>Visual perception</b>	
USE:	Visual systems	BT:	Visual systems
<i>Vision Based Robot Control</i>		<i>Visual prostheses</i>	
USE:	Visual servoing	USE:	Visual prosthesis



# 2019 IEEE Thesaurus

## Visual prosthesis

UF: Electronic visual  
prosthesis  
BT: Prosthetics  
RT: Blindness

## Visual servoing

UF: Vision Based Robot  
Control  
BT: Motion control  
Robot vision systems

## Visual systems

UF: Vision (biological)  
BT: Sense organs  
RT: Head  
Machine vision  
Saliency detection  
NT: Vision defects  
Visual perception

## Visualisation

USE: Visualization

## Visualization

UF: Visual  
Visualisation  
BT: Computer graphics  
Graphics  
RT: Animation  
Design tools  
Educational technology  
Image forensics  
NT: Curve fitting  
Surface reconstruction  
Visual analytics

## Viterbi algorithm

BT: Algorithms  
RT: Dynamic programming  
Information theory  
Mathematics  
Multiaccess

## communication

Probability  
Speaker recognition  
Stochastic processes  
Turbo codes

## Vitrification

BT: Chemical technology  
RT: Radioactive waste

## disposal

## Vivaldi antennas

UF: Vivaldi-antennas  
BT: Broadband antennas

## Vivaldi-antennas

USE: Vivaldi antennas

## VLIW

UF: Very long instruction  
word  
Very-long-instruction-  
word  
BT: Central Processing  
Unit

## VLSI

USE: Very large scale  
integration

## VMMs

USE: Virtual machine  
monitors

## Vocabulary

BT: Information retrieval  
RT: Ranking (statistics)

## Vocational training

UF: NVQ  
National vocational  
qualification  
BT: Training  
RT: Industrial training  
Multiskilling

## Vocoders

BT: Communication  
equipment  
Telephone equipment  
RT: Speech codecs  
Speech coding

## Voice activity detection

UF: Speech activity  
detection  
Speech detection  
VAD  
BT: Speech processing  
RT: Speech coding  
Speech recognition  
Speech synthesis

## Voice mail



# 2019 IEEE Thesaurus

BT: Message systems	RT: Automatic voltage
RT: Electronic mail	control
Office automation	Capacitance-voltage
<i>Voice over Internet protocol</i>	characteristics
USE: Internet telephony	detector
<i>Voice over IP</i>	Phase frequency
USE: Internet telephony	Voltage control
<i>Voice print</i>	Voltage measurement
USE: Spectrogram	NT: Breakdown voltage
<i>Voice response systems</i>	Dynamic voltage
USE: Speech synthesis	scaling
<i>Voice tract</i>	Threshold voltage
USE: Larynx	Voltage fluctuations
<i>Voice-over-Internet protocol</i>	<i>Voltage breakdown</i>
USE: Internet telephony	USE: Dielectric breakdown
<i>Voicegram</i>	<b>Voltage control</b>
USE: Spectrogram	UF: Voltage mode control
<i>Voiceprint</i>	Voltage regulation
USE: Spectrogram	Voltage-mode control
<i>VOIP</i>	BT: Electric variables
USE: Internet telephony	control
<b>Volatile organic compounds</b>	RT: Electric current
BT: Organic compounds	control
<b>Volcanic activity</b>	Limiting
BT: Volcanoes	Motor drives
<b>Volcanic ash</b>	On load tap changers
BT: Volcanoes	Phase frequency
RT: Ash	Power factor
<i>Volcano</i>	Reactive power control
USE: Volcanoes	Regulators
<b>Volcanoes</b>	Three-phase electric
UF: Volcano	Voltage
BT: Geoscience	Voltage multipliers
NT: Planetary volcanoes	NT: Automatic voltage
Volcanic activity	control
Volcanic ash	<i>Voltage controlled oscillators</i>
<b>Voltage</b>	USE: Voltage-controlled
BT: Electric variables	oscillators
	<b>Voltage fluctuations</b>
	BT: Voltage
	RT: Power systems
	<b>Voltage measurement</b>
	BT: Electric variables
	measurement
	RT: Automatic voltage
	control





# 2019 IEEE Thesaurus

	Potentiometers		Pulse width modulation
	Voltage	converters	
	Voltage transformers		
	Voltmeters	<i>Voltage-source convertors</i>	
NT:	Low voltage	USE:	Voltage-source
	Medium voltage	converters	
<i>Voltage mode control</i>		<b>Voltmeters</b>	
USE:	Voltage control	BT:	Meters
		RT:	Voltage measurement
<b>Voltage multipliers</b>		<i>Volume estimation</i>	
BT:	Circuits	USE:	Volume measurement
RT:	AC-DC power converters		
	Charge pumps	<b>Volume measurement</b>	
	Particle accelerators	UF:	Volume estimation
	Rectifiers	BT:	Mechanical variables
	Transformers	measurement	
	Voltage control	RT:	Size measurement
NT:	Capacitors		
	Diodes	<b>Volume relaxation</b>	
<i>Voltage regulation</i>		BT:	Mechanical factors
USE:	Voltage control		
<i>Voltage sags</i>		<i>Volunteer computing</i>	
USE:	Power quality	USE:	Computer applications
		AND	
			Distributed processing
<b>Voltage transformers</b>		<i>Vortices, optical</i>	
UF:	Potential transformers	USE:	Optical vortices
BT:	Instrument		
transformers		<b>Voting</b>	
RT:	Voltage measurement	BT:	Government
		NT:	Electronic voting
<b>Voltage-controlled oscillators</b>			
UF:	VCO	<i>VPN</i>	
	Voltage controlled	USE:	Virtual private
oscillators		networks	
BT:	Oscillators		
<i>Voltage-mode control</i>		<i>VPU</i>	
USE:	Voltage control	USE:	Graphics processing
		units	
<b>Voltage-source converters</b>		<i>VSC</i>	
UF:	Modular multi-level	USE:	Voltage-source
converters		converters	
	VSC		
	Voltage-source	<i>VTR</i>	
convertors		USE:	Video recording
BT:	Converters		
	Power conversion	<b>W3C</b>	
RT:	AC-DC power converters	UF:	World Wide Web
	HVDC transmission	Consortium	
	Power electronics		



# 2019 IEEE Thesaurus

BT: Standards organizations	USE: Alarm systems
<b>W3C Standards</b>	<b>Warranties</b>
BT: Standards publications	UF: Product warranties
	Product warranty
<b>Wafer bonding</b>	BT: Product liability
BT: Bonding processes	<b>Washing machines</b>
Semiconductor device	BT: Electric machines
manufacture	Electrical products
	Home appliances
<i>Wafer Level packaging</i>	Home automation
USE: Wafer scale	
integration	<i>Waste compaction</i>
	USE: Waste reduction
<b>Wafer scale integration</b>	
UF: Wafer level packaging	<b>Waste disposal</b>
Wafer-level packaging	BT: Waste management
BT: Circuits	RT: Effluents
Integrated circuits	Pollution
Large scale	Radioactive waste
integration	Sanitary engineering
	Slag
Very large scale	NT: Incineration
integration	Radioactive waste
<i>Wafer-Level packaging</i>	disposal
USE: Wafer scale	<i>Waste electrical and electronic equipment</i>
integration	USE: Electronic waste
<i>Walking</i>	
USE: Legged locomotion	<b>Waste handling</b>
	BT: Waste management
<i>WAMS</i>	RT: Radioactive waste
USE: Wide area measurements	disposal
	Waste reduction
<i>WAN</i>	NT: Sewage treatment
USE: Wide area networks	Sludge treatment
	Waste handling
<i>WANs</i>	equipment
USE: Wide area networks	Wastewater treatment
<i>WAP</i>	<b>Waste handling equipment</b>
USE: Wireless access points	BT: Waste handling
	RT: Materials handling
<b>AND</b>	equipment
Wireless application	Remote handling
protocol	equipment
<b>Warehousing</b>	<b>Waste heat</b>
BT: Material storage	BT: Energy conversion
RT: Production facilities	RT: Boilers
Stacking	Cogeneration
Storage automation	Energy conservation
<i>Warning systems</i>	



# 2019 IEEE Thesaurus

	Industrial waste		Sanitary engineering
	Thermal pollution		Sludge treatment
<i>Waste incineration</i>			Wastewater treatment
USE:	Incineration		Water
			Water pollution
			Water pumps
<b>Waste management</b>		<b>Wastewater treatment</b>	
BT:	Environmental	UF:	Dissolved air
management		flotation	
RT:	Biodegradation	BT:	Waste handling
	Effluents	RT:	Rubber products
	Production management		Sanitary engineering
	Radioactive waste		Sludge treatment
	Sanitary engineering		Waste management
	Slag		Wastewater
	Waste materials		Water conservation
	Wastewater treatment		Water pollution
NT:	Waste disposal	NT:	Ozonation
	Waste handling		
	Waste recovery	<b>Watches</b>	
	Waste reduction	BT:	Clocks
		RT:	Consumer products
<b>Waste materials</b>			Time measurement
UF:	Refuse		
BT:	Materials	<b>Water</b>	
RT:	Fuels	UF:	H2O
	Radioactive pollution	BT:	Liquids
	Sanitary engineering	RT:	Hydrodynamics
	Waste management		Hydrologic
	Waste recovery	measurements	
	Water pollution		Hydrology
NT:	Effluents		Lakes
	Electronic waste		Oceans
	Industrial waste		Reservoirs
	Radioactive waste		Rivers
	Slurries		Steam engines
	Wastewater		Wastewater
<b>Waste recovery</b>			Water heating
BT:	Waste management		Water pollution
RT:	Waste materials		Water resources
	Waste reduction		Water splitting
			Water storage
<b>Waste reduction</b>			Wetlands
UF:	Waste compaction	<b>Water conservation</b>	
BT:	Waste management	UF:	Water recycling
RT:	Design for disassembly	BT:	Environmental
	Waste handling	management	
	Waste recovery	RT:	Wastewater treatment
NT:	Compaction		Water resources
			Water storage
<b>Wastewater</b>		NT:	Desalination
BT:	Waste materials		
RT:	Industrial waste		



# 2019 IEEE Thesaurus

## Water heating

BT: Heating systems  
RT: Water

RT: Chemical reactors  
Hydrogen  
Photochemistry  
Water

## Water jet cutting

UF: Abrasive water jet  
cutting  
BT: Cutting tools

## Water storage

BT: Material storage  
RT: Crops  
Dams  
Lakes  
Land use planning  
Water  
Water conservation  
Reservoirs

## Water pollution

BT: Oceanic engineering  
and marine technology  
Pollution  
RT: Effluents  
Industrial pollution  
Lakes  
Oils  
Rivers  
Sanitary engineering  
Sewage treatment  
Thermal pollution  
Waste materials  
Wastewater  
Wastewater treatment  
Water  
Water resources  
NT: Marine pollution

## Water trees

USE: Trees - insulation

## Watermark

USE: Watermarking

## Watermarking

UF: Audio watermarking  
Digital watermarking  
Image watermarking  
Watermark  
BT: Security  
RT: Embossing  
Internet of Things

## Water pumps

BT: Pumps  
RT: Automotive components  
Cooling  
Hydraulic equipment  
Irrigation  
Photovoltaic systems  
Wastewater

## Watt hour meters

USE: Watthour meters

## Watt-hour meters

USE: Watthour meters

## Watthour meters

UF: Watt hour meters  
Watt-hour meters  
BT: Meters  
RT: Energy measurement

## Water recycling

USE: Water conservation

## Water resources

BT: Environmental  
management  
RT: Lakes  
Remote sensing  
Rivers  
Water  
Water conservation  
Water pollution  
NT: Desalination  
Reservoirs

## Wattmeters

BT: Meters  
RT: Power measurement

## WAVE

USE: Wireless Access in  
Vehicular Environments

## Wave diffraction

USE: Diffraction

## Water splitting

BT: Chemical processes

## Wave equations



# 2019 IEEE Thesaurus

USE: Propagation

## Wave functions

BT: Waves  
RT: Conformal mapping  
Elementary particle

exchange interactions

Functional analysis  
NT: Wavelet analysis  
Wavelet domain

## Wave power

BT: Energy resources  
Ocean waves  
RT: Renewable energy

sources

## Wave propagation

USE: Propagation

## Wave scattering

USE: Scattering

## Waveform analysis

USE: Signal analysis

## Waveform generators

USE: Signal generators

## Waveguide components

BT: Electromagnetic  
waveguides  
RT: Circulators  
Conformal mapping  
Helical antennas  
Waveguide theory  
NT: Optical waveguides  
Power combiners  
Power dividers

## Waveguide discontinuities

UF: Irises  
Waveguide obstacles  
BT: Transmission line  
discontinuities  
RT: Electromagnetic  
waveguides  
Loaded waveguides  
Waveguide theory  
NT: Reflection coefficient  
Waveguide transitions

## Waveguide junctions

BT: Junctions

## Waveguide lasers

BT: Electromagnetic  
waveguides  
RT: Lasers  
NT: Substrate integrated  
waveguides

## Waveguide obstacles

USE: Waveguide  
discontinuities

## Waveguide theory

UF: Guided electromagnetic  
wave propagation  
BT: Electromagnetic  
waveguides  
RT: Antennas  
Conformal mapping  
Mathematics  
Mode matching methods  
Waveguide components  
Waveguide  
discontinuities  
Waveguide transitions

## Waveguide transitions

BT: Waveguide  
discontinuities  
RT: Waveguide theory

## Wavelength assignment

BT: Optical fiber networks

## Wavelength conversion

BT: Optical fibers  
RT: Wavelength converters

## Wavelength converters

UF: Wavelength convertors  
BT: Converters  
RT: Wavelength conversion

## Wavelength convertors

USE: Wavelength converters

## Wavelength division multiplexed

USE: Wavelength division  
multiplexing

## Wavelength division multiplexing

UF: WDM  
Wavelength division  
multiplexed



# 2019 IEEE Thesaurus

multiplexing	Wavelength-division		transforms	Discrete wavelet	
	BT:	Multiplexing		Wavelet coefficients	
	RT:	Bragg gratings		Wavelet packets	
		Multicast			
communication			<b>Waves</b>		
	NT:	WDM networks		BT:	Physics
				RT:	Acoustic propagation
					Acoustic scattering
					Electromagnetic
<b>Wavelength measurement</b>			propagation		Electromagnetic
	BT:	Measurement			
	RT:	Acoustic measurements			
		Electromagnetic			
measurements			radiation		Electromagnetic
		Frequency measurement			
		Hyperspectral sensors			
		Optical variables			
measurement			scattering		Time-domain analysis
				NT:	Atmospheric waves
					Berry phase
					Doppler effect
					Electrodynamics
					Magnetostatic waves
					Matter waves
					Plasma waves
					Propagation
					Reflectivity
					Seismic waves
					Shock waves
					Solitons
					Surface acoustic waves
					Wave functions
<b>Wavelength routing</b>					
	BT:	Routing			
<i>Wavelength-division multiplexing</i>					
	USE:	Wavelength division			
multiplexing					
<b>Wavelet analysis</b>					
	BT:	Wave functions			
	RT:	Wavelet transforms			
	NT:	Multiresolution			
analysis					
<b>Wavelet coefficients</b>			<i>WDM</i>		
	BT:	Wavelet transforms		USE:	Wavelength division
<b>Wavelet domain</b>			multiplexing		
	BT:	Wave functions			
<i>Wavelet neural networks</i>			<b>WDM networks</b>		
	USE:	Neural networks		BT:	Wavelength division
<b>Wavelet packets</b>			<b>Weapons</b>		
	BT:	Wavelet transforms		UF:	Bomb
					Munitions
					Ordinance
				BT:	Military equipment
				RT:	Defense industry
					Electronic
<b>Wavelet transforms</b>			countermeasures		
	BT:	Transforms			
	RT:	Harmonic analysis			
		Signal analysis			
		Signal processing			
		Signal representation			
		Wavelet analysis		NT:	Terrorism
	NT:	Biorthogonal			Guns
					Missiles
					Nuclear weapons
					Projectiles
modulation					
		Continuous wavelet			
transforms			<b>Wearable computers</b>		



# 2019 IEEE Thesaurus

UF: Wearable Health Monitoring System	Textile industry Textiles
Wearable computing	
Wearable electronics	<b>Web 2.0</b>
BT: Computers	BT: Internet
Pervasive computing	
RT: Smart textiles	<b>Web and internet services</b>
Soft electronics	UF: Internet services
NT: Smart glasses	BT: Web services
<i>Wearable computing</i>	<i>Web browsers</i>
USE: Wearable computers	USE: Browsers
<i>Wearable electronics</i>	<i>Web cams</i>
USE: Wearable computers	USE: Webcams
<i>Wearable Health Monitoring System</i>	<b>Web design</b>
USE: Wearable computers	UF: Web site design
<b>Wearable robots</b>	BT: Web sites
UF: Hardsuit	RT: Authoring systems
Powered armor	Content management
Powered exoskeleton	Software design
BT: Robots	User interfaces
RT: Assistive technology	NT: Web page design
Biomechanics	Web pages
Human-robot	
interaction	<i>Web filters</i>
Medical robotics	USE: Information filters
Military equipment	<b>Web mining</b>
Mobile robots	BT: Data mining
Orthotics	
Prosthetics	<i>Web ontology Language</i>
Service robots	USE: OWL
<b>Wearable sensors</b>	<b>Web page design</b>
BT: Sensors	BT: Web design
<i>Weather</i>	<b>Web pages</b>
USE: Meteorology	BT: Web design
<b>Weather forecasting</b>	<i>Web real-time communications</i>
UF: Weather prediction	USE: WebRTC
BT: Meteorology	
NT: Wind forecasting	<i>Web robot</i>
<i>Weather prediction</i>	USE: Bot (Internet)
USE: Weather forecasting	<b>Web search</b>
<b>Weaving</b>	BT: Search methods
BT: Textile technology	NT: Crawlers
RT: Cotton	<b>Web servers</b>
Fabrics	BT: Servers
Textile fibers	Web services



# 2019 IEEE Thesaurus

Web services		Web services		
communication	BT:	Internet	Webcams	
		Middleware		
	RT:	Asynchronous		
		Cloud computing		
		Service computing		
architecture		Webcams	Webinars	
	NT:	Mashups		
		Message service		
		Service-oriented		
		Simple object access		
protocol		WS-BPEL	WebRTC	
		Web TV		
		Web and internet		
services		Web servers	communications	
		WebRTC		
Web services business process execution lanuage		Weibull distribution		
	USE:	WS-BPEL	BT:	Statistical
Web site design			RT:	Failure analysis
	USE:	Web design		Probability
				Reliability
Web sites		engineering		
	BT:	Computer applications		Statistics
		Information retrieval	Weibull fading channels	
	RT:	Computer networks	BT:	Fading channels
		Content management	Weight control	
		Extranets	BT:	Mechanical variables
		Internet	control	
		Portals	Weight measurement	
		Social network	BT:	Mechanical variables
services		Wikipedia	measurement	
	NT:	Facebook	Welding	
		MySpace	BT:	Fabrication
		Uniform resource		Joining processes
locators		Web design	RT:	Bonding processes
		YouTube		Brazing
Web television				Fasteners
	USE:	Web TV		Manufacturing
Web TV			NT:	Materials processing
	UF:	Web television		Spot welding
	BT:	Broadcasting	Well logging	
		TV	BT:	Geophysics





# 2019 IEEE Thesaurus

	Petroleum industry		
RT:	Oil drilling	<b>White noise</b>	
	Seismology	BT:	Noise
<b>Wet etching</b>		RT:	AWGN channels
BT:	Etching		Music
			Random number
<b>Wetlands</b>		generation	
BT:	Ecosystems	NT:	AWGN
	Geoscience	<b>White spaces</b>	
RT:	Hydrology	BT:	Radio spectrum
	Lakes	management	
	Rivers	<b>Whitelists</b>	
	Water	BT:	Information filters
<b>Whales</b>		RT:	Access control
BT:	Marine animals		Blacklisting
			Countermeasures
<b>Wheelchairs</b>		(computer)	
BT:	Assistive technology		Electronic mail
<b>Wheels</b>		<b>Whole body imaging</b>	
BT:	Mechanical products	BT:	Biomedical image
RT:	Automobile manufacture	processing	
	Automotive components	<b>Whole-body PET</b>	
	Automotive engineering	BT:	Positron emission
	Axles	tomography	
	Flanges	<b>wi-fi</b>	
	Machine components	USE:	Wireless fidelity
	Manufacturing		
	Production	<b>Wi-Max</b>	
	Steering systems	USE:	WiMAX
	Structural plates		
	Tires		
<b>Whispering gallery modes</b>		<b>Wide area measurement systems</b>	
UF:	Whispering-gallery	USE:	Wide area measurements
modes		<b>Wide area measurements</b>	
BT:	Optics	UF:	WAMS
RT:	Microcavities		Wide area measurement
<b>Whispering-gallery modes</b>		systems	
USE:	Whispering gallery		Wide-area measurement
modes		systems	
<b>White blood cells</b>			Wide-area measurements
BT:	Blood	BT:	Measurement
<b>White matter</b>		<b>Wide area networks</b>	
BT:	Central nervous system	UF:	WAN
RT:	Action potentials		WANs
	Axons	BT:	Communication systems
	Brain		Computer networks
	Learning systems	RT:	Electronic learning
			Frame relay



# 2019 IEEE Thesaurus

	IEEE 802.3 Standard Internetworking LAN interconnection Multiprocessor	<i>Wikis</i> USE: Wikipedia
interconnection	Open systems Protocols Token networks Virtual private	<i>Wild fires</i> USE: Fires
networks		<i>Wildfires</i> USE: Fires
<b>Wide band gap semiconductors</b>		<b>Wildlife</b> BT: Animals
BT: Semiconductor		<i>WiMax</i> USE: WiMAX
materials	RT: Gallium alloys Silicon compounds	<i>Wimax</i> USE: WiMAX
<i>Wide-area measurement systems</i>		<b>WiMAX</b> UF: Wi-Max WiMax Wimax Worldwide
USE: Wide area measurements		Interoperability for Microwave Access BT: Wireless communication RT: IEEE 802.16 Standard
<i>Wide-area measurements</i>		<b>Winches</b> BT: Materials handling equipment RT: Cables Lifting equipment
USE: Wide area measurements		<b>Wind</b> BT: Meteorology RT: Sea surface Wind energy Wind power generation Wind forecasting Wind speed
<b>Wideband</b>	BT: Bandwidth Communication systems RT: Narrowband	<b>Wind energy</b> UF: Wind-energy BT: Energy resources RT: Turbines Wind Wind forecasting Wind power generation Wind turbines
<i>Wideband amplifiers</i>	USE: Broadband amplifiers	<b>Wind energy generation</b> BT: Power generation RT: Wind forecasting Wind turbines
<i>Wideband antennas</i>	USE: Broadband antennas	
<b>Wiener filters</b>	BT: Noise reduction	
<i>wifi</i>	USE: Wireless fidelity	
<i>Wiggler magnets</i>	USE: Undulators	
<i>WiGig</i>	USE: IEEE 802.11 Standard	
<b>Wikipedia</b>	UF: Wikis BT: Information services RT: Collaboration Encyclopedias Internet Web sites	



# 2019 IEEE Thesaurus

NT: Wind energy	
integration	<i>Wind-energy</i>
	USE: Wind energy
<b>Wind energy integration</b>	
UF: Wind power grid	
integration	<b>Windings</b>
BT: Power systems	UF: Transformer windings
Wind energy generation	BT: Electromagnetic fields
RT: Power grids	RT: AC machines
	Coils
<i>Wind farm</i>	Electric machines
USE: Wind farms	Magnetic circuits
	Power transformers
<b>Wind farms</b>	Rotating machines
UF: Wind farm	Transformers
BT: Energy resources	NT: Machine windings
	<b>Windows</b>
<b>Wind forecasting</b>	BT: Building materials
BT: Weather forecasting	Manufactured products
Wind	RT: Glass products
RT: Wind energy	Vents
Wind energy generation	
Wind turbines	<i>Windscreen wipers</i>
	USE: Automotive components
<i>Wind power</i>	<i>Windscreens</i>
USE: Wind power generation	USE: Automotive components
<b>Wind power generation</b>	
UF: Wind power	<i>Windshield wipers</i>
BT: Power generation	USE: Automotive components
RT: Turbogenerators	
Wind	<i>Windshields</i>
Wind energy	USE: Automotive components
<i>Wind power grid integration</i>	
USE: Wind energy	<b>Windup</b>
integration	BT: Feedback control
<b>Wind speed</b>	<b>Wine industry</b>
BT: Wind	BT: Industry applications
	NT: Wineries
<b>Wind tunnels</b>	<b>Wineries</b>
BT: Aerospace testing	BT: Wine industry
Test facilities	
RT: Aerodynamics	<b>Wire</b>
Aerospace simulation	BT: Materials
	RT: Communication cables
<b>Wind turbines</b>	Conductors
BT: Turbines	Wiring
RT: Doubly fed induction	
generators	<b>Wire drawing</b>
Wind energy	BT: Wires
Wind energy generation	RT: Manufacturing
Wind forecasting	Production



# 2019 IEEE Thesaurus

## Wireless Access in Vehicular Environments

UF: WAVE  
BT: Wireless networks  
RT: IEEE 802.11p Standard  
Intelligent vehicles

## Wireless access networks

USE: Wireless networks

## Wireless access points

UF: WAP  
BT: Computer networks  
Hardware  
Mobile computing  
Wireless communication  
RT: IEEE 802.11 Standard  
Routing protocols  
Wireless LAN  
Wireless fidelity

## Wireless ad hoc network

USE: Mobile ad hoc networks

## Wireless application protocol

UF: WAP  
BT: Protocols  
Wireless communication

## Wireless cellular systems

BT: Wireless networks

## Wireless charging

USE: Inductive charging

## Wireless communication

UF: Wireless systems  
BT: Communication systems  
RT: Bluetooth  
Dynamic spectrum

## access

IEEE 802.11 Standard  
IEEE 802.11p Standard  
IEEE 802.22 Standard  
Inductive charging  
Light fidelity  
Location awareness  
Long Term Evolution  
Machine-to-machine

## communications

Mobile applications  
Paging systems  
Regional area networks

NT:

communication

communication

architecture

communications

protocol

Wireless LAN  
Wireless fidelity  
Cognitive radio  
Cooperative

Dedicated short range

GSM

Open wireless

Point-to-multipoint

Roaming

Smart devices

Spatial diversity

WRAN

WiMAX

Wireless access points

Wireless application

Wireless networks

## Wireless energy transmission

USE: Wireless power transfer

## Wireless fidelity

UF: wi-fi  
wifi

BT: Wireless LAN

RT: IEEE 802.11 Standard

Light fidelity

Radio frequency

Wireless access points

Wireless communication

## Wireless handheld devices

USE: Handheld computers

## Wireless LAN

UF: Radio LAN  
WLAN

Area Networks

networks

BT: Local area networks

RT: Ad hoc networks

Bluetooth

Butler matrices

IEEE 802.11 Standard

IEEE 802.11e Standard

IEEE 802.11g Standard

IEEE 802.11n Standard



# 2019 IEEE Thesaurus

	IEEE 802.15 Standard	<b>Wireless power transmission</b>	
	LAN interconnection	BT:	Power transmission
	Personal area networks	RT:	Conductors
	Radio communication		Wireless networks
	Time-varying channels	NT:	Wireless power
	Wireless access points		transfer
	Wireless communication		<i>Wireless regional area networks</i>
	Wireless sensor	USE:	WRAN
networks			<i>Wireless security</i>
NT:	Light fidelity	USE:	Communication system
	Wireless fidelity		security
<i>Wireless local area networks</i>			<b>Wireless sensor networks</b>
USE:	Wireless LAN	UF:	Underwater sensor
			networks
<b>Wireless mesh networks</b>		BT:	Communication systems
BT:	Communication systems		Vehicular and wireless
RT:	Wireless sensor		technologies
networks		RT:	Ad hoc networks
<i>Wireless Metropolitan Area Networks</i>			Cyber-physical systems
USE:	Wireless LAN		Distributed vision
			networks
<b>Wireless networks</b>			Edge computing
UF:	Wireless access		Internet of Things
networks			Machine-to-machine
BT:	Wireless communication		communications
RT:	Acoustic communication		Microsensors
(telecommunication)			Nanocommunication
	IEEE 802.11p Standard		(telecommunication)
	IEEE 802.22 Standard		Sensors
	Nanocommunication		Wireless LAN
(telecommunication)			Wireless mesh networks
	WRAN	NT:	Body sensor networks
	Wireless power		Event detection
transmission			<i>Wireless systems</i>
NT:	AODV	USE:	Wireless communication
	Self-organizing		
networks			<b>Wires</b>
	Wireless Access in	BT:	Structural shapes
Vehicular Environments		RT:	Nanowires
	Wireless cellular		Springs
systems		NT:	Wire drawing
			<b>Wiring</b>
<b>Wireless personal area networks</b>		BT:	Electric variables
UF:	WPAN	RT:	Building services
BT:	Personal area networks		Cables
			Conductors
<b>Wireless power transfer</b>			Layout
UF:	Wireless energy		Metallization
transmission			Printed circuits
BT:	Wireless power		
transmission			



# 2019 IEEE Thesaurus

	Wire	<i>Working conditions</i>	USE: Employee welfare
<i>WLAN</i>		<b>Working environment noise</b>	
	USE: Wireless LAN	UF: Environmental noise	
<i>Wolfram</i>		BT: Acoustic noise	
	USE: Tungsten	RT: Ergonomics	
<i>Wood alcohol</i>		Hazards	
	USE: Methanol	Occupational health	
<b>Wood industry</b>		Occupational safety	
BT: Industries			
RT: Forestry			
industry	Pulp and paper		
	Pulp manufacturing	<i>Workplace</i>	
<i>Wood naphtha</i>		USE: Employment	
	USE: Methanol	<i>Workshops</i>	
<i>Wood poles</i>		USE: Conferences	
	USE: Poles and towers	<i>Workstation clusters</i>	
<i>Wood spirits</i>		USE: Cluster computing	
	USE: Methanol	<b>Workstations</b>	
<b>Wool</b>		BT: Microcomputers	
BT: Agricultural products		RT: Cluster computing	
	Textiles	Computer displays	
RT: Clothing		Computer graphics	
	Fabrics	Peer-to-peer computing	
	Natural fibers		
	Textile fibers		
	Yarn	<b>World Wide Web</b>	
<i>Word cloud</i>		UF: WWW	
	USE: Tag clouds	BT: Computer applications	
<i>Word processing</i>		RT: Cyberspace	
	USE: Text processing	NT: Bot (Internet)	
<b>Workability</b>		Mashups	
BT: Mechanical factors		<i>World Wide Web Consortium</i>	
<b>Workflow management software</b>		USE: W3C	
UF: Workflow management		<i>Worldwide Interoperability for Microwave Access</i>	
system		USE: WiMAX	
BT: Office automation		<i>Worm gears</i>	
<i>Workflow management system</i>		USE: Gears	
	USE: Workflow management	<i>Worms</i>	
software		USE: Grippers	
		<i>Worms (computer)</i>	
		USE: Computer worms	
		<b>Wounds</b>	
		BT: Injuries	
		<i>Woven fabric composites</i>	



# 2019 IEEE Thesaurus

	USE:	Fabrics		<b>WS-BPEL</b>	
<i>WPAN</i>				UF:	Web services business process execution language
	USE:	Wireless personal area networks		BT:	Computer languages Web services
<b>WRAN</b>				RT:	Business process re-engineering
	UF:	Wireless regional area networks			Information processing
	BT:	Regional area networks Wireless communication		<i>WWW</i>	
	RT:	IEEE 802.22 Standard Wireless networks		USE:	World Wide Web
<b>Wrapping</b>				<i>WWW robot</i>	
	BT:	Packaging		USE:	Bot (Internet)
	RT:	Packaging machines		<b>X reality</b>	
<b>Wrist</b>				UF:	Cross reality XR
	BT:	Arms		BT:	Augmented reality Virtual reality
<b>Writing</b>				<b>X-ray applications</b>	
	UF:	Business writing Engineering writing Report writing Technical reports Technical writing		BT:	X-rays
	BT:	Professional communication		RT:	Collimators Phantoms X-ray detection
	RT:	Manuals Proposals		NT:	X-ray imaging X-ray lasers
	NT:	Abstracts Bibliographies Biographies Dictionaries Documentation Grammar Readability metrics Resumes Reviews Thesauri		<b>X-ray detection</b>	
<i>Written character recognition</i>				BT:	X-rays
	USE:	Handwriting recognition		RT:	Diagnostic radiography Diffraction Electromagnetic radiation
<i>Written characters</i>					Phantoms Radiography X-ray applications X-ray detectors X-ray imaging
	USE:	Handwriting recognition		<b>X-ray detectors</b>	
<i>Written-character recognition</i>				BT:	Ionizing radiation
	USE:	Handwriting recognition		sensors	
				RT:	Crystallography Electromagnetic radiation
					Gamma-ray detectors Radiation detectors X-ray detection X-ray imaging X-rays
				<b>X-ray diffraction</b>	



# 2019 IEEE Thesaurus

diffraction	BT: Electromagnetic	XML	UF: Automatic Test Markup Language
<b>X-ray imaging</b>			Extensible Markup Language
BT:	X-ray applications	Language	BT: Markup languages
RT:	Gamma-ray detectors Phantoms Radiography X-ray detection X-ray detectors	XR	USE: X reality
NT:	Plasma x-ray sources	XRD	USE: X-ray scattering
<b>X-ray lasers</b>		XSS	USE: Cross-site scripting
BT:	Lasers X-ray applications	<i>Y-Ba-Cu-O</i>	USE: Yttrium barium copper oxide
RT:	Plasma x-ray sources X-rays	<i>Yachts</i>	USE: Boats
<b>X-ray lithography</b>		<b>Yagi-Uda antennas</b>	BT: Antennas
BT:	Lithography	<b>Yarn</b>	BT: Textile fibers RT: Wool
<b>X-ray scattering</b>		<i>YBa2Cu3O7</i>	USE: Yttrium barium copper oxide
UF:	XRD	<i>YBCO</i>	USE: Yttrium barium copper oxide
BT:	X-rays	<i>Yield estimate</i>	USE: Yield estimation
<b>X-ray tomography</b>		<b>Yield estimation</b>	UF: Yield estimate BT: Estimation RT: Circuit analysis Crops Microprocessor chips
BT:	X-rays	<i>Young modulus</i>	USE: Young's modulus
<b>X-rays</b>		<b>Young's modulus</b>	UF: Young modulus BT: Solids
BT:	Medical services		
RT:	Collimators Electromagnetic		
radiation	Synchrotron radiation Undulators X-ray detectors X-ray lasers		
NT:	X-ray applications X-ray detection X-ray scattering X-ray tomography		
<b>X3D</b>			
BT:	Computer graphics Three-dimensional		
displays			
RT:	ISO Standards		
<b>Xenon</b>			
BT:	Gases		
<b>Xerography</b>			
USE:	Electrophotography		





# 2019 IEEE Thesaurus

<b>YouTube</b>		RT:	Inverters
services	BT: Social network		Switching converters
	Video sharing	<i>Zero-current switching</i>	
	Web sites	USE:	Zero current switching
<b>Ytterbium</b>		<i>Zero-voltage switching</i>	
BT:	Chemical elements	USE:	Zero voltage switching
<b>Yttrium</b>		<i>Zeros</i>	
BT:	Chemical elements	USE:	Poles and zeros
	Metals	<b>ZigBee</b>	
NT:	Yttrium compounds	BT:	Radio communication
<b>Yttrium barium copper oxide</b>		RT:	Automation
UF:	Y-Ba-Cu-O		Biomedical equipment
	YBCO		Bluetooth
	YBa <sub>2</sub> Cu <sub>3</sub> O <sub>7</sub>		IEEE 802.15 Standard
BT:	High-temperature		Personal area networks
superconductors			Personal communication
	Yttrium compounds	networks	
RT:	Barium compounds		Smoke detectors
<b>Yttrium compounds</b>		<b>Zinc</b>	
BT:	Yttrium	UF:	Zn
RT:	Alloying	BT:	Metals
NT:	Yttrium barium copper	NT:	Zinc compounds
oxide		<b>Zinc compounds</b>	
<b>ZCS</b>		BT:	Zinc
USE:	Zero current switching	NT:	Zinc oxide
<b>Zero correlation zone</b>		<b>Zinc oxide</b>	
BT:	Codes	UF:	ZnO
	Multiaccess	BT:	Zinc compounds
communication		NT:	Indium gallium zinc
	Sequential analysis	oxide	
<b>Zero current switching</b>		<i>ZINDO</i>	
UF:	ZCS	USE:	Computational modeling
	Zero-current switching	<i>Zip fasteners</i>	
BT:	Switching circuits	USE:	Fasteners
RT:	Inverters	<b>Zirconium</b>	
	Switching converters	BT:	Chemical elements
<b>Zero knowledge proof</b>		<b>Zn</b>	
BT:	Cryptography	USE:	Zinc
	Protocols	<b>ZnO</b>	
<b>Zero voltage switching</b>		USE:	Zinc oxide
UF:	ZVS	<b>Zoology</b>	
	Zero-voltage switching		
BT:	Switching circuits		



# 2019 IEEE Thesaurus

BT: Biology  
NT: Animals

ZVS

USE: Zero voltage switching

