

Full List of Acronyms and Abbreviations

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This document presents the full list of acronyms and abbreviations appearing in the book *Principles of GNSS, Inertial, and Multisensor Integrated Navigation Systems*, 2nd edition, and its appendices on CD.

2D	Two dimensional
2G	Second generation
3D	Three dimensional
3G	Third generation
8PSK	8-phase shift key
ABAS	Aircraft-based augmentation system
ABS	Anti-lock braking system
ACM	Association for Computing Machinery
ACU	Antenna control unit
ADC	Analog-to-digital converter
ADR	Accumulated delta range
ADS-B	Automatic dependent surveillance – broadcast
AECID	Adaptive enhanced cell identity
AES	Aerospace and Electronic Systems
AFLT	Advanced forward-looking trilateration
AFSCN	Air Force Satellite Control Network
AGARD	Advisory Group for Aerospace Research and Development
AGC	Automatic gain control
AGNSS	Assisted GNSS
AGPS	Assisted GPS
AHRS	Attitude and heading reference system
AIAA	American Institute of Aeronautics and Astronautics
AIS	Automatic Identification System
AltBOC	Alternate binary offset carrier
AM	Amplitude modulation
AM	Annual Meeting
AMSL	Above mean sea level
ANFIS	Adaptive neuro-fuzzy inference system
ANN	Artificial neural network
AOA	Angle of arrival
AP	Access point
APNT	Alternative position, navigation, and timing
APNT&D	Alternative position, navigation, timing, and data
APV	Approach operations with vertical guidance
AR	Autoregressive
ARINC	Aeronautical Radio Incorporated
AS	Antispoofing

ASF	Additional secondary factor
ASIC	Application-specific integrated circuit
ASK	Amplitude shift keying
ASME	American Society of Mechanical Engineers
ASPECT	Autocorrelation side-peak cancellation technique
ATAN	Arctangent
ATAN2	Arctangent (four quadrant)
ATC	Adaptive tightly coupled
ATF	Adaptive transversal filter
AtoN	Aid to navigation
ATSC	Advanced Television System Committee
Autonav	Automatic navigation
AUV	Autonomous underwater vehicle
BA	Bachelor of Arts
BABS	Blind-approach beacon system
baro	barometric altimeter
BCN	Bottom-contour navigation
BDT	Beidou time
BLE	Bluetooth low energy
BOC	Binary offset code
BPF	Bandpass Filter
BPSK	Biphase shift key
BRIEF	Binary robust independent elementary features
BTL	Boeing Timing and Location
C/A	Coarse/acquisition
CAN	Controller area network
CASM	Coherent adaptive sub-carrier modulation
CBOC	Composite binary offset carrier
CCD	Charge-coupled device
CD	Compact disc
CDF	Cumulative distribution function
CDMA	Code-division multiple access
CE	Common Era
CEP	Circular error probable
CGCS	China Geodetic Coordinate System
CGSIC	Civil GPS Service Interface Committee
CIRS	Conventional inertial reference system
CL	Civil long
CM	Civil moderate
CNES	Centre National d'Etudes Spatiales
CNR	Carrier power to noise density ratio
COD	Cross over dot product
CRAIM	Carrier-phase RAIM
CRC	Chemical Rubber Company
CRPA	Controlled-reception-pattern antenna
CS	Commercial service
CSAC	Chip-scale atomic clock
CSD	Cross spectral density
CSS	Chirp spread spectrum
CTP	Conventional terrestrial pole

CTRS	Conventional terrestrial reference system
CVL	Correlation velocity log
CVN	Continuous visual navigation
CZM	Conventional zero meridian
DAA	Detect and avoid
DAB	Digital Audio Broadcasting
DARPA	Defense Advanced Research Projects Agency
DC	Direct current
DCO	Digitally controlled oscillator
DDC	Decision-directed cross-product
DDM	Difference in depth of modulation
DDQ	Decision-directed quadrature phase
DECTRA	Decca Track
DELRAC	Decca Long-Range Area Cover
DEM	Digital elevation model
DERA	Defence Evaluation and Research Agency
DGNSS	Differential GNSS
DGPS	Differential GPS
DLL	Delay lock loop
DLoran	Differential Long range navigation
DMB	Digital Multimedia Broadcasting
DME	Distance measuring equipment
DNSS	Defense Navigation Satellite System
DOD	Department of Defense
DOP	Dilution of precision
DORIS	Doppler orbitography and radiopositioning integrated by satellite
DPhil	Doctor of philosophy
DPP	Dot-product Power
DQPSK	Differential quadrature phase-shift keying
DR	Dead reckoning
DRM	Digital Radio Mondiale
DRMS	Distance root-mean-squared
DSN	Deep Space Network
DSP	Digital signal processor
DSRC	Dedicated short-range communication
DSSS	Direct-sequence spread spectrum
DTED	Digital Terrain Elevation Data
DTM	Digital terrain model
DTMB	Digital Terrestrial Multimedia Broadcast
DVB-H	Digital Video Broadcasting – Handheld
DVB-SH	Digital Video Broadcasting – Satellite service to Handhelds
DVB-T	Digital Video Broadcasting – Terrestrial
DVL	Doppler velocity log
E	Electric (field)
ECAC	European Civil Aviation Conference
ECD	Envelope to cycle difference
ECEF	Earth-centered earth-fixed
ECI	Earth-centered inertial
E-CID	Enhanced cell identity
ED50	European Datum 1950

EGI	Embedded GNSS (or GPS) in INS
EGM	Earth Gravitational Model
EGNOS	European Geostationary Navigation Overlay System
EKF	Extended Kalman filter
ELE	Early-minus-late envelope
ELoran	Enhanced long-range navigation
ELP	Early-minus-late power
EM	Electromagnetic
ENC	European Navigation Conference
ENU	East, north, up
EO	Electro-optic
EOBD	European on-board diagnostics
EOTD	Enhanced-observed Time Difference
EPLRS	Enhanced Position Location Reporting System
ESA	European Space Agency
ETRF89	European Terrestrial Reference Frame 1989
EU	European Union
FAA	Federal Aviation Administration
FDE	Fault detection and exclusion
FDI	Fault detection and isolation
FDIS	Frequency-domain interference suppressor
FDMA	Frequency-division multiple access
FDR	Fault detection and recovery
FEC	Forward error correction
FFR	Federated fusion-reset
FFT	Fast Fourier transform
FH	Frequency hopping
FHSS	Frequency-hopping spread spectrum
FLL	Frequency lock loop
FM	Frequency modulation
FMCW	Frequency-modulated continuous-wave
FNR	Federated no-reset
FOC	Full operational capability
FOG	Fiber-optic gyro
FOV	Field of view
FPGA	Field-programmable gate array
FS	Full scale
FSK	Frequency shift keying
FTA	Fine time aiding
FWHM	Full width at half maximum
FZR	Federated zero-reset
GA	General aviation
GAGAN	GPS/GLONASS and Geo-augmented Navigation
GBAS	Ground-based augmentation system
GBCC	Ground-based control complex
GCC	Generalized cross correlation
GCS	Ground control segment
GDOP	Geometric dilution of precision
GIC	GNSS integrity channel
GIOVE	Galileo in-orbit validation element

GIS	Geographic information system
GJU	Galileo Joint Undertaking
GLAs	General Lighthouse Authorities of the United Kingdom and Ireland
GLONASS	GLObal'naya NAVigatsionnaya Sputnikovaya Sistema
GMS	Ground mission segment
GNSS	Global navigation satellite systems
GPS	Global Positioning System
GRAS	Ground-based Regional Augmentation System
GRI	Group repetition interval
GRS80	Geodetic Reference System 1980
GSA	GNSS Supervisory Authority
GSM	Global standard for mobile communications
GSM-R	Global standard for mobile communications - Rail
GSS	Galileo sensor station
GST	Galileo System Time
GTRF	Galileo Terrestrial Reference Frame
gyro	Gyroscope
H	Magnetic (field)
HAIP	High-accuracy indoor positioning
HAL	Horizontal alert limit
HARS	Heading and attitude reference system
HDOP	Horizontal dilution of precision
HMM	Hidden Markov model
HOW	Handover word
HP	High performance
HPL	Horizontal protection level
HRG	Hemispherical resonator gyro
HSGPS	High sensitivity GPS
HZA	High-zenith antenna
IAE	Innovation-based adaptive estimation
IAIN	International Association of Institutes of Navigation
IBLS	Integrity beacon landing system
IBOC	In-band on-channel
ICAO	International Civil Aviation Organization
ICD	Interface control document
ICG	International Committee on GNSS
ID	Identification
IEE	Institute of Electrical Engineers
IEEE	Institute of Electrical and Electronic Engineers
IERS	International Earth Rotation and reference systems Service
IET	Institute of Engineering and Technology
IF	Intermediate frequency
IFOG	Interferometric fiber-optic gyro
IFR	Instrument flight rules
IGI	Integrated GNSS/INS
IGMAP	Iterative Gaussian mixture approximation of the posterior
IGRF	International Geomagnetic Reference Field
IGS	International GNSS Service
IGSO	Inclined geosynchronous orbit
ILS	Instrument landing system

ILS	Iterated least squares
IMES	Indoor Messaging System
IMO	International Maritime Organization
IMRE	Intelligent method for recursive estimation
IMU	Inertial measurement unit
INS	Inertial navigation system
INU	Inertial navigation unit
IOC	Initial operational capability
IODA	Issue of data almanac
IODC	Issue of data clock
IODE	Issue of data ephemeris
IODNav	Issue of data navigation
ION	Institute of Navigation
IOV	In-orbit validation
IPDL	Idle period downlink
IPF	Integrity processing function
IPIN	Indoor Positioning Indoor Navigation
IQP	In-phase quadrature product
IR	Impulse radio
IRM	IERS reference meridian
IRNSS	Indian Regional Navigation Satellite System
IRP	IERS reference pole
IRS	Inertial reference system
IS	Interface standard
ISA	Inertial sensor assembly
ISDB-T	Integrated Services Digital Broadcasting – Terrestrial
ISM	Industrial, scientific, and medical
ITM	International Technical Meeting
ITRF	International Terrestrial Reference Frame
ITS	Intelligent transportation systems
ITU	International Telecommunications Union
JION	Journal of the Institute of Navigation
JOB	Japanese on-board diagnostics
JPALS	Joint Precision Approach and Landing System
JPO	Joint Program Office
JTIDS	Joint tactical information distribution system
KCPT	Kinematic carrier phase tracking
KF	Kalman filter
KNN	K nearest neighbors
LAAS	Local area augmentation system
LADAR	Laser detection and ranging
LADGNSS	Local area differential GNSS
L-AII	Legacy accuracy improvement initiative
LAMBDA	Least-squares ambiguity decorrelation adjustment
LAN	Local area network
laser	Light amplification by stimulated emission and radiation
LBL	Long baseline
LBS	Location-based services
LCM	Lowest common multiple
LDA	Linear discriminant analysis

LDACS	L-Band Digital Aeronautical Communication System
LDC	Loran data channel
LED	Light-emitting diode
LHCP	Left-handed circular polarization
LHP	Low-frequency-minus-high-frequency power
LEO	Low Earth orbit
LEX	L-band experimental
LF	Low frequency
LIDAR	Light detection and ranging
LMU	Location measurement unit
LOP	Line of position
Loran	Long-range navigation
LOS	Line of sight
LPS	Local positioning system
LSB	Least significant bit
LTE	Long-term evolution
LUSBL	Long and ultra-short baseline
L1/2/3/5	Link 1/2/3/5
L1C	Link 1 civil
L2C	Link 2 civil
L5I	Link 5 in-phase
L5Q	Link 5 quadrature
M	Military
MA	Master of arts
MAI	Multiple access interference
MAN	Metropolitan access network
MARU	Magnetic angular rate update
MAV	Micro air vehicle
MBOC	Multiplexed binary offset carrier
MC	Multicarrier
MCMCMC	Metropolis-coupled Monte-Carlo Markov chain
MCS	Master control station
MEDLL	Multipath-estimating delay lock loop
MEMS	Microelectromechanical systems
MEO	Medium Earth orbit
MET	Multipath elimination technology
MF	Medium frequency
MGD	Multiple-gate discriminator
MGRS	Military Grid Reference System
MHKF	Multiple-hypothesis Kalman filter
MHT	Multiple-hypothesis tracking
MIDS	Multifunctional information distribution system
MIT	Massachusetts Institute of Technology
MLA	Multipath-Limiting Antenna
MLS	Microwave Landing System
MMAE	Multiple-model adaptive estimation
MOEMS	Micro-optical-electromechanical systems
MOG	Micro-optic gyro
MRL	Measured results list
MRS	Multi-Constellation Regional System

MSAS	MTSat Satellite Augmentation System
MSc	Master of Science
MTS	Marine Technology Society
MTSat	Multi-function transport satellite
NAD27	North American Datum of 1927
NAD83	North American Datum of 1983
NASA	National Aeronautical and Space Administration
NATO	North Atlantic Treaty Organization
NAVSEG	Navigation Satellite Executive Steering Group
NAVSTAR	Navigation by Satellite Ranging and Timing
NBC	Naïve Bayesian classifier
NCO	Numerically controlled oscillator
NDB	Nondirectional beacon
NED	Nominal emission delay
NED	North, east, down
NESDIS	National Environmental Satellite, Data, and Information Service
NGA	National Geospatial-Intelligence Agency
NGDC	National Geophysical Data Center
NIMA	National Imagery and Mapping Agency
NLOS	Non-line-of-sight
NMR	Nuclear magnetic resonance
NN	Nearest neighbor
NOAA	National Oceanic and Atmospheric Administration
NTM	National Technical Meeting
NPA	Nonprecision approach
OBD	On-board diagnostics
OCR	Optical character recognition
OCS	Operational control segment
OCXO	Oven-controlled crystal oscillator
OEM	Original equipment manufacturer
OFDM	Orthogonal frequency division multiplex
OFDMA	Orthogonal frequency division multiple access
OOK	On-off keying
OS	Open service
OSD	Office of the Secretary of Defense
OSGB36	Ordnance Survey Great Britain 1936
OTDOA	Observed TDOA
OUP	Oxford University Press
P	Precise
PCI	Phase code interval
PDAF	Probabilistic data association filter
PDF	Probability density function
PDOP	Position dilution of precision
PDR	Pedestrian dead reckoning
PF	Particle filter
PhD	Doctor of philosophy
PIGA	Pendulous integrating gyro accelerometer
PLANS	Position, Location And Navigation Symposium
PLD	Programmable logic device
PLL	Phase lock loop

PLRS	Position location reporting system
PM	Phase modulation
PND	Personal navigation device
PNS	Personal navigation system
PNT	Positioning, navigation, and timing
POPI	Post Office Position Indicator
ppm	parts per million
PPM	Pulse position modulation
PPP	Precise point positioning
PPP	Public private partnership
PPS	Precise positioning service
PRMG	Approach and landing radio beacon group system (Russian acronym)
PRN	Pseudo-random noise
Proc.	Proceedings of
PRS	Public regulated service
PSK	Phase shift keying
PVT	Position, velocity and time
P(Y)	Precise (encrypted precise)
QAM	Quadrature amplitude modulation
QASK	Quadrature-amplitude shift keying
QASPR	Qualcomm Automatic Satellite Position Reporting System
QC	Quadrature channel
QDA	Quadratic discriminant analysis
QOI	Quadrature over in-phase
QPSK	Quadrature-phase shift key
QR	Quick response
QSF	Quasi-static field
QZSS	Quasi-Zenith Satellite System
radalt	radar altimeter
RADGNSS	Regional area differential GNSS
RAIM	Receiver autonomous integrity monitoring
RAU	Restricted to authorized users
RDSS	Radio determination satellite service
RelNav	Relative navigation
RF	Radio frequency
RFID	Radio-frequency Identification
RFOG	Resonant fiber-optic gyro
RGNSS	Relative GNSS
RHCP	Right-handed circular polarization
RIN	Royal Institute of Navigation
RLG	Ring laser gyro
RMS	Root mean square
RNAV	Area navigation
RNP	Required navigation performance
RNT	Radio Numérique Terrestre
ROV	Remotely operated vehicle
RS	Restricted service
RSBN	Radio engineers' system of short-range navigation (Russian acronym)
RSDN	Normal long-range navigation system (Russian acronym)
RSS	Root sum of squares

RSS	Received signal strength
RTCA	Radio Technical Commission for Aeronautics
RTCM	Radio Technical Committee for Maritime Services
RTK	Real-time kinematic
RTLS	Real-time location system
RTO	Research and Technology Organization
RTS	Rauch, Tung, and Striebel
RTT	Round-trip time
SA	Selective availability
SAASM	Selective availability and anti-spoofing module
SAIM	Satellite autonomous integrity monitoring
SAR	Synthetic aperture radar
SAR	Search and rescue
SARPS	Standards and recommended practices
SBAS	Space-based augmentation system
SBL	Short baseline
SC	Special Committee
SCC	Subcarrier cancellation
SCP	Spectral compression processing
SD	Standard deviation
SDCM	System of Differential Corrections and Monitoring
SDR	Software-defined receiver/radio
SEP	Spherical error probable
SF	Significant figures
SFN	Single frequency network
SI	Système International d'unités
SIFT	Scale-invariant feature transform
SINS	Strapdown inertial navigation system
SIS	Signal in space
SITAN	Sandia Inertial Terrain Aided Navigation
SLAM	Simultaneous localization and mapping
SLR	Satellite laser ranging
SMAC	Scene matching by area correlation
SNAS	Satellite Navigation Augmentation System
SNR	Signal to noise ratio
SNU	Standard navigation unit
SOL	Safety of life
SOLAS	Safety of Life at Sea
SOO	Signal(s) of opportunity
SOOP	Signal(s) of opportunity
SOP	Signal(s) of opportunity
SOP	Surface of position
SPARTAN	Stockpot algorithm for robust terrain aided navigation
SPIE	Society of Photo-optical Instrumentation Engineers
SPS	Standard positioning service
SS	Skywave synchronized
SSBL	Super-short baseline
SSS	Strict-sense stationary
SSTL	Surrey Satellite Technology Ltd.
STANAG	Standardization Agreement

SV	Space vehicle
SVM	Support vector machine
SVN	Space vehicle number
SURF	Speeded up robust feature
TA	Timing advance
TACAN	Tactical air navigation
TAI	International Atomic Time
TAN	Terrain-aided navigation
TBD	To be determined
TBN	Terrain-based navigation
TCAR	Three-carrier ambiguity resolution
TCM	Terrain contour matching
TCN	Terrain-contour navigation
TCXO	Temperature-compensated crystal oscillator
TD	Time difference
TDDM	Time-division data multiplexing
TDM	Time-division multiplex
TDMA	Time-division multiple access
TDOA	Time difference of arrival
TDOP	Time dilution of precision
TDS	Time-domain switching
TEC	Total electron count
TERCOM	Terrain Contour Matching
TERPROM	Terrain Profile Matching
TFPR	Time-frequency-phase reference
THSS	Time-hopping spread spectrum
TII	Transmitter identification information
TMBOC	Time-multiplexed binary offset carrier
TMN	Terrain-matching navigation
TOA	Time of arrival
TOF	Time of flight
TOT	Time of transmission
TR	Technical report
TRN	Terrain-referenced navigation
TRT	Thales Research and Technology
TT&C	Telemetry, tracking and control
TTFF	Time to first fix
VHF	Very high frequency
UAV	Unmanned air vehicle
UDA	Undefined acronym
UDU	Upper diagonal upper
UE	User equipment
UERE	User-equivalent range error
UGV	Unmanned ground vehicle
UHF	Ultra-high frequency
U.K.	United Kingdom
UKF	Unscented Kalman filter
UMTS	Universal mobile telecommunication system
UNB3	University of New Brunswick 3
UNESCO	United Nations Educational, Scientific and Cultural Organization

URA	User range accuracy
U.S.	United States
USAF	United States Air Force
USBL	Ultra-short baseline
USNG	United States National Grid
USNO	US Naval Observatory
USSR	Union of Soviet Socialist Republics
UTC	Ultratightly Coupled
UTC	Coordinated Universal Time
U-TDOA	Uplink-TDOA
UTM	Universal Transverse Mercator
UWB	Ultra-wideband
VAL	Vertical alert limit
VAR	Visual aural range
VBA	Vibrating-beam accelerometer
VDLL	Vector delay and frequency lock loop
VDLL	Vector delay lock loop
VDOP	Vertical dilution of precision
VFR	Visual flight rules
VHF	Very high frequency
VLBI	Very long baseline interferometry
VLF	Very low frequency
VOR	VHF omnidirectional radiorange
VPL	Vertical protection level
VRE	Vibration rectification error
VSF	Vestigial sideband
V2I	Vehicle to infrastructure
V2V	Vehicle to vehicle
WAAS	Wide Area Augmentation System
WADGNSS	Wide area differential GNSS
WADGPS	Wide area differential GPS
WCDMA	Wideband code division multiple access
WGS 84	World Geodetic System 1984
Wi-Fi	Wireless Fidelity
WiMAX	Worldwide Interoperability for Microwave Access
WLAN	Wireless local area network
WMM	World Magnetic Model
WPAN	Wireless personal area network
WSS	Wheel speed sensor
WSS	Wide-sense stationary
XO	Crystal oscillator
Y	Encrypted precise
ZARU	Zero angular rate update
ZUPT	Zero velocity update
ZVU	Zero velocity update