

Internet of Things (IoT) - Past, Present and Future

Tech Talk South City

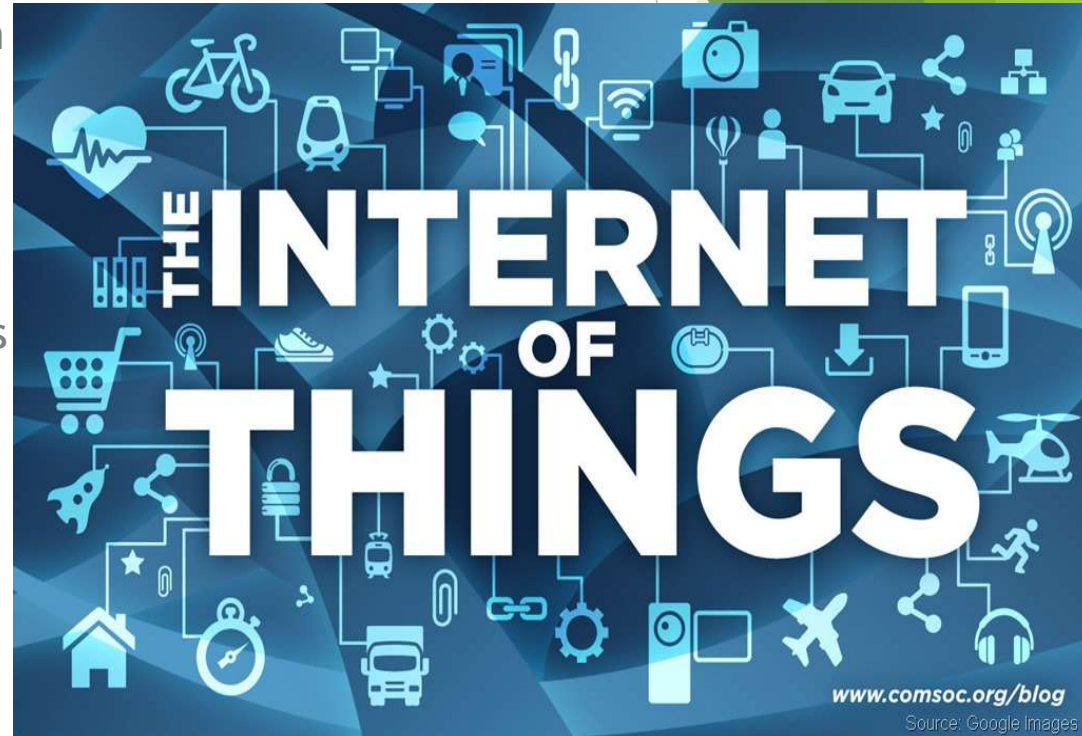
By Deepesh Goel

28th March, 2020

15/07/2017 11:29

Agenda

- IoT: Internet of things, beginning & definition
- IoT Applications & Market trends
- IoT Drivers and country specific goals
- Technology and Platform involved
- Mobile data speed comparison and challenges
- IIoT: the definition, domains and problems
- IIoT Use cases (1-7) & Savings \$\$\$\$
- Integrated solution of IoT
- Future of sensors & IoT
- Takeaways



IOT: Internet of Things, the beginning



https://www.youtube.com/watch?v=gipL_CEW-fk

The way Internet has changed our quality of life, internet of things would change our life faster and better

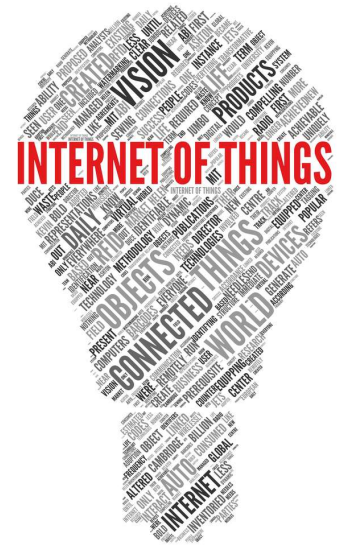
IIOT: Internet of Things, the definition

- What is IIOT?

An infrastructure worldwide for the information society which sanctions interconnecting at an advance level for both physical and virtual things ever evolving practical information and communication technologies.

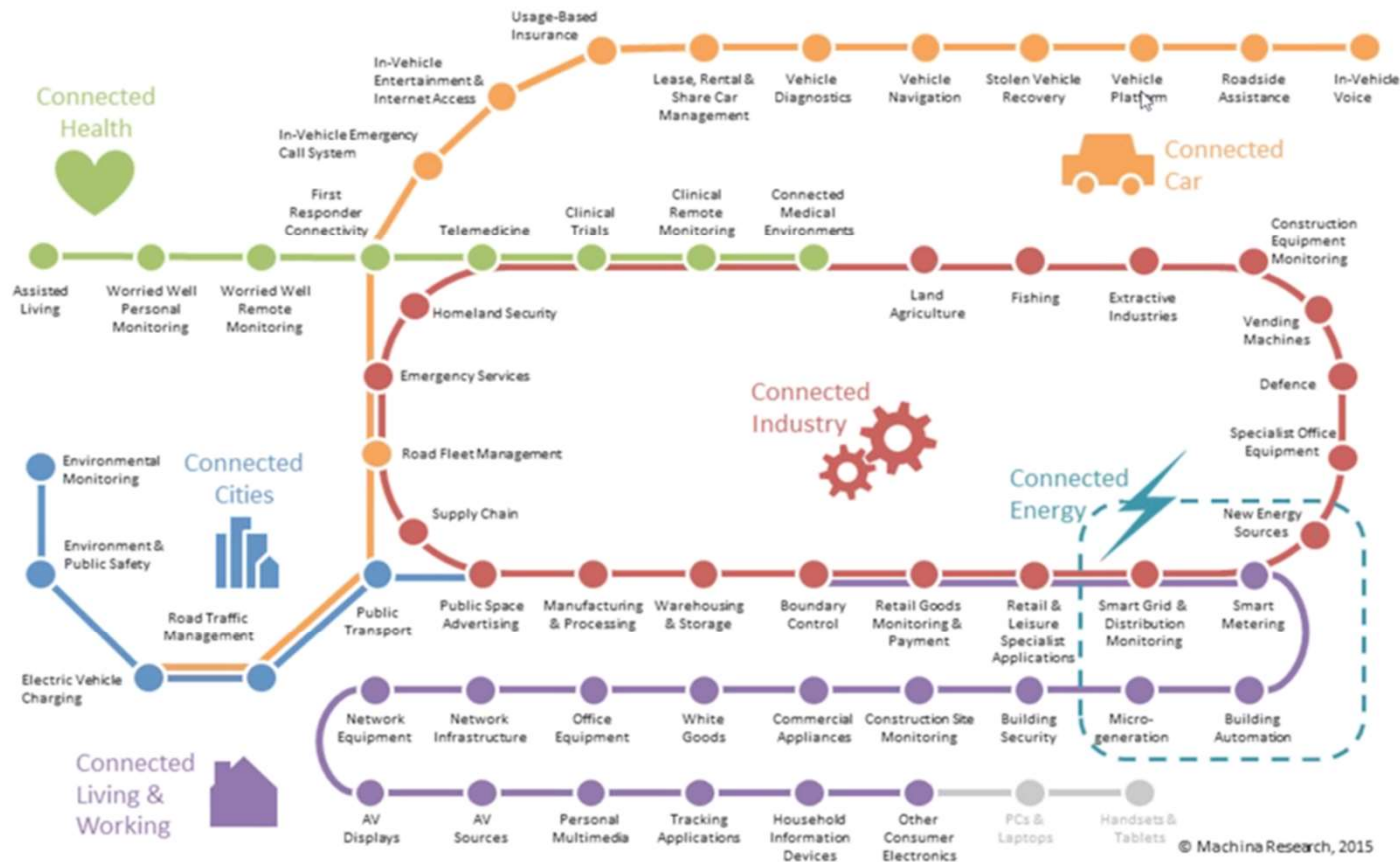
- The Core components of IIOT are:

- Things - Smart things (objects) with Unique address or identification options to connectivity and networked sensors.
- Communication medium - Wired & wireless (Wi-Fi, 4G, Bluetooth, ZigBee)
- Analytical Infrastructure - Data Stores, Analytic Engines.
- Controller Tools - Hardware or software providing complete control over the Object.
- Presenters - Light / Sound indicators, alarms, or even Dashboards and reports.



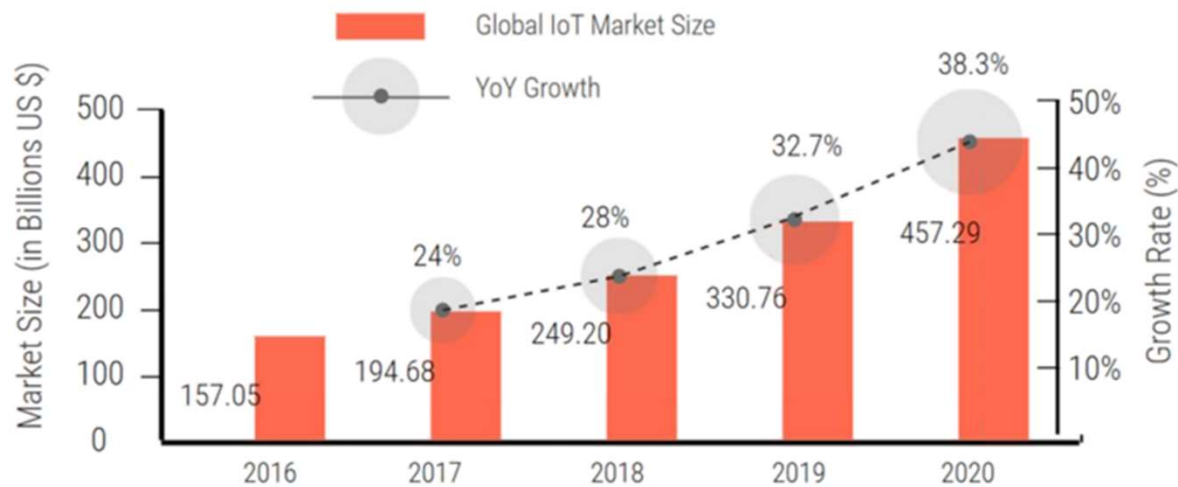
Internet of things in simple words is the way things communicate through the internet to make our life better

IOT Applications

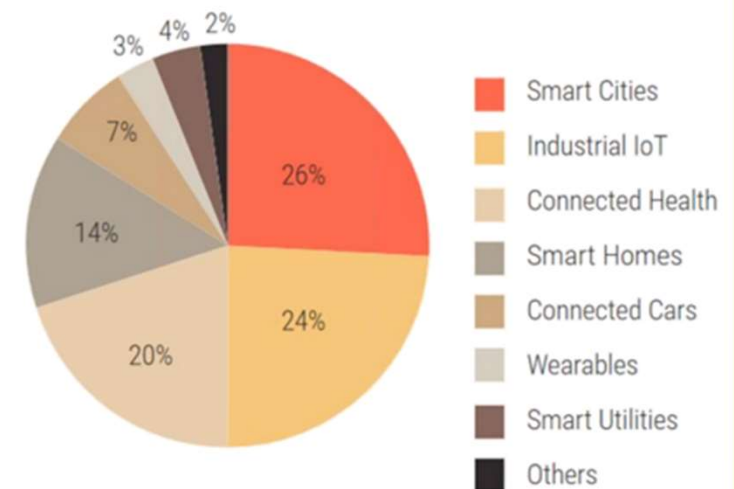


IOT Applications are interconnected: Connected Health, Car, Industry, Energy, Cities and Living & Working

IOT Market trends



Global IoT Market Share by Sub-Sector



[Source: GrowthEnabler Analysis]

<https://growthenabler.com/tlipbook/pdf/IOT%20Report.pdf>

- The IoT market is set to rise from its valuation of \$157B in 2016 to estimated \$457B by 2020, accomplishing the CAGR of 28.5%.
- The industry's market share is going to be ruled by three sub-domains; Smart Cities – 26%, Industrial – 24%, and Connected Health – 20%.
- Followed by 14% Smart Homes, 7% Connected Cars, 4% share in Smart Utilities, and 3% in Wearables.

Technology a great enabler for Smart cities, Industrial and Connected health which has major IoT share

IOT drivers and country specific goals

IOT Drivers

Reducing costs and improving business processes are the top IoT drivers, but a solid 1/3 of respondents also placed high priority on using IoT to improve competitiveness or customer experience.

Building new revenue streams from IoT is also important.



More aspirational goals include:

- Develop new revenue streams
- Build up ongoing data collection to leverage for future use
- Shift to as-a-service or usage-based business model
- Better use of environmental or energy resources (sustainability)

n=1,343
Percentages indicate % of enterprise respondents selecting goal as one of their top 3. Multiple response question.

IOT goals differ by country

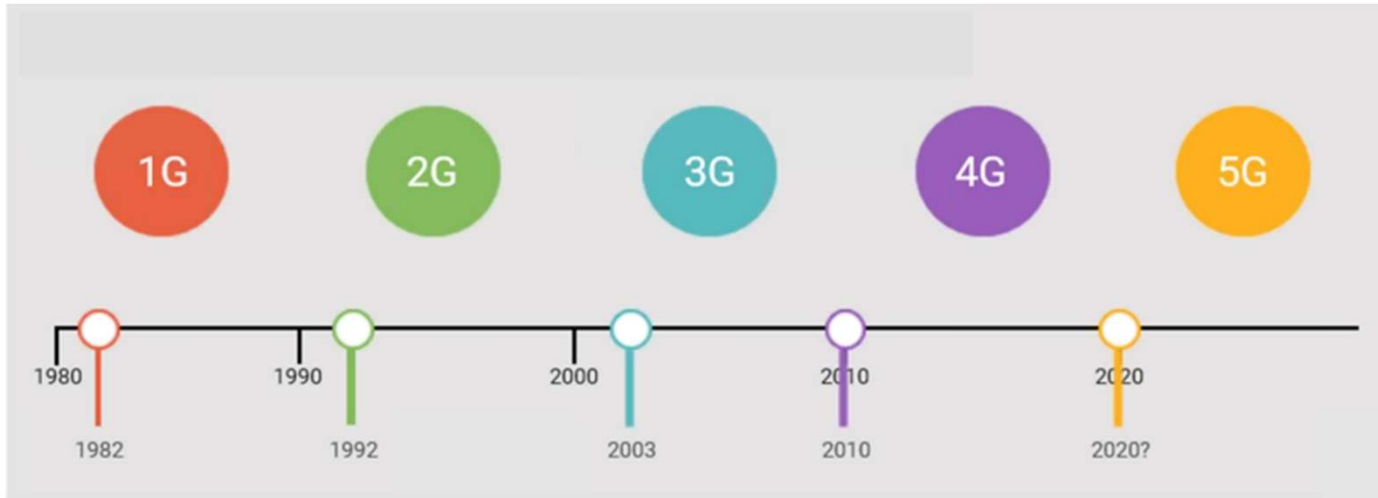
#1 goal of enterprise IoT deployment, by country



Note: % of respondents choosing option as #1 goal

Reducing cost & improving business processes are the top IOT drivers and India should focus on Agriculture

Technology and platform involved

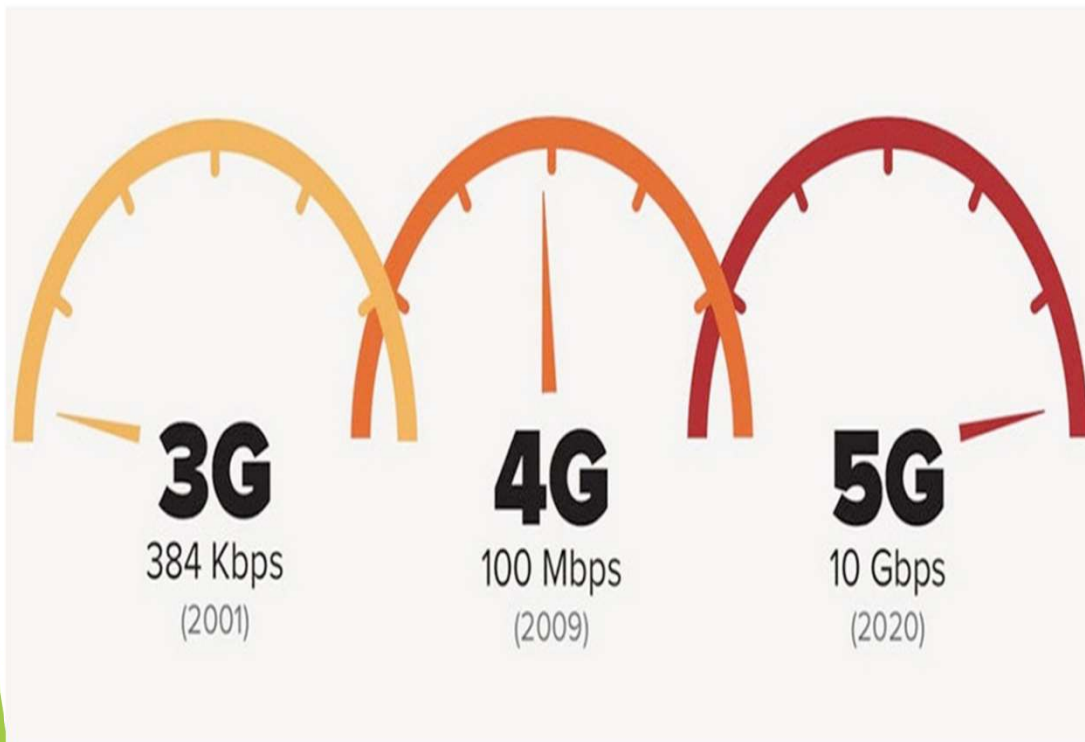


<http://www.carriotech.com/news/evolution-mobile-communication-1g-5g/>

- 2G - for voice
- 3G - for voice and data
- 4G - for broadband internet experiences
- 5G - ?

5G does not seem to be a reality in India in 2020 due to several pressing telecommunication issues

Mobile data speed comparison & challenges



Top 5 IoT challenges

1. Complexity/ technical challenges
2. Lack of budget/ staff resources
3. Lack of knowledge
4. Haven't found the right IoT solution
5. Security

With 10Gbps speed through 5G, improved performance and latency, IoT can play a vital role in economic growth

IIOT: Industrial Internet of Things, the definition

❑ Connected Industry

The collaboration of Machine Learning, Big Data, Sensors, Machine to Machine (M2M) communication, Automation, Artificial Intelligence and IoT gives us a promising formula for near perfect Industrial Operations

❑ Opportunities and benefits of IIoT are:

- Improved operational efficiency (e.g., improved uptime, asset utilization) through predictive maintenance and remote management.
- The emergence of an outcome economy fuelled by software-driven services, innovations in hardware and increase in visibility of products, processes, customers and partners
- New connected ecosystems, coalescing around software platforms that blur conventional industry boundaries.
- Collaboration between humans and machines, which will result in unparalleled levels of productivity and engaging work experiences in high numbers



Industrial Internet of things is also coined as “connected Industry” or “Industry 4.0”

IloT: Domains and problems

□ The domains adopting IloT are:

Process & Discrete Manufacturing



Wholesale and Retail



Utilities & Logistics



□ Current Problems:

Connectivity Challenges

Security

Transparency

Standards

Performance & Scaling

Longevity

Privacy

Proprietary Ecosystem

Cost Constraints

Legacy Systems

Hyper connectivity

Configuration

Industrial Internet of things has major constraints such as interoperability, connectivity and awareness

IoT Use cases: 1. Connected Cars/Telematics

Purpose

- ❑ Provide mobile access to customers for:
 - a. Control the car e.g. start / stop / open trunk / lock / unlock etc
 - b. See any critical parameters that may impact driving conditions e.g. Tyre pressure, Oil, Heat etc
 - c. Provide statistics on driving behaviour
- ❑ Provide Service Center / Garage with:
 - a. Statistics that can help preventive and predictive maintenance
 - b. Provide better service to the customers by analyzing exceptions
- ❑ Provide Sales representatives:
 - a. Ability to offer connected cars as a solution
- ❑ Provide Insurance advisor:
 - a. Differential insurance products based on driving patterns

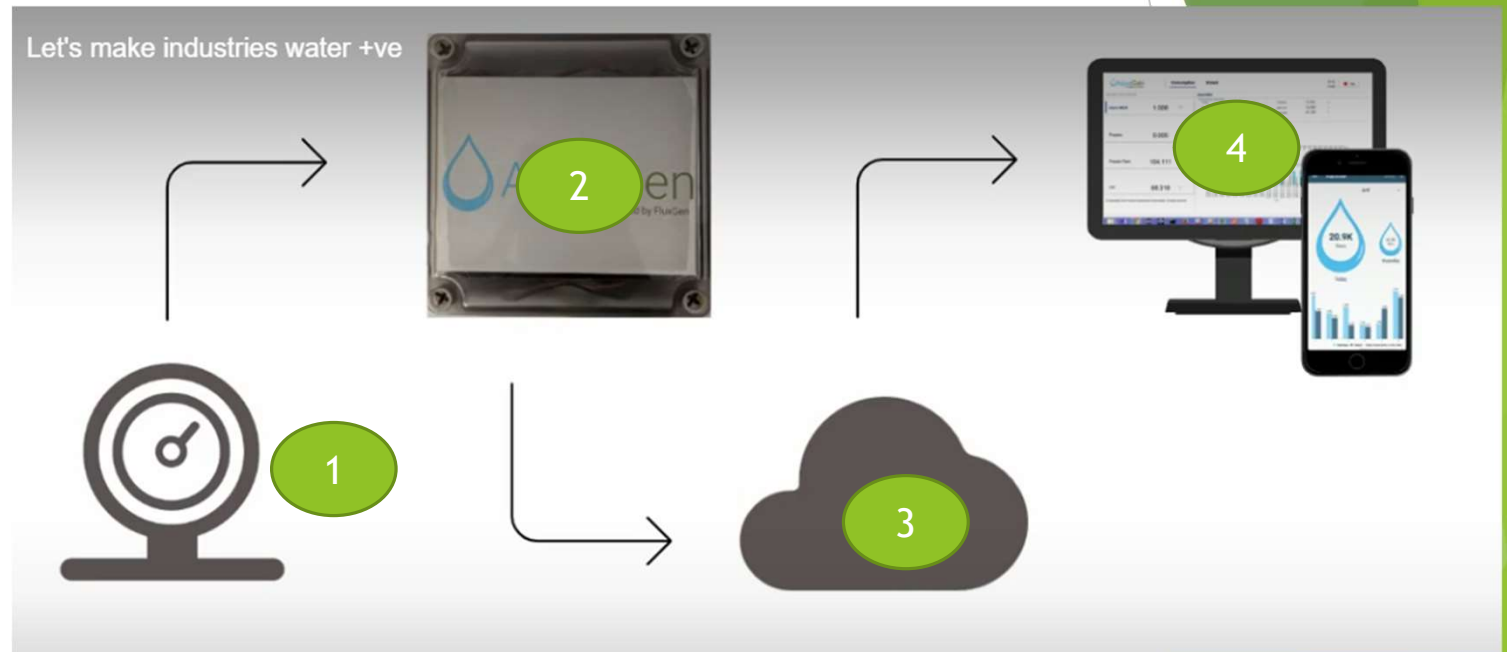


Automotive sector will have a major boost with currently connected cars and autonomous cars in future

IoT Use cases: 2. Water management

Purpose

1. Water monitoring sensors at facility
2. Cloud connector aggregates data from sensors
3. Collected data processed in cloud
4. Consumption details at your fingertips



Out of total water available on earth for “human use” , 50% is consumed by industries where IoT can help

IoT Use cases: 6. Climate change

Purpose : India has the largest number of LEED projects outside North America. Here's how ITC Hotels helped make that happen.

When Hillary Clinton landed in New Delhi in 2009, she drove from the airport to ITC Green Center, a building in the satellite town of Gurgaon.

That building, which she called "a monument to the future", is the headquarters of the hotels division of Kolkata-based conglomerate ITC.

In 2005, ITC Green Center became the world's largest office building to be certified LEED Platinum, the highest green-building rating from USGBC (US Green Buildings Council).

The building reuses and recycles all water, and daylight lights up all offices inside, while insulated glass keeps out heat. All this has reduced energy consumption by half. It cost 10-12 percent more than a typical building, but the company says it's recovered the investment.



ITC head office in a Delhi suburb is the world's biggest LEED Platinum office building.

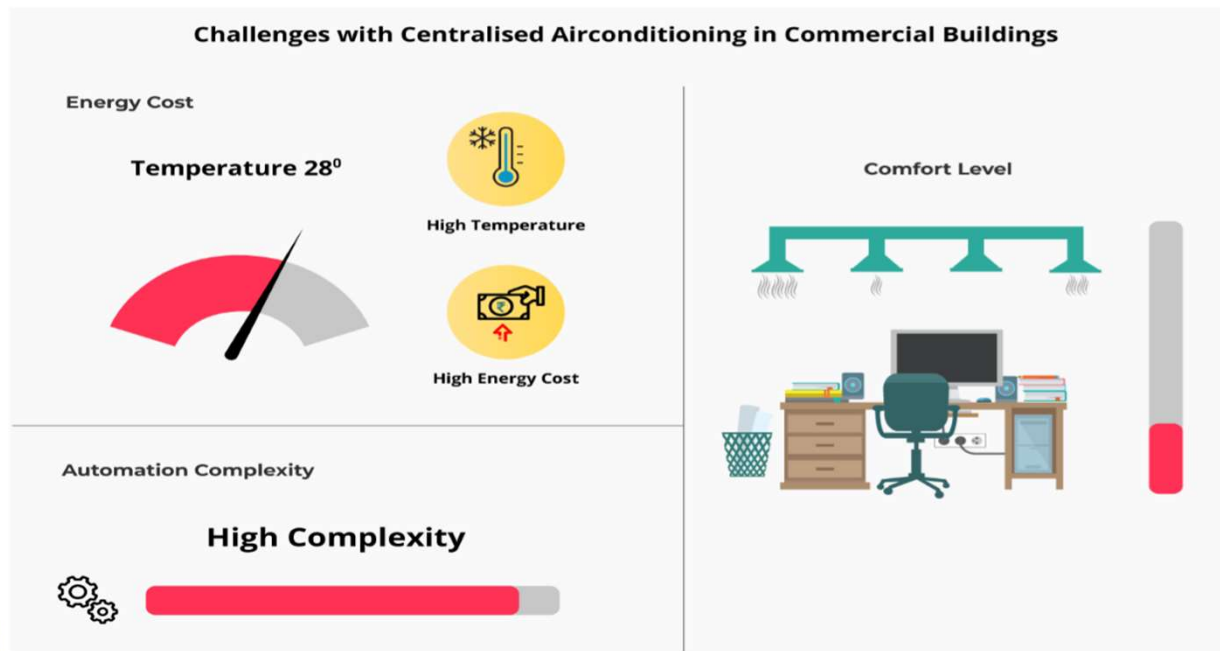


ITC's Gardenia hotel in Bangalore, Asia's first LEED platinum hotel, has a non-AC lobby.

ITC- 1st hotel chain in India to incorporate green as business strategy: "triple bottom line"...people, planet & profit.

IoT use case- BMS using HVAC Sensors









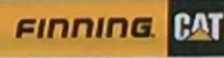
Control of air supply based on people present in vicinity and temperature based on thermal heat load in building management system centralized air-conditioning



Efficient HVAC Usage
& Effective Energy
consumption

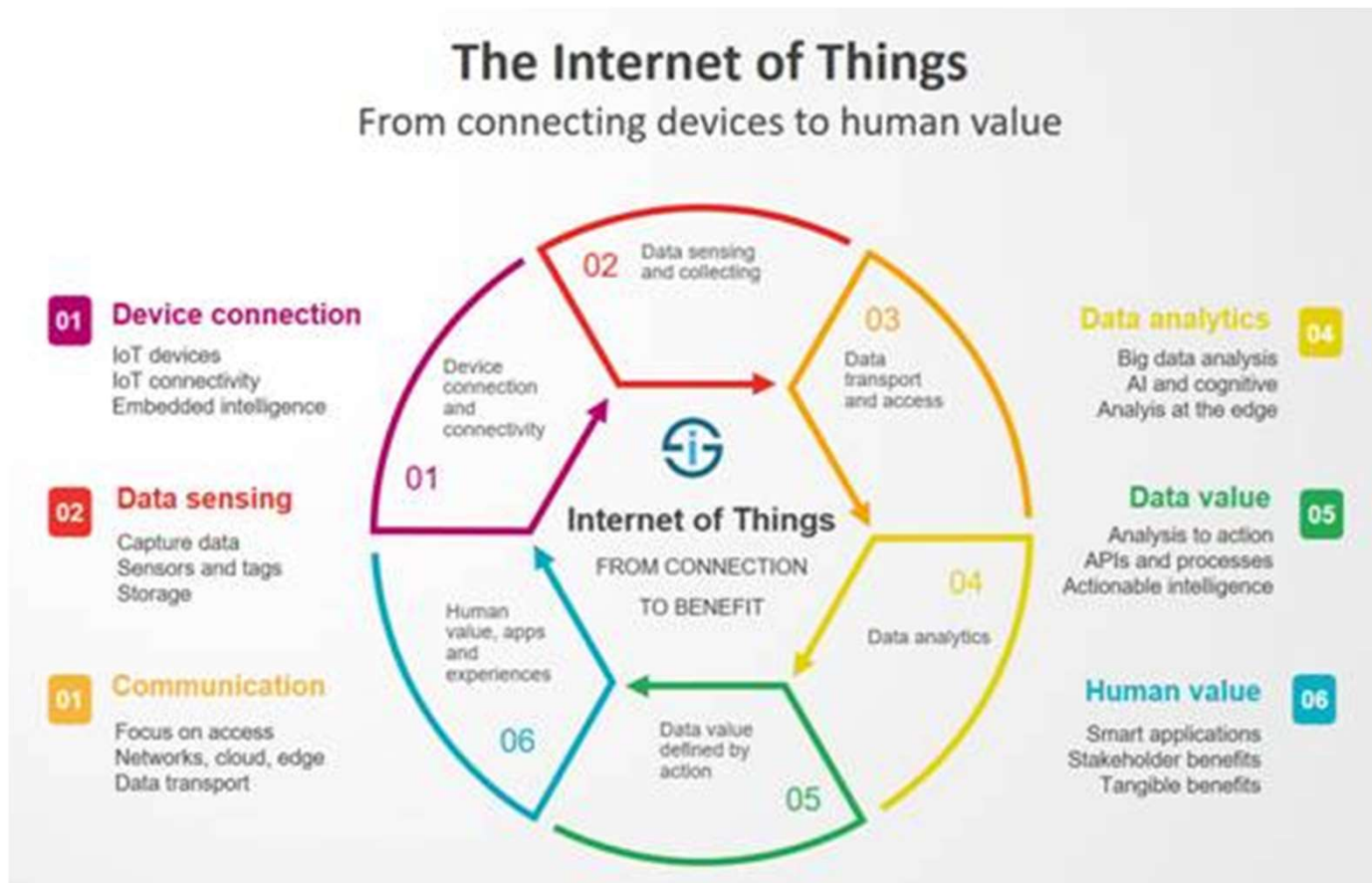
Reduce electricity consumption costs. Streamline energy efficiencies. Ensure productive workspace.

Global IOT use cases and savings \$\$\$

 Johnson Controls Connected chillers are back online 9x faster than unconnected equipment, avoiding more than \$300,000 in hourly downtime costs	 RAC Reduced its accident rate by 25% and fuel usage by 20%, reporting annual savings of \$1.8 million	 Tetra Pak Cut down-time cut for each packaging line by up to 48 hours, saving €30,000 for customers	 thyssenkrupp Data from sensors and systems to create valuable business intelligence and reduce downtime by 50%	 DUNAV NET Keeping farmers informed about irrigation, disease control diseases, and pest has led to increased yields of 30%, and a 20% reduction in water use
 HERSHEY'S Licorice extruders on Twizzler's production line are performing at peak optimization, saving over \$500K/year on materials alone	 Rolls-Royce Rolls Royce "power by the hour" model provides maximize availability by cutting fuel consumption by 1% and up to \$250,000 per plane, per year.	 Rockwell Automation Access to production and supply chain data worldwide, reduced downtime costs by as much as \$300,000 per day	 FINNING CAT Enabled customers to transport more than 1M additional tons of cargo, and reduce fuel consumption by 17%	

IoT savings are there for real, join the bandwagon before it is too late!

Integrated solution of IOT



The ecosystem needs more connect between solution provider ie startups and industry ie consumers.

Future of Sensors and IOT

	Purpose	MEMS/Micro format*	
Basic Sensing	Force	Accelerometer	
	Pressure	Pressure sensors	
	Temperature	Thermocouple	
	Light	Photodetector	
Emulating Human Sensing	Inertia/Orientation	Inertial device, gyroscope,	E-compass
	Touch	Haptic, touch sensors	
	Hearing	Microphones	
	Vision	Image sensors	Micromirrors/lenses, microdisplays, auto-focus
	Speech	Microspeakers	
	Smell	Gas sensors,	e-nose
	Taste	Moisture/humidity	
	Infrared	Microbolometer, IR sensors	
Uses	Ultrasonic	Microphone	
	Radio frequency	Oscillators, tuners, switches	
	Chemistry	Microfluidics, micropumps, biosensors	
	Electrical	Electrode sensors	
	Energy	Energy harvesting, microbatteries	
*Key		Established	Early Commercial Emerging

Present & Future MEMS sensors

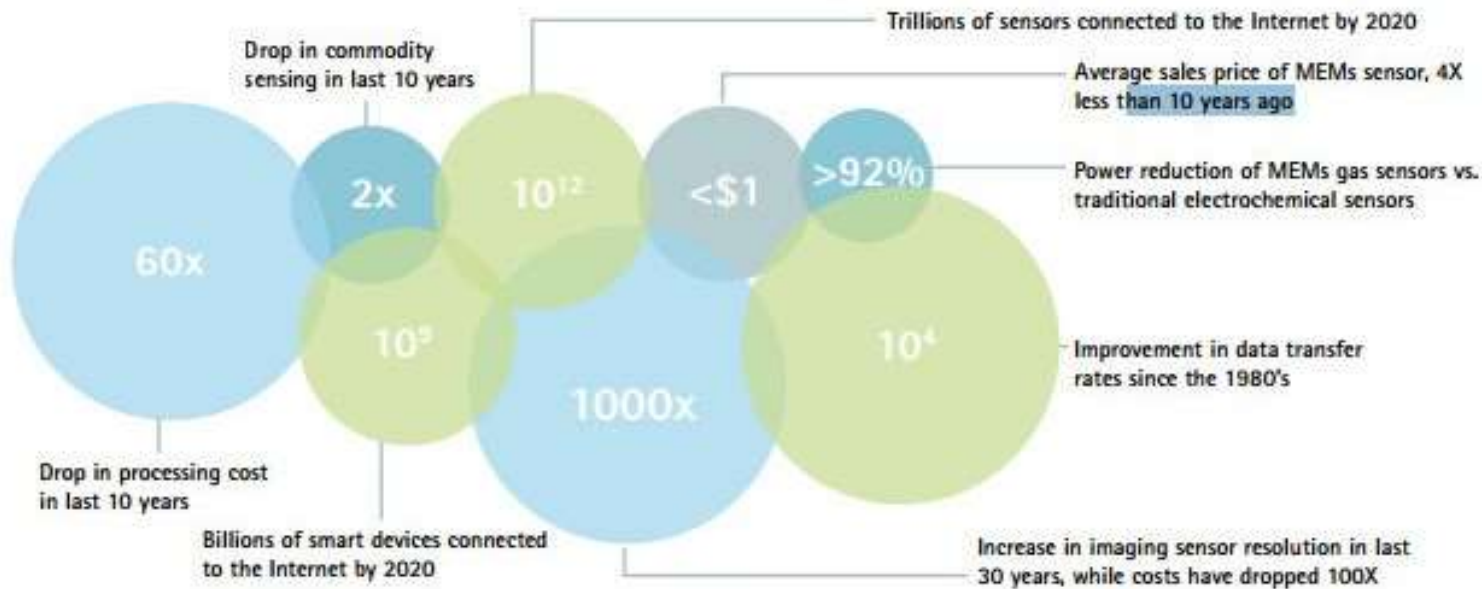
Many Possibilities

- Everything can be sensor now
- We can update sensors firmware
- Accessible sensors: the hypersense revolution

Sensing is going to evolve rapidly now which has been the case in past too, the key is being "Smart".

Future of Sensors and IOT (Contd..)

Technological advancement that enable sensing

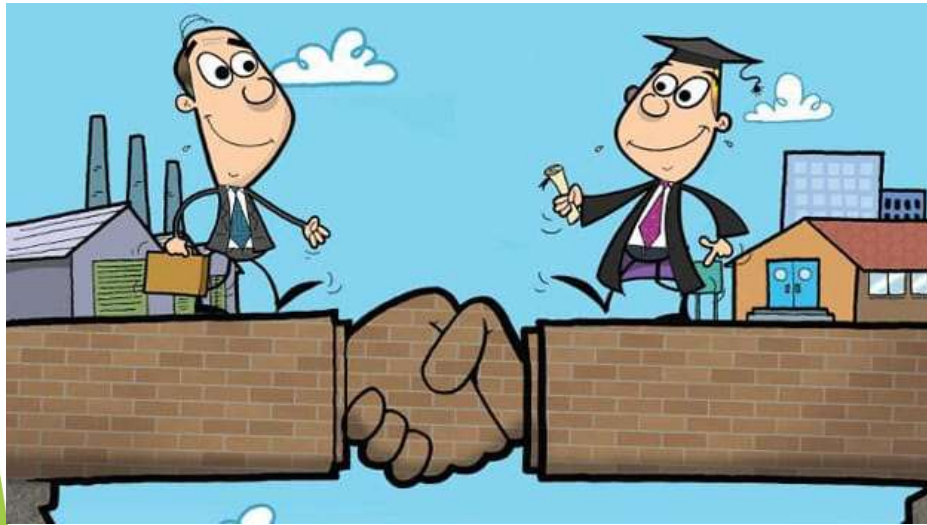


Futuristic sensors

- "Unobservable" detection sensors
- Depth resolution
- Self-healing sensors
- 3D image sensors
- Sensors for detection of elements & atoms
- Intelligent dust sensors

Sensing is going to evolve rapidly now which has been the case in past too, the key is being "Smart".

Takeaways



- ▶ IoT: changemaker to our quality of life
- ▶ IoT Applications are interconnected
- ▶ IoT has constraint of complexity/technical challenges
- ▶ IoT reduces cost & improves business processes
- ▶ Disruption is the key, Technology a great enabler
- ▶ IoT market set to touch \$457B in 20' from 157B in 16'
- ▶ IoT devices in 2020 expected to be >30 billion nos.
- ▶ New terms AIOT, Digital twin & Internet of Everything



Thank You

Any Questions!

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