

Internet of Things

Department of Computer Science and Engineering
School of Technology, PDEU, Gandhinagar

Introduction to Internet of Things

- Internet of Things (IoT) refers to the interconnection of computing devices embedded in everyday objects via internet, enabling them to send and receive data
- Things = HARDWARE + SOFTWARE + SERVICES

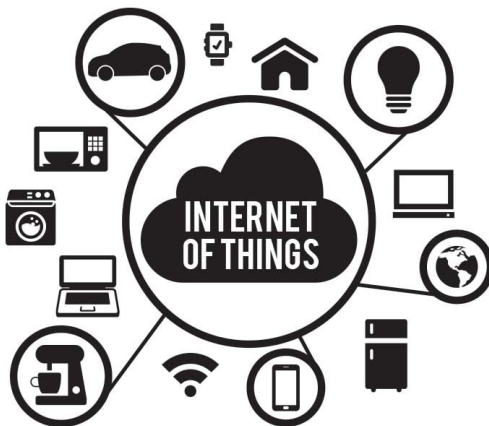


Figure 1 : Internet of (every) thing

Growth of Internet from Nowhere to Everywhere

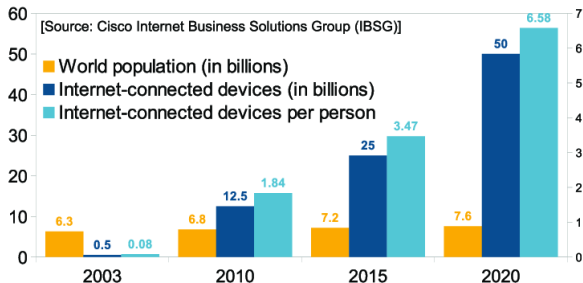


Figure 2 : Growth of Internet from Nowhere to Everywhere

Introduction to Internet of Things

Interdisciplinary IoT

- Data is everything and everywhere (capture it)
- Scope of IoT is not limited to getting the device connected to internet, but is more about the exchange of meaningful information from one device to another to acquire purposeful results.
- Not a single technology, but a combination of technologies and domain knowledge

Design Goals

- Any Time - Any Device
- Anyone
- Any Service/ Any Business
- Any Network (Non-homogenous)
- Anywhere/ Any Location

Introduction to Internet of Things

Applications

- Vehicle, Assets, Pet and Human Tracking
- Agriculture and Resources, including Water
- Energy Sector
- Safety/ Vigilance/ Security Systems
- Embedded Applications/ Mobile Applications
- Healthcare
- Telemedicine
- Smart City

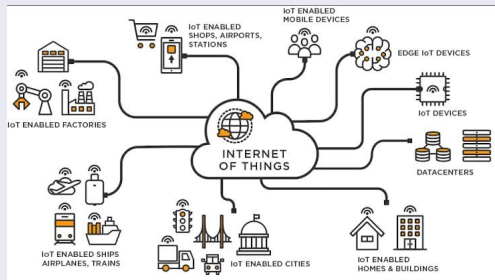
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Introduction to Internet of Things

Characteristics of IoT

- Connectivity
 - Things in IoT should be connected to the IoT infrastructure
 - Anyone, anywhere, anytime connectivity should be guaranteed at all time
 - Without connection nothing makes sense
- Intelligence and Identity
 - Extraction of the knowledge from the generated data is very important
 - Each IoT device has a unique identity (eg. IP address)
 - Identification helps in tracking the equipment and for querying its status
- Scalability
 - Devices connecting to IoT network increasing day by day
 - IoT setup should be capable of handling the massive expansion
 - The amount of generated data is enormous and should be handled appropriately

Introduction to Internet of Things

Characteristics of IoT

- Dynamic and Self-Adapting (Complexity)
 - IoT devices should dynamically adapt themselves to the changing contexts or scenarios
 - eg Camera for Surveillance
- Architecture
 - IoT architecture cannot be homogeneous in nature
 - Should be hybrid, supporting different manufacturer's products to function in IoT network
- Safety
 - Danger of sensitive personal details of user getting comprised when devices connected to the internet
 - Data security is a major challenge along with the equipment safety

M2M vs IoT

M2M vs IoT

- Direct communication system between the devices using wired or wireless communication channels without any human interaction
- Refers to networking of machines (or devices) for the purpose of remote monitoring and control and data exchange
- Just concern about Interaction or communication between two devices or machines
- M2M term was introduced by telecommunication service providers and pays emphasis on machine interactions via one or more telecom/ communication networks (eg. 3G, 4G, 5G, Satellite, Public networks)
- M2M is a part of IoT, M2M standards have prominent place in the IoT standard landscape
- IoT has a broader scope than M2M, since it comprises a broader range of interactions, including interactions between devices/things, things and people, things with applications and people with applications
- IoT includes the notion of internet connectivity, but is not necessarily focused on use of telecom networks
- M2M eg. Automatic Meter Reading (AMR), Home Appliances, Healthcare Device Management

M2M vs IoT

M2M	IoT
Deployed in a closed standalone system	Connects to public and larger network
Uses non IP protocols	Uses IP based protocols
Can use internet but is not necessary	Using cloud service is must
Communication is mostly one way	Back to forth communication
Needs triggered response to operate	No need of triggered response to operate
Integration options are limited as propriety communication standards are used.	No limit for integration as standard public protocols are used to exchange data.
Used to monitor and control	Can be used for multiple applications
Only machine to machine communication	Machine to machine, human to machine & machine to human all options are there.
Data transmitted is always structured	Both structured and non structured data can be transmitted.
Hardware based	Software based
B2B business model	B2C business model
Limited devices in scope	Large devices in scope
Data collected is not shared with other applications	Data collected are shared among various applications

Questions Please ...