INTRODUCTION TO INTERNET of THINGS

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Course Objectives:

Enable the student to

1. To understand the basic concepts of IoT and device connectivity.
2. To acquire Knowledge in Real time data logging and data analytics on cloud.
3. To explore the potential areas utilizing embedded controllers/processors in real time systems.

Course Outcomes:

The student will be able to

1. Understand internet of Things and its hardware and software components
2. Interface I/O devices, sensors & communication modules
3. Remotely monitor data and control devices
4. Compare the connectivity technologies and protocols in IOT
5. Infer Security issues in IOT
6. Develop real life IoT based projects

INTERNET of THINGS

- Internet technology connecting devices, machines and tools to the internet by means of wireless technologies.
- Over 9 billion ‘Things’ connected to the Internet, as of now.
- ‘Things’ connected to the Internet are projected to cross 20 billion in the near future.
- Unification of technologies such as low-power embedded systems, cloud computing, big-data, machine learning, and networking

DEFINITION FOR IOT

IoT: Extending the power of the internet beyond computers and smartphones to a whole range of other things, processes and environments. Those “connected” things are used to gather information, send information back, or both.

ALTERNATE DEFINITION

The Internet of Things (IoT) is the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment

The title of the report was “Internet of Things”

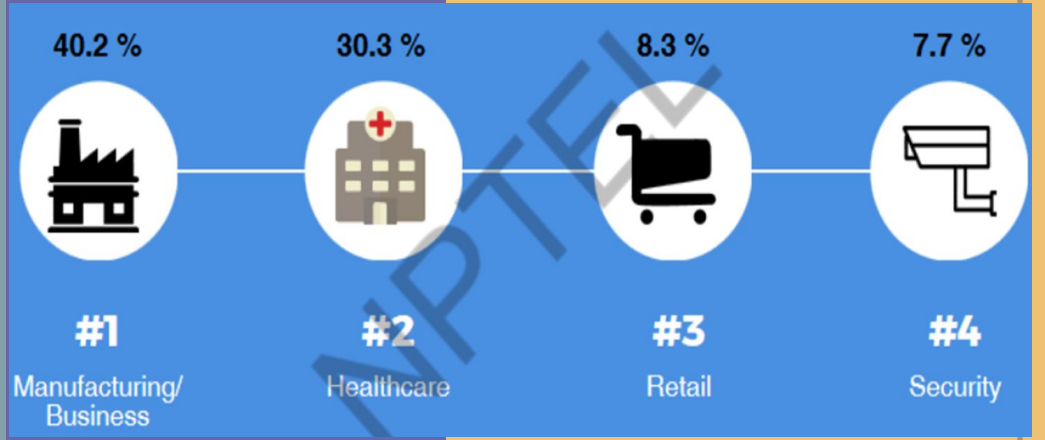
- Discussed the possibility of internet connected M2M connectivity networks, extending to common household devices.
- Some areas identified as IoT enablers:

- RFID,
- Nanotechnology,
- Sensors,
- Smart Networks.

Characteristics of IoT

- Efficient, scalable and associated architecture
- Unambiguous naming and addressing
- Abundance of sleeping nodes, mobile and non-IP devices
- Intermittent connectivity

IOT MARKET SHARE



Business/Manufacturing

· Real-time analytics of supply chains and equipment, robotic machinery.

Healthcare

· Portable health monitoring, electronic recordkeeping, pharmaceutical safeguards.

Retail

· Inventory tracking, smartphone purchasing, anonymous analytics of consumer choices.

Security

EVOLUTION OF CONNECTED DEVICES

ATM : These ubiquitous money dispensers went online for the first time way back in 1974.

WEB : World Wide Web made its debut in 1991 to revolutionize computing and communications.

SMART METERS :The first power meters to communicate remotely with the grid were installed in the early 2000s.

DIGITAL LOCKS : Smartphones can be used to lock and unlock doors remotely, and business owners can change key codes rapidly to grant or restrict access to employees and guests.

EVOLUTION OF CONNECTED DEVICES

SMART HEALTHCARE

• Devices connect to hospitals, doctors and relatives to alert them of medical emergencies and take preventive measures.

SMART VEHICLES

• Vehicles self-diagnose themselves and alert owners about system failures.

EVOLUTION OF CONNECTED DEVICES

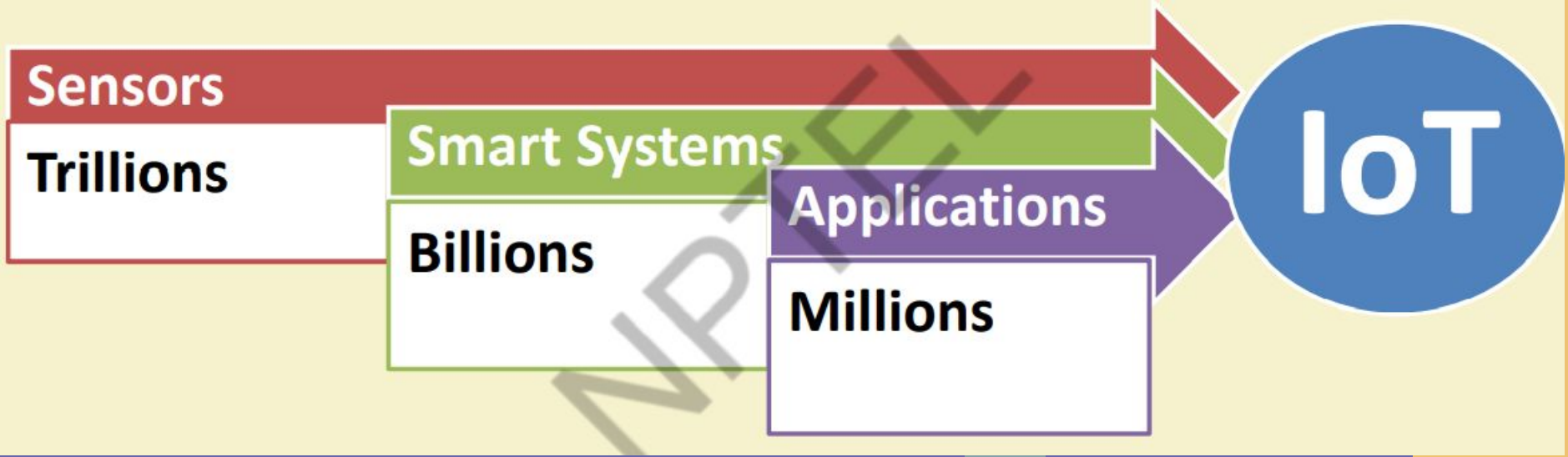
SMART CITIES

- City-wide infrastructure communicating amongst themselves for unified and synchronized operations and information dissemination.

SMART DUST

- Computers smaller than a grain of sand can be sprayed or injected almost anywhere to measure chemicals in the soil or to diagnose problems in the human body.

IOT NETWORK



APPLICATIONS OF IOT

Modern Day IoT Applications

- Forest Fire Detection
- Air Pollution
- Snow Level Monitoring
- Landslide and Avalanche Prevention
- Earthquake Early Detection
- Water Leakages
- Radiation Levels
- Explosive and Hazardous Gases
- Supply Chain Control
- NFC Payment
- Intelligent Shopping Applications
- Smart Product Management

APPLICATIONS OF IOT

Modern Day IoT Applications

- Smart Parking
- Structural health
- Noise Urban Maps
- Smartphone Detection
- Traffic Congestion
- Smart Lighting
- Waste Management
- Smart Roads

❑ River Floods

- Smart Grid
- Tank level
- Photovoltaic Installations
- Water Flow
- Silos Stock Calculation
- Perimeter Access Control
- Liquid Presence

BASELINE TECHNOLOGIES

A number of technologies that are very closely related to IoT include

- Machine-to-Machine (M2M) communications,
- Cyber-Physical-Systems (CPS)
- Web-of-Things (WoT).

CHALLENGES

- Limited resources – bandwidth, memory and battery.
- Security issues in physical layer, network layer and application layer.
- Heterogenicity – devices, protocols and software.
- Standardization – security, communication and identification.
- Interdependence – two different application in same area.

IOT RESULTING IN ADDRESS CRUNCH

Estimated 20-50 billion devices by 2018

- Reason is the integration of existing devices, smart devices as well as constrained nodes in a singular framework.
- Integration of various connectivity features such as cellular, Wi-Fi, ethernet with upcoming ones such as Bluetooth Low Energy (BLE), DASH7, Insteon, IEEE 802.15.4, etc.
- The reality as the present day networked devices have outnumbered humans on earth.

IPV4 VERSUS IPV6

Example of IPv4:

69.89.31.226

Example of IPv6:

2002:4559:1FE2::4559:1FE2

	IPv4	IPv6
Developed	IETF 1974	IEF 1998
Length (bits)	32	128
No. of Addresses	2^32	2^128
Notation	Dotted Decimal	Hexadecimal


THANK
YOU