Emerging Technology: Internet of Things (IoT)

Course: Master of Arts (Hindi)
Course Name: Computer and Information Technology
Course Code: HIND4014
Semester: II
Session: 2019-20

Mr. Joynath Mishra
Assistant Professor (Guest)
Department of Computer Science and Information Technology

Mahatma Gandhi Central University
Bihar, INDIA

May 26, 2020

Outline

Objectives

Objectives

- Context of Internet of Thing
- Architechture of IoT
- Importance and applications of IoT

Introduction

- An electronic platform to convey some information to central processing unit
- IoT devices are embedded computer
- Inter-network of things
- IoT things are daily life used electronics, software, sensors, actuators enabled with internet
- Informations are collected without hman interaction
- Advanced automation and analytics system
- IoT is involved with information collection and performance of variety of assigned task through internet

History

- 1990: The first Internet connected toaster is born; Developed by John Roomkey
- 1999: The term IoT was coined by Kevin Ashton
- 2000: LG announces its first Internet connected refrigerator plans

Introduction (Contd...)

Example

Smart Street Light

- Sensor
- Controller
- Actuator
- Communication Interface

A Complete "Thing"

- Power
- Sensor
- Controller
- Actuator
- Communication Interface

Controller Selection Parameters

- Cost
- Memory
- Power consumption

Characteristics

Features

- Sensors, controller and actuators are the main concern of a Thing
- IoT devices are connected to a server or cloud and its connectivity is bidirectional
- Large amount of IoT devices builds a system and makes easy of data analysis
- Things should be smart and enhance real time experience
- Things should be fast and engaged with the environment to collect the data
- Message delivering system/actuator should be smart(end point management)

Architechture

Ingredients of a Thing

- Connect (sensor)
- Compute (controller)
- Communicate (communication interface)
- Storage (may be present based on system)

Computer Environment

- Python is preferred language for IoT programming

Architechture (Contd...)

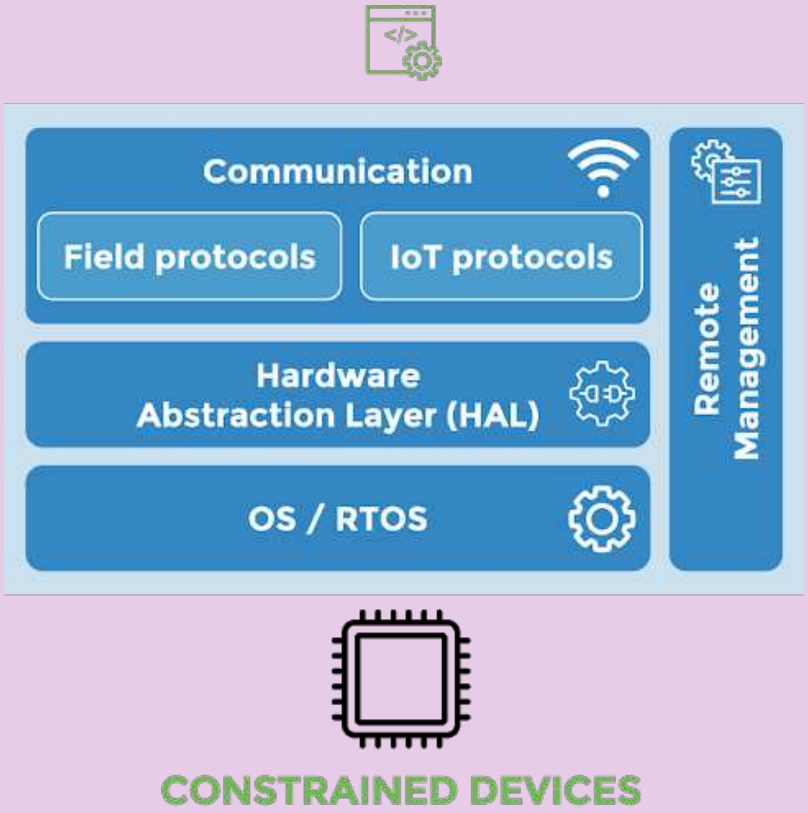

Figure 1: Internet of Things Architechture (Source: Internet)

Wireless Sensor Network (WSN) is the part of IoT which aggregate the data by individual or set of sensors and its inter-connected network. Whereas, IoT is the extension of WSN by internet and self information delivering system.

Communication Models

IoT Communication Models

1. Device to Device
2. Device to Cloud
3. Device to Gateway
4. Device to Application

IoT performs device to device connection (may be other) which are cyber based physical system, but smartphones perform machine to machine(M2M) connection.

IoT Protocols

- Bluetooth [Bluetooth 4.2 core specification, 2.4GHz (ISM), 50-150m, 1 Mbps (Smart/BLE)]
- Zigbee (ZigBee 3.0 based on IEEE802.15.4, 2.4GHz, 10-100m, 250kbps)
- Z-Wave (Z-Wave Alliance ZAD12837 / ITU-T G.9959, 900MHz (ISM), 30m, 9.6/40/100kbps, 16 bit address space)
- 6LowPAN (Bluetooth Smart (2.4GHz) or ZigBee or low-power RF (sub-1GHz))
- Thread (Thread, 2.4GHz (ISM), Mesh network)
- WiFi (IEEE 802.11n, 2.4GHz and 5GHz, 50m, 600 Mbps maximum)
- Cellular (GSM/GPRS/EDGE/3G/4G, 2100MHz maximum, 35km max for GSM, 3-10Mbps for 4G)

Advantage[1]

Advantage

- Improves the autonatic system work in industry
- IoT collects system status and notify to user as well as manufacturer to resolve the issue once product comes to applicability
- Internet connected sensors has optimized the technical demand and improving them
- Automatic data collection and statistical analysis reduce decission making time
- Efficient resource utilization
- Once all sensors are connected via a single network, then system is more secure

Disadvantage

Disadvantage

- IoT work over the internet and it may lead various kind of network attacks
- Without inetrvention of user, all substantial personal information is provided to the manufacturer
- Complex network and management (but acceptable based on demanded technology)

Applications[2]

Smart City

- Transport
- Governance
- Energy and municipal related technology

Agriculture

1. Precision Farming
2. Smart Irrigation
3. Smart Greenhouse

Industrial Automation

1. Optimization and Time Saving
2. Quality Control and Inventory Management
3. Cost and Labour Efficient

Disaster Management

1. Prediction
2. Prepareness
3. Response
4. Recovery

Applications (Contd...)

Other Applications

- Wearables (wrist watch)
- Smart Home Applications
- Health Care

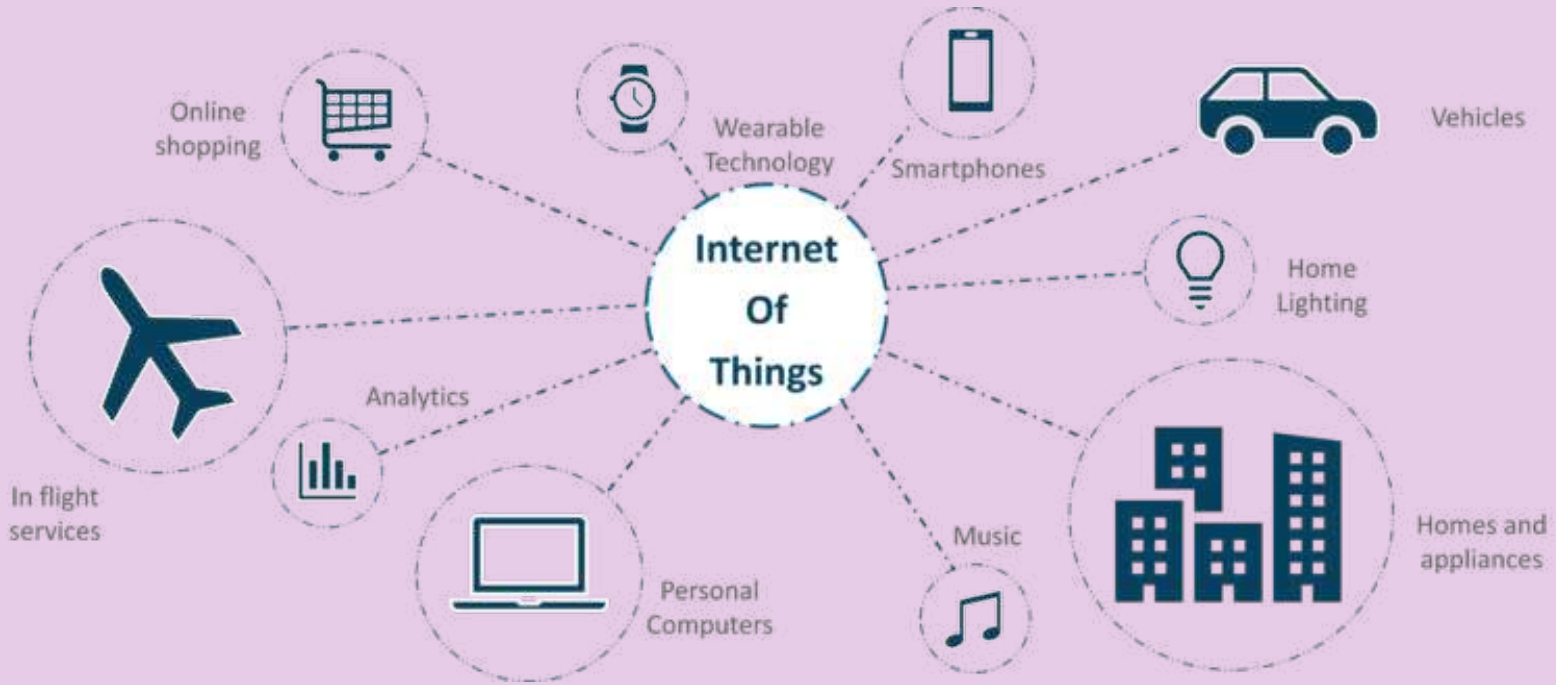

Figure 2: Applications of Internet of Things (Source: Internet)

Conclusion[3]

Conclusion

- IoT has a disadvantage over the security issue
- Still, if it become believable, it could improve the outcomes
- Here, less effort produces large amount of outputs
- Hence, it is more applicable in a confined area with same network connectivity

Future Scope

- Energy efficient algorithms need to be developed to consume power
- Privacy and security should be maintained
- Communication time between sensor, destination and actuator should be minimized

Exercise

Exercise

- What do you mean by IoT? Explain with a suitable example.
- What is difference between web of things and internet of things?
- Describe about the IoT Communication model and IoT protocols.
- Describe about the applications of IoT devices.

References I


S. C. Mukhopadhyay and N. K. Suryadevara, "Internet of things: Challenges and opportunities," in *Internet of Things*. Springer, 2014, pp. 1–17.


R. Buyya, *Internet of Things: Principles and Paradigm*. Todd Green, 2016.


S. Greengard, *The internet of things*. MIT press, 2015.

Mr. J. Mishra
MGCUB, INDIA

Get in touch via...

+91 9046174189

jaynath4025@gmail.com

Thank You...