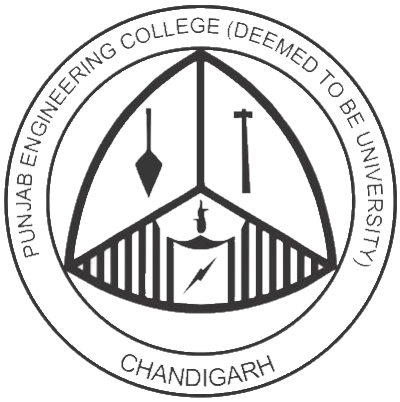
CSN 205
Technical Communication
Report

Internet of Things



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1 Introduction

What would happen if your electronic devices start communicating with each other and with you as well ?
How amazing would you feel if even before you wake up in the morning, water gets heated for a warm shower and toaster prepares your breakfast. All just because they were connected to your alarm clock and they were triggered accordingly. You wake up have a warm shower, enjoy your breakfast with your favourite music being played. What a wonderful morning it would be! Such morning are not far away. All this could be achieved with help of IoT and engineers are working hard to achieve this.

This is just one example of how things would change once all devices are equipped with proper sensors and are connected to the internet and everything gets implemented using IoT. You could control things happening in your house from your office. You could keep a security check on your children. The security of various places could be monitored on your smart phones, this is even happening now. The temperature of your house would be automatically maintained according to the weather conditions outside. You could give orders to your washing machine or your fridge will enjoying in a party. There would no long queues in shopping malls or grocery stores. Things would be automatically delivered to your house as and when required. Ambulances will be provided GREEN corridor and many lives will be saved. Our devices will keep a check on our health and would intimate us even if it recognizes any minor symptoms. Farming would improve as the devices installed would check the moisture as well as fertility content of the soil and would irrigate the fields according and would tell the farmers which fertilizers to be put. This would save a lot of water as well energy. Industry will be revolutionized as there will be decentralization and whole process would be automated and could even be monitored through remote access.

2 What is IoT ?

System of systems in which all electronic devices are connected to each other in a local area forming a system and these systems are further connected to form bigger network system

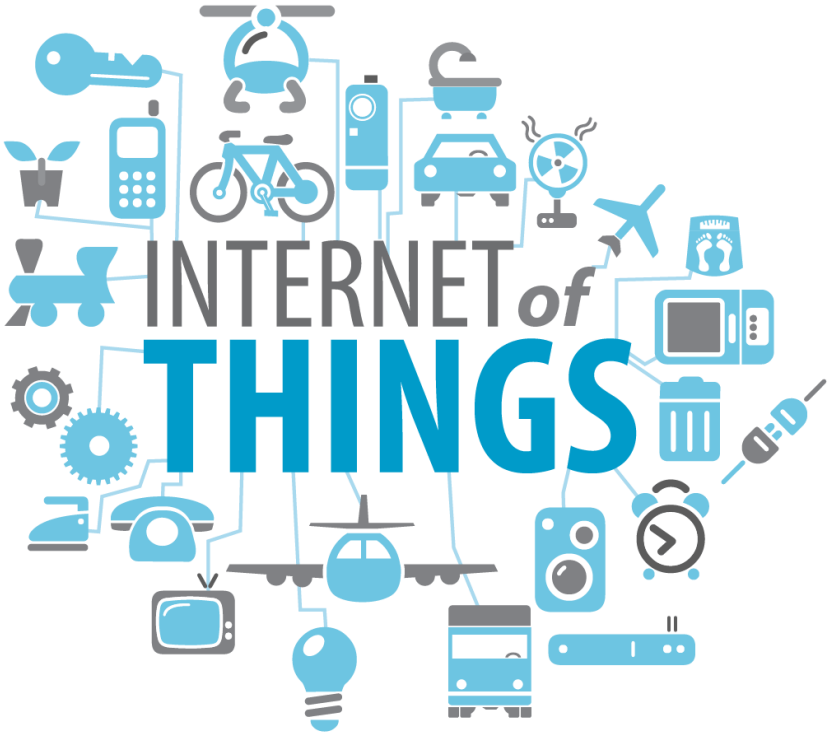

Figure 1: IoT - System of systems [1]

All devices are equipped with sensors and are connected to the internet. The sensors collect data, data is processed and smart solutions are offered.

3 Building blocks of IoT [2]

The basic architecture of an IoT system can be understood from a four-layer model as follow -
1) IoT devices and Gateways
2) Communication Network
3) Cloud or Server
4) IoT application

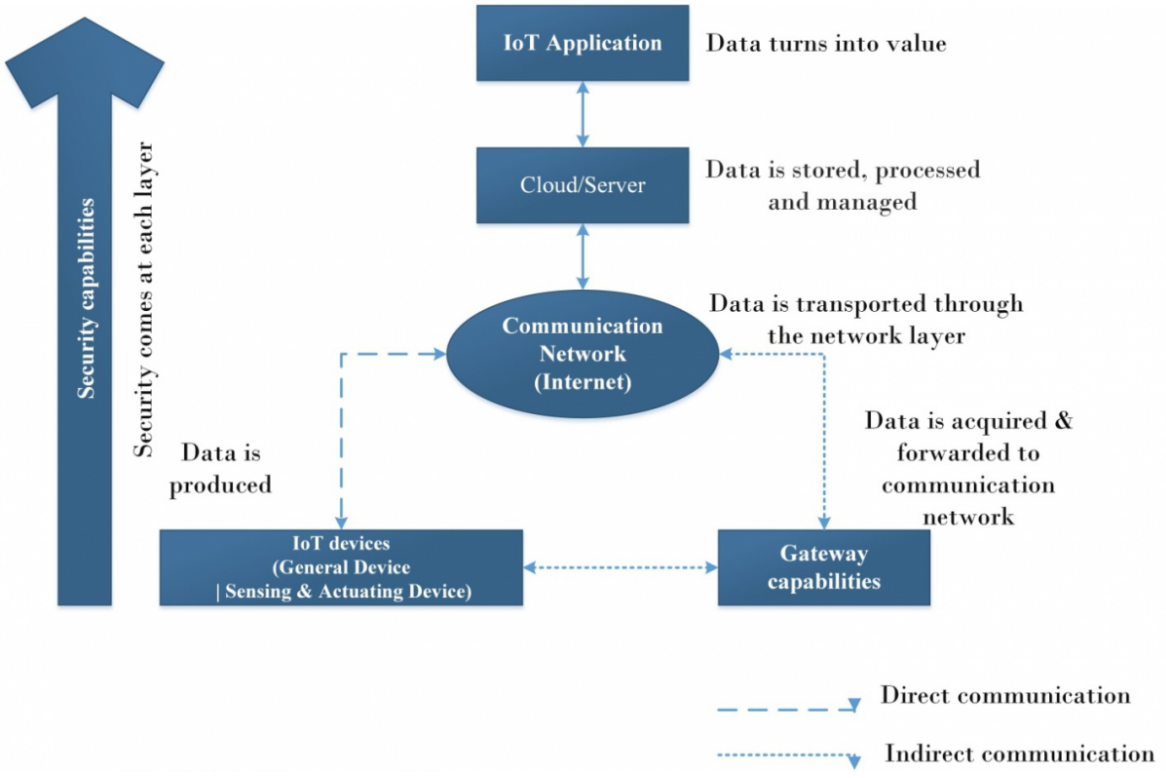

Figure 2: IoT Architecture [2]

3.1 IoT Devices

Any device or equipment counts as an IOT device if it satisfies the following requirements

- It is capable of communicating with other devices and connect with an internet network.
- It must be equipped with sensors and/or actuators. The sensors may be collecting static or dynamic information from the physical world.
- The device must have a controller or processor to capture data, memory to store it (often temporarily) and firmware or operating system to process captured data or data received from the server or cloud.

Gateways All devices in this network of IoT cant be connected to the internet. The solution to this is the introduction of an intermediate device known as gateway. All devices are connected to the gateway and data is send to it. The gateway is connected to the internet and gateway forwards the data. Similarly all data is received by the gateway through the internet and it forwards the data to individual devices.

3.2 Communication Network

The communication network is generally the typical internet network having different layers (Physical, Link, Network, Transport and Application) and communication protocols operating at different layers.

3.3 Cloud or Server

- The cloud or server is the edge of the IOT system.
- It is responsible for managing the connected devices and networks, manage device to device communications
- Implement IOT applications by operating and synchronizing different IOT devices and communication between them.
- To enable an IOT application, the cloud has to communicate with other private and public cloud services.

3.4 IoT Application

- The processing, mining and analysis of the data at the cloud is done by the IOT application.
- The IOT application is a software at the cloud server which extracts data, manipulate it to derive useful insights and manage to securely push insights to the target IOT devices.
- For example, an IOT application designed for home automation might process data from sensors and send commands from the cloud to operate home appliances.

4 Why IoT ?

- Objects will be able to speak to each other and do work for us, look after us.
- Intelligent objects will improve our interaction with the environment
- Since they are intelligent, they will do work on our behave, saving us from doing boring tasks
- So we can concentrate on what we enjoy
- Meanwhile objects collect data and take care of us
- Saves money, do shopping and save us from waiting in big lines

5 Applications of IoT [3]

- **Smart Homes :** Now a days homes are equipped with devices that implement IoT technology and make our lives simpler. These include smart thermometer, smart fridges, smart lights that switch on only when a person is physically present, smart door locks that give instant information to us on our smartphones and many more such devices. These devices help to save energy.

- **Smart Wearables :** Many wearable devices have emerged in the recent past which track our daily routine and help us to remain fit. There are many devices that have solely came for the purpose of entertainment or for providing us easier access such as smart watches and google glasses.

- **Smart City :** IoT projects under smart city include smart parking, smart water management, smart waste management, fast corridors for ambulance. Providing fast route for ambulances is very important as ever second for a patient or an accident victim is precious. Parking issue is arrising at a tremendous rate, IoT could solve this by providing you a parking slot in advance.

- **Smart Grid :** Smart grid keeps a track of the requirement of electricity in various regions and supply accordingly.

- **Industrial Internet :** The different tasks that are performed in an industry are all automated and can be decentalized all because of IoT. Even an industry could be remotely managed through internet.

- **Connected Car :** Using the technology of GPS, now any vehicle could be traced. This could be used in many ways such as monitoring children or any valuable goods. This helps in keeping track of traffic and controlling it.

- **Connected Health :** Our devices will keep a check on our health and would intimate us even if it recognizes any minor symptoms. Patients could be shifted to homes and doctors could remotely keep a check on their improvement.

- **Smart retail:** There would no long queues in shopping malls or grocery stores. Things would be automatically delivered to your house as and when required. Things would be automatically added to your shopping cart according to personal preferences.

- **Smart Farming :** Farming would improve as the devices installed would check the moisture as well as fertility content of the soil and would irrigate the fields according and would tell the farmers which fertilizers to be put. This would save a lot of water as well energy.

6 Future of IoT

- By 2020 approx. 50 billion products will be connected to the internet that will be 6 times more equipment than that of the world's would be population.
- Very soon all the electronic devices produced will be IoT enabled. They will come with sensors and actuators. They will make our life more convenient and efficient.
- Development scenario will completely depend on our needs, the creativity of the developer.
- IoT is going to be big, very big and very soon hopefully not taking all the controls and steer the human race.

7 Barriers to IoT Applications

- Different standards
- Lot of DATA – not known how to handle
- Not everyone wants to share DATA
- DATA selling
- Security concern

References

[1] https://www.coursera.org/learn/iot-cyber-security

[2] https://www.engineersgarage.com/Articles/Internet-of-Things-Architecture

[3] https://iot-analytics.com/10-internet-of-things-applications