

IOT & its APPLICATIONS

¹Diptangshu Dutta Chowdhury, ²Shantanu Sharma, ³Indu Khatri

^{1,2}Students, ³Assistant Professor

Department of Information Technology
BMCEM, Sonapat, India

Abstract: *The Internet of Things (IoT) brings connectivity to about every object found in the physical space. Today almost all devices are equipped with sensors and are controlled by controllers such as from cars to vacuum cleaners, air conditioners to water pumps. By embedding intelligence in everyday objects, they can be turned into smart devices and can be controlled from anywhere in the world. From connected fridges, cars to full blown cities, IoT creates opportunities in numerous domains.*

This paper briefly surveys some IoT applications and the impact IoT could have on societies, it shows how the various applications of the IoT enhances the overall quality of life and reduces management and costs in the various sectors.

Keywords—*IOT, Applications, Benefits.*

1. INTRODUCTION

The internet of things (IoT) is the working of physical devices with the help of internet, physical devices which are embedded with sensors, electronics, software's and network connectivity that enable these objects to collect and exchange data. It was first introduced by Kelvin Ashton in the year 1998[1].



[IoT]

Typically, IoT helps in advanced connectivity of devices, systems, and services that goes beyond machine-to-machine (M2M) communications [2]. In the modern world people wants more luxury, IoT enables hundreds of billions of physical devices which are embedded with smart sensors to interact with one another without human involvement, on a Machine-to-Machine basis [3].

2. APPLICATIONS

A. Smart Homes

A smart, connected home is an instance of this paradigm, inheriting all the aspects of connectivity of the devices involved. A smart, connected home is a residence equipped with sensors, systems, and devices that can [4] be remotely accessed, controlled, and monitored, typically via the Internet. This can include anything from cell phones, smart bulbs, fitness trackers, smart speakers and dishwashers, all the way to water quality sensors in pumping stations. The chance for interconnection is endless.

Smart home technologies can unlock both individual and society-wide advantage in dissimilar ways. They can provide economic saving, make better convenience for consumers, contribute to more ecological and sustainable living, reinforce the buyer's sense of safety and security, and more [5].



[IoT in smart homes]

B. Crowdsensing

The crowdsensing allows a huge population of mobile devices to measure incident of common interest over an extended geographic area, enabling the big data collection, [6] sharing, and analysis. It has major urban applications for the active or passive collection of traffic conditions, weather conditions, and even video images. The crowdsensing leverages everywhere mobile devices and the increasingly more pervasive wireless network infrastructure to collect and analyze sensed data without the necessity to deploy a huge set of stable sensors.

C. Road Traffic

The smart cities make sure that their citizens move from point A to point B as safely and efficiently as possible. To attain this, municipalities turn to IoT development and execution smart traffic solutions. The smart traffic solutions use dissimilar types of sensors, bring in GPS data from driver's smart phones and even their vehicles, to control the number, location and the speed of vehicles. Concurrently, smart traffic lights connected to a cloud management platform [7] permit monitoring green light timings and automatically change the lights based on current traffic circumstance to put a stop to congestion. Besides, using historical data, smart solutions for traffic management can forecast the flow of traffic and take measures to put a stop to a potential congestion.

D. Transportation

The IoT can play the important role in integration of communications, control, and information processing across various transportation. Application of the IoT extends to all aspects of transportation systems. Dynamic interaction between the components of a vehicle enables inter and intra vehicular communication, smart traffic control, smart parking, electronic, logistic and fleet management, vehicle control, and safety and road assistance [8]. Modern automobiles are equipped with sensors which are connected to the internet through control systems. IoT plays important role in road safety-systems, such as collision detection, lane change warning, traffic signal detection which enables us to have self-driving vehicles.

E. Security

The systems in the security category are often targeted for personal services, which are designed to monitor, find out, and control security and safety threats. Smart home security and safety systems typically range from remote entrance monitoring services for systems that automatically [9] recognize physical threats, namely a fire or a burglary, and autonomously take the corresponding action. This domain contains functionality that support alarm systems, cameras, and smart door locks. It ensures the peace of mind for the user as it can remotely intimate the user and also trigger a precautionary response that can either be predefined or be specified by the user.

Even security protocols like 2 factor authentication are enabled by IoT, smart sign-in, auto-unlocking etc are a few such examples.

F. Agriculture

Precision farming can be idea of as anything that makes the farming implementation more controlled and well-aimed when it comes to raising livestock and growing of crops. In this method of farm management, a key component is the use of IT and different items like robotics, autonomous vehicles, sensors, control systems, automated hardware, variable rate technology, and so on.

Drones are being used in agriculture in order to increase different agricultural practices. The ways ground-based and aerial based drones are being used in agriculture are crop monitoring, crop spraying, crop health assessment, irrigation, planting, and soil and field analysis etc. The major advantage of using drones include crop health imaging, integrated GIS mapping, effortless to use, saves time, and the potential rise yields.

Autonomous tractors aren't just mindless driving robots. They also operate with intelligence to maximize farming dexterity so in essence they are like Tesla(s) but for farms. Robotics collaborated to make tractors that use path generating algorithms calculate the most efficient area coverage pattern in a field taking into account the type of action, vehicle, size of implementing, number of vehicles in the field, implement turn radius.



[IoT in Agriculture]

G. Healthcare

In an environment where healthcare remains notably expensive to the average citizen, the overall age of the global population is increasing, and the prevalence of chronic diseases is on the rise, the advent of the Internet of Things shows assurance in helping healthcare facilities operate more efficiently. This technology is set to change the healthcare industry within the next decade, as it has great potential and multiple potential applications, from remote monitoring to medical device integration [10].

Using of connected devices such as smart wearable tech helps people monitor their health on the go, integration of heart rate monitors, ECG sensors, Blood O2 monitors, sleep monitors etc. into our day-to-day devices such as watches and ear/head phones enable us to monitor our health at all times.

3. ACCEPTANCE OF IoT

Two major issues in IoT are privacy of the humans and confidentiality of the business processes. Because of the scale of deployment, their mobility and often their relatively

low complexity, the cloud of things is hard to control. For ensuring confidentiality, a large number of standard encryption technologies exists for use. However, the main challenge is to make encryption algorithms faster and less energy-consuming. Moreover, an efficient key distribution scheme should be in place for using an encryption scheme. For small-scale systems, key distribution can happen in the factory or at the time of deployment, but for ad-hoc networks, novel key distribution schemes have only been proposed in recent years.

For privacy, the situation is more serious; one of the reasons is the ignorance (regarding privacy) of the general public. Moreover, privacy-preserving technology is still in its infancy: the systems that do work are not designed for resource-restricted devices, and a holistic view on privacy is still to be developed. The heterogeneity and mobility of THINGS in IoT will add complexity to the situation.

Also, from a legal point of view, some issues remain far from clear and need legal interpretation; examples include the impact of location on privacy regulation, and the issue of data ownership in collaborative clouds of THINGS. Network and data anonymity can provide a basis for privacy, but at the moment, these technologies are mainly supported by rather powerful equipment, in terms of computing power and bandwidth.



4. CONCLUSION

IoT has the potential to dramatically increase the availability of information, and is likely to transform companies and organizations in virtually every industry around the world. As such, finding ways to leverage the power of the IoT is expected to factor into the strategic objectives of most technology companies, regardless of their industry focus. The number of different technologies required to support the deployment and further growth of the IoT places a premium on interoperability, and has resulted in widespread efforts to develop standards and technical specifications that support seamless communication between IoT devices and components.

But it's already very evident that even today we are leaps and bounds ahead than where we were just a few years back and now IoT isn't just another concept but is already a reality. IoT enabled devices are no longer for only the selected few but, is now affordable, easy to integrate and very reliable to use for the masses.

We in our day-to-day lives interact with hundreds of IoT

enables devices without even our knowledge, from our smart phones to smart watches, our cars to the metro trains, from self-checkout stores to even our offices and homes, smart fridge(s), smart ACs, smart speakers to even smart fans and smart toilets (wont we all like one of them) we are surrounded with such devices and it has made our lives a lot more comfortable, enjoyable and efficient.

It's true that there are a lot of challenges that we still have to overcome privacy and security being the primary ones but everything has a learning and acceptance curve and the world has realized the potential and the necessity of this magical technology and is working at developing standards and solutions to make this an even more integrated and enjoyable experience.

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