

INTERNET OF THINGS AND ITS APPLICATIONS

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ABSTRACT: Nowadays in technology internet of thing (IOT) plays an important part that gives everyone a smart way of living life. It helps us to convey with digital machines. It gives the system that contains things around us. Sensors are attached to these things and it is connected via internet by two methods wireless network structures as well as wired structures. It has transformed our lives from traditional to high technology lifestyle. IOT is getting improved day by day and makes it easy in many important fields such as smart homes, smart cities, smart transportation, energy saving, pollution control, smart industries. In this paper, IOT and Applications of IOT are explained which help the readers to learn about what IOT is and its importance to our world.

Keywords: Internet of Things, Smart Machine, Wearables, Connected device

I. INTRODUCTION

The internet of Things was coined by Kevin Ashton [7]. When the IOT was introduced to the world with such a communication concept, many companies adapted to it and understood the whole significance and also tried to correlate it to future aspects. At regular intervals of time, many companies invested in their idea of IOT. [8]



Figure 1. IOT all over world

The internet of Things (IOT) has a very profound effect on both science and business. It has been the most important and strong creation in the history of mankind and now with IOT, the internet is also more favourable to make life smarter in every field that makes our work easy today. IOT is a technology of the Internet accessing, it obtains intelligent behaviour by communicating information about themselves.

In the coming future, there will be highly distributed storage and communication services among computers, user, smart machines and platform that are connected with wireless as well as wired sensors like machine to machines gadget and radio frequency identification label which will generate well distributed asset which are interlinked by a active network. The language of data exchange would be established on compatibility procedures which will be operating in diverse conditions and stages. In IOT every object are playing an active part in their Internet connection and by creating smart environments.

Applications of IOT also apply cloud computing services to get appropriate combined services for service based application in IOT through the composition of existing atomic services. Outline of the IOT are applied to applications and also applied by the users for daily activities in many areas.

II. LITERATURE SURVEY

There is a versatile way of IOT to give its benefit to some of the major fields like industrial, medical, private/public logistics and transportation etc. people explained the concept of IoT in many ways that are different from each other with respect to their particular characteristics. The IoT's potential and its power can be seen in several applications. Some application domains of IoT's potential are shown in Figure 2.

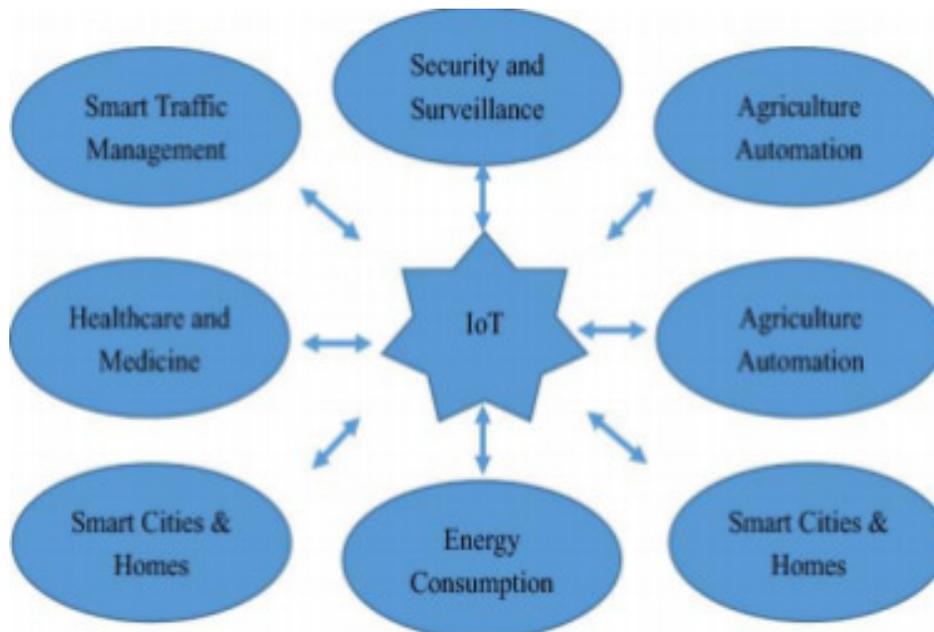


Figure 2. Potential application domains of IoT

In the last few years, the charge over the market has been taken by many crucial IoT projects. a worldwide distribution of IoT projects is given between European, American, and Asia/Pacific regions in Figure 3. It shows that Americans are the ones contributing to medical infrastructure and efficient supply-demand chain projects and Europeans are the ones more into smart city projects.

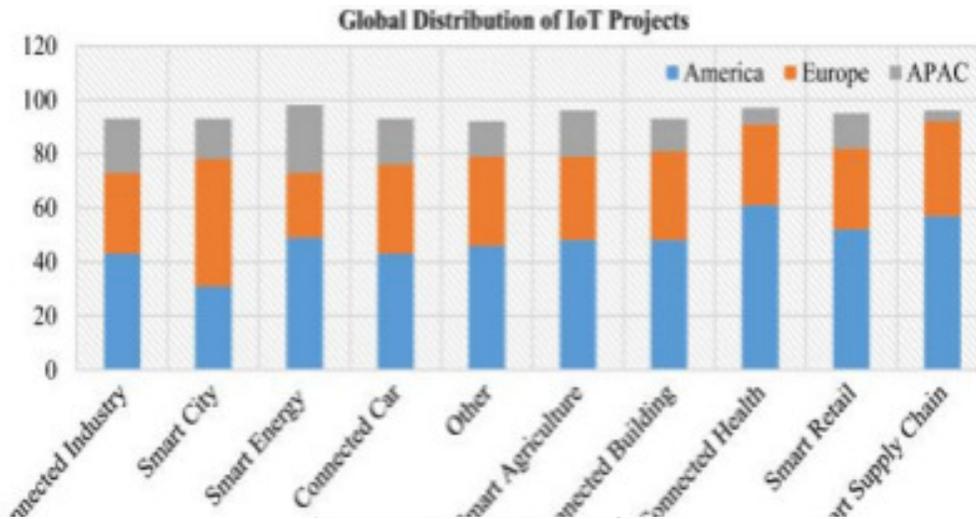


Figure 4 shows the worldwide market allot of projects under IOT running all over the world. Comparatively to others, It is clearly shown that smart cities, energy and industry based IOT projects that has huge portion in the market.

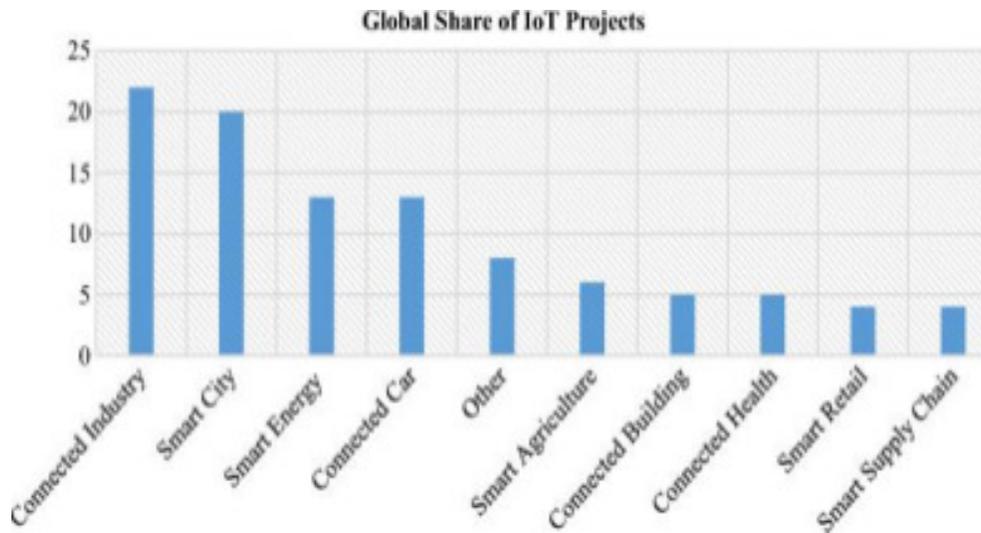


Figure 4. Global share of IoT projects all over the world

The most popular application area of IOT is smart cities and smart homes. In smart homes IOT is implemented in televisions, air conditioner, security devices and many more all these devices are connected with one another to provide an efficient consumption of energy and give best comfort and security to the user. IOT based central control unit and internet are used together to ensure that there is a communication between these devices. It is estimated by 2022 the market value of smart home will boost to around 100 billion dollars. There is another category which implement smart home concept which is smart vehicles. Nowadays cars come with smart devices and variety of sensors which are controlled by vehicles itself. IOT is working on development of new system on smart cars which includes a car-to-car and driver-to-car connection wirelessly to ensure safe and comfortable driving and predictive maintenance

III. INTERNET OF THINGS (IOT)

A system of objects which are connected via internet and are interrelated and give and send data through a wireless network is called Internet of Things

Nowadays Researchers have shown great interest in internet of things as it ensures a smart life by connecting machines and objects with peoples. A system represented by IOT is an object with various sensors attached to it and all these are connected with internet by means of wireless and wired network structures

Sensors implemented on IOT use different means of connection which includes Bluetooth, RFID, and Wi-Fi etc and technology like 4G, GPRS, VOLTE allow a wide range of connectivity based on IOT. It helps to establish smart healthcare, city and buildings and this technique allow us to monitor and share information about state of things.

IOT devices are connected in such a way to each other that they reduce human intervention and minimise our efforts which saves energy and time. Hence IOT implemented devices are very efficient and save lots of time

The Internet is spread around the world, still it a connection between person and person. The Internet connects every people, so that why it is titled the "Internet of People" and IOT connects all objects or things, that is why it's titled the "Internet of Things". A network referred by internet of objects is a self-hosted or a wireless network. IOT describes a various number of technologies that allow the Internet to reach out to the world.

IOT describes a world where all electronic entities are paired to the internet to perform its functions. it is a system of physical entities implanted with sensors and software and has internet connection either wireless or self-configured which gives an excellent experience and good manufacturing services

Kevin Ashton was an esteemed scientist who coined the word internet of things to give an understanding of a network where internet is connected to a physical device via extensive sensors which can appear anytime and everywhere



Figure 5. Internet of Things

Internet of things is a system where people or objects can share or transfer information over a network. Physical object IP addresses are used for internet connection. Through Internet of things there are a greater number of connected devices than the number of connected humans. IOT aims to expand internet connectivity beyond our desktop to a wide range of devices. It also aims to include everyday things that use embedded systems for communicating with external environments all through the internet in a secured manner.

IOT is of two types mainly industrial IOT and consumer IOT. Industrial IOT is defined as machines and computers allowing the use of industrial operations which are intelligent using advanced data analysis for transformational business outcomes. The advantage of industrial

IOT is that it can work with minimal support by human and semi independently. The industrial IOT is used in various technologies like cloud computing, cyber security, mobile technologies, machine to machine communication, big data, RFID technology, 3D printing, advanced robotics, cognitive computing and edge computing.

Consumer IOT applications can be started from very simple and cheap ones which include fitness devices, wristbands and can range up to high end smart home automation applications. The main point of difference between consumer IOT and industrial IOT is that both have different types of devices and applications which operate them.

IV. APPLICATIONS OF INTERNET OF THINGS

IOT has many applications in our lives, and it helps in making our life easier, safer and smarter. Various applications of the IOT are in Medical sector, Smart Automation, Smart and Innovative Cities, connected vehicles, Smart shopping, Smart agriculture and Water management, Privacy and Security.



Figure 6. Smart Homes

4.1 Medical Field

All detection can be done using IOT embedded devices where the elderly and old age people can be monitored all day and they can live their independent lives. Medical Fridges can also have IOT embedded devices which can be used to monitor and maintain optimal temperature for the medications and organic entities inside the fridge.

Athletes can also be monitored using IOT embedded devices and they can be given a wrist band to wear on their wrist which will constantly keep a check on their heart beat, pulse rate and blood sugar levels and would indicate if something goes wrong and would automatically call the emergency number.



Figure 7. Wristbands

Patients in the hospitals can be monitored using IOT embedded devices and they can be given a wrist band to wear on their wrist which will constantly keep a check on their heart beat, pulse rate and blood sugar levels and would indicate if something goes wrong and would automatically call the emergency number.

4.2 Smart Home Automation

We call a home a “smart home” if it has devices connected through the internet for remote monitoring and effective appliance management.

The security, energy efficiency, comfort and convenience of smart homeowners is ensured through a smart home app on the homeowner’s smartphone.

IOT bases devices such as smart systems and smart devices generally work together as an application of the Internet of Things, sharing consumer usage data and providing different automations based upon homeowner’s requirements.

Smart Televisions connected via web which can access on-demand video and songs through applications. Voice or gesture recognition are implemented in some smart televisions

Some advanced smart lighting devices can detect when people are in near vicinity and varies the lighting accordingly. Some light bulbs can sense the daylight intensity and modify its light according to that. examples of smart lights like hue from Philips’s plc

Smart devices which have application on thermostats allows to monitor, schedule and control temperature around the house using Wi-Fi examples like nest device by nest labs. Such equipment’s can detect from their owner's behaviour and can regulate and modify settings based on their needs of comfort. These devices can check the use of energy and report the energy usage to the users and can also notify the user when to change the filters etc

Smart devices such as smart doors and locks can used to protect from robbers and intruders. User can deny or grant access to visitor. These locks can sense when people are close by and automatically opens the door for them



User can monitor their houses even they are far away from their home due to work or going for holidays via smart security cameras. Smart motion sensors can tell difference between the animals, neighbours, visitors, and robbers and alert the owners if they detect any suspicious behaviour.

In case of any water failures or an electric surge system monitors should detect these defects and take necessary actions like to prevent flooding in the basement by spinning off the water

Elderly people can also stay in smart homes comfortably and have a safer, smarter life and can easily access the home just by the use of a simple smartphone or IOT embedded devices which allow regulating and controlling the whole house by just a single tap on the smartphone.

A very basic drawback of smart automation or home automation is that people who have difficulty with technology give up on technology by giving it a try for the first time itself. Home automation producers are working on this drawback and are making home automation technology simpler and more enjoyable at all technical levels.

4.3 Smart and Innovative Cities

Smart Cities should have smart construction paves which is a way for structural sensors to detect the structural damage of buildings, roads, highways and many more. Many parking lots should be fitted with sensors at parking spots indicating the user's empty spots in that zone and if there are no empty spots also informing the user about that issue which can in turn help to avoid trafficking and overcrowding.

Traffic control measures can be taken with the help of sensors on certain roads which are generally crowded and these traffic sensors inform the users about the traffic and also tell them a shorter route if possible, to avoid traffic jams. Highways should also have sensors so that the drivers have a quick update each time they are nearer to traffic and can also show different routes that would help the driver have a right choice about the route to choose.



CCTV cameras and audio sensors should be fitted at each spot and they can detect gunfire and other problematic sounds and can inform the police as soon as there is such an indication and finding the criminal who committed crime would get easier through the use of CCTV cameras.

Thus, using the new technology in such a way that it is beneficial to the citizens of the country would be a better way to live a safer, smarter and easier life.

4.4 Connected Vehicles

The most emerging and researched technologies include connected vehicle technology under the automotive sector. In the near future, the world is going to have a large number of automated cars, connected cars which will have advanced driver inbuilt systems and currently they are very less in number.



Fig.10 Car connected to Internet

Connected vehicles are the vehicles that can easily communicate with the driver or other cars moving on the road at that particular time and the cloud to avoid any type of traffic congestion.

This technology can help us to improve vehicles efficiency, safety and traffic congestion.

V. CONCLUSION

IOT can bring a change in an individual's quality of life and it improves the quality of life of an individual. IOT has the potential to enhance the services which include transport, security, privacy, healthcare and other areas. IOT has started progressing in its field and we can use IOT embedded devices in our daily life each day which make our lives easier, safer and smarter. There are many pros and cons of IOT applications which add meaning to our life. By using IOT we can control our home and the surroundings around us using one single tap on our mobile phones and also there are various other applications of IOT with which one can take benefit of the current technology. Advantages of using IOT applications are that we can monitor our home using one single mobile phone which has all things connected to it and all the devices used in the home are IOT enabled technology devices. This can provide personal comfort to the individuals. Another use of IOT is that all members are virtually connected to each other and can contact each other virtually also. IOT helps family members maintain a personal network. Differently abled patients and old age one can be monitored and could get immediate help as and when wanted by the use of IOT embedded devices such as wristbands which monitor their heart beat, pulse rate, blood sugar levels and other stuff which could help maintain a record of their medical history and it would have an emergency number which would be automatically dialled when there is a change in the heart beat levels and other personal stuff can also be monitored. Using IOT embedded systems in the parking lots would help in reducing congestion and without any confusion in the parking lots empty spaces would be already visible to the individuals. IOT has a big impact on our lives and IOT technology is helping individuals live a safer, smarter and easier life and with its various applications all individuals can take benefit of this technology.

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