

A Study on the Internet of Things

Hemanth. G

Software Developer, Cognizant, Hyderabad, IN.

ABSTRACT

The term IoT refers to the Internet of Things that uses several devices such as Routers, sensors interconnected with each other through a network to share or exchange data. These devices are controlled remotely without physical contact by humans. Today IOT plays a vital role in different areas of our day to day life, such as farming, Healthcare, traffic management, Environment management, home appliances, and so on. Almost it occupied our essential part of our Life and made our Life smart with real-time observations.

Keywords: Actuators, Internet of Things (IoT), Physical Devices, Sensors, Wearable Devices, Smart farming, Healthcare, IoT, Smart home, Environment Management, Automobile Industry.

I. INTRODUCTION

IoT uses several network devices for exchanging data. Through IoT, it made our Life smart and simple one. Fig.1 shows the usage of IoT from home appliances to advanced healthcare systems. In many ways, IoT helps people to do their work more efficiently. IoT helps people to do their work more efficiently in all other applications like IOT smart farming, Healthcare, and environment management seems to be playing a vital role in our Life. [1] The global population is increasing every day, and this will have a significant impact in all areas like consumption of food, Health care, Traffic problems, Environment problems, etc., so to have control over these things IOT have to be implemented. Nowadays, due to climatic and weather conditions, more demand for farming becomes more necessary. To overcome these facts, new technology should be implemented in farming with the help of IoT devices. Likewise, the healthcare sector lacks its potential to make patients' safety and health. So by continuous monitoring of patients' health, it is possible to reduce the failure ratio. Considering IoT, it not only works on farms; it also works on our cattle to separate infected animals from the

herd to present the spreading of disease. The environment is the place to live with. It helps us to check the status of weather such as temperature, humidity, and so on.

A. Hardware requirements

Everything happens because of wireless sensors that capture the data through the Internet. It connects to the satellite and responds to the corresponding instructor. In agriculture, sensors are used for livestock monitoring, soil moisture monitoring, temperature monitoring. These sensors may be electrochemical or mechanical, Dielectric soil moisture sensors, or airflow sensors. In health care sensors are in the form of wearable devices used for continuous glucose monitoring (CGM), Blood pressure level monitoring, Asthma, diabetes using bio-sensor nodes for continuous transfer of real-time data. Waste management uses fill-level sensors in bins to sense the level of waste. Similarly, the shortest route or distance is calculated for doing the waste collection efficiently.

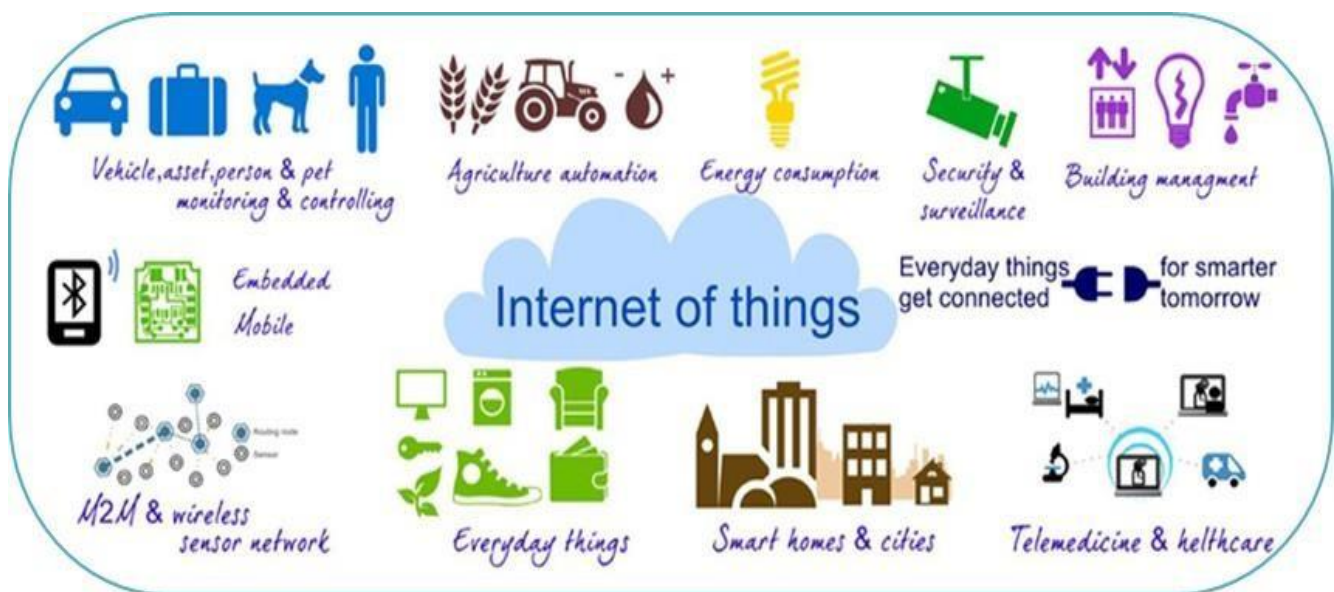


Fig.1 Internet of Things

II. IOT IN AGRICULTURE

Agriculture, as technology is being transformed or developing day by day, the same to be developed in agriculture. [2], One of the most critical areas to be given more concentration. Considering IoT in agriculture as shown in Fig.2, it not only helps us to increase productivity and make it smart using precision farming with the help of sensors, Robots,



Fig. 2 IoT in Agriculture

Drones, automated hardware devices make our farming more successful. Agricultural drones help us to analyze and plan for a good yield. Through real-time data collection and processing plants, height, health indices, nitrogen content, and yield prediction can be made.

III. IOT IN HEALTHCARE



Fig. 3 IoT in Healthcare

[3] IoT enhanced the general practice of going through medical tests after a particular problem in our body by using smart wearable devices. Smartwatches have come into the Life of the people within built IoT applications, which made it very smart.

[4] It consists of sensors like Accelerarometer, gyroscope, temperature sensor, microphone, heart-rate sensors [5], which are used for Human activity recognition, healthcare monitoring, user-authentication, speech data recognition especially with heart-rate monitoring, drowsiness detection with supporting protocols.

All the data collected here is in real-time and through data that is sent to the cloud, and it is shared with our medical advisor. This kind of sensor used in Healthcare analyses over a long period of time and gives accurate information regarding health such as temperature, Blood pressure level, Blood sugar, oxygen level, as shown in Fig. 3.uses deep and Machine learning algorithms in some cases.

IV. IOT FOR SMART CITIES

Considering Population smart city becomes more critical with [7] smart street lighting, smart parking, smart traffic control, garbage collection, energy management are few examples for smart cities. Sensors in traffic control collect and send data to transport solution control, which analyses the data and adjusts the traffic automatically using historical data. In smart parking, it identifies the free parking slot and suggests the driver about the space availability. Air pollution, Noise level, River level also be detected using sensors to provide a better environment. In case of any road accidents, remote monitoring helps us by providing instant support on that situation. Due to the heavy population collection of waste becomes more at a specific time. But the present strategy is not having any advancement in technology for collecting waste, everything is done physically, and sometimes it is not cleared periodically, and it causes hygiene problems in urban and rural areas. [8] So, to avoid such a situation, whenever bins reach a certain limit, it makes alert to the corresponding node by route-optimization technique. In spite of following the same route by trucks every day, monitoring data in real-time makes "waste bins become smart bins," as shown in Fig. 4. Calculating the best path to reach the destination. But in the future, everyone recommends these types of vehicles for a better environment.



Fig. 4 IOT for Environment Management

V. IOT IN SMARTHOME

Considering all other applications in IoT, smart home plays a vital role in one's Life.[6]With this, we can control the appliances in our home like lights, room heater, ventilation, air-conditioner, and security system, washers, ovens, refrigerators are monitored allow humans to operate remotely. This makes humans do their work very quickly and smartly, even they forget some essential things like switching off the room lights, lighter, etc. as shown in Fig. 5.

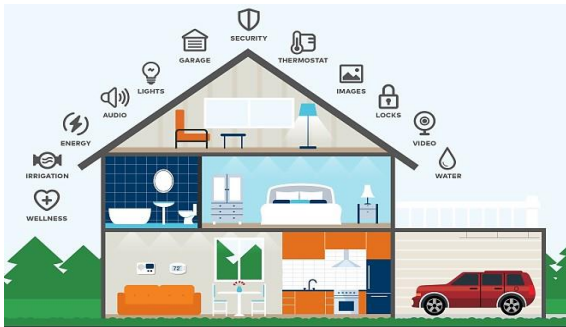


Fig. 5. Smart Home

Consider the situation, once we wake up, our voice assistant tells us the today's weather, important schedule and work to be done. The same way it checks for the grocery items that we need, and it places an order by itself which will be delivered at our doorstep by drone, can switch off/on lights, increase or decrease room temperature, ensuring the door lock all through voice instructions like instructing a person in our home. Even thermostats, refrigerators are also controlled using IOT sensors. Obviously, this saves time, energy, and money. Using face recognition, it acts as a key to enter the home.

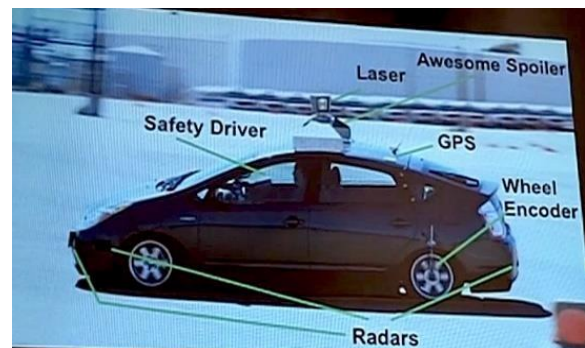
VI. IOT IN PET AND CATTLE MONITORING

Through livestock monitoring, it helps us to gather data about health status, early sickness, its location, temperature. With these data ranchers able to know about the new health issue s and data is collected through wearable sensors. Through these sensors, farmers [10] can know the livestock, reproductive cycles, feeding problems, grazing patterns before they affect herd's health. By analyzing the reproductive cycle, we can make the calving process safer, and if anyone is sick in a herd it is very tedious to find until it becomes complicated without this. As a human, we can communicate, but animals don't. So wearable is also used to detect heart rate, blood pressure, digestion level, and respiratory rates. With these IoT devices, it is possible to measure the milking amount, quantity of food, and how many steps walked in a day. This wearable may be fixed in ears or neck. The above things can be implemented in pet monitoring also.

VII. IOT IN AUTOMOTIVE INDUSTRY

Driverless vehicles are technological development in the area of automobiles. It has the capacity to sense the environment and moves without human intervention. This vehicle comes up with various sensors [11], which have radars to deal with traffic, a camera to detect traffic lights, a Global Positioning System, Wheel encoder to determine the location and movements of the vehicle. Before going on the road, it is tested with many routes to gather data about the environment; this data helps a lot in live routes and for calculating the best path to reach the destination. Nowadays, driverless cars are available at the minimum number. But in the future, everyone recommends these types of cars for human safety, as shown in Fig .6.

Fig. 6. Driverless Cars



VIII. FACTORS THAT INFLUENCE IoT.

Security: Through remote monitoring, we can monitor our homes through mobile phones with IOT support.

Stay Connected: The person(s) those who want to connect to any device in IoT; it happens through the network connectivity.

Electricity Usage: Once our work is done, equipment or appliances will be turned off by our instruction to save electricity.

Safety: Embedded systems available in vehicles to avoid accidents on roads.

Healthcare: Patient monitoring can be done 24 x 7, without doctor's support, and enables them to make decisions based on Analysis, as shown in Fig.7.

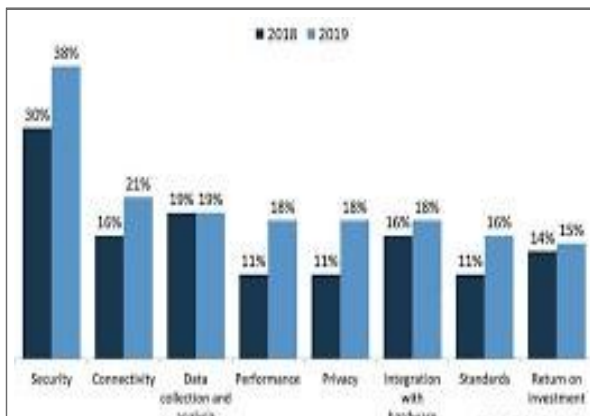


Fig.7 Factors that affect IoT

In the future, everything will get implemented in IoT. There might be a situation that our compound gate opens when we are near to our compound wall and main doors open when we are in front of our house, and accordingly, it also adjusts the temperature of heater/cooler based on our body temperature. Other home appliances may instruct us to take food in time and reminding us of their maintenance time. It alerts about the traffic conditions of the road, which we are traveling. So with these smart things, Life will be an easier and smarter one and make us do our work smart.

IX. SCOPE OF IOT

In 1990, around 30,000 lakh desktop computers were connected to the Internet. In 2000, around 3 million desktops were connected to the Internet. In 2010 around 2 billion mobile phones are connected to the Internet. In 2016, around two out of 10 uses the smart home with smart appliances like automatic washing machines, water purifiers, etc., by this year 2020, we can expect to use the smartwatch that alarms us about our routine and the smart glasses that guides us to search.

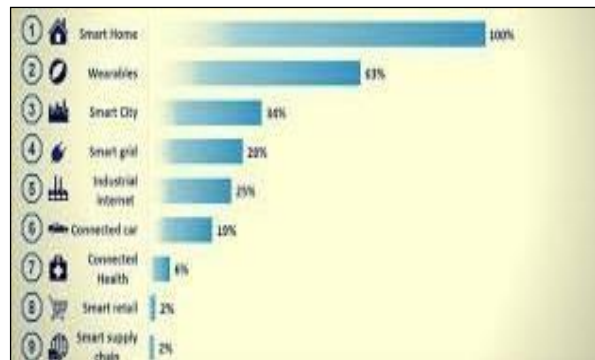


Fig.8 Scope of IoT

IoT is being implemented everywhere nowadays to make Life smarter and easier, as shown in Fig. 8. [12] Even its architecture, hardware, software requirements seem a little bit complicated until it gets implemented with a lot of security attacks and network issues. Within the next five years definitely, IoT is going to rule the people, and people can't live without IoT. Although we do have drawbacks of having IoT, it will be cleared in the near future with a lot of effort, and all the important projects will be a smart one with IoT in the future. The data which is collected through IoT devices plays a vital role in the case of Data Science and Artificial Intelligence.

X. CONCLUSION

IoT provides a better opportunity for making our dreams come into reality. I will make a significant impact in our day to day life. It will not be separated apart from humans, wherever we are connected to our device, and it creates a huge opportunity for business and government sector. A report by NASSCOM expects 15 billion IOT reach by 2020.

REFERENCES

- [1]. Perwej Y, Haq K, Parwej F, Mumdouh M, Hassan M. The internet of things (IoT) and its application domains. *International Journal of Computer Applications*. 2019; 975:8887.
- [2]. Patel KK, Patel SM. Internet of things-IOT: definition, characteristics, architecture, enabling technologies, application & future challenges. *International journal of engineering science and computing*. 2016 May; 6(5).
- [3]. Naresh M, Munaswamy P. Smart agriculture system using IOT technology. *Int J Rec Technol Eng (IJRTE)*. 2019 Jan; 7(5):98-102.
- [4]. Dewangan K, Mishra M. Internet of Things for Healthcare: A Review. *International Journal of Advanced in Management, Technology and Engineering Sciences*. 2018; 8(2,526-534).
- [5] Gadde, S. S. (2020). Artificial Intelligence - The Future of Radiology. *International Journal for Research in Applied Science and Engineering Technology*. 8. 10.22214/ijraset.2020.6043.
- [6] Fatai Adesina Anifowose, Safiriyu Ibiyemi Eludiora, "Application of Artificial Intelligence in Network Intrusion Detection", *World Applied Programming*, Vol (2), No (3), March 2012.
- [7] Gadde, S. S., & Kalli, V. D. R. Artificial Intelligence To Detect Heart Rate Variability. 10.33144/23939516/IJETA-V7I3P2
- [8] Gadde, S. S., & Kalli, V. D. R. Applications of Artificial Intelligence in Medical Devices and Healthcare. 10.33144/23478578/IJCST-V8I2P27
- [9] Gadde, S. S., & Kalli, V. D. R. (2020). Technology Engineering for Medical Devices-A Lean Manufacturing Plant Viewpoint. 10.17148/IJARCCCE.2020.9401
- [10] Gadde, S. S., & Kalli, V. D. R. Descriptive Analysis of Machine Learning and Its Application in Healthcare. 10.33144/23478578/IJCST-V8I2P28
- [11] Gadde, S. S., & Kalli, V. D. R. Medical Device Qualification Use. 10.17148/IJARCCCE.2020.9410
- [12]. Hota J, Sinha PK. Scope and challenges of Internet of things: an emerging technological innovation. *International Conference on Futuristic Trends in Computational analysis and Knowledge management 2015*.