# A Study on IOT and its Applications

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**Abstract:** The term IOT refers to 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 today 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 the people to do their work more efficient. IOT helps the people to do their work more efficient in all other applications like IOT smart farming, Healthcare and environment management, seems to be playing vital role in our life. [1] The global population is increasing everyday and this will have a great impact in all the areas like consumption of food, Health care, Traffic problems, Environment problems etc., so to have control over these things IOT have to be implemented. Now a days due to climatic and weather condition, more demand on farming becomes more necessary. To overcome these facts a new technology should be implemented in farming with the help of IOT devices. Likewise 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's to separate infected animal from the herd, to present spreading of disease. Environment is the place to live with .It help us to check the status of weather such as temperature, humidity and so on.
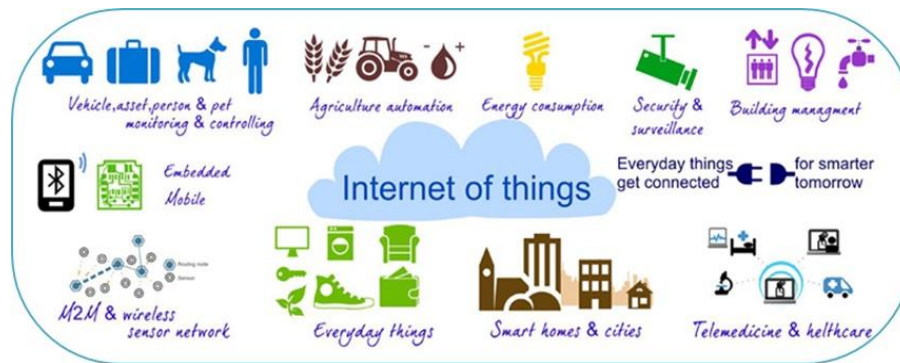


Fig.1 Internet of Things

A. Hardware requirements

Everything happens because of wireless sensors that capture the data through internet it connects to the satellite and responds to the corresponding instructor. In agriculture sensors are used for live stock monitoring, soil moisture monitoring, temperature monitoring. These sensors may be electro chemical 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.

## II. IOT IN AGRICULTURE

Agriculture, as technology is being transformed or developing day by day, the same to be developed in agriculture. [2], [3] One of the most important area 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 drone help us to analyse and plan for good yield. Through real-time data collection and processing plants height, health indices, nitrogen content and yield prediction can be done.

## III. IOT IN HEALTHCARE



Fig. 3  IOT in Healthcare

[4]  IoT enhanced the general practice of going through medical tests after certain problem in our body by using smart devices that are wearable's. smart watches have come into the life of the people within built IOT applications ,which made it very smart .It consists of sensors like Accelararometer, 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 which is sent to cloud and it is shared with our medical advisor. These kind of sensors used in healthcare analyse 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 important with [7] smart street lighting, Smart parking, smart traffic control, garbage collection, energy management are few examples for smart cities. Sensors in traffic control collects 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 heavy population collection of waste becomes more in a certain 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 cause hygiene problems in urban and rural areas. [8] So to avoid such situation, whenever bins reach a certain limit it makes alert to the corresponding node by route-optimization technique. In spite of following same route by trucks every day, monitoring data in real time makes "waste bins become smart bins" as shown in Fig. 4. Calculating best path to reach the destination. But in future everyone recommends these types of vehicles for better environment.
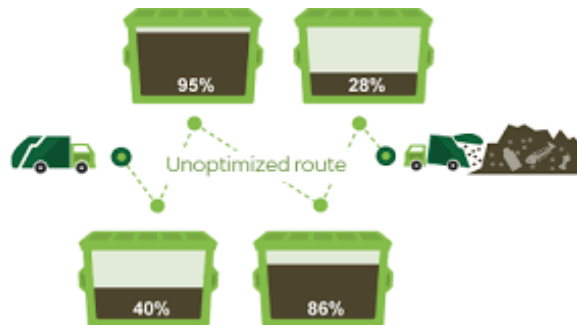


Fig. 4 IOT for Environment Management

## V. IOT IN SMART HOME

Considering all other applications in IOT, smart home plays 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 to do their work very easily and smartly, even they forget some important 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. Same way it checks for the grocery items that we need and it places 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 live stock monitoring it helps us to gather data about the health status, early sickness, its location, temperature. With these data ranchers able to know about the early health issue s and data is collected through wearable sensors. Through these sensors farmers [10] are able to know the live stock, reproductive cycles, feeding problems, grazing patterns before they affect herd's health. By analysing reproductive cycle we can make calving process safer and if anyone is sick in 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 are 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. These wearable may be fixed in ears or neck. 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 is having 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, Global Positioning system, Wheel encoder to determine the vehicles location and movements. Before going on road it is tested with many routes to gather data about the environment, this data helps a lot in live routes and for calculating best path to reach the destination. Now a days driverless cars are available at minimum number .But in future everyone recommends this types of cars for human safety as shown in Fig .6.
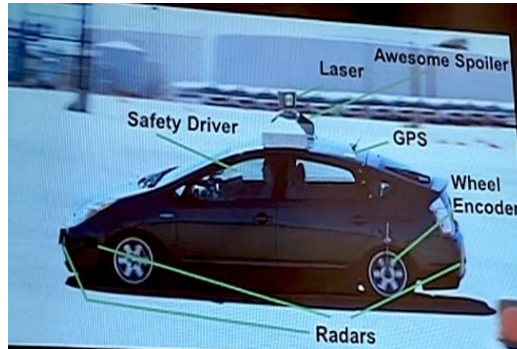


Fig. 6. Driverless Cars

## VIII. FACTORS THAT INFLUENCE IOT.

**Security**: Through remote monitoring we are able to 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, equipments or appliances will be turned off by our instruction to save electricity.
**Safety**: Embedded system available in vehicles to avoid accident on roads.
**Healthcare**: Patient monitoring can be done 24 x 7, without doctor's support and enables them to make decision based on Analysis as shown in Fig.7.
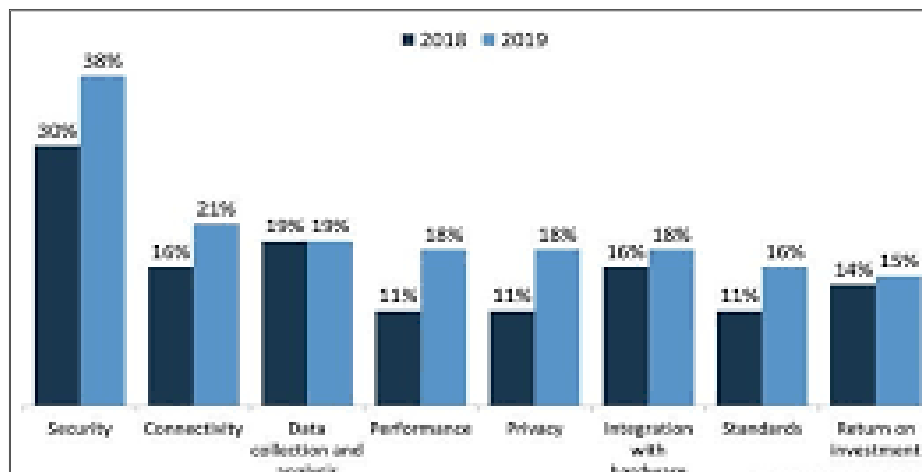


Fig.7 Factors that affect IOT

In 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 adjust the temperature of heater/cooler based on our body temperature. Other home appliances may instruct us to take food in time and reminding us for their maintenance time. It alerts about the traffic conditions of road, which we are travelling. So with these smart things, Life will be an easier and smarter one and make us to do our work smart.

## IX. SCOPE OF IOT

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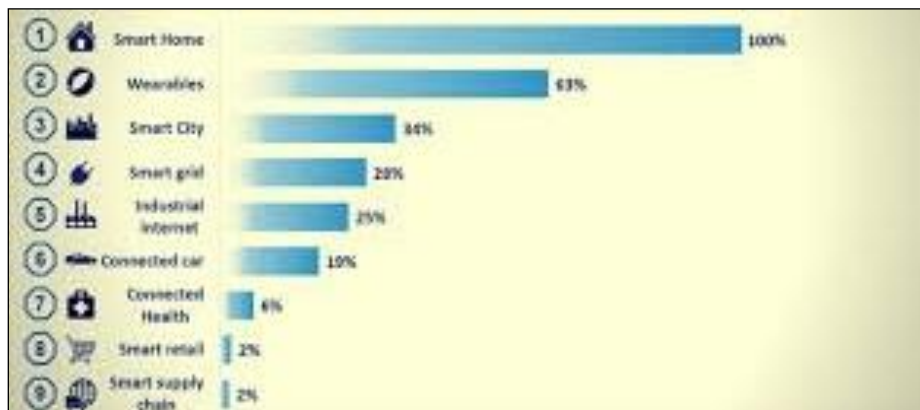


Fig.8 Scope of IOT

IOT is being implemented everywhere now a days to make the life smarter and easier as shown in Fig. 8. [12] Even its architecture, hardware, software requirements seems little bit complicated until it gets implemented with lot of security attacks and network issues. Within 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 lot of effort and all the important projects will be a smart one with IOT in future. The data which is collected through IOT devices plays a vital role in case of Data Science and Artificial Intelligence.

## X. CONCLUSION

IOT provides a better opportunity for making our dreams come in to reality.IOT will make huge impact in our day today 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]. Sathya M, Madhan S, Jayanthi K. Internet of things (IoT) based health monitoring system and challenges. International Journal of Engineering & Technology. 2018; 7(1.7):175-8.
[6]. Zanella A, Bui N, Castellani A, Vangelista L, Zorzi M. Internet of things for smart cities. IEEE Internet of Things journal. 2014 Feb 14;1 (1):22-32.
[7]. Rajab H, Cinkelr T. IoT based smart cities. In2018 International Symposium on Networks, Computers and Communications (ISNCC) 2018 Jun 19 (pp. 1-4). IEEE.
[8]. Chaudhari SS, Bhole VY. Solid waste collection as a service using IoT-solution for smart cities. In 2018 International Conference on Smart City and Emerging Technology (ICSCET) 2018 Jan 5 (pp. 1-5). IEEE.
[9]. Gabhane MJ, Thakare MS, Craig MM. Smart Homes System Using Internet-of-Things: Issues, Solutions and Recent Research Directions. International Research Journal of Engineering and Technology (IRJET). 1965; 4(5):1969.
[10]. Nóbrega L, Tavares A, Cardoso A, Gonçalves P. Animal monitoring based on IoT technologies. In2018 IoT Vertical and Topical Summit on Agriculture-Tuscany (IOT Tuscany) 2018 May 8 (pp. 1-5). IEEE.
[11]. Krasniqi X, Hajrizi E. Use of IoT technology to drive the automotive industry from connected to full autonomous vehicles. IFAC- Papers OnLine. 2016 Jan1; 49(29):269-74.
[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.