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## INTERNET OF THINGS (IOT): APPLICATIONS, COMPONENTS, RELATED FUTURE TECHNOLOGIES

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### ABSTRACT

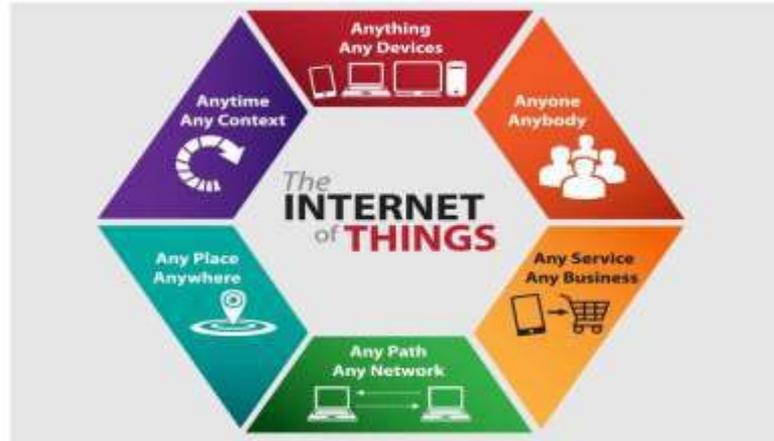
*The Internet of Things (IoT), sometimes referred to as the Internet of Objects, will change everything including ourselves. The Internet of Things (IoT), a new technology connects physical objects with the support of internet. The Internet is one of the most important and dominant creations in all of human history and now with the concept of the internet of things, internet befits more approving to have a smart life in every phases, with the internet of things, anything's will able to communicate to the internet at any time from any place to provide any services by any network to anyone. This conception will create a new types of applications can encompass such as smart vehicle and the smart home, to provide many services such as notifications, security, energy saving, automation, communication, computers and entertainment, Smart Traffic System, Smart Home, Smart Parking, Woman Safety, Smart Garbage and Waste Collection Bin. The intention of this paper is presents the internet of things Applications, Related Future Technologies, and also explain the Components of IOT (Internet of things).*

**KEYWORDS:** *IoT Applications, Future Technologies, Smart Traffic System, Smart Home, Smart Garbage and Waste Collection Bin, Smart Parking, Woman Safety using IOT.*

### INTRODUCTION

Internet and its applications have become an essential part of today's human lifestyle. It has become an vital tool in every aspect. Due to the fabulous demand and requisite, researchers went beyond connecting just computers into the web. These researches directed to the birth of Internet of Things ( IOT). The basic definition of an Internet of Things (IoT) can be defined as anything which could be associated to internet results into "Internet of Things". The Internet has an influence on education, communication, business, science, government, and humanity. Clearly, the Internet is one of the most energetic and dominant creations in all of human antiquity and now with the concept of the internet of things, internet becomes more sympathetic to have a smooth life in every aspect. The Internet of Things (IoT), sometimes denoted to as the Internet of Objects, will change everything including ourselves. The epitome

of creating a Smart City, Smart City, and Smart Hospitals etc. is now fetching possible with the emergence of the Internet of Things. The Internet-of-Things technology (IoT) has created a insurrection in many ways in life as well as in smart technology. All the equipment's we use in our day to day life can be well-ordered and monitored using the IoT. A mainstream of process is done with the help of sensors in IoT. Home computerization industry and transference industries are sighted hasty tumour with IoT. The Internet of Things (IoT), a new technology connects physical objects with the help of internet. The IoT has different applications in smart cities, healthcare, logistics, and industrial control, Smart Parking, Smart Garbage and Waste Collection Bin, **Smart Parking System Using IoT**, Smart Home, Woman Protection using IOT, Smart Traffic System.



**INTERNET OF THINGS APPLICATIONS**

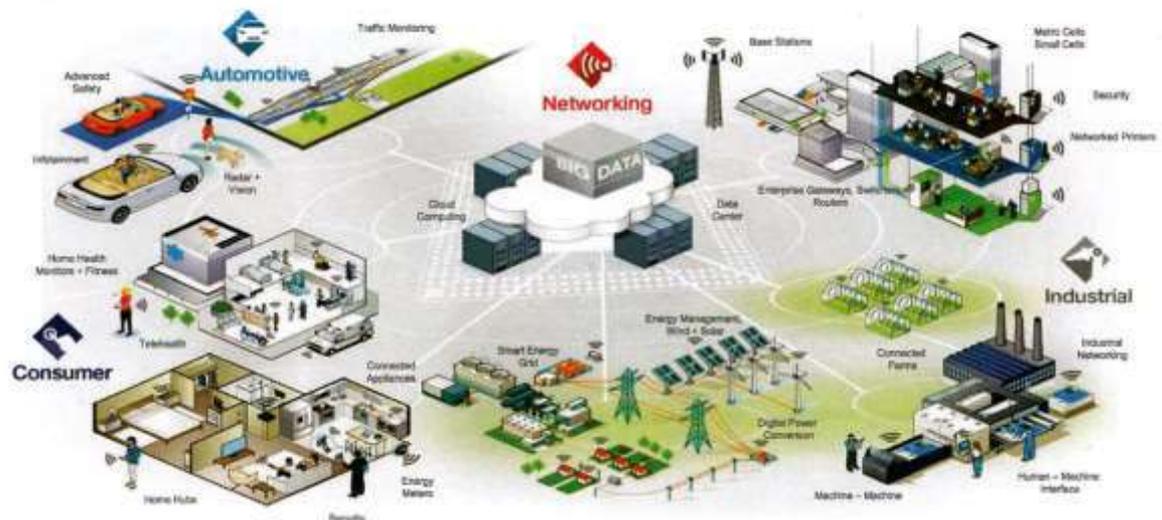
Internet of things assures many applications in human life, making life calmer, safe and smart. There are many applications such as Smart Traffic System, Smart Home, Smart Parking, smart cities, homes, conveyance, energy and smart atmosphere, Woman Safety, Smart Garbage and Waste Gathering Bin.

**1. Smart Garbage and Waste Gathering Bin**

Many times, in our city we see that the garbage bins or dustbins placed at public places are burdened. It creates unhealthy conditions for people as well as violence to that Place leaving bad smell. To avoid all such situations we are going to implement a project called IoT Based Smart Garbage and Waste Collection bins. Internet and its applications have become an basic part of today’s human lifestyle. It has become an critical tool in every aspect. Due to

the incredible demand and necessity, researchers went beyond involving just computers into the web. Communication over the internet has developed from user - user collaboration to device – device interactions these days. The IoT concepts were suggested years back but still it’s in the preliminary stage of commercial deployment. Home computerization industry and transportation industries are seeing speedy growth with IoT. Since most of the process is ended through the internet we must have an active high speed internet connection. we can monitor environment changes distantly from any part of the world using internet. smart collection bin works in the similar manner through sensor namely IR sensor that directs its different levels. The IR sensors will show us the various levels of garbage in the wastebaskets and also the weight sensor gets activated to send its output ahead when its inception level is crossed.

**The Internet of Things**



**2. Smart Home and Buildings**

Wi-Fi’s technologies in home mechanisation has been used primarily due to the networked nature of arranged electronics where electronic devices such as TVs, mobile devices, etc are generally supported by Wi-Fi . Smart Home clearly stands out, ranking as

top Internet of Things application on all stately channels. More than 60,000 people currently search for the term “Smart Home” each month. This is not a astonishment. The IoT Analytics company database for Smart Home includes 256 companies and startups. More establishments are active in smart

home than any other application in the field of IoT. Wi-Fi have started fetching part of the home IP network and due the increasing rate of approval of mobile multiplying devices like smart phones, tablets, etc.. Many companies are bearing in mind developing platforms that incorporate the building automation with entertainment, healthcare monitoring, energy monitoring and wireless radar monitoring in the home and building environments . By the concept of the internet of things, homes and buildings may drive many devices and objects smartly, of the most interesting application of IoT in smart homes and buildings are smart illumination, smart environmental and broadcasting.

### 3. Smart Health & Hospitals

A nearby attention that mandatory to hospitalized patients whose physiological status should be examined continuously can be persistently done by using IoT monitoring machineries. For smart health sensors are used to collect inclusive physiological information and uses posterns and the cloud to analyze and store the information and then send the analyzed data wirelessly to caregivers for further analysis and review .It replaces the process of having a health specialized come by at regular intervals to check the patient's dynamic signs, instead providing a continuous automated flow of information. In this way, it simultaneously improves the quality of care through constant attention and lowers the cost of care by reduces the cost of old-fashioned ways of care in addition to data collection and analysis . Hospitals will be well-appointed with smart flexible wearable surrounded with RFID tags which will be given to the patients on arrivals, through which not just doctors but nurses will also be able to monitor heart rate, blood pressure, infection and other conditions of patients intimate or outside the premises of hospital . There are many medical tragedies such as cardiac arrest but ambulances take some time to reach patient, Drone Ambulances are already in the market which can fly to the scene with the emergency kit so due to proper intensive care, doctors will be able to track the patients and can send in the drone to provide speedy medical care until the ambulance work out.

### 4. Wearables

Wearables remains a sizzling topic too. As consumers wait for the release of Apple's new smart watch in April 2015, there are adequately of other wearable innovations to be excited about: like the Sony Smart B Trainer, the Myo gesture control, or LookSee bracelet. Of all the IoT startups, wearables maker Jawbone is probably the one with the biggest funding to date.

### 5. Smart Transportation and Mobility

The development in transportation is one of the factors to designate the security of the country. A road condition monitoring and observant application is one of the most important of IoT transformation application. The main idea of the concept of smooth transportation and mobility is to apply the principles

of crowd sourcing and involved sensing. The process began with user identified the route wishes and marked some points as depression in the smart phone's application . The smart transportation is deal with three main commencements they are transportation methodical, transportation control, and vehicle connectivity. The transportation analytic represents the analysis of demand calculation and abnormality detection. The routing of vehicles and speed control in addition to traffic management are all known as transportation control which they actually tightly related to the way of the vehicles connectivity (V2X communication), and overall governed by multi-technology dissemination. IoT can also be used in transportation is an rechargeable vehicles, which is an important means to lessen both the fuel cost and the impact of overall warming have also gained significant attention from drivers.

### 6. Smart City

Smart cities may still be watched as a cities of the future and smart life, and by the origination rate of creating smart cities today's, it will became very achievable to enter the IoT technology in cities development.Smart city periods a wide variety of use cases, from traffic management to water scattering, to waste management, municipal security and environmental monitoring. Its popularity is fueled by the fact that many Smart City solutions promise to improve real pains of people living in cities these days. IoT explanations in the area of Smart City explain traffic jamming problems, shrink noise and pollution and help make cities harmless.

### 7. Smart grids

A smart grid is associated to the information and regulator and developed to have a smart energy management .Smart grids is a special one. A imminent smart grid possibilities to use information about the behaviors of electricity merchants and consumers in an computerised fashion to mend the efficiency, consistency, and economics of electricity. Many applications can be supervision due to the internet of things for smart grids, such as industrial, solar power, fissionable power, vehicles, hospitals and cities influence control.

### 8. Smart Factory and Smart Manufacturing

The smart factory will essentially change how products are devised, manufactured and conveyed. At the same time it will progress worker safety and protect the environment by qualifying low releases and low incident manufacturing. Smart factory added a new values in manufacturing revolution by incorporates artificial intelligence, machine learning, and computerization of knowledge work and M2M communication with the manufacturing process . These improvements in the way machines and other objects link and the follow-on way in which decision-making moves from humans to technical systems means that industrialized becomes "smarter". New technologies such ; Automation, robotics, and autonomous mobility are all offers a means of smart

manufacturing but M2M communications enabled by the “industrial” internet of things will provides a full meaning of smart factory and smart manufacturing by the way of Big Data concept which in this context, refers to the investigative possibilities obtainable by

the volume and variety of data that is produced by a networked economy to optimize the industrial processes to implying less maintenance downtime, littler outages and much reduced energy ingestion.

## 9. Smart Parking System Using IoT



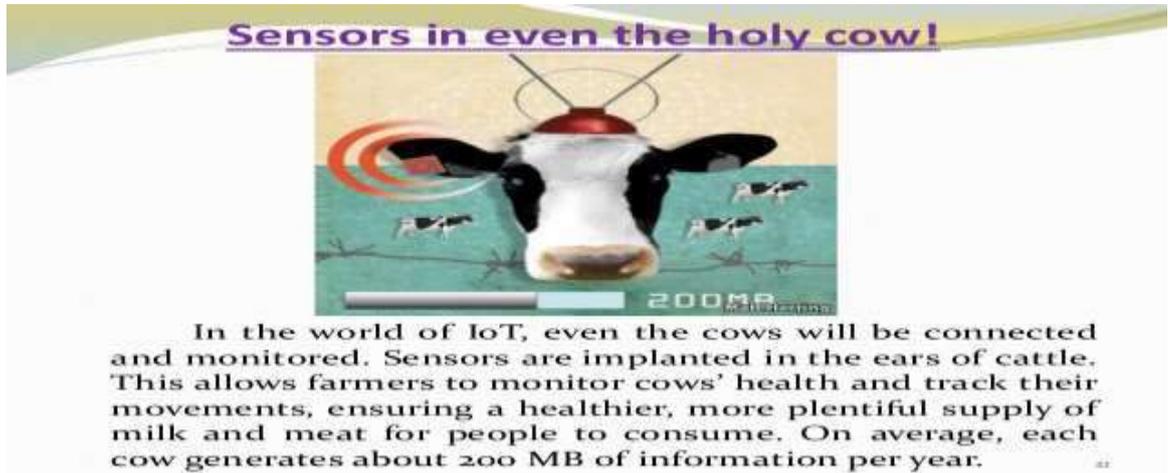
The numbers of vehicles are accumulative day by day and it is very tough for the driver to bargain a parking space among few. The smart parking system offers the info of obtainable parking places to the drivers according to their profile and the details provided. Smart parking systems are proved to help drivers to find and park their vehicle in cost active manner. Various smart parking systems, which uses cloud database, RFID, wireless sensor nodes and purifying set of rules like collaborative purifying algorithm.

**10. Smart supply chain:** Supply chains have been accomplishment smarter for some years previously. Solutions for tracking goods while they are on the road, or getting providers to exchange register information have been on the market for years. So while it is seamlessly logic that the topic will get an original ambition with the Internet of

Things, it seems that so far its attractiveness remains limited.

**11. Smart Agriculture.** India is a land of resourceful soils and different climate conditions. Due to hasty rain and without exact weather forecast, Indian farmers face difficulties such as damage of the already grown crops in their field. And even the Indian farmers do not have an enough understanding about their soil. Due to change in the structure of soil because of different weather condition, IoT device is used for solving such issues for Indian farmers it will monitor Soil nutrition, Light, Humidity etc and expand the green housing experience by automatic amendment of temperature to maximize the production. Precise watering and fertilization will help refining the water quality and saving the fertilizers correspondingly.

## 12. Sensors in even the holy cow



## 13. Smart Environment

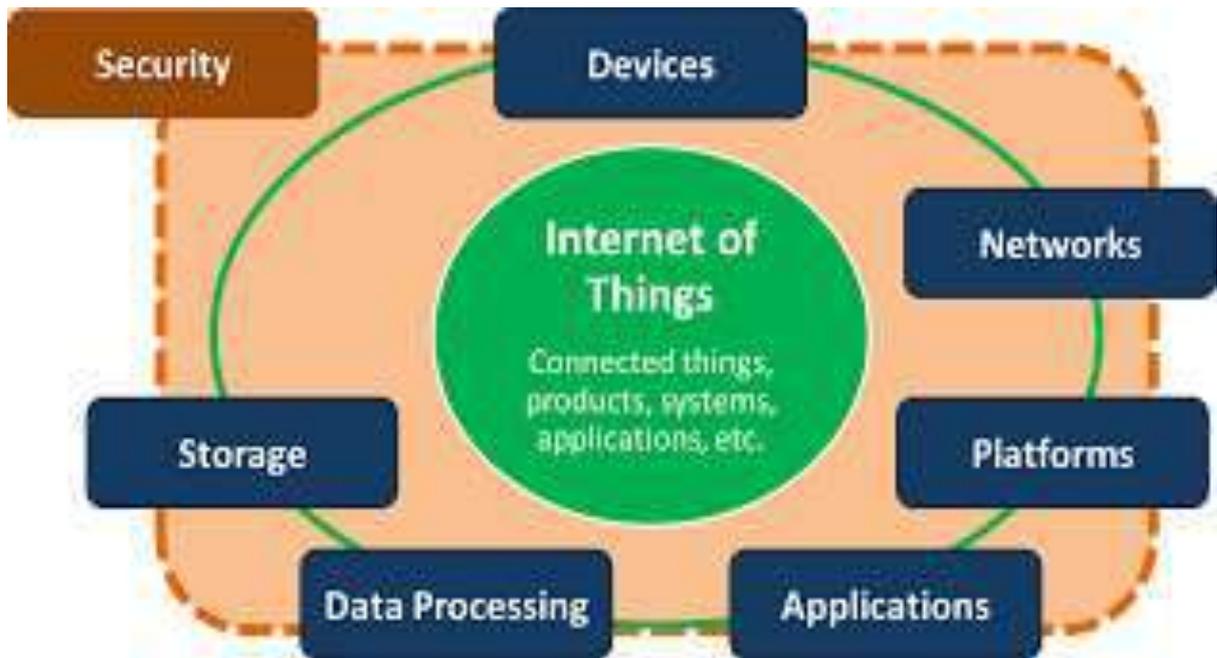
Environment plays a chief effect in human life. People, even animals, birds, fishes and plants may be affected in unhealthy environment. The environment needs a smart ways and new technologies for monitoring and management. Smart environment is an important technology in our everyday life which provides many facilities and solutions for many environmental applications such as water and air pollution, weather and emission monitoring, waste management, natural tragedy, and many other environment pointers and all may connected to each persons through home area network. Smart environment devices addition with Internet of Things (IoT) technology is developed for tracking, sensing and monitoring objects of environment which provide budding benefits to accomplish a green world and justifiable life. There are many applications of internet of things in environment and that can be divided to two main classifications environmental resources management, and environmental quality and protection management. Expectation of natural disasters such as flood, fire, earthquakes etc will be possible due to advanced technologies of IoT. There will be an appropriate monitoring of air pollution in the environment.

**14. IoT Based Ration Card System Using Bluetooth Technology:** Ration card is one of the imperative documents for every Indian family. Every family is given the aptitude by the government

to receive food grains against a card. But the present ration circulation system has lot of limitations like low processing speed, false proclamation of deficit in food grain, solid theft in ration shop, etc. This problem can be solved by IoT based ration card system using NFC enabled hand held reader which works on Arduino with Bluetooth technology. This system swaps the manual work in the ration distribution system. NFC tag is allocated to every Indian citizen from government offices. These NFC tags are provided in its place of conventional ration cards. In this system all the dealings are done by IOT.

**15. Women's safety using IOT:** women and children protection is a prime issue of our society. The counts of the fatality are increasing day by day. To ensure the safety of women and children's all over the global. We have used different sensors like heartbeat sensor, temperature sensor, accelerometer sensor for identifying heartbeat, temperature and sudden change in indication of user. We have also used GPS which will help to detect position of the device. GSM used in the model is used to direct alert message to caretakers, relatives and police station. So many Iot (internet of things) based device which will help to endlessly monitor values of different sensors and GPS used in device. IoT (internet of things) is relatively new and fast-developing concept. By using IoT-based technology protectors, relatives and police can monitor and track different sensors value and situation of a device. A device is wearable and so it is relaxed to carry.

**KEY COMPONENTS OF IOT**



**INTERNET OF THINGS AND RELATED FUTURE TECHNOLOGIES**

Many innovative technologies are related to IoT to verify the incorporation of wired as well as wireless control, communication and IT technologies together which are accountable for connecting several subsystems and things which function under a combined platform precise and succeeded speedily. In this fragment we discuss the relevant technologies that can help in the large-scale enlargement of IoT.

**A. Cloud Computing**

The two words of Cloud and IoT have seen a speedy and self-determining growth. These arguments are very different from each other, but their features are often balancing in general, Cloud can offer an operative solution for IoT service supervision and arrangement as well as for applying submissions and services that abuse the things or the data manufactured by them .On the other hand, cloud can assistance from IoT by covering its scope to deal with real world things in a more scattered and energetic manner, and for assigning new facilities in a large number of truthful life scenarios. In many cases, Cloud can provide the transitional layer between the things and the applications, hiding all the complication and functionalities necessary to appliance the latter. This will impact future application improvement, where information assembly, processing, and conduction will produce new challenges exclusively in a multi cloud situation.

**B. Big Data**

Due to the rapid development in the networks nowadays, the number of devices and sensors in

networks are improved more and more in the physical environments which will variation the information communication networks, services and applications in various domains. The prospects in the next year’s show that around 50 billion devices will produce large volumes of data from many applications and services in a diversity of areas such as smart grids, smart homes, healthcare, automotive, transport, logistics and environmental monitoring. The related technologies and solutions that permit incorporation of real world data and services into the current information networking technologies are often designated underneath the term of the Internet of Things (IoT) .

**C. Distributed Computing**

Distributed computing procedures groups of networked computers for the identical computational objective. Distributed Computing has numerous common disputes with concurrent and parallel computing, as all these three fall in the technical computing field. Nowadays, a huge amount of distributed computing technologies together with hardware virtualization, and autonomic and effectiveness computing have controlled to cloud computing. Internet of Things with distributed computing signifies a apparition in which the Internet encompasses into the real world espousal everyday entities. Physical items are no lengthier disconnected from the simulated world, but can be distantly controlled and can act as physical access opinions to Internet services.

#### D. Fog Computing

Fog computing is correlated to the superiority computing in the cloud. In disparity to the cloud, fog stages have been described as impenetrable computational architectures at the network's authority. Characteristics of such platforms supposedly include low potential, location alertness and use of wireless admittance. While edge computing or edge analytics may absolutely refer to accomplishment analytics at devices that are on, or close to, the network's edge, a fog computing construction would implement analytics on anything from the network center to the edge. IoT may more likely be sustained by fog computing in which computing, loading, mechanism and networking authority may exist anywhere sideways the design, either in data centers, the cloud, edge devices such as gateways or routers, edge equipment itself such as a machine, or in sensors .

#### E. Radio Frequency Identification (RFID)

RFID is the essential technology for making the substances uniquely identifiable. Its compact size and cost makes it integrable into any object. It is a transceiver microchip analogous to an adhesive sticker which could be both active and passive, depending on the type of application. Depending on the type of application, RFID occurrences are divided into four different frequencies ranges , which are given below:

- (1) Low frequency (135 KHz or less)
- (2) High Frequency (13.56MHz)
- (3) Ultra-High Frequency (862MHz 928MHz)
- (4) Microwave Frequency (2.4G , 5.80)

#### F. Nano Technologies:

This technology recognizes smaller and enhanced version of the things that are intersected. It can diminution the consumption of a system by permitting the development of devices in nano meters measure which can be used as a sensor and an actuator just like a normal device. Such a Nano device is made from Nano machineries and the resulting network expresses a new networking standard which is Internet of Nano-Things.

#### G. Optical Technologies:

Speedy developments in the field of Visual technologies in the form of technologies like Li-Fi and Cisco's BiDi optical technology could be a foremost innovation in the development of IoT. Li-Fi, an crucial Visible Light Communication (VLC) technology, will deliver a great connectivity on a higher bandwidth for the substances interconnected on the concept of IoT. Correspondingly Bi-Directional (BiDi) technology gives a 40G Ethernet for a big data from manifold devices of IoT.

#### H. Security and privacy

IoT becomes a significant element of the imminent internet, the need to afford tolerable sanctuary for the IoT infrastructure suits ever more imperative. A large scale applications and facilities based on the IoT are increasingly exposed to interruption from attack or evidence theft. Many advanced security techniques

are required in several areas to make the IoT sheltered from attacks, thefts and many other security glitches such as

DoS/DDOS attacks, compromised nodes, and cruel code hacking attacks, that because the IoT is vulnerable to such attacks and will necessitate specific techniques and mechanisms to certify that transport, energy, city infrastructures cannot be disabled or overthrown .The IoT requires a variety of access control and associated accounting schemes to funding the various endorsement and usage models that are prerequisite by users.

#### CONCLUSIONS

Internet of things is a new technology which affords many applications to bond the things to things and human to things concluded the internet. Each articles in the world can be identified, associated to each other through internet taking judgments independently. by the internet of things many insolent applications becomes genuine in our life , which enable us to spread and exchange with every things in adding to facilities many important phases for human life such as smart healthcare, smart homes, smart energy , smart cities and smart environments, Women's safety using IOT. The internet of things assurances future innovative technologies when related to cloud, fog and distributed computing, big data, and security disputes. By incorporating all these issues with the internet of things, smoother applications will be developed as quickly. This paper we discoursed a number of applications consequential from the IoT that are anticipated to enable us in our daily survives and the other forthcoming technologies make the concept of IoT feasible.

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