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Utilization of internet of things (IoT) in Socitical daily life

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Abstract
Today society is using modern technology for its amenities in day to make day to day life easier this can be possible with the existence of modern technology, Internet of Things (IoT), Which is the most advanced technology and the future is the Internet of Things will transform real-world objects into intelligent virtual objects. The purpose of the IoT is to bring everything in our world together under a common infrastructure. This not only allows us to control the things around us. Here, I try to shed some light on the concept of IoT, its importance and use in everyday life. IoT devices are network microcontrollers with connected hubs and outputs. More importantly, IoT examples provide students with an interesting context for thinking beyond imagination and develop multiple IoT-enabled devices while solving real-world problems. This research provides an overview of Internet of Things, architectures, and vital technologies and their usages in our daily life.

Keywords: WSN (wireless sensor network), RFID (radio frequency identification device), HVAC system, DAS (data acquisition system), WI-FI, V2X correspondence

1. Introduction
The Internet of Things (IOT) is the network of physical objects, in which things are uniquely identifiable nodes, primarily sensors that communicate without human interaction using IP connectivity. A thing in IOT can be anything with sensor and internet connection According to wrist-watch, sunglass, T.V., Car-key etc, Devices collect an huge amount of data from every person and stored [1]. Connect them to the internet. In less than a decade, we have gone from using our fingers to interacting with our devices to being able to talk to our devices. “Alexa, Siri, Google Assistant, Smart Refrigerator, Smart Security System, etc. are some examples of IoT-based devices that are used in daily life. According to a survey, around 50 million devices will be connected to the Internet in a period of around 4-5 years and 6 (approximately) products will be used per person [2].
IOT plays an important role in improving the smartness of cities and developing the infrastructure. Some of the IOT based application that are helpful in creating smart cities include: IOT based transportation system, smart buildings, waste management, self-driving cars, smart parking facilities etc.

2. Brief history
In 1989, the “INTERNET” was first introduced and its characteristic features attracted people in such a great extent that it spread like a forest fire throughout world. After the birth of internet the process of linking everything to internet started. The first device that was linked to internet was a coco-cola vending machine at Carnegie Mellon University becoming the first ARPANET-connected appliance, able to report its inventory and whether recently encumbered drinks were cold or not [3].
In 1999, “Kevin Ashton introduced the term IOT and established MIT’s Auto-ID center, a global research network of academic laboratories focused on RFID and the IOT. The internet is an essential part of the life of a social animal. It's a great space for information and people. The internet began to develop into The "Internet of Computers" [5] is a global platform on which services such as the World Wide Web can be accessed. It's the age of sharing information. Over time People are starting to appear on the Internet: the "Internet of the People [4]." Many social media sites come into the picture and keep people connected all the time. This makes the internet full of people instead of information.

On the other way, as technology is advancing day to day and at the same time, the era of "MobiComp" (mobile computing) began. Mobile devices enable humans to connect to the Internet anytime, anywhere. Today, 3G and 4G mobile Internet connections have enabled faster Internet access. And provides better quality for video calls. Wireless technology and mobile computing became cheaper and more popular [4]. Then a new computer was born: Ubiquitous Computing. This computation focused on smart space and minimal user engagement [2].

3. Background functioning of IoT

A. Architecture and design of IoT

Technology has a vast assortment of applications and utility of IOT. On the basis of smearing areas of IOT, it is no wrong to say that IOT does not have a standard structure or architecture, it works as per the purpose for what it has been designed. Although by [5], there is a basic methodology on which IOT is built.

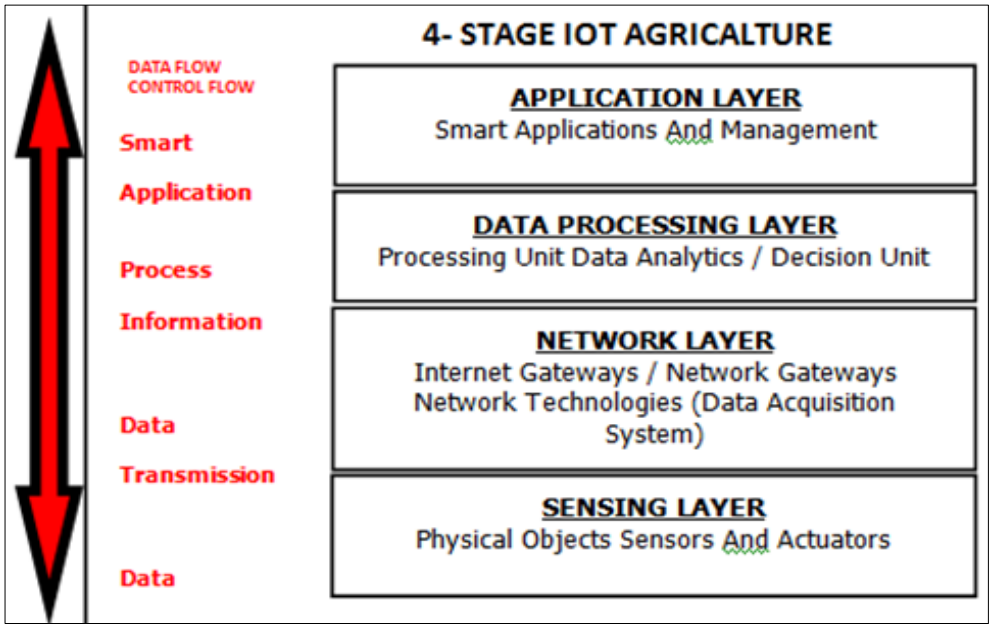

Fig 1: Layers of IoT [4]

So, from the above figure-1 it is clear that IOT architecture contains four layers: Sensing Layer, Network layer, Data Layer processing, Application Layer. Detailed functioning and services of these layers is as follows:

a) Sensing Layer: Sensors, actuators, devices are present in this Sensing layer. These Sensors or Actuators accepts data (physical / environmental parameters), processes data and emits data over network [4].

b) Network Layer: This layer comprises of Internet/Network gateways, DAS (Data Acquisition System), the function of DAS is to carry out data aggregation and conversion function. Advanced technology provides the facilities of gateways which open up connection between Sensor networks. Internet also performs many basic gateway functionalities like malware protection, and filtering also sometimes decision making based on inputted data and data management services, etc [4, 5].

c) Data Process Layer: This is processing unit of IoT ecosystem. In this layer data is analyzed and perform optimization because data is pre-processed before sending it to data center from where data is accessed by software applications often termed as technological business applications where data is monitored and managed and further actions are also prepared. So here Edge IT or edge analytics comes into picture [4].

d) Application Layer: This is the final layer out of four layer of IOT architecture. this layer is also known as the management center of data and cloud computing, which are further being used by end user applications such as-agriculture, healthcare, etc [4].

4. Utility domains of IoT

The intension behind the development of Internet of Things was to make the things or objects to be controlled via Internet or other wireless devices. In the path of making this intent accomplish numerous technologies come up with great features, some of them were: RFID, nanotechnologies, sensors, WSN, etc [7].

In this section, we're going to look about for some budding applications of IOT in various fields such as: Home appliance, agriculture, healthcare facilities, environment protection, waste management, security, transportation etc.

B. Smart Home Applications

Smart home is a resident that have all automation and technological controlled devices. If one is saying 'Smart home', than the picture is clear in mind that a house consisting of appliances such as lighting, Tv's, refrigerators, human and temperature sensing electronic gadgets, washers, dryers, security cameras with the ability to communicate with each other and secure the house even when nobody is present. Here are some such Gadgets:- Bit Defender Box IOT Security Solution, Google home voice controller, Nest cam indoor camera, Mr. coffee(Smart coffee maker), Smart Mat (intelligent Yoga mat) and many more [8].

C. Smart Buildings and lives

A smart building contains automated building equipments and a communication infrastructure. The equipments includes HVAC systems, lighting systems, shading systems, elevators, air quality control systems, automated parking facilities and other electrical devices. Such dedicated

equipment, categorized by functions, has been integrated with the smart building platform to facilitate real-time monitoring and controls using advanced technologies [9, 10]. But the problem is that these devices are not interlinked as they all have different communication protocols customized by their developers. To solve this data communication issues, There are several attempts have been made to standardize the protocol and integrate it into the same platform. Smart buildings connect with users and respond promptly to user requests [11].

On the other hand, Mortals are always chasing for the ways that make their living standard abit easier as possible. The term "Smart" means the involvement of some sort of intelligence in a system or entity. But it is wrong to say that people who lived before modern era doesn't live smartly. Living being is era find a way to live a smart lives. Some example of them were- for distant communication they use letter, pigeons etc. After that wired telephone, fax came into existence and then the wireless internet were discovered. Comparable to that voluntarily or involuntarily we always chase to discover an easiest way to do a task. Though Smartness is always being a part of mortals. Out of all these smartness ways the most recent was IoT which is obliged to make humans life much easier as it was now.

D. Smart Health Care Facilities

A bundle of advantages that IOT provides in the healthcare depends on a number of actions and devices that can be computerized and intensified through technology. The benefits that IT provides are tracking of patients, staffs and objects. Recognizing individuals and the automatic collection of information and sensing [12]. Sensor appliances permits functions on patients, specially in diagnosing conditions and getting the knowledge about patients health condition. Another elements of IOT in the health care sector are RFID, Bluetooth, and WIFI among others. These increases the calculation and keeping track of critical functions like blood pressure, temperature, heart rate, blood glucose, cholestrol levels and many others [13]. RFID is a wireless technology that is utilized for finding of objects. Because of its inexpensive cost and advanced potential like tracking the location of objects and remote rading. RFID uses radio waves to identify objects. IOT can be used in monitoring patient's health status from a remote place which is known as tele-medicine [14].

E. Environmental Protection

Environment is a very important part of humans, animals, birds and plants. Each and every aspect above is affected by bad environment. In the field of environment IoT technology is used for sensing, and tracking of objects present in the environment which provides great advantages in getting a green world. IoT helps in finding and coping the air quality by the group of data collected from remote sensors throughout the city and giving geographic coverage to get better ways of coping up with traffic in big cities. IoT is also used in measuring pollution level in water. In the fields of waste management IoT can be used for environmental protection by controlling the pollution through industries by means of instantaneous tracking and management systems with supervision and decision making networks. This helps in lessening the waste. By weather forecasting IoT can provide accuracy and high resolution for monitoring weather. By IoT technology, we can get information about barometric pressure, humidity, temperature, motion, light. The information is achieved by installing sensors in various places. IoT network can manage radiations through continuous tracking of its levels specially near nuclear plant areas for finding leakage [16].

F. Smart Agriculture Facilities

IOT has a huge role in the agriculture sector. It can be used in keeping track of the growth of medicinal plants. These plants are equipped with RFID tags ND sensors. When there is a tremendous transition in the development of plants because of temperature, humidity or any other means, then the sensors senses this and RFID tags send the EPC to the reader and is saved through internet.

The farmers or scientist can have access to the data collected by the sensors from a remote place and take the actions needed. IOT has the capability to intensify the agriculture sector.

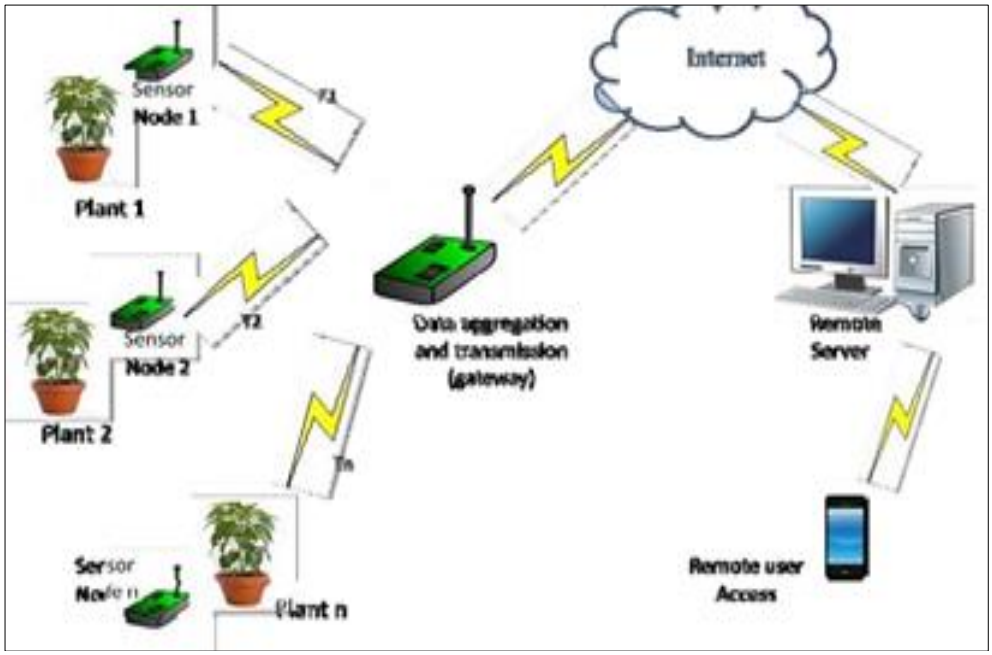

Fig 2: Soil moisture checking system [4]

By testing soli and moisture. The above shows the IOT controlled soil moisture checking model. This device is connected with one of your social media or messaging application and will notify you whenever your plants need water.

G. Smart Mobility Facilities

The purpose of this function is concentrated on the betterment of transportation, increases safety, lessens congestion and manages traffic. The challenges in this type are: identification, heterogeneity of sensors, scalability and dynamic behavior of objects [17].

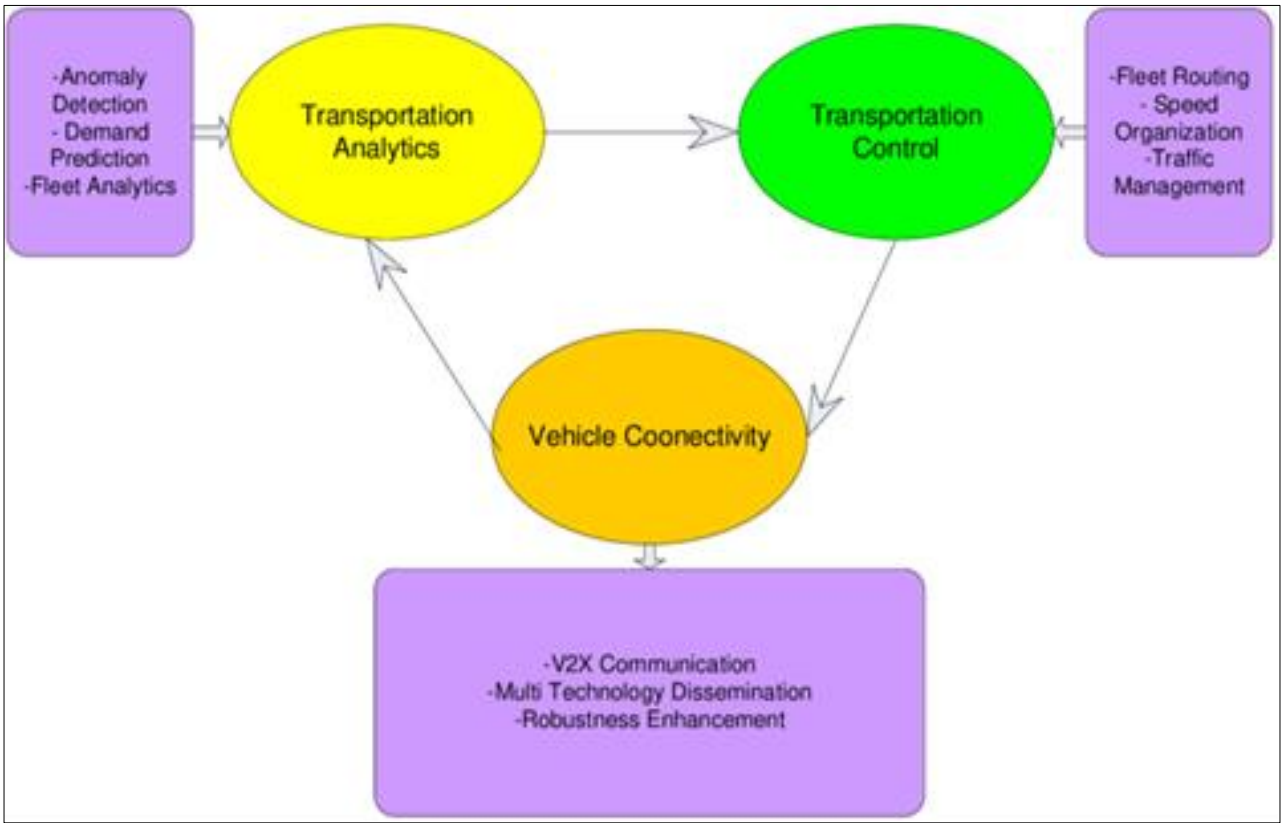

Fig 3: IoT in smart Transportation and Mobility [18]

Smart Transportation Systems manages three main sources: transportation systems, transportation controls. And vehicle network the transportation exhibit discusses the investigation of interesting expectations and the identification of inconsistencies. Vehicle routing and speed control, although the traffic is completely known as transport control. This is something identified by the vehicle network method (V2X support) and is typically represented by a diversified distribution of innovation [18].

H. Smart Mass Production Appliances

Smart factory included another incentive in assembling unrest by coordinate's man-made brainpower, AI, and robotization of information work and M2Mcommunication with the assembling procedure [19]. The smart factory will on an extremely fundamental stage transform that how items are created, fabricated and transported. At the same time it resolve and improve laborer safety by empowering low discharges and low episode fabricating. Such type of advances in the technological growth and different items convey and the subsequent manner by which dynamic moves from people to specialized frameworks implies that assembling becomes "more astute" [20]. These type of advances technology include like, Automation, mechanical technology, and independent versatility are all gives a methods for brilliant assembling yet M2Mcommunications empowered by the "modern" IoT will gives a full significance of well turned-out factory and mechanized by the method of Big Data idea which in this specific situation, refers to the scientific prospects offered by the volume and assortment of information that is created by an organized economy to enhance the mechanical procedures to suggesting less support vacation, less blackouts and much reduced energy consumption [21, 26, 27].

5. Comparison of quality of service in issues in various Iot applications

Table 1: Network Characteristics of IOT Technologies [23, 24]

Technology	Frequency	Limit / Range	Data Speed	Battery Life Span	Topology	Governing Body
RFID	1 Giga Hertz	1 centimeter-100 meter	1-100 kilo bit per second	3-5 years	P2P	Single Body
NFC	13.56 Mega Hertz	0.2 meter	424 kilo bit per second	3-5 years	P2P	ISO/IEC
BLE	2.4 Giga Hertz	10-100 meter	1 mega bit per second	1 year	P2P Star / Mesh / Tree	Bluetooth SIG
Ant	2.4 Giga Hertz	30 meter	1 mega bit per second	1 year	P2P / Star / Mesh / Tree	Gamin
EnOcean	Sub-1 Giga Hertz	30-300 meter	125 kilo bit per second	Months to Years	Mesh	EnOcean Alliance
Z-Wave	Sub-1 Giga Hertz	40-200 meter	100 kilo bit per second	Months to Years	Mesh	Z-Wave Alliance
ZigBee	Sub-1 category Giga Hertz, 2.4 Giga Hertz	10-100 meter	250 kilo bit per second	Months to Years	Star / Mesh / Tree	ZigBee Alliance
Wireless HART	Sub-1 Giga Hertz, 2.4 Giga Hertz	10-100 meter	250 kilo bit per second	Years	Mesh	HART Communication
Thread	Sub-1 Giga Hertz, 2.4 Giga Hertz	10-100 meter	250 kilo bit per second	Months to Years	Star / Mesh / Tree	Thread Group Alliance
6LowPAN	Sub-1 Category Giga Hertz, 2.4 Giga Hertz	10-100 meter	250 kilo bit per second	Months to Years	Star / Mesh / Tree	IETF
Wi-Fi	2.4 Giga Hertz, 5 Sub-1 Giga Hertz(Wi-Fi HaLow)	100 meter – 1 kilo meter	1 mega bit per second to giga bit per second	Days to Month	Star	Wi-Fi Alliance
Nb-IoT	450 Mega Hertz, 3.5 Giga Hertz	10-15 kilo meter	250 kilo bit per second	10+ years	Star	3GPP
Emtc	450 Mega Hertz, 3.5 Giga Hertz	10-15 kilo meter	1 mega bit per second	10+ years	Star	3GPP
EC-GSM-IoT	90-850 Mega Hertz	10-15 kilo meter	70-240 kilo bit per second	10+ years	Star	3GPP
LoRaWAN	Sub-1 Giga Hertz	10-15 kilo meter	50 kilo bit per second	10+ years	Star of stars	LoRa Alliance
Symphony Link	Sub-1 Giga Hertz	10-15 kilo meter	50 kilo bit per second	10+ years	Star	Link Labs
SIGFOX	Sub-1 Giga Hertz	10-15 kilo meter	100 kilo bit per second	10+ years	Star	Sigfox
DASH7	Sub-1 Giga Hertz	2-5 kilo meter	167 kilo bit per second	10+ years	Star/Tree	Dash 7 Alliance

The tables shed light on the set of connections of network characteristics like frequency band, range, data rate, battery life, topology and governing body of the various technologies.

6. Some remarkable differences between IoT and Traditional network

The Internet of Things (IoT) is sometimes referred to as the physical Internet. Unlike the regular Internet, as computers and phones are connected to physical devices all over the world, IoT is because the real Internet eventually connects everything to everything. And with the internet from street lamps and cars to plants and sometimes animals to tennis rackets. Your clothes, etc., are all connected and connected to the Internet.

With the Internet of Things, everything is connected to the Internet and the world around them. This opens up a world of unprecedented possibilities as the new Internet of Things has the potential to directly improve the physical world [24, 25].

a) Here's how IoT is better than the Internet: Improving the aerospace experience: With the IoT, we provide eco-friendly sensors that anonymously collect information about our planet and help improve it, collect it, and allow owners and operators to help create location and Better placement [24] IoT Now we can adjust the intensity of light according to our eyes. Use of space and providing information to space designers so that the project can be adapted to the actual use of the residents and the use of the space [24, 28].

b) Make the physical world more attractive: It is estimated that Americans use digital media approximately 8 hours a day. Which if maintained is equal to almost half of our lives. Some studies suggest that this online amount of time leads to the physical and social degradation of the real world while people reported being more satisfied with spending time with friends, family and loved ones. Spending time outdoors and in nature with the IoT will prioritize the real world over the virtual world. Promote a deeper balance between virtual and real experiences.

c) Good for the environment: in the outdoor environment Powerful sensors can help manage traffic at intersections. This reduces congestion, stagnant water and pollution, and also reduces wastewater from leaking municipal utility pipes. Internet-connected remote sensors can monitor forest areas for ecosystem health or track endangered species and prevent poaching. In commercial buildings, systems such as Enlight reduce a building's energy demand by 50-75% immediately after installation. There are hundreds of similar examples.

d) Improve our health: One of the most promising things to improve the Internet of Things is personal medical devices, such as personal fitness trackers like Fit bit, to help people increase their activity. Reduce calorie consumption and sleep better. Every day more sophisticated devices are attached. It is a tool that collects personal health data such as blood sugar for people with diabetes. And store such information anonymously on the Internet. This can analyze and compare with other data to improve health or mood trackers that show us patterns in our emotional lives and in the emotional lives of society in general. Similarly, in hospitals, systems like Enlighten use IoT to track both devices and employees. This reduces inefficiencies and time-consuming for expensive and demanding healthcare professionals. And the equipment they need to work and save lives.

Table 2: Difference between IOT & Traditional Network

Topic	Traditional Internet	IOT
Who Creates Contents?	Humans	Machines
How is the content combined?	Using explicitly defined links	Through explicitly defined operations1
What is the value	Answers questions	Action and Timely Information
What was done so far?	Both content creation(HTML) and content consumption (Search Engine)	Mainly content creation
Which type of connections	It may be Point-to-Point and Multipoint	Only Multipoint
Support of digital data	May gladly Available	Does not generate unless augmented or manipulated
Technology concept based on	Both Physical-first and Digital-first	Physical-first

7. Conclusion and Future Work

IoT is a concept by which we can create a connection between the virtual world of information technology and the real world. Technologies such as RFID and sensors make life better and more convenient with the potential to dramatically increase the availability of information and are known to transform companies and organizations in almost every industry in the world. How to Harnessing the power of the IoT should be a factor in most tech companies' strategic goals. They focus regardless of industry. Collaboration between standards development groups and integrating existing efforts will provide a clearer picture of IoT technology companies. UL is committed to continually developing technologies related to the IoT ecosystem.

The future of IoT has limitless possibilities. The growth of the industrial Internet will accelerate with increased network mobility. Embedded artificial intelligence (AI) and deployment capabilities automate, synchronize, and secure a wide range of use cases. This capability isn't just about activating billions of devices simultaneously, But also take advantage of the large amount of data that works which automates a wide range of business processes. The feasibility of this paper is to review the IoT Quadrant and understand how embedded hardware and software play an important role in IoT.

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