A STUDY ON INTERNET OF THINGS APPLICATIONS, CHALLENGES AND NEW TECHNOLOGIES

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Abstract— ***The IoT is a network of physical objects, such as vehicles, machines, home appliances, and more, that use sensors and APIs to connect and exchange data over the Internet. IoT is interconnecting through the Internet of computer devices embedded in everyday objects, enabling it to transmit and receive data over the network. IoT connects various inanimate objects through the Internet and helps humans to share information with their social network to simplify processes and make their lives easier. It allows people to interact with objects, machines and everything in between. IoT refers to a system of things in the real world, and sensors connected to or connected to these things are connected to the Internet via a wired and wireless network system. It combines anything web-based in specific protocols with information sensing tools to facilitate information exchange and communication in order to achieve smart authentication, matching, monitoring, monitoring and administration. IoT sensors allow wide area connectivity using many technologies such as GSM, GPRS, 3G and LTE, and can be used for a wide variety of connections, such as RFID, Wi-Fi, Bluetooth and ZigBee.***

Keywords - IOT, Network,Sensors, Connect, Exchange, Internet, Embedded, Objects, Wireless, Protocols, Information

I. INTRODUCTION

The Internet of Things, or IoT, is a system capable of transferring data over a network without the need for interconnected computing devices, mechanical and digital machines, objects, animals, or unique identifiers (UIDs) and humans. Computer or human-to-computer communication [1].

IoT is a network physical objects with technology to feel and communicate to the environment. The Internet of Things is not only connecting devices to the Internet, but also signaling how things are connected. The idea of IoT is particularly valuable or for people with disabilities, because IoT technologies can support human functions at large, such as building or community, as devices can interact with each other and act as a total organization. The Internet of Things (IoT) terminology represents a common notion of the ability of network devices to realize and collect data from around the world, and then share that data across the Internet, where it can be processed and used for a variety of interesting purposes. IoT encompasses and interacts with smart machines and other machines, objects, environments and infrastructures [2]. IoT sensors allow wide area connectivity using many technologies such as GSM, GPRS, 3G and LTE, and can be used for a wide variety of connections, such as RFID, Wi-Fi, Bluetooth and ZigBee. IoT-enabled things share information about people, software systems and other machines around the environment. The Internet of Things has an impact on education, business, communications, science and technology, humanities and government. Clearly, the Internet is one of the most important and powerful works in human history and with the concept of the Internet of Things. The Internet of Things is a new technology of Internet access [3]. Through the Internet of Things, objects acquire intelligence behaviors by identifying themselves, making or making relevant decisions, and thinking about the fact that they can communicate information about themselves.

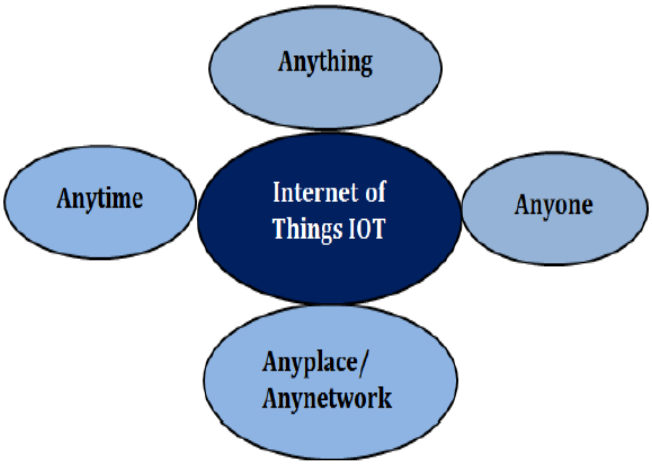

Fig1. Internet of Things

As Figure 1 shows, with the Internet of Things, any person can access services through the network at any time, from anywhere, this concept will create new types of applications such as smart vehicle and smart. To provide many services such as home, announcements, security, energy storage, automation, communications, computers and entertainment.

II. GROWTH OF IOT

Today's 3G and 4G mobile devices offer faster access to the internet and better quality in video calls. Wireless technologies and mobile computing have become cheaper and more popular compared to the early years. The advancement of technology has led to a decrease in the size of mobile and other handheld devices. Smart phones, iPads, tablets and notebooks have replaced ordinary mobiles and PCs. So there was a change in the way people access the Internet [4].

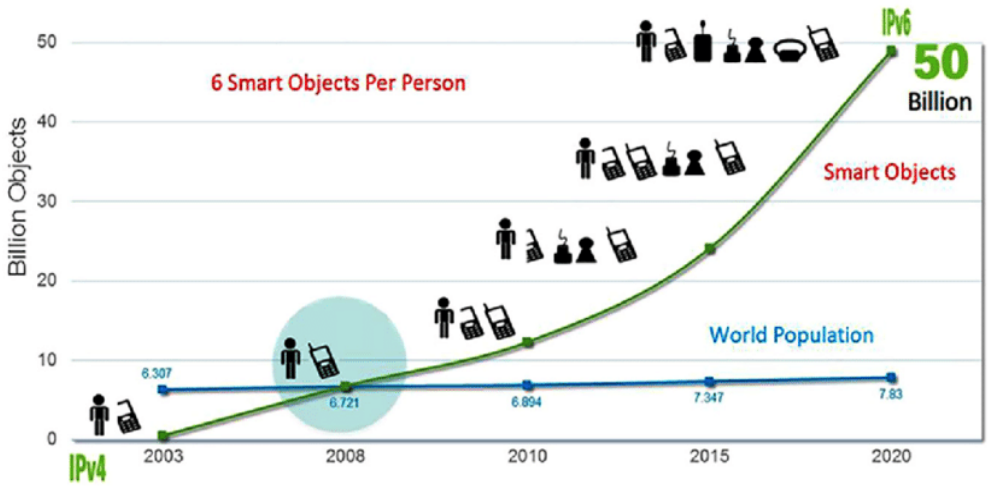

Fig2. Growth of IOT

INTERNET OF THINGS APPLICATIONS

The IoT developer focuses on a variety of real-time issues. In various areas, IoT application is developed, that is, healthcare, agriculture, smart buildings (school, hospital, home), supply chain management, retail, transport, industry, infrastructure monitoring and security [5].

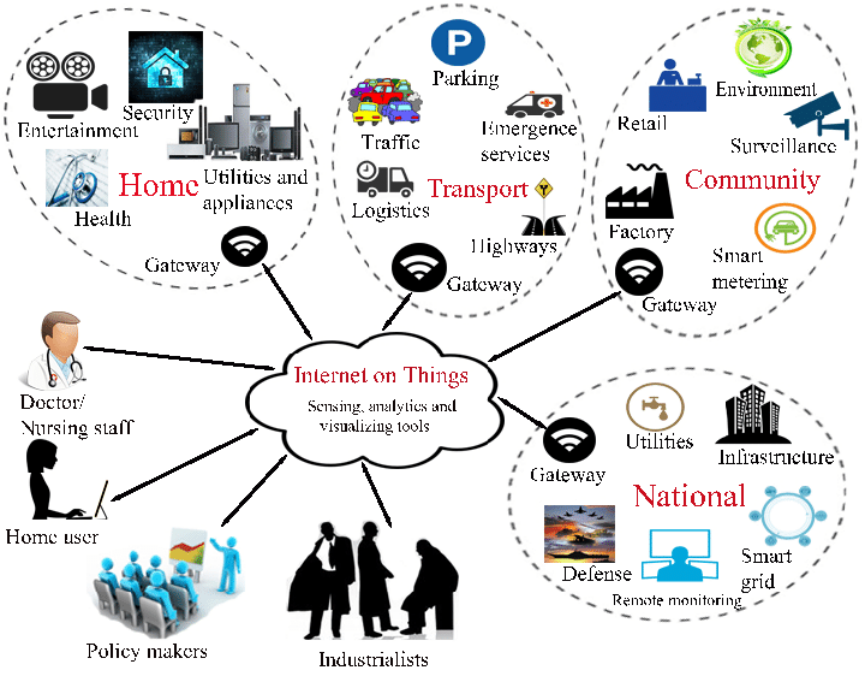

Fig3. Applications of IOT

A. *Health care*

It's hard to overestimate the role of IoT in the healthcare industry these days. Overall connectivity and innovations in smart devices, wearable's and modern medical equipment have changed the industry forever[6]. Digitalization in hospitals is a comprehensive IT solution. IoT in Healthcare is a way to make hospitals more efficient, deliver patient-relevant patient data faster, and accelerate clinical processes[7].

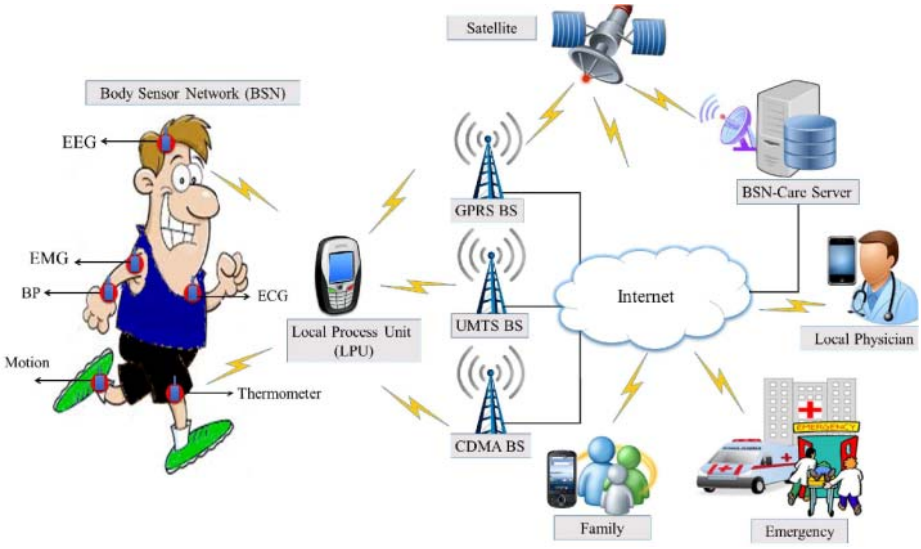

Fig4. IOT in Health Care

B. *Remote monitoring*

IoT Remote Monitoring Solutions imagine if your products or machines had eyes, could sense environmental changes, or could talk to you and inform you in real time[8]. IoT remote monitoring solutions offer features to improve visibility in operational performance and automate the business process. This includes collecting data from products or machines through smart sensors[9]. That data triggers automated alerts, such as remote detection, maintenance requests, and other operational processes, that machines may be located near or far away.

Fig5. Remote Monitoring using IOT

C. Agriculture

In agriculture IoT, the most advanced sensors are used. The sensors are now connected to the cloud via a cellular / satellite network[10]. This enables us to know the real-time data from the sensors, making the decision useful. Since the latest agricultural trends depend on agriculture, the Internet of Things has brought great benefits such as the efficient use of water, improving inputs and more[11]. Making the difference has huge benefits and has become a revolutionary agriculture in recent days.

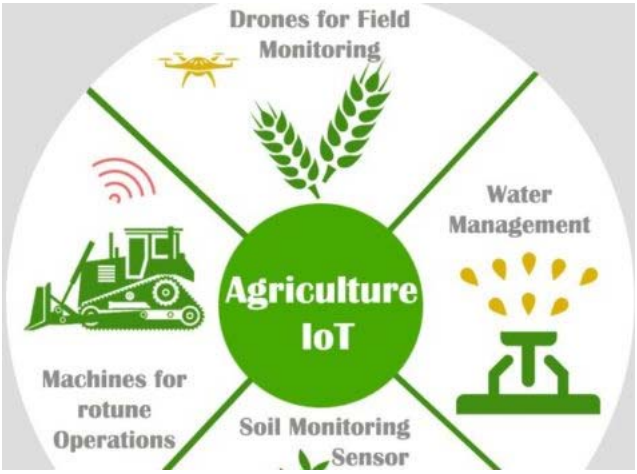

Fig6. IOT in Agriculture

D. Logistics coordination

Logistics operators can see the bright side of IoT when it comes to implementing logistics operations for businesses and end-consumers. Experts identify areas of logistics functionality that can be automated with the Internet of Things [12]. Experts find a way to analyze processes in the entire logistics value chain and integrate warehouse operations, inventory transportation and final delivery with the help of an integrated IoT system. This will lead to a paradigm shift in the logistics and supply chain industry. Customers will have unlimited information to monitor - track not only their exports but also the health of their exports during transportation. They determine the performance of their service provider based on the information they generate [13].

Fig 7. IoT in Logistics

E. Smart sports

Simple architecture of IoT game applications using smart sports equipment and wearable's with integrated sensors [14]. Smart gaming equipment and wearable's transmit sensor data directly to the IoT cloud or via a gateway. Sensor data processing can be done locally with a mobile device or cloud. The results can be verified by any connected device.

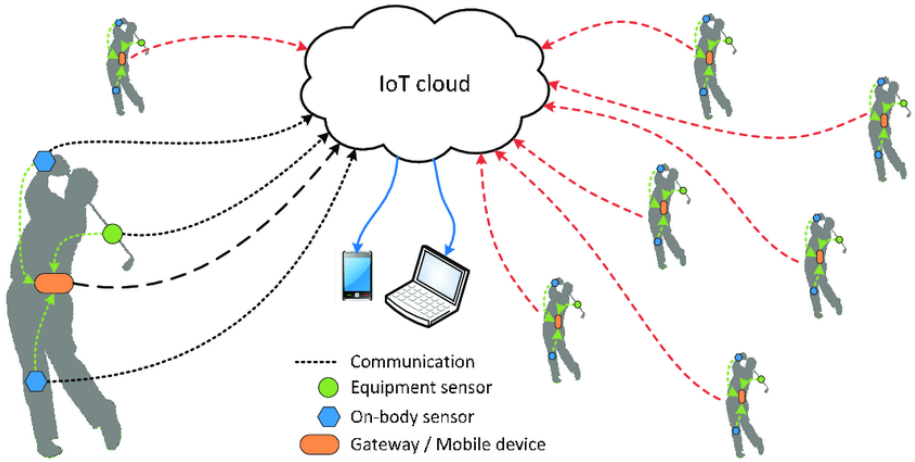

Fig 8. IoT in Sports

F. Smart cities

They are doing everything they can to digitize information, build modern infrastructure and create the best in class facilities for their citizens [15]. Automation is the bottom line of the smart city architecture. Monitoring, monitoring and timely feedback are critical for smart city systems to operate. IoT enables ecosystem and infrastructure development with tools that automate data collection, timely inputs, and actuators to improve management [16].

- ✓ Monitoring of parking areas availability in the city.
- ✓ Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.
- ✓ Intelligent Highways with warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.
- ✓ Water Level Monitoring
- ✓ Waste & Garbage Management
- ✓ Transport Systems
- ✓ Smart traffic management
- ✓ Infrastructure Assets Management
- ✓ Surveillance Systems
- ✓ Pollution control with sensors

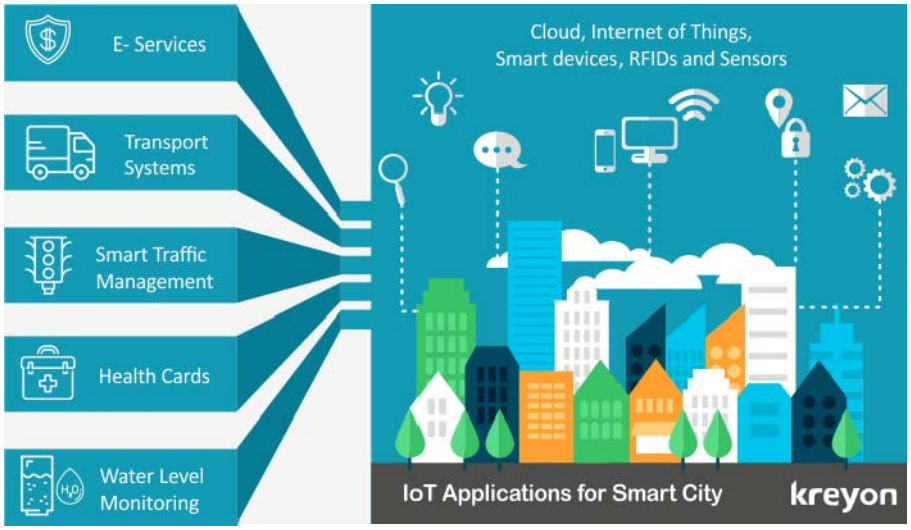

Fig 9. Smart cities using IoT

G. Brilliant home and buildings

Remotely monitor and manage our home appliances using the iodine system Reduce your monthly bills and resource usagen[17].

- ✓ Energy and Water Use: Energy and water supply consumption monitoring to obtain advice on how to save
- ✓ cost and resources.
- ✓ Remote Control Appliances: Switching on and off remotely appliances to avoid accidents and save energy [18].
- ✓ Intrusion Detection Systems:Detection of windows and doors openings and violations to prevent intruders.
- ✓ Art and Goods Preservation: Monitoring of conditions inside museums and art warehouses.
- ✓ Wi-Fi: Wi-Fi technologies in home automation has been used primarily due to the networked nature of deployed electronics where electronic devices such as TVs, mobile devices, etc are usually supported by Wi-Fi.

Fig 10. IoT in Home / Buildings

H. Smart health

Continuous monitoring of ICU patients is very difficult. To deal with these types of situations, our organization is beneficial. Our system is designed to measure and monitor various parameters such as temperature, ECG, heart rate, and blood pressure in hospitals and homes. You can record results using Adriano [19]. Doctors can see those results in the Android app. The system will generate a warning notification, which will be sent to the doctor. Our system is useful for tracking each person's health system by easily connecting and recording the device. It can analyze the patient's condition through their past data and recommend medication in the event of any emergency [20].

Fig 11. IoT in Health

III. INTERNET OF THINGS CHALLENGES

a. Scalability - The larger the size of the system, the more likely the solutions will be to scale. Deployments can occur in stages at any time and the architecture can be scaled up without taking too much overhead [21]. Scaling up on those topics will come up a lot. We talk about this with customers, prospects, analysts and media as one of the key differences for our product and why companies should look at us so the basic function of communication and service innovation is to operate equally efficiently in small and large scale environments. IoT requires new functions and methods to achieve scalable efficiency.

b. Self-Organizing - Network availability to support IoT applications meaning the common goal in times of trouble Communication between devices can be even better. Self-organization is a process of bootstrapping communications On the devices on the network after the communications provided have failed

c. Data interpretation - To support those who use smart things, it is important to interpret the local environment as determined by the sensors as accurately as possible. In order to profit from the different data generated by service providers, some general conclusions can be drawn from the described sensor data [22].

d. Automatic Discovery - In dynamic environments, Connected IoT devices communicate, usually at the earliest, via HTTP, to automatically detect these active devices and understand their device type. Create, model, version, etc.

e. Software complexity - Networking and background servers will require a more comprehensive software infrastructure to manage smart objects and provide support for them. Software systems in smart objects should work with minimal resources, just like regular embedded systems.

*f. Security and pri***vacy** - n expansion to the security and security perspectives of the Web in terms of data secrecy, the dependability and unwavering quality of the communications accomplices, and the keenness of the message, other necessities may too be vital in Web things. There's a have to be get to certain administrations or to anticipate them from association with other things in IoT, and trade exchanges including shrewd objects must moreover be ensured from the eyes of competitors.

g. Wireless communications - Wireless technologies such as GSM, UMTS, Wi-Fi and Bluetooth are the most relevant when it comes to energy. Many recent WPAN trends, such as ZigBee and still in development, have narrow bandwidth and use less energy.

h. Standards - Technical legacies and data-gathering legacies, including network and communications protocols, are a set of functions that handle the process and store information received from multiple sensors. These improve the data by increasing the size, scope and frequency of data available for analysis [23].

i. Dynamic changes - The state of the device varies dynamically, e.g., the environment of devices including sleeping and waking, connected and disconnected, and location and speed. Also, the number of devices will change to maintain user instructions.

IV. FUTURE OF IOT

A Google search for the term "Internet of Things" reveals 280,000,000 results, thanks to the media that has created a link between smart home wearable devices and connected automobiles, with the IoT predicted to be one of the top 10 trends over the next 5 years. The Internet of Things is made up of data sharing devices with the help of an Internet connection. IoT devices include not only smartphones, laptops, and computers, but also chips equipped objects to receive and transfer data over the network. Now, there is an extensive range of IoT devices on the market [24]. Consumers often connect their smartphones with IoT devices such as a speaker or thermostat. Connected devices offer features such as running the AC, creating groceries, playing favorite music, and more

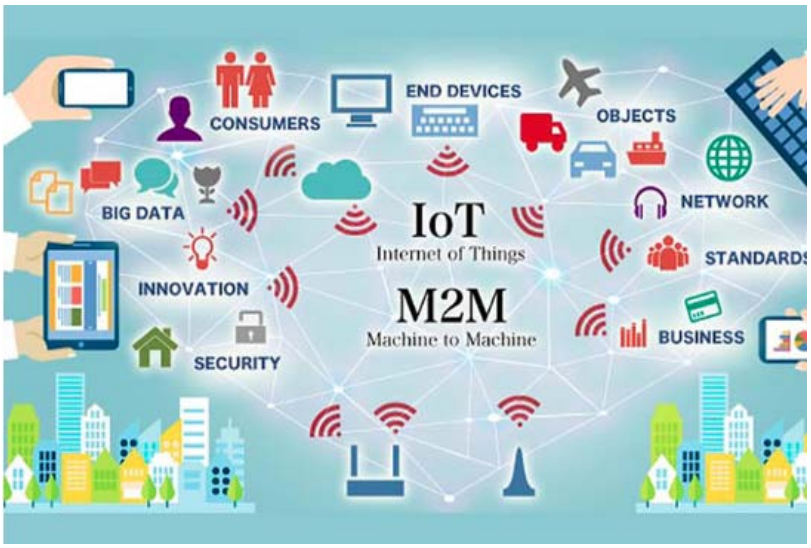

Fig 12. Future of IoT

It is estimated that there will be more than 25B IoT devices by 2026 - Let's take a quick look at the evolution of IoT devices. According to IoT analysis, in 2017, more than 5.7B devices were connected to the Internet. In 2022 and 2027 it is expected to increase to 13.4B and 25B devices respectively.

5G networks will continue to propel IoT growth - Major Wireless has launched 5G networks in 2019. 5G offers high speed and the ability to connect more smart devices simultaneously. Faster networks mean that the data collected by your smart devices is analyzed and managed more heavily. This will spur innovation in companies developing IoT devices and increase consumer demand for new products.

More cities will become smart - Besides, consumers, cities and companies are rapidly adopting smart technologies to save time, money and energy. This will enable cities to automate, manage and collect data through visitor kiosks and video camera surveillance systems. Taxis, bike rental stations and more [25].

V. CONCLUSIONS

The Internet of Things is a new Internet application that leads to the era of smart technology, where object-communication is more important than human-to-human communications. With IoT, every object in this world can easily be identified and identified independently. IoT is committed to delivering a step change in individuals — quality of life and organizations — productivity. With widely distributed, locally intelligent smart devices, IoT enables extensions and enhancements to basic services in transportation, logistics, security, utilities, education, health and other areas, while providing a new ecosystem for app development. The Internet of Things related to cloud, fog and distributed computing, big data and security issues are promising new technologies for the future. By connecting all of these issues to the Internet, better applications will soon be created. Technology needs to be embraced by the people, and should be taken into consideration during its development as gadgets, unwillingness to use smart devices and not comfortable with technology. There will be a difficult time to work with the complex implementation of IoT, and more time to deal with factors that can significantly reduce the strong future of IoT.

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