A Survey on Technologies, Applications and Challenges of IoT

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Abstract- In simple terms IoT refers to connecting everyday objects to the internet and to one another. This research paper presents different technologies of IoT, applications in various sectors and implementation challenges of IoT. The different technologies which are empowering IoT are RFID, WSN and Cloud Computing. IoT has various applications in different areas from smart homes to smart transportation, in healthcare etc.

Keywords: challenges,   applications, overview- IoT

I. Introduction

The internet of things allows people and things to be connected anywhere, anytime with anyone and anything. [1] The different components of IoT are sensors, networks, standards, intelligent analysis and intelligent actions. The Internet of Things (IoT) is the network of physical objects- devices, vehicles, buildings and other items which are embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. [2]

II. Key Technologies in IoT

The IoT requires a few basic important components to enable communication between devices and objects. In order to uniquely identify the objects, Objects need to be augmented with an Auto-ID technology, which is typically an RFID tag

A. RFID

RFID stands for Radio-Frequency Identification which is the use of radio waves to read and capture information stored on a tag attached to an object. The RFID device serves the same purpose as a bar code or a magnetic strip on the back of a credit card or ATM card. It provides a unique identifier for that object. And, just as a bar code or magnetic strip must be scanned to get the information, the RFID device must be scanned to retrieve the identifying information.

B. WSN

The idea of internet of things (IoT) was developed in parallel to WSNs.Wireless Sensor Networks is responsible for passing the sensed real world values to the internet. WSN is thus involved with the hardware communication. A WSN can generally be described as a network of nodes that cooperatively sense and may control the environment, enabling interaction between persons or computers and the surrounding environment. In fact, the activity of sensing, processing, and communication with a limited amount of energy, ignites a cross-layer design approach typically requiring the joint consideration of distributed signal/data processing, medium access control, and communication protocols.

C. Cloud Computing

The cloud computing of IoT is an on-demand self service, meaning it's there when you need it. Cloud computing is a web-based service that can be accessed without any special assistance or permission from other people; however, you need at minimum some sort of internet access. The cloud computing of IoT involves broad network access, meaning it offers several connectivity options. Cloud computing resources can be accessed through a wide variety of internet-connected devices such as tablets, mobile devices and laptops. This level of convenience means users can access those resources in a wide variety of manners, even from older devices. Again, though, this emphasizes the need for network access points. [2]

III. Applications of IoT

A. Automotive
In internet of things the connected vehicle is the best example for the applications of IoT in automobile industries.

B. Energy

With the help of IoT, information can be shared in real time to distribute and manage more efficiently using the power grids countless devices.

C. Healthcare

The IoT has significant and various applications in healthcare like clinical wearables to first responder tablets , sophisticated surgical suite equipments etc.
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D. Smart Manufacturing

IoT technology enables today's factories to unlock operational

efficiency, optimize production, and increase worker safety.

E. Retail

Unlimited opportunities to increase supply chain efficiencies, develop new customer service and reshape the customer experience for retailers using IoT .

F. Smart Buildings

The IoT is addressing rising energy costs, sustainability, and code compliance by connecting, managing, and securing devices that collect data from core systems.

G. Smart Homes

By using IoT technology, the dream

of having a smart and secure

home has become a reality in today's times.

H. Smart Transportation

Using IoT technology we have connected cars or self driving cars and intelligent transportation and logistics systems. It is possible to save life of people from accidents, reduce traffic congestion while travelling and also minimize vehicle impact on the environment.

IV. Challenges in IoT

The different challenges faced by IoT in implementation are:

A.Ubiquitios Connectivity

For implementation of IoT in various sectors internet connectivity should be available everywhere. But in reality even today internet connection is not there in most parts of the world. The IoT technology requires constant and reliable connectivity. Due to unreliable source of connectivity lot of problems are being faced in IoT implementation.

B. Security

When we think of IoT, the first question which arises is security of personal data. In implementation of IoT the main concern is security because more and more devices are being connected over the network thus there are more chances of getting our devices infected with malware. Less expensive devices have higher chances of getting tampered.

C. Interoperability

Connecting different systems through IoT interoperability challenges arises. There is a difficulty in creating real cross-domain services for seamless movement of different devices and data. Therefore interoperability of different systems in IoT is main issue.

D. Complexity in Integration

There is complexity in integration of IoT because of availability of multiple platforms, end-number of APIs and different protocols. This creates confusion among the evolving standards leading to slow adoption. Due to slower adoption and unanticipated resource requirements for development are the main reason for the delay in delivery and funding for IoT projects.

E. Evolving architectures and competing standards

There is an ongoing war between the different competitors to protect their proprietory systems and set new

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standards. Every day, multiple standards are evolving based on different requirements determined by device class, power requirements, capabilities, and uses. This presents opportunities for platform vendors to contribute and influence future standards. This causes problems in IoT implementations as too many standards are produced, leading to confusion. Even though implementing IoT has complications, the convergence of technologies will make IoT implementation much easier and faster. [4][5]

V. Conclusion

In this paper we studied the overview of IoT, the technologies which make the internet of thing to work efficiently, different implementation challenges faced by IoT. In future IOT is going to become a reality. It will change our life style. But there are many challenges to face related to the deployment, growth, implementation, and use of this technology. The Internet of Things involves a complex and evolving set of technological, social, and policy considerations across a diverse set of stakeholders. But it will be a boon for us in future.

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