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Internet of Things: Survey and Challenges in Education Sector

Ms. Shilpa Dattatraya Kolhe
Assistant Professor
MAEERS MIT Arts, Commerce and Science College, Alandi, Maharashtra, India
shilpaa3@gmail.com

Abstract: *IoT has been gradually bringing a sea of technological changes in our daily lives, which in turn helps to making our life simpler and more comfortable, though various technologies and applications. There is innumerable use- fulness of IoT applications into all the domains including medical, manufacturing, industrial, transportation, education, governance, mining, habitat etc. The future is Internet of Things, which will transform the real world objects into intelligent virtual objects. The IoT aims to unify everything in our world under a common infrastructure, giving us not only control of things around us, but also keeping us informed of the state of the things. In Light of this, present study addresses IoT concepts through systematic review of scholarly research papers, corporate white papers, professional discussions with experts and online databases. Moreover this research article focuses on definitions, geneses, basic requirements, characteristics and aliases of Internet of Things. The main objective of this paper is to provide an overview of Internet of Things, working, and vital technologies and their usages in our daily life and mainly challenges in Education Sector.*

Keywords: Internet of Things, IoT, RFID, Barcode, Wi-Fi, Bluetooth, NFC, ZigBee, Sensors, Actuators.

I. INTRODUCTION

1.1 What is Survey of this Paper

A Survey is a piece of academic writing demonstrating knowledge and understanding of the academic literature on a specific topic placed in context. A literature review also includes a critical evaluation of the material.

A survey is a piece of discursive prose, not a list describing or summarizing one piece of literature after another. It is an iterative process, assessing and distilling information. One of the key purposes of the literature survey is to investigate a problem that no one else has addressed.

The rise of mobile technology and the IoT allows schools to improve the safety of their campuses, keep track of key resources, and enhance access to information in the learning environment. Teachers can even use this technology to create "smart lesson plans," rather than the traditional plans of year.

1.2 History of Internet of Things

The phrase “Internet of Things” which is also shortly well-known as IoT is coined from the two words i.e. the first word is “Internet” and the second word is “Things”. The Internet is a global system of interconnected computer networks that use the standard Internet protocol suite (TCP/IP) to serve billions of users worldwide. It is a network of networks that consists of millions of private, public, academic, business, and government networks, of local to global scope, that are linked by a broad array of electronic, wireless and optical networking technologies. Today more than 100 countries are linked into exchanges of data, news and opinions through Internet.

1.3 Definitions

There is no unique definition available for Internet of Things that is acceptable by the world community of users. In fact, there are many different groups including academicians, researchers, practitioners, innovators, developers and corporate people that have defined the term, although its initial use has been attributed to Kevin Ashton, an expert on digital

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innovation. What all of the definitions have in common is the idea that the first version of the Internet was about data created by people, while the next version is about data created by things. The best definition for the Internet of Things would be:

It emphasizes the fact that objects are connected over the internet rather than people. The properties of Internet of Things (IOT) are product information, electronic tag, standard expressed and uploading information.

1.4 Requirements

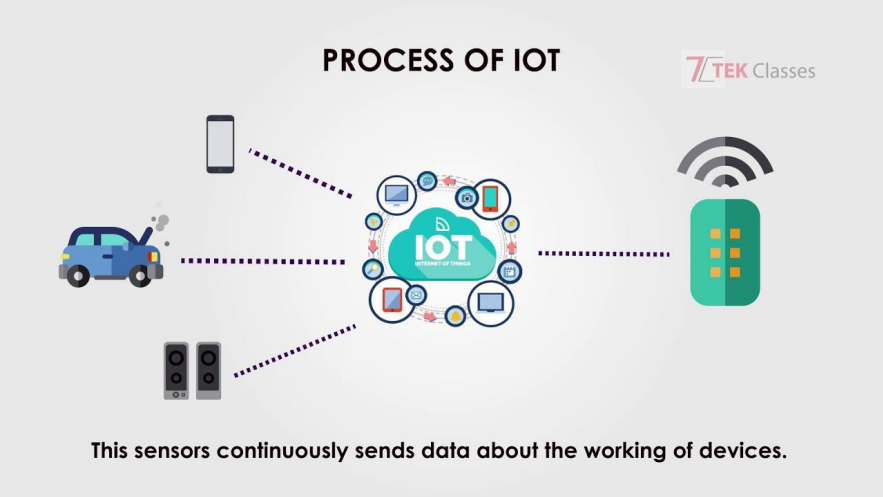
For successful implementation of Internet of Things (IoT), the prerequisites are:

1. Dynamic resource demand
2. Real time needs
3. Exponential growth of demand
4. Availability of applications
5. Data protection and user privacy
6. Efficient power consumptions of applications
7. Execution of the applications near to end users
8. Access to an open and inter operable cloud system

According to another author, there are three components, which required for seamless Internet of Things (IoT) computing

1. Hardware—composed of sensors, actuators, IP cameras, CCTV and embedded communication hardware
2. Middleware—on demand storage and computing tools for data analytics with cloud and Big Data Analytics
3. Presentation—easy to understand visualization and interpretation tools that can be designed for the different applications.

II. How IoT Works?



An IoT system consists of sensors/devices which "talk" to the cloud through some kind of connectivity. Once the data gets to the cloud, software processes it and then might decide to perform an action, such as sending an alert or automatically adjusting the sensors/devices without the need for the user.

The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. The main parts of IoT systems are Sensors/devices, connectivity, data processing, and a user interface.

The IoT and its counterpart, the Industrial Internet of Things (IIoT), are bringing sensor usage to a new level. Broadly speaking, sensors are devices that detect and respond to changes in an environment. Inputs can come from a variety of sources such as light, temperature, motion and pressure

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III. TECHNOLOGIES USED

1. Raspberry Pi (RPi) defines as a series of single-board computers that are now increasingly being used to connect IoT devices. RPi can be plugged into a computer monitor. It is a capable little device that enables people to explore computing and learn how to program in languages like Scratch and Python.
2. Arduino IoT Cloud is an application that helps makers build connected objects in a quick, easy and secure way. You can connect multiple devices to each other and allow them to exchange real-time data. You can also monitor them from anywhere using a simple user interface.
3. Radio Frequency Identification (RFID) Radio Frequency Identification (RFID) is a system that transmits the identity of an object or person wirelessly using radio waves in the form of a serial number.
4. Bluetooth Bluetooth wireless technology is an inexpensive, short-range radio technology that eliminates the need for proprietary cabling between devices such as notebook PCs, handheld PCs, PDAs, cameras, and printers and effec-tive range of 10 - 100 meters. And generally communicate at less than 1 Mbps and Bluetooth.
5. ZigBee ZigBee is one of the protocols developed for enhancing the features of wireless sensor networks. ZigBee tech-nology is created by the ZigBee Alliance which is founded in the year 2001. Characteristics of ZigBee are low cost, low data rate, relatively short transmission range, scalability, reliability, flexible protocol design. It is a low power wireless network protocol based on the IEEE 802

IV. CHALLENGES

With the help of the Internet of Things, a teacher can use digital pens and interactive whiteboards to display information on the student's connected tablet in real time, making it possible for their students to be instructed wherever they are.
There are various types of challenges in front of IoT.

4.1 Security challenges in IoT

- **Lack of Encryption:** Although encryption is a great way to prevent hackers from accessing data, it is also one of the leading IoT security challenges. These drives like the storage and processing capabilities that would be found on a traditional computer. The result is an increase in attacks where hackers can easily manipulate the algorithms that were designed for protection.
- **Insufficient Testing and Updating:** With the increase in the number of IoT(internet of things) devices, IoT manufacturers are more eager to produce and deliver their device as fast as they can without giving security too much of although. Most of these devices and IoT products do not get enough testing and updates and are prone to hackers and other security issues.
- **Battery Life is a Limitation:** Issues in packaging and integration of small-sized chip with low weight and less power consumption. If you've been following the mobile space, you've likely see how every yr it looks like there's no restriction in terms of display screen size. Take the upward thrust of 'phablets', for instance, which can be telephones nearly as huge as tablets. Although helpful, the bigger monitors aren't always only for convenience, rather, instead, display screen sizes are growing to accommodate larger batteries. Computers have getting slimmer, but battery energy stays the same.
- **Connectivity:** It is the foremost concern while connecting devices, applications and cloud platforms. Connected devices that provide useful front and information are extremely valuable. But poor connectivity becomes a challenge where IoT sensors are required to monitor process data and supply information.

V. CONCLUSION

The rise of mobile technology and the IoT allows schools to improve the safety of their campuses, keep track of key resources, and enhance access to information. Teachers can even use this technology to create "smart lesson plans," rather than the traditional stoic plans of yesteryear. Below, we've compiled a list of IoT education examples, including the uses of the IoT in higher education, the future of the internet in education, and examples of companies that are using the IoT to enter the education space. Students, particularly in college, are increasingly moving away from paper books toward tablets and laptops. With all of the necessary information at their fingertips, students can now learn at their own pace and have a

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nearly identical educational experience in their homes and in the classroom. And while this trend provides increased convenience for students, it also makes the teaching process more efficient for professors. The surge in connected technology means that instructors do not need to manually grade tests on paper or perform other routine tasks.

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