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Review Article

Internet of Things (IoT Devices)-A Literature Review

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Abstract

Moving into the future world, life will be getting more easier and easier because of internet of things (IOT). Nowadays with increased need for surveillance, monitoring and data collection IOT has become more important. Today almost all devices are equipped with sensors and are controlled by controllers such as from cars to vacuum cleaners, rockets to Vernier calipers, air conditioners to water pumps. By embedding intelligence in everyday objects, they turned into smart devices and can be controlled from anywhere in the world. This paper discusses about internet of things and its advantages and disadvantages. It discusses the applications of IOT in various fields such as city, agriculture, remote monitoring, smart street light, etc. This paper also tells about the history of IOT.

Keywords: *IoT, Surveillance, RFID, Autonomously, LoRa*

Introduction

There has been a rapid development in the field of IOT due to its ability to provide service which made it the fastest growing technology, with its huge impact on social and business life. Internet of things, IOT alike its name; can be referred to as the internet of everything. According to the research by 2020, 50 Billion products will be connected to the internet. This means that use of IOT will be six times more efficient [1]. So according to the increasing demand the performance of IoT will be six times more efficient.

In addition to the introduction of IOT technology manufacturers, many other service sectors are started the use of IoT. The internet of things (IoT) is an idea that could radically alter our relationship with technology. Many smart home devices will begin, everyday appliances like kettle and toasters.

IoT in the education sector has now started to make the conventional education system more efficient and useful-smart innovative classroom are helping students to learn more. Even at the time of epidemic online classes has started students to continue their learning without any disturbance. IoT is used in a lot of electronic devices. The use of word 'smart' for electronics is only possible because of IOT.

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As it makes the devices and machinery smart and automatic, so companies or organization need fewer human efforts and thus helping them to run these machineries in lower cost.

At the Internet World Statistics there are more than 201 countries that use internet and 3,731,973,423 internet users by March 2017[2]

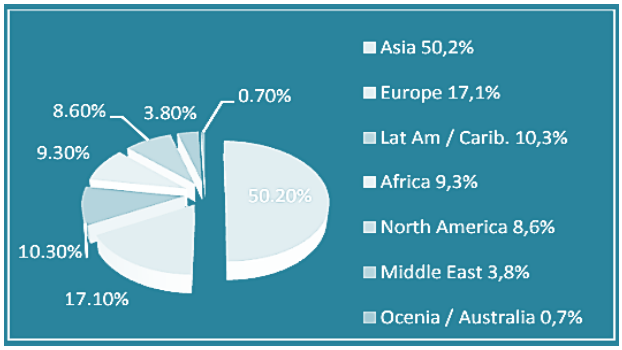

Fig 1: Internet Users in the World by regions,

IoT as an open and comprehensive network of intelligent objects which are capable of self-organizing and data sharing and those intelligent objects which have ability of reacting in any changes happening in our environment [3]. As it makes the devices and machinery smart and automatic, so companies or organization need lesser human efforts and thus helping them to run these machineries in lower cost.

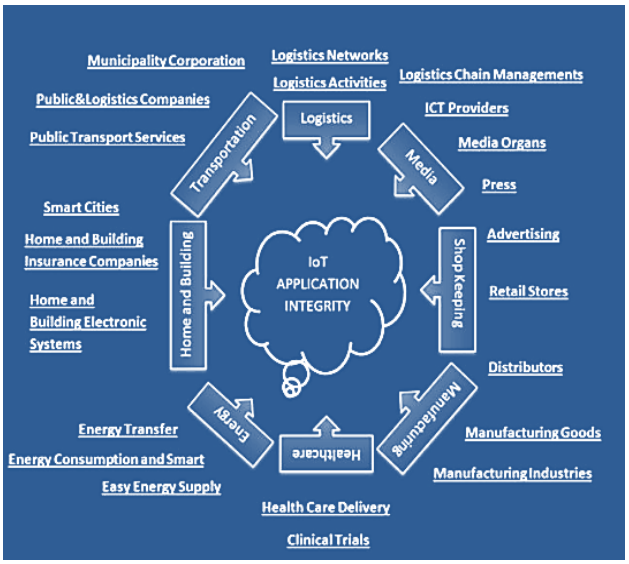

Fig 2: IoT Emerging Trends and Potential Opportunities

History of IOT

The term 'internet of things' was coined by Kevin Ashton, executive director of the Anticenter, MIT in the year 1999 but the concept of connecting devices dates back to 1832.[4] However the true history internet of things begins with the invention of the internet in the late 1960s.

The world first IOT device was invented in the early 1980s at the Carnegie-Mellon university by John Romney. [5] Groups of students they working on the coca cola wending machine to report on its content through a network in order to save them track if the machine was out of coke so they installed micro switches into the machine to report on how many coke cans were available and if were cold. The internet of things was a common topic used by the media at Radio Frequency Identification (RFID) is a technology that uses radio frequencies to transmit data. This process is executed using RFID tags that would be deployed at the respective spots. These tags are of two kinds; active tags are those with an internal power supply and passive tags are those without internal power supply. These tags communicate to the RFID readers. [6]

The IoT technology can be simply explained as a connection between humans – computers – things. All the equipment's we use in our day-to-day life can be controlled and monitored using the IoT. A majority of process is done with the help of sensors in IoT. Sensors are deployed everywhere and these sensors convert raw physical data into digital signals and transmits them to its control centre. [7] The introduction of IPv6 in 2011 has generated tremendous growth and interest in this area. IT giants such as Cisco, IBM and Ericson are continuing many educational and commercial initiatives with IOT. [8]

Applications of IoT

Smart Homes

IoT has now proved that it has a more valuable existence in this world. Now let's question ourself that what are the top - level features of IoT. Just for example if we like to turn on the air conditioner before we go home or we turn off lights, fans and so on, even after we leave the room. It is possible just because of smart home. [9] Smart homes come with a automated lightning system, audio system and security. You can easily optimise your smart home their usage and adjust your smart home setting in a cost-efficient way. A lot of processes in your home run autonomously, yet the overall control still remains in your hands. Is not it the future our ancestors dreamed of?

Smart Cities

IoT has now come across our cities and improving our cities which we call as smart cities. It comes with a fairly range of traffic management, waste management, water management, city security and environmental monitoring such as air quantity indices and other matter. [10] By using sensors and the internet, people can find free parking places in the neighbourhood. Google uses an application called 'Google Neighbour'. [11] Despite the coronavirus pandemic, people continue to move to or visit cities for several reasons, including employment opportunities, lifestyle, and more. According to a recent survey from Daintree Networks, almost 60% of building managers in the U.S. are familiar with IoT. Further, 43% believe that in the next two to three years, the IoT will shape how they operate their buildings. [12]

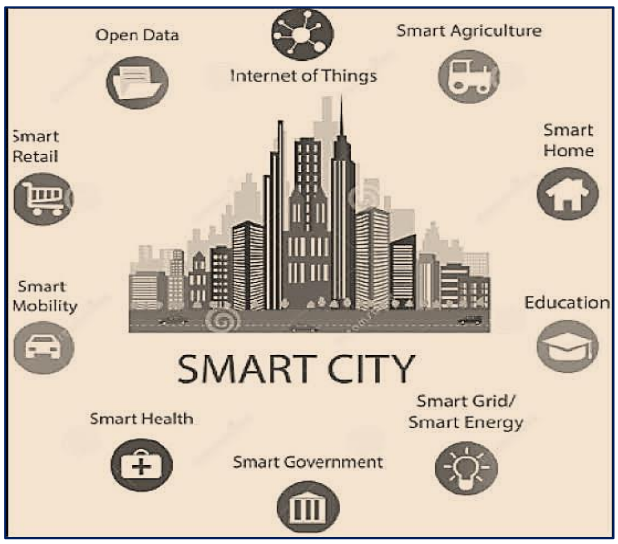

Fig 3: Smart City

Agriculture

Agriculture is the backbone of the developing country like India. The Failure/Successful growth of agriculture

yields of crop can turn the fortunes of farmers as it would help him to fetch more revenue for his agricultural produce but it would also boast the GDP of the country. Outreach of IoT can definitely influence the life of the farmer as by deployment of the sensor nodes deep inside the soil, can help the farmers to plan the month and time of the year when to sow the seeds. [13] Smart agriculture technologies from IoT sensors to predictive analytics- can best be applied to predictive analysis - can best be applied to supply chains to reduce food loss and waste.

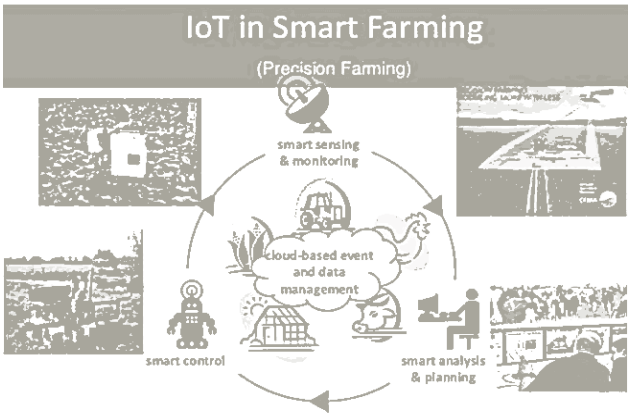

Fig: 4 Smart Farming

Remote Monitoring

United States is currently using this application to monitor the habitat at the Great Duck Island. They have also invested millions in installing many types of sensors in certain vegetation to track each and every movement.

LoRa (Long-Range Wireless IoT Protocol)

All the connected devices so farren on the same network and protocols such as Wi-Fi, Bluetooth, cellular, etc. [14]

Smart street light

This is the most mass energy savvy application used to control street lights. It has sensors to detect weather and daylight. It will send the data to the data processor for analytics turn the street light will receive the signal of on/off lights or dim/bright light.

Advantages of IOT

Time Saving

By programming the work, whenever needed or required will be completed and doing this will save human valuable time and energy. [15] IoT has now proved that it has a more valuable existence in this world.

Connectivity

On the network of directly connected devices, better communication is possible, making device communication more transparent and reducing inefficiencies. [16] Processes in which machines have to work with each other become more effective and produce better, faster results. The machines in the production or production unit are the perfect example. [17] connectivity enables network accessibility and compatibility. Connectivity empowers internet of things by bringing together everyday objects]. In 2021, there were more than 10 billion active IoT devices and by 2025, there will be 152,200 IoT devices connecting to the internet per minute. [18]

Expenditure effective

As we know communication through internet networks can be easily facilitated. The transfer of data packets to a network saves time and money. [19] The same information that can be transmitted can be done less than ever, just by internet of things. [10] IoT reduces costs by prioritizing and reducing the impact of productivity congestion by offering process optimization and analysis as well as conditional analysis to make sure human and machine work in perfect harmony. [20]

Access of Data

The more information you have, the easier it to make an appropriate decision. You have access to real-time data and information that is far away from your location. [15] Right now, you can easily gain the required information I real time, from(almost) any location you are at…IoT also encourage the communication between devices, also famously known as Machine-to-Machine(M2M) communication.

Disadvantages of IoT

Compatibility

As devices from different manufacturers will be interconnected in IoT, presently, there is no international standard of compatibility for tagging and monitoring equipments.

Complexity

The IoT is a diverse and complex network. Any failure or bugs in the software will have serious consequences. even power failure can cause a lot of inconvenience. The designing, developing, and maintaining and enabling the large technology to IoT system is quite complicated.

Privacy and security

As the lot of system are interconnected and communicate over networks. The system offers little

control despite any security measures, and it can lead the various kinds of network attacks. Even without the active participation on the user, The IoT system provide substantial personal data in maximum detail.
Getting access to companion devices on a network is not a big task neither is getting into a network. The hacking of monitors, smartfridge, drug infusion pumps, cameras and even assault rifles are a security nightmare being caused by the future of IoT. Many IoT devices have limited amounts of storage, memory, and processing capability and they often need to be able to operate on lower power, for example, when running on power backup. Security approaches that rely heavily on encryption are not a good fit for these constrained devices, because devices are not capable of performing complex encryption and decryption quickly enough to be able to transmit data securely in real-time. [21]

Connectivity issues

IoT requires a number of devices to be connected in a system at once. This is now becoming possible and easier with the introduction of IPv6. IoT systems need to defy the current communication models and used hardware/technologies.

Reference

[1]. Somaya Madakam, R. Ramaswamy. "Smart Homes (Conceptual Views)", 2014 2nd International Symposium on Computational and Business Intelligence, 201

[2]. "Internet Users in the World by regions," 2017. [Online]. Available: http:// www. Internet worldstats. com/ stats.htm.

[3]. S. Madakam, R. Ramaswamy, and S. Tripathi, "Internet of Things (IoT): A Literature Review," J. Comput. Commun., vol. 3, no. 3, pp. 164–173, 2015.

[4]. http://www.rfidjournal.com/articles/view?4986

[5]. https://romkey.com/

[6]. Stephen A. Weis, "RFID (Radio Frequency Identification): Principles and Applications" 2007 at MIT CSAIL

[7]. Ross Yu, Thomas Watteyne "Reliable, Low Power Wireless Sensor Networks for the Internet of Things: Making Wireless Sensors as Accessible as Web Servers", white paper, LT 1213, © Linear Technology Corporation 2013.

[8]. M. Chui, M. Löffler, and R. Roberts, "The Internet of Things," Mkcinsey Quaterly, 2010, http://www. mckinseyquarterly.com/High_Tech/Hardwa re/The_Internet_of_Things_2538?gp=1.

[9]. International Telecommunications Union, ITU Internet Reports 2005: The Internet of Things. Executive Summary, Geneva: ITU, 2005.

[10]. Abhishek Malik, Amrit Thapa Magar, Harsh Verma, Meeta Singh, Pinki Sagar: international journal of scientific & technology research volume 8, december 2019.

[11]. https://www.scientific.net/SSP.261.440

[12]. https://stefanini.com/en/trends/news/top-5-applications-of-iot-in-building-smart-cities

[13]. Sapna Chaudhary, Kalpana Gupta, Aditi Bhatnagars, Riya Bhatia SWINGER, USICT GGSIPU Delhi, India.

[14]. http://postscapes.com/home-wireless-sensor-systems

[15]. https://www.econlib.org/library/Topics/College/

[16]. https://www.academia.edu/35086213/A_SURVEYAP

[17]. https://www.gartner.com/en/newsroom/press-releases/2017-02-07-gartner-says-8-billion-connected-things-will-be-in-use-in-2017-up-31-percent-from-2016

[18]. https://dataprot.net/statistics/iot-statistics/

[19]. https://www.scientific.net/SSP.261.440

[20]. https://www.machinemetrics.com/blog/industrial-iot-reduces-costs

[21]. Yanish Sahu, Lalit kumar, Shabnam Sharma International Journal of Computer Applications (0975 – 8887)Volume 182 – No. 31, December 2018.