INTERNET of THINGS IN COMMUNICATION SYSTEM

Pooja V S[1], Radhika U Nair[2] and Sifiena Antony[3]
[1, 2,3]*Third year B.Tech students*
[1, 2,3]*Department of Computer Science and Engineering*
[1, 2, 3] *Royal College Of Engineering and Technology, Akkikavu, Thrissur, India*
poojavstirur@gmail.com[1],radhikaunair@gmail.com[2],sifienaantony@gmail.com[3]

***Abstract*- We are now in a new era of computing technology i.e. Internet of Things (IoT). IOT is a sort of "universal global neural network" in the cloud which connects distinct things. In this technology the devices and systems are intelligently connected to each other and it comprises of smart machines communicating with other machines, objects and infrastructures and the Radio Frequency Identification (RFID) and sensor network technologies will rise to meet this new technology. As a result, a large amount of data are being generated, stored, and that data is being processed into useful actions that can "command and control" the things to make our lives much easier and safer. Every organization such as companies and institutions needs up-to-date information about people. For this, most establishments either use websites, emails or notice boards. However, in most of countries internet availability is there for people on systems and their mobile devices, so that the transferring of the information can be much easier and cost efficient through the internet.**

***Keywords*- Information dissemination, Embedded System, Web server formatting, smart system**

I. INTRODUCTION

Internet of Things (IoT) represents a general concept for the capability of network devices to sense and collect data from around the world and then share that data across the Internet where it can be accessed and used for various purposes. The IoT is comprised of smart machines which can communicate with other machines, objects, environments and infrastructures. Now a day's all of us are connected to one another by means of different communication methods. Where most accepted communication method is internet, so in another words we can say that internet connects people.

Many connected devices are approaching the new communication technologies due to their networks and services approaches as per their limits and available re-sources. The new communication technologies have a provision to provide seamless connectivity which is the requirement of IoT. Communication technologies used in IoT has low power consumption, low bandwidth used, low computation power, seamless communication with devices in environment due to the concept of IoT is computing for everyone, anywhere, any network an any service. Moreover, these technologies are very much penetrating in e-health, e-traffic management, e-disaster management etc.

2. COMMUNICATION TECHNOLOGIES IN IoT

The major communication technologies that can be utilized by IoT devices are summarized below:

2.1 BLUETOOTH

Bluetooth is an IEEE 802.15.1 standard for low cost, short range and cheap devices of wireless radio technology. Bluetooth has been one of the first wireless communications protocols designed with lower power consumption for replacing short-range wired communications (in computer peripherals, mobile phone accessories, etc.), short distance data sharing and devices' mobility support. It has an exceptional property of creating personal area network during communication and discovers and communicates to its neighbor without need to be in visual line of sight. Due to its global standard it is also known as WPAN (Wireless Personal Area Network). It is very important for the case of IoT since many of the devices that one would like to interconnect to the IoT (sensors, actuators, etc.) having limited power resources.

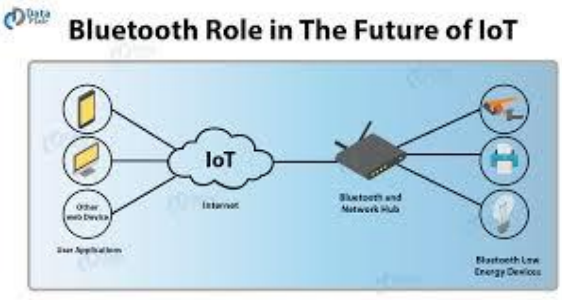

Fig1 Role of Bluetooth

2.2 Wi-Fi

Wireless fidelity is known as Wi-Fi, the IEEE 802.11x standards, is the most common way to connect devices wirelessly to the Internet. Laptop, Smartphone and Tablet PC are equipped with Wi-Fi interfaces and talk to wireless router and provide two way accesses to the Internet. The Wi-Fi standard family allows establishing wireless network on short distances. Wi-Fi has series types of networks like IEEE 802.11, IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11e: QoS extension, IEEE 802.11f: extension for managing handover and IEEE 802.11i security extension. The Wi-Fi group is working on unlicensed spectrum of 2.4 GHz (ISM) band.

2. RELATED WORK

Relevant articles were searched using the keywords "Inter-net of Things (IoT)" and "communication components in smart homes". Studies on smart transportation and smart city applications were excluded from the search. The search scope was restricted to those studies written in English and those that entirely focus on automated IoT-based smart home applications. The digital databases used for the articles search included: (1) IEEE Xplore, a scholarly database that supplies reliable articles in electronic technologies, electrical engineering, and computer science; (2) Web of Science (WoS), which provides cross-disciplinary research in sciences, humanities, social sciences, arts, and electronic technologies; and (3) Science Direct, which is a huge database of scientific researches. These databases cover a sufficient amount of research on IoT and its applications in smart homes from a wide range of disciplines. The selection, search, and categorization of the relevant literature were divided into two rounds. In the first round, three iterations of screening and filtering processes were conducted. In the first iteration, the duplicate articles were removed. In the second iteration, all unrelated articles were determined and excluded by scanning their titles and abstracts. In the third iteration, the full-text articles that were screened in the second iteration were carefully reviewed. All iteration steps followed the same eligibility criteria. In the second round, those papers selected in the first-round iterations were screened and filtered using the keyword "communication components". The final set included articles that explored different topics related to the communication components of IoT-based smart home technologies.

3. EXISTING SYSTEM WITH DRAWBACKS

The essential idea of the Internet of Things (IoT) has been around for nearly two decades, and has attracted many researchers and industries because of its great estimated impact in improving our daily lives and society. When things like household appliances are connected to a network, they can work together in cooperation to provide the ideal service as a whole, not as a collection of independently working devices. This is useful for many of the real-world applications and services, and one would for example apply it to build a smart residence; windows can be closed automatically when the air conditioner is turned on, or can be opened for oxygen when the gas oven is turned on. The idea of IoT is especially valuable or persons with disabilities, as IoT technologies can support human activities at larger scale like building or society, as the devices can mutually cooperate to act as a total system.

Communication capability and remote manual control lead to the next step … how do I automate things and, based on my settings and with sophisticated cloud-based processing, make things happen without my intervention? That's the ultimate goal of some IoT applications. And, for those applications to connect with and leverage the Internet to achieve this goal, they must first become "smart" (incorporate an MCU/embedded processor with an associated unique ID) then connected and, finally, controlled. Those capabilities can then enable a new class of services that makes life easier for their users. The term Internet of Things was first coined by Kevin Ashton in 1999 in the context of supply chain management. However, in the past decade, the definition has been more inclusive covering wide range of applications like healthcare, utilities, transport, etc. Although the definition of "Things" has changed as technology evolved, the main goal of making computer sense information without the aid of human intervention remains the same. A radical evolution of the current Internet into a Network of interconnected objects that not only harvests information from the environment (sensing)and interacts with the physical world (actuation/command/control), but also uses existing Internet standards to provide services for information transfer, analytics, applications, and communications. Fueled by the prevalence of devices enabled by open wireless technology such as Bluetooth, radio frequency identification (RFID), Wi-Fi, and telephonic data services as well as embedded sensor and actuator nodes, IoT has stepped out of its infancy and is on the verge of transforming the current static Internet into a fully integrated Future Internet. The Internet revolution led to the interconnection between people at an unprecedented scale and pace. The next revolution will be the interconnection between objects to create a smart environment. Only in 2011 did the number of interconnected devices on the planet overtake the actual number of people. Currently there are 9 billion interconnected devices and it is expected to reach 24 billion devices by 2020. Now days everywhere like at railway station, shopping malls, in colleges an information desk is mandatory that provides information about the train schedule, promotional offers and important notice immediately. From educational organization perspective, the problem is that it requires some staff that is dedicated to that

purpose and that must have up to date information about the institute and the recent happenings in the institute. The second problem is that a person needs to go in the institute at the information desk in order to get information from them. The solution of this is to use a technology and make technology responsible to answer all the queries asked by people. The best tool is Cell phones, which are available to almost everyone and that is connectable to internet to download latest information. If the information is not updated over the internet, in those cases where the information is not being updated over internet, we need to call customer service center for support. Some authors designed a device that has all the information stored in its database, whenever someone needs information they have to use that device and get related information from through that device. For this to work, the device must be available to user who needs any help or support. In Educational institutions have a situation wherein students can be present in any part of the campus and might miss important updates such as rescheduling of classes etc. Furthermore, students or customers might not be able to know important information in-time for it to be useful to them as they might not be able to pass through those notice boards regularly.

Enabling technologies for the IOT: - There are three types of technologies that enable the internet of things, i. Near-field communication and Radio Frequency Identification (RFID) - n the 2000s, RFID was the dominant technology. After few years, NFC became dominant (NFC). NFC has become common in smart phones during the early 2010s, with uses such as reading NFC tags or for access to public transportation. ii. Quick response codes and Optical tags - This is used for low cost tagging. Phone cameras decode QR code using image-processing techniques. In reality QR advertisement campaigns gives less turnout as users need to have another application to read QR codes. iii. Bluetooth and low energy - This is one of the latest technique. All newly releasing smartphones have BLE hardware in them. Tags based on BLE can signal their presence at a power budget that enables them to operate for up to one year on a lithium coin cell battery.

4. PROPOSED SYSTEM

In every organization there is always information desk that provides information, advertisement messages and many notifications to their customers and staff. The problem is that it requires some staff that is dedicated to that purpose and that must have up to date information about the offers advertisement and the organization. Due to IOT we can see many smart devices around us. Many people hold the view that cities and the world itself will be overlaid with sensing and actuation, many embedded in “things” creating what is referred to as a smart world. Similar work has been already done by many people around the world. In literature [10] the IoT refers as intelligently connected devices and systems to gathered data from embedded sensors and actuators and other physical objects. IoT is expected to spread rapidly in coming years a new dimension of services that improve the quality of life of consumers and productivity of enterprises, unlocking an opportunity. Now this time Mobile networks already deliver connectivity to a broad range of devices, which can enable the development of new services and applications. This new wave of connectivity is going beyond tablets and laptops; to connected cars and buildings; smart meters and traffic control; with the prospect of intelligently connecting almost anything and anyone. This is what the GSMA refers to as the “Connected Life”. The author in [11] describes the concept of sensor networks which has been made viable by the convergence of micro electro-mechanical systems technology, wireless communications. Firstly the sensor networks applications and sensing task are explored, and according to that the review factors influencing the design of sensor network is provided. Then the algorithms and protocols developed for each layer and the communication architecture for sensor networks is outlined.

The authors in [1] developed an Electronic Information Desk System. Here they are using SMS based approach but different way. The system is designed to work independently without the need of any human operator and when a student or employee needs any information, they will need to send an SMS to this system which will respond with the information required by user. Many technical communities are vigorously pursuing research topics that contribute to the IOT. In [12] the purpose of research is to understand the feasibility of IoT in bus transportation system in Singapore. The Singapore, which is technically very advanced but still has scop of advancement in their transportation system.the made a system by the using the IOT for the consumer to understand and evaluate different bus options in an efficient manner. Secondary research was used to predict arrival timings of buses as well as the crowd inside each bus. The literature [13] presents a three layered network construction of Internet of Things (IOT) communication method for high-voltage transmission line which involves the wireless self-organized sensor network (WSN), optical fiber composite overhead ground wire (OPGW), general packet radio service (GPRS) and the Beidou (COMPASS) navigation satellite system (CNSS). The function of each layer of network, application deployment and management of energy consumption are studied. The method can meet the needs of interconnection between the monitoring center and terminals, reduce the terminals‟ GPRS and CNSS configuration and OPGW optical access points, and ensure the on-line monitoring data

transmission real-time and reliable under the situation of remote region, extreme weather and other environmental conditions.

[3] Many technical communities are vigorously pursuing research topics that contribute to the IoT. Today, as sensing, communication, and control become ever more sophisticated and ubiquitous, there is significant overlap in these communities, sometimes from slightly different perspectives. More cooperation between the communities is encouraged. To provide the basis for discussing open research problems in IOT, a vision for how IOT could change the world in the distant future. Now in this era the iot may be used in various research field in this literature those may classified as: massive scaling, creating knowledge and big data, architecture and dependencies, , robustness, openness, security, privacy, and human-in-the-loop. Advantages: •Students or employee easily get important notice or information by message any time 24x7. •Within a seconds organization can change notice or information by sending SMS only. •Admin can change the display message or notice from any place or anywhere.

Disadvantage: •If anybody wants information they have to do message and for every new information they have to send message again and again to the system.

The authors in [6] developed Digital electronic display board is fast gaining acceptance and application in different spheres of life which include educational institutions, public utility places and in advertisement due to the problem associated with construction of signposts and manually placement of papers on walls, buildings, and edifies which makes the environment look untidy. These authors [6] presents the design and development of a microcontroller based electronic strolling message display board, which will be used to display messages and information in real-time via SMS This microcontroller based electronic strolling message display board offers the flexibility to a user to control the message or information displayed without recourse to geographical location of the user, provided there is GSM (Global System for Mobile Communication) mobile network. It therefore eliminates the inconveniences of physically going to the display board to manually input information using a computer system. The paper also incorporates a feedback mechanism from the remote display board to ascertain that the message sent by the user has been displayed.

Advantages: •Within a seconds organization can change notice or information by sending SMS only. •User can change the display message or notice from any place or anywhere and anytime. Disadvantages: •For SMS we have to pay or we have to give extra charges to organization. •Security and network issue may occur sometimes.. The authors in [7] deal with an innovative rather an interesting manner of intimating the message to the people using a wireless electronic display board which is synchronized using the GSM technology. This will help us in passing any message almost immediately without any delay just by sending a SMS which is better and more reliable than the old traditional way of pasting the message on notice board. This proposed technology can be used in many public places, malls or big buildings to enhance the security system and also make awareness of the emergency situations and avoid many dangers. Using various AT commands is used to display the message onto the display board. GSM technology is used to control the display board and for conveying the information through a message sent from authenticated user. The authors in [4] the term Internet of Things was first coined by Kevin Ashton in 1999 in the context of supply chain management. However, in the past decade, the definition has been more specified covering a wide range of applications like healthcare, utilities, transport, etc. Although the definition of „Things" has changed as technology evolved, the main goal of making a computer sense information without the aid of human effort remains the same. A radical evolution of the current Internet system into a Network of interconnected the objects that not only gathering the information from the environment (sensing) and interacts with the physical world, but also uses existing Internet standards to provide services for information transfer, analytics, applications and communications. Advantages: •Students or employee easily get important notice or information by message any time 24x7. •Within a seconds organization can change notice or information by sending SMS only. •Admin can change the display message or notice from any place or anywhere.

III. APPLICATIONS

This system is designed for a shopping complex mall but it can be also used in various organizations like educational Notice board system or at Railway station, Bus stand and Air-port to display the information and notification. In mall it is also used to control the humidity and temperature of mall via central AC by using temperature sensor. In Industrial organization it can be also used. E-display system may be used to display Emergency message in Hospitals.

i. Smart cities:- To make the city as a smart city to engage with the data exhaust produced from your city and neighborhood.

• Monitoring of parking areas availability in the city.

• Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.

• Detect Android devices, iPhone and in general any device which works with Bluetooth interfaces or WiFi .
• Measurement of the energy radiated by cell stations and and Wi-Fi routers.
• Monitoring of vehicles and pedestrian levels to optimize driving and walking routes.
• Detection of rubbish levels in containers to optimize the trash collection routes.
• Intelligent Highways with warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.

ii. Security & Emergencies:-

• Perimeter Access Control: Detection and control of people in non authorized and restricted.
• Liquid Presence: Liquid detection in data centers, sensitive building grounds and warehouses to prevent breakdowns and corrosion.
• Radiation Levels: In nuclear power stations surroundings distributed measurement of radiation levels to generate leakage alerts.
• Explosive and Hazardous Gases: Detection of gas leakages and levels in industrial environments, surroundings of chemical factories and inside mines.
iii. Smart agriculture:-

• Wine Quality Enhancing: Monitoring soil moisture and trunk diameter in vineyards to control the amount of sugar in grapes and grapevine health.
• Green Houses: Control micro-climate conditions to maximize the production of fruits and vegetables and its quality.
• Golf Courses: Selective irrigation in dry zones to reduce the water resources required in the green.
• Meteorological Station Network: Study of weather conditions in fields to forecast ice formation, rain, drought, snow or wind changes.
• Compost: Control of humidity and temperature levels in alfalfa, hay, straw, etc. to prevent fungus and other microbial contaminants.

iv. Domestic & Home Automation:- In home by using the iot system remotely monitor and manage our home appliences and cut down on your monthly bills and resource usage.

• 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.
• 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.

v. Medical field:-

• All Detection: Assistance for elderly or disabled people living independent.
• Medical Fridges: Monitoring and Control of conditions inside freezers storing medicines ,vaccines, and organic elements.
• Sportsmen Care: Vital signs monitoring in high performance centers and fields.
• Patients Surveillance: Monitoring of conditions of patients inside hospitals and in old people's home.
• Ultraviolet Radiation: Measurement of UV sun rays to warn people not to be exposed in certain hours.

vi. Industrial Control:- • Machine to Machine Applications: Machine auto-diagnosis the problem and control.
• Indoor Air Quality: Monitoring of oxygen levels and toxic gas inside chemical plants to ensure workers and goods safety.
• Temperature Monitoring: Monitor the temperature inside the industry.
• Ozone Presence: In food factories monitoring of ozone levels during the drying meat process.
• Vehicle Auto-diagnosis: Information collection from Can Bus to send real time alarms to emergencies or provide advice to drivers.

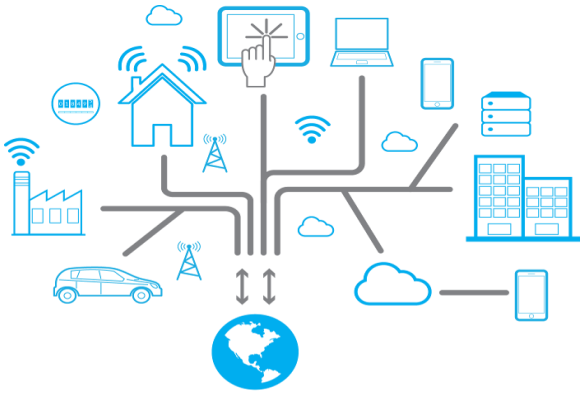

Fig 2 Different Application Areas of IoT

6.CONCLUSION

The IoT promises to deliver a step change in individuals‟ quality of life and enterprises‟ productivity. Through a widely distributed, locally intelligent network of smart devices, the IoT has the potential to enable extensions and enhancements to fundamental services in transportation, logistics, security, utilities, education, healthcare and other areas, while providing a new ecosystem for application development. A concerted effort is required to move the industry beyond the early stages

of market development towards maturity, driven by common understanding of the distinct nature of the opportunity. This market has distinct characteristics in the areas of service distribution, business and charging models, capabilities required to deliver IoT services, and the differing demands these services will place on mobile networks. Connecting those smart devices (nodes) to the web has also started happening, although at a slower rate. The pieces of the technology puzzle are coming together to accommodate the Internet of Things sooner than most people expect. Just as the Internet phenomenon happened not so long ago and caught like a wildfire, the Internet of Things will touch every aspect of our lives in less than a decade. We have already seen the wide application of internet of things. In this work we will present a model of IOT based E-Advertisement system for the applications of Shopping malls & other organizations. This proposes model will replace the advertisement system in big shopping complex like Big bazaar, Reliance Fresh etc. Even we can maintain the humidity inside the big shopping malls without any Human efforts. Also we can use this prototype system for the educational organization or Railway stations. This prototype model we will implement using virtual components in Proteus 7.1 software.

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