A Review Paper on Home Automation System Based on Internet of Things Technology

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Abstract - *Internet of Things (IoT) is extension of current internet to provide communication, connection, and internetworking between various devices or physical objects also known as "Things". IoT term represents a general concept for the ability of network devices to sense and collect data from the world around us, and then share that data across the Internet where it can be processed and utilized for various interesting purposes. The IoT is comprised of smart machines interacting and communicating with other machines, objects, environments and infrastructures. Now a day's every person is connected to each other using lots of communication way, where most popular communication way is internet so in another word we can say internet which connect peoples can connect things too.*

Key Words: **IOT, Wi-Fi, GSM, GPS, GPRS.**

1. INTRODUCTION

The Internet of things can be defined as connecting the various types of objects like smart phones, personal computer and Tablets to internet, which brings in very newfangled type of communication between things and people and also between things [2]. With the introduction of IoTs, the research and development of home automation are becoming popular in the recent days. Many of the devices are controlled and monitored for helps the human being. Additionally various wireless technologies help in connecting from remote places to improve the intelligence of home environment. An advanced network of IoT is being formed when a human being is in need of connecting with other things. IoTs technology is used to come in with innovative idea and great growth for smart homes to improve the living standards of life. Internet helps us to bring in with immediate solution for many problems and also able to connect from any of the remote places which contributes to overall cost reduction and energy consumption [3].

In recent years, there has been a growing interest among consumers in the smart home concept. Home automation system represents and reports the status of the connected devices in an intuitive, user-friendly interface allowing the user to interact and control various devices with the touch of a few buttons. Some of the major communication technologies used by today's home automation system include Bluetooth, Wi-MAX and Wireless LAN (Wi-Fi), ZigBee, and Global System for Mobile Communication (GSM) [1].Here we are using Wi-Fi module. It offers the user complete access control of the appliances through a remote interface. Automation is the use of control systems and information technology to control equipment, industrial machinery and processes, reducing the need for the human intervention [2].

The wide variety of potential IoT applications needs a software development environment that ties together the applications, the command, control and routing processing and the security of the node and system. While the importance of software in MCU solutions has increased during the past few years, for MCUs supporting the IoT, even more software, tools and enablement will be needed. A broad ecosystem with easily accessible support is key to enabling the development of embedded processing nodes and IoT applications.

1.1 Motivation

Nowadays IoT is everywhere in the world to make the smarter world. Due to IoT we can see many smart devices around us. Many people, including myself, 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. For example, today many buildings already have sensors for attempting to save energy, home automation; cars, taxis, and traffic lights have devices to try and improve safety and transportation; people have smart phones with sensors for running many useful apps; industrial plants are connecting to the Internet; and healthcare services are relying on increased home sensing to support remote medicine and wellness. One possibility is a global sensing and actuation utility connected to the

Internet. Electricity and water are two utilities that can be used for a myriad of purposes. Sensing and actuation in the form of an IoT platform will become a utility. IoT will not be seen as individual systems, but as a critical, integrated infrastructure upon which many applications and services can run. Some applications will be personalized such as digitizing daily life activities, others will be city-wide such as efficient, delay-free transportation, and others will be worldwide such as global delivery systems. In cities perhaps there will be no traffic lights and even 3D transportation vehicles. Smart buildings will not only control energy or security, but integrate personal comfort, energy savings, security and health and wellness aspects into convenient and effective spaces. Individuals may have patches of bionic skin with sensing of physiological parameters being transmitted to the cloud which houses his digital health, and to the surrounding smart spaces for improved comfort, health, efficiency, and safety. In fact, smart watches, phones, body nodes, and clothes will act as personalized input to optimize city-wide services benefiting both the individual and society [10]. Ten "critical" trends and technologies impacting IT for the next five years were laid out by Gartner and among them the Internet of Things [5]. All of these things have an IP address and can be tracked. The Internet is expanding into enterprise assets and consumer items such as cars and televisions. The problem is that most enterprises and technology vendors have yet to explore the possibilities of an expanded Internet and are not operationally or organizationally ready. Gartner identifies four basic usage models that are:

- Emerging
- Manage
- Monetize
- Operate
- Extend

These can be applied to people, things, information, and places, and therefore the so called "Internet of Things" will be succeeded by the "Internet of Everything."
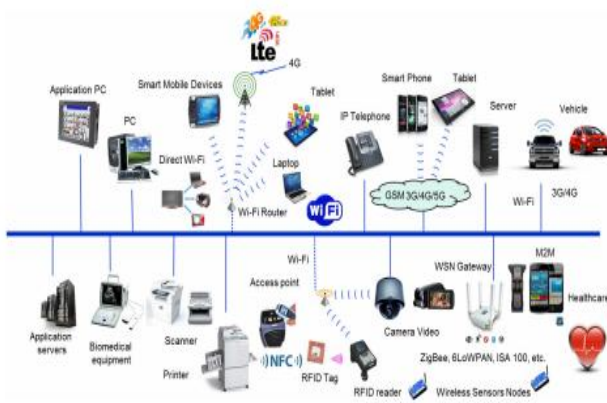

Fig. 1 Internet of Things

The fundamental characteristics of the IoT are as follows:

• Interconnectivity: With regard to the IoT, anything can be interconnected with the global information and communication infrastructure.
• Things-related services: The IoT is capable of providing thing-related services within the constraints of things, such as privacy protection and semantic consistency between physical things and their associated virtual things. In order to provide thing-related services within the constraints of things, both the technologies in physical world and information world will change.
• Heterogeneity: The devices in the IoT are heterogeneous as based on different hardware platforms and networks. They can interact with other devices or service platforms through different networks.• Dynamic changes: The state of devices change dynamically, e.g., sleeping and waking up, connected and/or disconnected as well as the context of devices including location and speed. Moreover, the number of devices can change dynamically.
• Enormous scale: The number of devices that need to be managed and that communicate with each other will be at least an order of magnitude larger than the devices connected to the current Internet. The ratio of communication triggered by devices as compared to communication triggered by humans will noticeably shift towards device-triggered communication. Even more critical will be the management of the data generated and their interpretation for application purposes. This relates to semantics of data, as well as efficient data handling.

Fig. 2 Applications of IoT

2. LITERATURE REVIEW

Consequently, we will often be implicitly linked into the new utility. Some examples of new services include immediate and continuous access to the right information for the task at hand, be it, traveling to work or a meeting, exercising, shopping, socializing, or visiting a doctor. Sometimes these activities will be virtual activities, or even include the use of

avatars or robots. Many outputs and displays for users may be holographic. Credit cards should disappear and biometrics like voice or retinas will provide safe access to buildings, ATMs, and transportation systems. A sensing and actuation utility will not only exist in public spaces, but also extend into the home, apartments, and condominiums. Here people will be able to run health, energy, security, and entertainment apps on the infrastructure. Installing and running new apps will be as easy as plugging in a new toaster into the electric utility. One app may help monitor and control heart rate, another perform financial and investments services, another automatically ordering food and wine, or even predicting a impending medical problem that should be addressed early to mitigate or even avoid the problem. Humans will often be integral parts of the IoT system. The Industrial Internet is also a form of IoT where the devices (things) are objects in manufacturing plants, dispatch centers, process control industries, etc[11].

According to Jayavardhana[12], 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 a 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. John A. Stankovic vision saying [10], 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 communities is encouraged. To provide a basis for discussing open research problems in IoT, a vision for how IoT could change the world in the distant future. In 2013, Salah Addin Ahmed developed Smart GSM Based Home Automation System. In recent years, there has been a growing interest among consumers in the smart home concept. Smart homes contain multiple, connected devices such as home entertainment consoles, security systems, lighting, access control systems and surveillance. Intelligent home automation system is incorporated into smart homes to provide comfort, convenience, and security to home owners. Home automation system represents and reports the status of the connected devices in an intuitive, user-friendly interface allowing the user to interact and control various devices with the touch of a few buttons. Some of the major communication technologies used by today's home automation system include Bluetooth, WiMAX and Wireless LAN (Wi-Fi), ZigBee, and Global System for Mobile Communication (GSM). All GSM is one of the most widely used cellular technologies in the world. With the increase in the number of GSM subscribers, research and development is heavily supported in further investigating the GSM implementation [1]. In 2014, Nikhil Singh, Shambhu Shankar Bharti, Rupal Singh, Dushyant Kumar Singh, developed Remotely Controlled Home Automation System. They made server and android based Home automation system. The program is designed such that if no one is at home then all home appliances automatically switched off. For designed purpose we have used Proteus Design Suite. The design consist a simple home automation design having a "motion sensor" for counting number of people inside home, "a speed controlled fan" ,"a light bulb", "a LCD" for displaying status of home appliances. "a microcontroller ic" for controlling devices "a port" for connection purpose.

3. PROBLEMS IN PREVIOUS RESEARCH

In Existing system, GSM based Home automation system if GPRS connection is not available then full system will not work. Cost effective: As we know most of systems are using GPRS system is expensive as compare to Wi-Fi. Data Pack requirement: Some systems are based on GPRS so for those system there is need of Data pack which we have to recharge every month. Some architecture are using Wi-Fi concept but those architecture are mostly use Raspberry pi which is expensive in cost. Still home automation system is not having some basic features like automatic control of outside light. Home automation systems are also don't have notification facility, where user can easily take action according to that notification

4. FUTURE OBJECTIVE

As we already see there are lots of issues in previous existing approaches. In this section we present primarily focusing on, the use of IoT for the advance, energy efficient and self-learning home automation system. The main objective is to design and implement cost effective and smart home automated system. We are using Wi-Fi based approach for communication between Server and Home appliances. This smart home automated system will design with the implementation of related software and hardware. The project proposes an implementation of IoT (Internet of Things) based smart home automated system for remotely control the home appliances using Wi-Fi. Low cost Wi-Fi module ESP8266 is used to build Smart Units. The user will operate home appliances like lights; fans and TV are

remotely controlled through Android App. The server will be interfaced with relay hardware circuits that control the appliances running at home.

5. CONCLUSION

As we saw in literature section the scope of internet on things on current era. We also saw what home automation is and the issues that still need to be solved. So in this paper basically we study about internet of things and we did the comparative study on home automation technique. There are still lots of future scope on home automation using IoT.

REFERENCES

1   Teymourzadeh, Rozita, et al. "Smart GSM Based Home Automation System." *Systems, Process & Control (ICSPC), 2013 IEEE Conference on*. IEEE, 2013.

2   Singh, Navab, et al. "Remotely controlled home automation system."*Advances in Engineering and Technology Research (ICAETR), 2014 International Conference on*. IEEE, 2014.

3   PavithraD,IoT based Monitoring and Control System for Home Automation,Proceedings of 2015 Global Conference on Communication Technologies(GCCT 2015)

4   Wenbo, Yan, Wang Quanyu, and GaoZhenwei. "Smart home implementation based on Internet and WiFi technology." *Control Conference (CCC), 2015 34th Chinese*. IEEE, 2015.

5   Gurek, Alper, et al. "An android based home automation system." *High Capacity Optical Networks and Enabling Technologies (HONET-CNS), 2013 10th International Conference on*. IEEE, 2013.

6   Bhide, VishwajeetHari, and SanjeevWagh. "i-learning IoT: An intelligent self-learning system for home automation using IoT." *Communications and Signal Processing (ICCSP), 2015 International Conference on*. IEEE, 2015.

7   Gamba, Mattia, Alessandro Gonella, and Claudio E. Palazzi. "Design issues and solutions in a modern home automation system." *Computing, Networking and Communications (ICNC), 2015 International Conference on*. IEEE, 2015.

9.   Gubbi, Jayavardhana, et al. "Internet of Things (IoT): A vision, architectural elements, and future directions." *Future Generation Computer Systems* 29.7 (2013): 1645-1660.

10. Karimi, Kaivan, and Gary Atkinson. "What the Internet of Things (IoT) needs to become a reality." *White Paper, FreeScale and ARM* (2013).

11. Stankovic, John. "Research directions for the internet of things." *Internet of Things Journal, IEEE* 1.1 (2014): 3-9.F

12. "Understanding the Internet of Things (IoT) ", July 2014. Gubbi, Jayavardhana, et al. "Internet of Things (IoT): A vision, architectural elements, and future directions." *Future Generation Computer Systems* 29.7 (2013): 1645-1660.