Internet of Things (IoT) for smart Home – A brief Review

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Abstract. Internet of Things (IoT) is expected to become active participants where they are able to interact and communicate among themselves by exchanging data and information sensed about the environment. For that they react autonomously to the real world events and provide services with or without direct human intervention. In this paper we use IOT for energy efficient Environmental Conditions sensing and controlling in Home. In this paper we will see how to provide fully smart environment condition monitoring by various sensors (Temperature, Humidity, Light and Level) for providing necessary data to automatically adjust the comfort level in homes by optimize use of energy. We also use prediction here for automatically detection and resolution of any problem in the devices. For that we are using Naïve Bayes Classifier algorithm for data mining. It will send email or SMS to required technician for service and it will also notify the owner. This gives a huge advantage on the smart home systems using IoT.
Keywords: Internet of Things; things; SMS; smart home; home automation.

1. Introduction

The Internet of Things (IoT) is the "network of interconnected sensor-equipped electronic devices that collect data, communicate with each other, and can be monitored or controlled remotely over the Internet" (Ahrens, "Making Sense of The Internet of Things"). The main goal of the IoT's development is to connect the physical world and the environment to the Internet or to wireless networks, this would allow making objects, machines and work environments interactive. By using sensors, objects will be capable of exchanging data with other machines without the need of human intervention (Heires, "Preparing for the Internet of Things"). The IoT includes different technology infrastructure, devices and services such as the cloud, computing, data analytics and mobile communications. The IoT is not a prediction; it is a plausible trend that is moving forward, rapidly. It is estimated that by 2020, 50 billion devices around the world will be connected to the Internet. "A third of them will be computers, smartphones, tablets and TVs… The remaining two-thirds will be other kinds of things: sensors, actuators, and newly invented intelligent devices that monitor, control, analyze, and optimize our world (Burkitt, "A Strategist's Guide to the Internet of Things"). There are major platforms and discoveries that have had a rich wage of complexity, global reach and novelty. But the IoT is for sure a trend that takes the development of interconnectivity to another level, one that once was only imaginable.

There will be an gigantic range of interconnected systems and products that the IoT will enable, from simple monitoring of home temperature and security to the quantified self … to fully networked factories and hospitals, to automated cities". (Burkitt, "A Strategist's Guide to the Internet of Things"). While it is true that the IoT will signify a major shift in the economy, politics and regulations from all government agencies, companies, and non-profit organizations, this paper will only focus on the effects that it will have on citizens by arguing that, although the development of the IoT is still on early phases regarding its development and spread, it is potentially a threat to both security and privacy.

Since the IoT is a rapidly growing trend, most major companies are seeking to get involved, there are enormous efforts to trigger this trend as something positive in the forthcoming future. A frequent discourse that is present in the media mentions the major positive technological improvement that the IoT represents. "Capitalist societies generally educate people to appreciate the conveniences and choices of modern consumer technologies" (Parks and Starosielski, 6). Who wouldn't want a refrigerator that could tell you when you are running out of milk or that you need to replace one of its pieces? How fantastic it would be that your car could save information about what routes you take every day? Who would not want a house that can monitor and regulate the temperature to save energy? Or a watch that can save your sleep pattern information? These are all conveniences that are presented to potential consumers about the IoT, however little is said about what happens to all these information that is saved by the devices and whether this is safe or could be a treat for the consumers´ privacy.

Now anyone, from anytime and anywhere can have connectivity for anything and it is expected that these

connections will extend and create an entirely advanced dynamic network. IoTs technology can also be applied to create a new concept and wide development space for smart homes to provide intelligence, comfort and to improve the quality of life. Modern advances in electronics and communications Technologies have lead to the miniaturization and improvement of the performance of computers, sensors and networking. These changes have given rise to the development of several home automation technologies and systems. According to, home automation can be useful to those who need to Access home appliances while away from their home and can incredibly improve the lives of the disabled.

2. RELATED WORK

Home automation has been a feature of science fiction writing for many years, but has only become practical since the early 20th Century following the widespread introduction of electricity into the home, and the rapid advancement of information technology. Early remote control devices began to emerge in the late 1800s. For example, Nikola Tesla patented an idea for the remote control of vessels and vehicles in 1898.

Home Automation is automation of the home, housework or household activity. Home automation may include centralized control of lighting, HVAC (heating, ventilation and air conditioning), appliances, security locks of gates and doors and other systems, to provide improved convenience, comfort, energy efficiency and security. Home automation for the elderly and disabled can provide increased quality of life for persons who might otherwise require caregivers or institutional care.

The popularity of home automation has been increasing greatly in recent years due to much higher affordability and simplicity through smartphone and tablet connectivity. The concept of the "Internet of Things" has tied in closely with the popularization of home automation. A home automation system integrates electrical devices in a house with each other. Through the integration of information technologies with the home environment, systems and appliances are able to communicate in an integrated manner which results in convenience, energy efficiency, and safety benefits. However, problems with complexity, competition between vendors, multiple incompatible standards and the resulting expense have limited the penetration of home automation to homes of the wealthy, or ambitious hobbyists.

Home automation or smart homes can be described as introduction of technology within the home environment to provide convenience, comfort, security and energy efficiency to its occupants [3]. With the introduction of the Internet of Things, the research and implementation of home automation are getting more popular [4]. Various wireless technologies that can support some form of remote data transfer, sensing and control such as Bluetooth, Wi-Fi, RFID, and cellular networks have been utilized to embed various levels of intelligence in the home [3].

Many of the home automation systems that are commercially available can be separated into two categories: locally controlled systems and remotely controlled systems. Locally controlled systems use an in-home controller to achieve home automation. This allows users complete use of their automation system from within their home via a stationary or wireless interface. Remotely controlled systems use an Internet connection or integration with

an existing home security system to allow the user complete control of their system from their mobile device, personal computer, or via telephone from their home security provider.

There are a number of issues involved when designing a home automation system. It should provide a user- friendly interface on the host side, so that the devices can be easily setup, monitored, and controlled. Furthermore the overall system should be swift enough to realize the true power of wireless technology. Lastly the system should be cost effective in order to justify its application in home automation. To minimize the shortcomings of each system and to overcome the design issues previously mentioned, this project integrates locally and remotely controlled systems with the use of Cloud data network. This allows the system to operate without the dependence of a mobile provider, allows the system to be used with various mobile phone platforms, and allows the system to operate locally when phone or computer access is not available. Cloud networking and data infrastructure allow individuals to monitor, manage, and control their personal data points through the Internet [5-7]. One of the available services is Pachube [5].

In some study also have presented Bluetooth based home automation systems using Android Smart phones without the Internet controllability. The devices are physically connected to a Bluetooth sub-controller which is then accessed and controlled by the Smart phone using built-in Bluetooth connectivity. Researchers have also attempted to provide network interoperability and remote access to control devices and appliances at home using home gateways. [2]
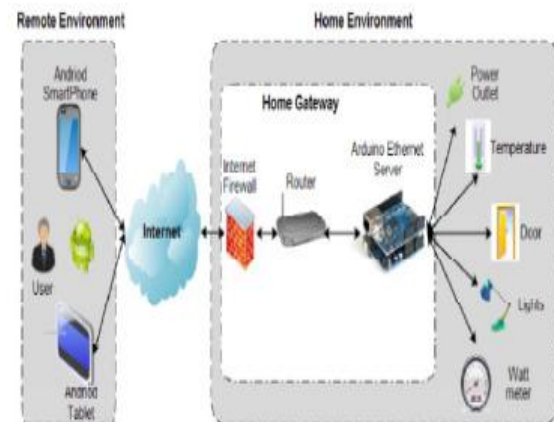

Fig.1. overview of the Architecture

We need energy efficient, flexible system which detect the fault in the devices automatically and generate a recovery process to resolve the detected problem. As in many cases some people are not able move much from one place it is essential for them to develop a system which requires less human interaction. Also to improve standard of living it is needed to change home condition according to the mood of the user without any interruption. So we need a much smart system which provide all the above facilities in low price and less energy consumption.

3.PROPOSED DESIGN

We use different sensors (light, temp, level and humidity) to collect the data to understand the environmental conditions and also to detect any fault in devices. It is necessary to act devices according to the inhabitant requirement.

Home PC continuously monitors sensors values and control the devices accordingly. If problem found it report to cloud server. Here user can modify some settings and see the devices functionality and working.

We build one Registration Application where Technicians, super market vendors and other service provider will register on it. They provide their details like type of service (Sales/Service) and their service timing etc.

Finally Cloud Server will apply data mining on data sets. It also mail or SMS Technician and send details to the Owner (mail or SMS). We can connect any number of users on cloud server so it support multi user system characteristics.

Here we can use only one cloud server but we can connect many numbers of users to it via pc, or any android devices. [6] discussed about a system, GSM based AMR has low infrastructure cost and it reduces man power. The system is fully automatic, hence the probability of error is reduced. The data is highly secured and it not only solve the problem of traditional meter reading system but also provides additional features such as power disconnection, reconnection and the concept of power management. The database stores the current month and also all the previous month data for the future use. Hence the system saves a lot amount of time and energy. Due to the power fluctuations, there might be a damage in the home appliances. Hence to avoid such damages and to protect the appliances, the voltage controlling method can be implemented.
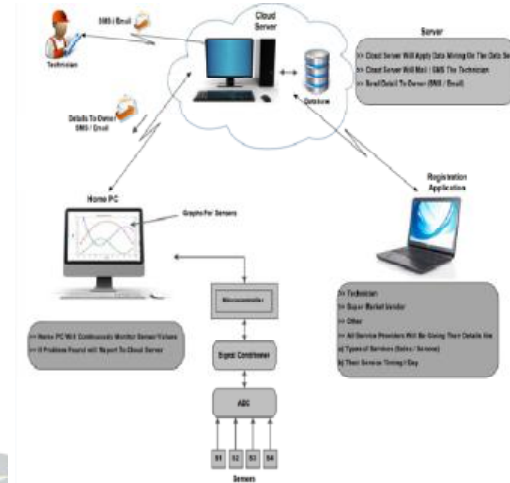

Fig 2. Proposed Architecture

4. RESULTS

The system allows the user to control appliances and lights in their home from a smart phones and PC from anywhere in the world through an internet connection. It also allows the user to control their units within their home from a wireless remote.

In these papers we proposed a Novel technique that will give us best result. Which include prediction by providing Notifications to the user if problem occurs in any device. First of all we collect different sensor values and analyse it with the help of microcontroller. We can monitor and control it with pc or any android device connected to it. If problem found in any device we notify owner and the related technician about the problem. We use Naive Bayes classifier algorithm for data mining which is a simple probabilistic classifier based on applying Bayes' theorem with strong (naive) independence assumptions.

5. SCOPE AND FUTURE WORK

In our system we have SMS and e-mail notifications to the user but in future we

can add also some voice alerts. This system can be expanded to include various other options which could include home security feature such as open-door and motion detection, energy monitoring.

6. CONCLUSION

A Smart Home system integrates electrical devices in a house with each other. The techniques which are going to use in home automation include those in building automation as well as the control of domestic activities, such as TV, fan, electric tubes, refrigerator and washing machine. After studying and understanding literature survey and other existing works, we proposed a Novel technique that will gives us better understanding of the Environmental conditions in home. Our system not only just monitors environmental conditions but it acts according to inhabitant requirement. We also provide notification to the user about any error occurs in the devices and send mail or SMS to the service provider about the problem. In this paper we are planning to eliminate most of the human interaction by providing intelligent system. Development of such Smart Home achieve by using Internet of Things technologies. By using these system we can actually manage to make low cost, flexible smart homes to adjust its environmental conditions and resolve its errors with energy saving.

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