

A Short Review on the Perspective of Home Automation Technology

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Abstract- Nowadays, with the increasing technology, the automation plays a significant role among mankind. This review paper is based on the low cost as well as the security with reliability of home controlling or monitoring system for accessing and controlling devices and appliances remotely using Android application-based Smartphone. Mobile communication technology helps in making this more user friendly and feasible for elderly and physically challenged people. Using this technology, the living standard can be improved at home which results in reducing human effort and energy and also saves time thus resulting in comfort and convenience for the humans. The proposed work shows the several possibilities to ensure the security of the home automation in different perspective.

Key words: Home automation, IoT, Bluetooth, GSM, Arduino UNO.

1. INTRODUCTION

The Internet of Things (IoT) encompasses many consumer applications, including home automation wireless technologies such as Wi-Fi, Bluetooth controlling smart homes. Nowadays, it is ubiquitous to simplify the human lifestyle by connecting with the technology. To overcome this, the automation is one key role which plays a crucial role. Meanwhile, the smart home automation is rising as a great contender as it enabled home appliances to be controlled by smartphones or tablet. Home Automation is a unique system that can control and establish communication between nearly all aspects of your house. [1] Home automation is a term which refers to the description of working together of all the household appliances. It includes controlling the devices of our home remotely through mobile equipment by programming the electronics devices to respond automatically to whether some conditions or centralizing the controlling of the appliances in our home into single control center. Home automation purposefully focuses on the controlling or monitoring of the signals from different appliances, or basic services. Using a smart phone and a web browser we can control or monitor the home automation system. [1]

The home automation technology is performed by using the microcontroller interface on android-based devices in such a way that one can control the appliances according to the user-defined requirements. With the help of smartphones the user can control different home appliances such as switching of devices, altering the temperature of your A.C. using the remote controller which are linked and controlled via Arduino through Bluetooth. Despite of the ease in living style, the problem of home security is also raising concern. Several studies are performed to improve the home security by applying home automation technique that enables the user access via Internet, smartphones. The problem of home security and automation can be solved by using the same set of technologies. It is possible to gather and share data between personal area networks (PAN) linked devices. Devices and machinery may be remotely controlled and monitored by the user. Bluetooth's range is too small to operate the electrical appliances from a distant point. This means that operations such as turning on the fan from outside the home cannot be performed, and thus there is a need to have some secure alternative for home automation.

Thus, in this work, a comprehensive study was conducted to analyze the performance of different Bluetooth based home automation devices. The performance of these devices was evaluated on the basis of security and connectivity.

2. LITERATURE SURVEY

This section includes the comprehensive review of different technologies employed on the IoT based home automation system.

In this context, the Mamata Khatuet.al.,[1] implemented the Internet of Things for home automation. They mainly focus on the coverage of IoT connecting all the different appliances or devices like smart phone, tablets, digital cameras and sensors in the

internet and thus providing many services and a great amount of data and information. With the help of Cloud Computing, cloud based platform helps connecting things so as to access them any time and from anywhere by just using an internet connection and with a smart phone or laptop. The authors have proposed a prototype model for providing sensing as a service on cloud and have also illustrated the same using some applications like Augmented Reality, Agriculture, Environment monitoring, etc. However, there is need of new and scalable, compatible and even secured solutions for the both management of the ever broader complexly networked Internet of Things. In addition, the security concern is overcome by the presented model since they are using Wi-Fi Wireless Equivalent Privacy (WEP) and Wi-Fi Protected Access (WPA) are two most highly used security access that are being used in Wi-Fi. Moreover, a voice recognition based home automation system is being proposed and implemented by in another research work [2]. The hardware consists of the connection between the smartphone and the Arduino UNO which is done using Bluetooth technology. The Android OS has built-in feature for voice recognition which is being used in the development of application which has the ability to control the home appliances from user voice command. The application is used to convert the voice of the user into the text and then transmit the text to Bluetooth module HC-05 which is connected to Arduino UNO. The advantage of using this voice recognition technology is that the user is only required to speak out the appliance name in smartphone microphone and giving it the command whether to turn the appliance ON or OFF. In this way the user can easily control the appliance with less effort. The application that is being used in the system is designed in such a way that it provides a user -friendly experience and has the ability to add more home appliances into the system as per the requirement. Every building using the electrical appliances and devices can use this home automation technology. The main drawback of the system is the limited range for the connectivity because of the use of Bluetooth module. The connectivity range can be extended using internet instead of Bluetooth making it expensive. In addition, to the Bluetooth, the GSM based technology is widely implemented for security purpose in home automation system.

In this paper Akanksha Singhet *et.al.*, developed a GSM based home automation system consisting two modules *i.e.*, hardware and software. The hardware module consists of an 8-bit microcontroller, GSM phone with GSM module, relay module and sensors. The Software module consists of programming which is being used in Arduino UNO and also developed an application for the smart phone. GSM modem is used for communication between user and system to execute command or send SMS alerts. The GSM after receiving the command from SMS, it will trigger the microcontroller (ATmega 2560) which changes the status of the appliance as per the command *i.e.* ON or OFF. For the home security purpose sensors are used like MQ2, MQ7 and ultrasonic sensor [3]. As MQ2 and MQ7 are gas sensors, in case of any nasty situation microcontroller raises an alarm and sent SMS through GSM modem to GSM phone [3]. The safety and security system can be installed easily in the house and then can be used. It informs the user in case of fire, gas leakage and theft even when the user is not in the house.

In addition, to the home appliances, the home automation is widely implemented for disabled people using the brain computer interface. In this scenario, Pande *et.al.*, proposed a system in which the brain wave electric signals are being used to control computer and the hardware system in this paper.[4] In order to control the home automation prototype sample model, the variations in electric signal strength through voltages level near the eye area are being used to detect and generate the Radio Frequency (RF) signals. The system consists of temperature sensor, light detector sensor, motion (obstacle) sensor, water sensor and fire sensor. The central system is connected to these sensors and sends alert message whenever any of the sensor is activated. The Multiple Sensor Board Home Security System can be used both in home environment and as well as business or office environment.[4]

The system can monitor the surrounds and thus will be helpful in protection of our properties and lives. Customization is available as per the needs of the user and their preferences. It is expected for the system to be more reactive at the highest priority in order to get fast responses from the system in critical conditions and identify the human brain wave to operate the home appliances for the same. The system is designed in such a way that it senses the signal from brain sensor of any disabled person and will follow the commands as per the requirements and hence he can operate the appliances with comfort. The alert signal will be provided and the overall system can be monitored by the person externally using the android phone. Apart from this, Cui *et.al.* proposed a system for home automation using the cloud based system which focus on the designing and implementing of home gateway to collect data about the data from home appliances and then sending it to the data server which is based on cloud to get it stored on the Hadoop Distributed File System (HDFS) which ensures scalability and security, irrespective of the size of data being increased. The paper presents the design and development of home automation which used the cloud computing as a service. There are three important units in the current system:

1. Cloud Server, which is the central server that aims on the handling and controlling the data and information of clients and the users, also the status of the devices. The server is responsible for evaluating the data that is being collected from the house and transmitting the latest status to the mobile device and vice versa.
2. The Hardware Interface Module, which is being used for implementing the connection that is relevant for the connection of the actuators and the sensing devices for providing the physical service.
3. Home Server, which is used in the construction of hardware device and provide the user interface with the help of internet for any desktop or mobile phones.

3. CONCLUSION

This paper consists of the short review that will encompasses the possibility of the home automation devices. It is obtained from the study, that the IoT based home automation devices is much secure which will enhance the reliability of the system. However, the IoT based home automation system suffers a low-speed processing. Further, using voice recognition based automation technology, it possesses high speed as well as the technology is user friendly with the large appliances to get connected. Further, the GSM based technology is also considered as one of the intriguing technologies in the field of home automation. The GSM based technology will help to enhance the security of the system. Further, it is found that the home automation also depicts the crucial role for disabled person, using brain control interface module. Moreover, the technology uses the cloud based system to collect the information and control of the of home appliances. Thus, the research paper presents the several possibilities to ensure the security of the home automation in different perspective.

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