Android Based Home Automation System Using Bluetooth & Voice Command

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Abstract— In the past few years, technology has grown at high speed. Also human lives have become much more dependent on electronic devices and appliances. It has thus led to the idea of developing a home automation system. This paper is about home automation system which would use a smartphone to enable any naïve user to operate all the appliances. The system has three components: an Arduino microcontroller for connecting the appliances, a Bluetooth module for signal transfer, and a smartphone running the Android application. The system also supports voice command for naïve users with command sensing.

Home automation allows us to control household electrical appliances like light, door, fan, AC etc. It also provides home security and emergency system to be activated. Home automation not only refers to reduce human efforts but also energy efficiency and time saving. The main objective of home automation and security is to help handicapped and old aged people who will enable them to control home appliances and alert them in critical situations.

Key Words: HAS, Android, Smart Speech Sense, Bluetooth, Arduino .

1. INTRODUCTION

In this modern era of development, automation of everything is the need of the hour. The basic aim of any development is to ease the human life. Home automation aims at automating the human lives. Activating the home appliances without conventional switch but by using a smart phone is known as home automation. Home automation is the use of one or more computerized remotes to control basic home functions and features remotely and sometimes automatically. An automated home is sometimes called a smart home.

In present day world, more emphasis is put on wireless technology. It is because; wired networks are messy and really complicated. These wireless technologies have impacted human life in a positive manner and human development speed has increased fore fold.

The main wireless technologies used in home automation are GSM, Internet, Cloud and Bluetooth. Each technology has its own advantages and disadvantages. But Bluetooth based home automation systems have way more advantages. Devices can be connected from a range of 10m to 100m and this range can be increased by using piconet architecture. Also the frequency used for Bluetooth is 2.4GHz, which is globally available. The speed that can be fetched for Bluetooth services is up to 3Mbps. It is these basic advantages that have driven us to the idea of developing a Bluetooth based home automation system.

2. LITERATURE SURVEY

The idea of automation can be dated back to 1800s, when Nikola Tesla developed the idea of having a remote control for vessels and vehicles in 1898.[6] Later with the advent of electrical appliances, the idea of home automation became more important. A.R.Al-Ali and M.Al-Rousan developed a Java based Home Automation System.[2] It used Wi-Fi as a medium for communication between the hardware and software component. Its main disadvantage was that Wi-Fi range is limited and hence the user has to be in a certain range for operating the system. An android based HAS was developed in [3]. It would use internet as a medium for connectivity. Its disadvantage was that the unavailability of internet would fail the entire system. Embedded smart home management scheme was presented in [4]. It was based on use of Ethernet network. The system also had GSM support for the issue of unavailability of network. It was thus costly and hence was the only disadvantage. D.Naresh, B.Chakradhar & S.Krishnaveni presented the idea of Bluetooth based HASin [5]. It used arm processor (ARM9 and ARM7), and so the system has a complex architecture.

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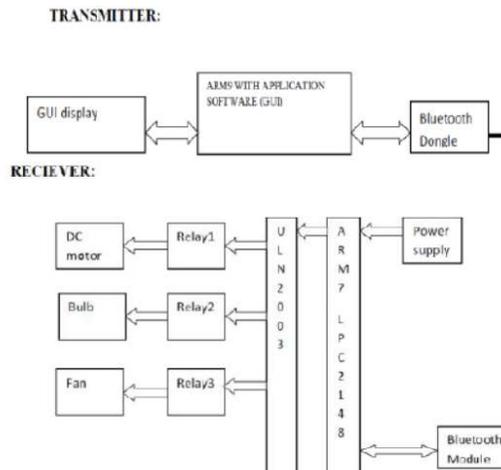
Fig -1: *Block diagram of Bluetooth Based Home Automation and Security System Using ARM9*

3. PROPOSED SYSTEM

This paper is primarily concerned with the home automation system which uses Bluetooth for interaction between the android mobile application and the appliances under the control of the system. The paper will shed light on the features & design of the system.

3.1 Features

3.1.1. Voice Command

The project will have an android application in the user's android device. This application is designed to receive the voice commands from the user. The application will the automatically convert the voice signals into digital data and send these signals to the microcontroller.

3.1.2. Smart Speech Sense

The application will be coded as such to decode the meaning of any statement from the user. The user won't be restricted to use of any particular command set. He would just have to state out his problem & the application will itself sense the meaning of the user's speech & convert it into respective available command.

3.1.3. Scheduler

The application will be in synchronization with the alarm clock of the phone. It will detect the alarm times set by the user and ask the user for schedule it wants to have for the appliances. It will then automatically start the appliances at the specified time and then stop them when their functioning ends.

3.1.4. LPG Leakage Detection

The system will also have sensors of LPG leak in its control. If there is a leak, the application will notify the user about the leak. The sensors, as soon as, detect the leakage will generate signals. These analogue signals will be converted to data signals and sent to the application by the microcontroller via the Bluetooth module.

3.1.5. Regular Appliance Support

The system won't require any specialized appliances with support for Bluetooth or technology. The existing conventional appliance will work in total efficiency with the system.

3.1.6. Scalability

This feature can be achieved in two ways:

3.1.6.1. Bluetooth Range

The system can have a variety of Bluetooth ranges. Depending upon the use, required Bluetooth range module can be used the system. It thus makes the system cost dependent upon the kind of use of the system.

3.1.6.2. Appliances

The system can also be made scalable based upon the appliances used. The variety of appliances and the number and location of these appliances will determine the relay network of the microcontroller. It will also decide the business logic for the application.

3.1.7. Authentication

The android application will be password protected. The user of the application will be provided with a password. The user of the application will have to enter the password each time he wishes to operate the appliances from the application. This will ensure that the application won't be used by any unintended user.

3.2. Design
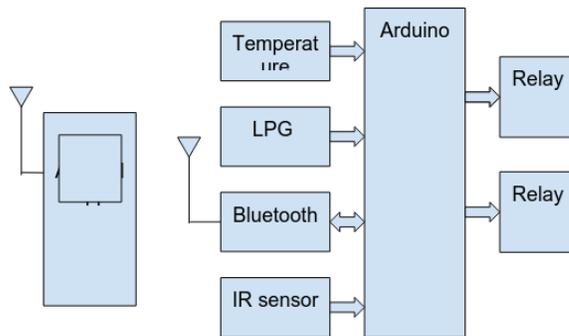
Fig -2: Block Diagram for Android Based Home Automation System Using Bluetooth & Voice Command

The block diagram shown above shows the work-flow of the system. The user would be initially logging into the system with his/her login credentials. On authentication, the user will be presented with number of options for controlling the different appliances. Also, an option for voice command is available. The user will just have to record his voice. On receiving the input, the application will convert this input into byte format and transmit this signal to the Arduino microcontroller via Bluetooth module. The microcontroller is connected with the appliances through relays. The microcontroller converts the byte signal it has received to string format and passes it to the respective relay. The application is coded using the concept of Smart Speech Sense, which would help in enabling the system to convert the user's sentences into appropriate commands.

4. CONCLUSION

In this paper, we have shown the design and features of a Smart Home Automation System. It is Bluetooth based, hence wireless and can be flexible in terms of cost. It has a special feature for smart speech sense, which would decode user's sentences into appropriate commands. It requires authentication details as a medium of security, thus preventing the use of application by unauthorized users. The system also connects with sensors, thus helping in detecting LPG leakage, intrusion detection or fire breakout.

5. ACKNOWLEDGMENT

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