

Wireless Voice and GSM Controlled Home Appliances

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Abstract: With the invention of new technologies, each day we are moving towards more relaxing and better future. The development in home automation technologies has led us to an ideal smart home environment. As we all know that home automation is gaining popularity day by day, we need a system which is affordable as well as simple to implement. This paper aims to build a home automation system which is based on SMS and voice recognition technology. The proposed system is divided into 2 groups: 1-Voice controlled and 2-SMS controlled. Wireless voice controlled system is mainly for elderly and disabled people to provide them an easy means to operate the appliances. The GSM module is provided in the system to control appliances from anywhere in the world and can have an eye on the security of the home. Before providing input to the system, it needs to be trained of voice command only once. After testing it was found that the system has an accuracy of 90%.

Keywords: HM 2007, GSM, Voice recognition, Wireless, Smart home.

I. INTRODUCTION

Technology is one of the principal driving forces of the present as well as future. With the technological advancements, the Home automation does not remain a new concept. Home automation has become a general term which is associated with the control of home appliances more easily and with less manual effort. This has been created to satisfy the different needs of the people such as to maintain a luxurious modern lifestyle or for the people with special needs like disabled and elderly person. According to a report by United Nations, the life expectancy was 78 years in 2010 and it will grow continuously to become 83 years by 2045. On the other hand, it was reported that 35% of people from age group 65 or over in 2011 had some type of disability. But most of the people from that age group prefer living independently and self managing their own home. So the concept of our home automation can help them to lead an independent living as it is very simple to operate. In a survey it was found that only 42 percent people in US are aware of existing tools to automate home appliances. The reasons for such less percentage are costly equipments and complex techniques involved in the existing tools. The proposed system is cost effective and very simple to operate. It is a prototype of a smart home in which human voice and SMS are used to activate the electrical appliances. The GSM module present at the receiver side is used to get the status of the appliances which provides an extra security. This system can be used to control appliances from anywhere in the world so that efficient use of electricity can be carried out. The system converts the voice input into digital data and is being transmitted to the receiver. Based on the data received by the receiver, the system does the desired switching operation and a confirmation message will be sent to the desired numbers.

II. RELATED WORK

Home automation can be defined in different way but the basic concept of every methods remains the same, i.e., to

control any appliance wirelessly whether the appliance is a fan, light or any window or door. In our method any appliance can be controlled by the voice command or SMS and a confirmation message for the security purpose can be received.

Md. Ashraful and group [1] proposed a system that controls the home appliances using the personal computer. This system uses Microsoft voice engine tools for speech recognition and the software is developed by using the Visual Basic 6.0 as programming language. The system proposed in [3] is to control the home appliances through voice commands which are converted into text by an android based application and is sent to the receiver which controls the desired appliances through a Bluetooth medium. Haliemah Rashed [4] has proposed a voice controlled Zigbee-based home automation system which uses Microsoft voice engine tools for speech recognition and LabView software to support human-computer interactions. The wireless part of the system has been implemented by using Zigbee RF modules.

Malik and group [6] proposed a system whose main objective is to provide security and control the home appliances such as AC, lights and alarms. The system transfers data from sender to receiver using SMS technology over GSM network.

III. SYSTEM AND METHODS

This method proposes a system which is capable of switching ON/OFF the electrical appliances with the help of speech (command) as an input or with the SMS. This system is very cost effective and need no maintenance. It consists of speech recognition module which includes HM 2007 which is the heart of the whole circuit. The data provided by speech recognition module or by the SMS is supplied to the microcontroller. The microcontroller compares the data with the set of instructions and is transmitted via a radio frequency transmitter.

The data received by the radio frequency receiver is supplied to the receiver side microcontroller. The microcontroller does the desired switching action and directs the GSM module to send a confirmation message to the installed number. The whole system can be grouped into following:

A. *Voice recognition module*

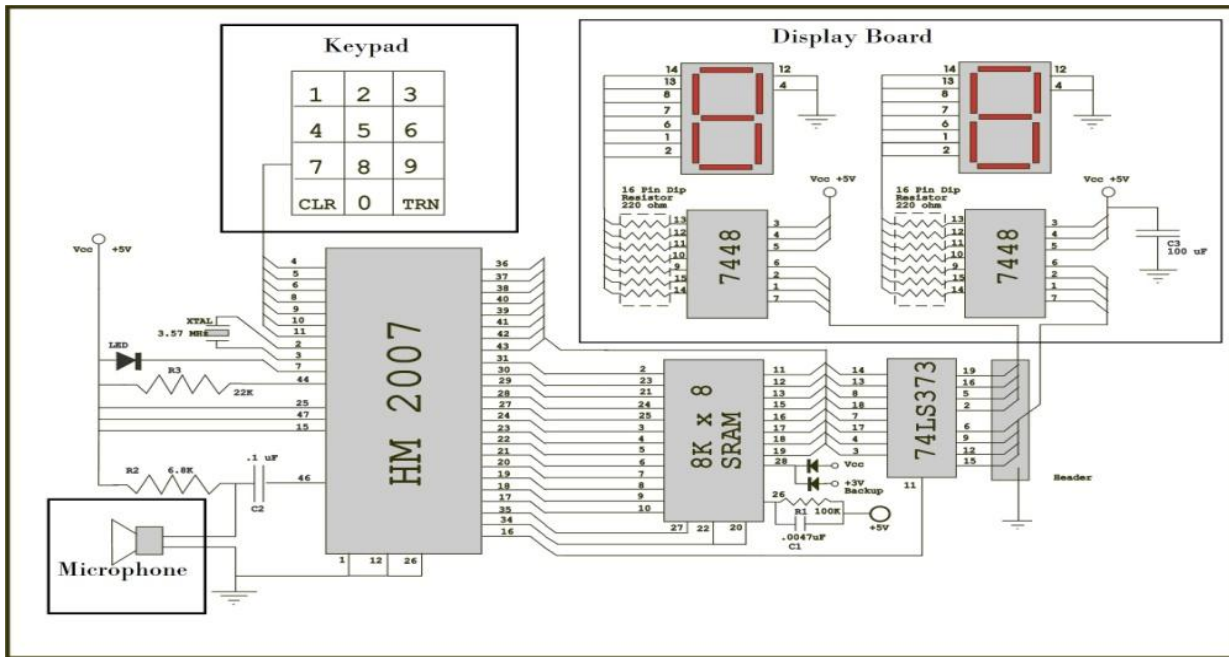
Voice recognition module is used to recognize the input which is in the form of sound and convert that into 8 bit digital data. The heart of the total circuit is HM 2007 IC. Besides HM 2007, it is provided with the following:

- Keypad for training of module
- 7-segment display (to provide status of input commands)

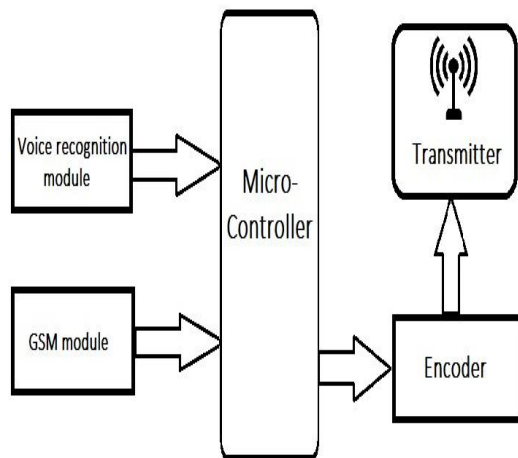
- 8k X 8 SRAM with battery backup
- Microphone for input of voice

This module can work in manual and CPU mode. But in this method it is used in manual mode. The response time of this module is very fast (less than 300 milliseconds) and the maximum word length is 1.92 seconds. The module is needed to be trained at least once in its whole lifetime. It can be easily trained with the help of keypad provided in the module. In case the input cannot be recognized by the module, the following result will be displayed on the 7 segment display:

- 55 = word too long
- 66 = word too short
- 77 = word no match



B. *Transmitter block*



Transmitter side block diagram

The transmitter block includes voice recognition module, GSM module, microcontroller, encoder and RF transmitter. Besides voice as the input, this system can also take an SMS as an input. This extra-ordinary feature

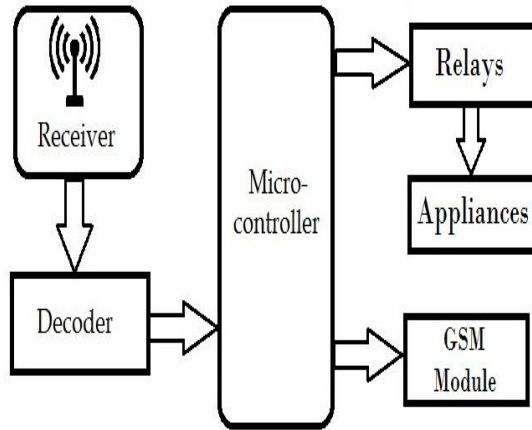
gives an ahead of other systems available in the market. The GSM module provided in the system is used to control appliances when voice commands are out of reach. For example, in a multistoried building to control switching operations of different floors from a particular place we can use the SMS input to the system. The input data is received by the microcontroller by either of the input method. The data received is compared with the set of instructions. After the successful comparison of data, the desired signal is transmitted through encoder and RF transmitter. The encoder used here is to convert the parallel data into serial data because RF transmitter and receiver works on the principle of serial communication.

C. *Receiver block*

The receiver side consists of RF receiver, decoder, microcontroller, relays and GSM module. The signal transmitted by the RF transmitter is received by RF receiver. The signal received will be a serial data which has to be again converted into parallel data. Here the decoder plays an important role and converts the serial data into parallel data which can be supplied to microcontroller.

The microcontroller compares the received data with the instructions and then signal is supplied to the desired relays.

A relay acts as an electromagnetic switch which is operated by a relatively small electric current that can turn on or off a much larger electric current. This leads to the switching of desired electrical appliances.



Receiver side block diagram

IV. RESULTS

The system supports multi-language input. The voice input is being tested in different temperature conditions but the performance of the system remains unaffected. When the voice input is provided in a noisy room, the accuracy of the system decreases as it takes input from the background noise. But in a silent environment the accuracy is more than 90%.

V. CONCLUSION

Voice and GSM controlled home appliances system was built and implemented. This system can be a big relief to elderly and disabled people. The wireless data transmission is done by RF transmitter and receiver which are of low cost in comparison to zigbee module. The overall cost of the system is very low and system is easy to install. The main advantage of proposed system is that it provides wireless communication capabilities on an embedded board rather than on a PC. Most of the existing system requires PC for control of the appliances. The disadvantage of the existing system is necessity of a computer. The GSM module provided at the receiver side provides an extra security of the home. Whenever there will be transition from on state to off state or vice-versa, an SMS will be sent to the installed numbers.

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