

AN ADVANCED HOME AUTOMATION SYSTEM USING MOBILE PHONE

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ABSTRACT

This paper represents an effective technique for the user to monitor and control the house/office appliances and other equipments via the mobile phone. The home automation improves the lifestyle of control of the home device. Our work is based on embedded system. In this project, we propose a unique System for Home automation utilizing Dual Tone Multi Frequency (DTMF) that is paired with a wireless module to provide seamless wireless control over many devices in a house. We can operate our robot from any distant or remote area. It is a wireless robot but instead of using a separate wireless module (transmitter and receiver) we are using the cell phones for this purpose. The principle used for mobile controlled robot is the decoding of DTMF tone.

Keywords: *DTMF, Microcontroller, Embedded System, Mobile Phone*

I. INTRODUCTION

Home Automation system employs the integration of wireless communication, and power-line communication to provide the user with remote control of various lights and appliances within their home. As per our survey of literature various workers gained achievement in this field. "N. Srisanthan[1]" explained the model for home automation using Bluetooth via PC but that work lacks to support mobile technology.

"Muhhammad Izhar Ramli [2]" designed a prototype electrical device control system using web. They also set the server with auto restart if the server condition is currently down. "Al-Ali and Al-Rousan [3]" presented a design and java based automation system through world wide web. "Pradeep G [4]" proposed home automation system by using Bluetooth. "Hassan[5]" has developed a telephone and PIC remote control device for controlling the devices via cable network but there was a lack of wireless communication. "R. Piyare [6]" have introduced design and implementation of a low cost, flexible and wireless solution to the home automation. In the field of home automation "Das S.R. et al[7]" and "LaurI [8]" have achieved a great success about microcontroller based systems. This system uses a consolidation of a mobile phone application, handheld wireless remote, and PC based program to provide a means of user interface to the consumer. This system is designed to be low cost and expandable allowing a variety of devices to be controlled. Home automation is becoming more and more popular around the world and is becoming a common practice. Smart home automation becomes important, because it gives the user the comfortable and easy access to the home devices. The process of home automation works by making everything in the house automatically controlled, using technology to control and do the jobs that we would normally do manually. Home automation takes care of a lot of different activities in the house. In this project, we propose a unique system for Home automation utilizing

Dual Tone Multi Frequency (DTMF) that is paired with a wireless module to provide seamless wireless control over many devices in a house.

Conventionally, electrical appliances in a home are controlled via switches that regulate the electricity to these devices. As the world gets more and more technologically advanced, we find new technology coming in deeper and deeper into our personal lives even at home. Home automation is becoming more and more popular around the world and is becoming a common practice. Smart home automation becomes important, because it gives the user the comfortable and easy access to the home devices. The process of home automation works by making everything in the house automatically controlled, using technology to control and do the jobs that we would normally do manually. Home automation takes care of a lot of different activities in the house. In this project, we propose a unique System for Home automation utilizing Dual Tone Multi Frequency (DTMF) that is paired with a wireless module to provide seamless wireless control over many devices in a house.

We can operate our robot from any distant or remote area. It is a wireless robot but instead of using a separate wireless module (transmitter and receiver) we are using the cell phones for this purpose. This robot has advantages over simple wireless robot as it overcomes the limitations of wireless like limited range, frequency interference etc. Mobile operated robot is having a wide range (service provider range), less fear of interference as every call is having a unique frequency and moreover it has more control keys. The principle used for mobile controlled robot is the decoding of DTMF tone.

II. AIM OF THE WORK

The aim of this project is to extend a device that allows for a user to somewhat control and monitor multiple home appliances using a cellular phone. This system will be a powerful and flexible tool that will offer this service at any time, and from anywhere with the constraints of the technologies being applied.

Many times a situation occurs when we have to control various devices from a long/remote location according to our choice .Consider following examples

- 1) If, we are working in some industry and have to reach at workplace at the earliest to turn on some electrical device like boiler or conveyor belt.
- 2) In our normal day to day life we go out of home and forgot to turn off fan/light
- 3) In summer season we want to turn on Fan or AC — Air cooler before we reach home.

For all above situations, we need a device / controller which can turn on / off the devices. To implement this system the consumer should send a unique code accompanied by the required function to his home control system through GSM.

III. PRINCIPLE

In the present project a microcontroller is used as a control unit which gets inputs (instructions, commands) from a mobile connected through GSM. To make the connection more secure, consumer authentication along with a password will be provided.

To switch on/off any appliance positioned at controller's part, the cellular phones are connected, the appropriate tone and password are entered. The tone entered is decoded via the DTMF decoder which further translates it

into binary values. Binary values are the input to the microcontroller which verifies each tone individually and corresponding output is given at the output terminal.

Thus, when the relay drive is activated by the microcontroller, the device either gets ON or is switched OFF as per the requirement. Our project makes use of auto answer facility and hence eliminates the need of a ring detector circuit.

IV. BLOCK DIAGRAM

The block diagram is shown in “Fig. 4.” This user console has many keys, each corresponding to the device that needs to be activated. The encoder encodes the user choice and sends via a transmitter. The receiver receives the modulated signal and demodulates it and the user choice is determined by the DTMF decoder.

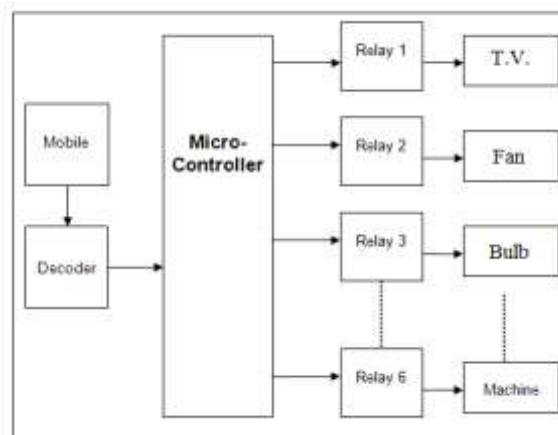


FIGURE 4. Showing Block Diagram

4.1 Dual Tone Multiple Frequency Decoder

MT8870 is a decoder IC which decodes the DTMF tone and fed the decoded signal to the microcontroller i.e. on board processor. According to the program in the microcontroller the robot starts working.

In DTMF the tones and assignments are given in the “Table 4.1”:

Table 4.1 Dtmf Tone Assignments

FREQUENCIES	1209 Hz	1336 Hz	1477 Hz	1633 Hz
697 Hz	1	2	3	A
770 Hz	4	5	6	B
852 Hz	7	8	9	C
941 Hz	*	0	#	D

4.2 Introduction to Atmega 16

- ATmega16 is a low-power CMOS 8-bit microcontroller based on the AVR RISC architecture.
- In order to maximize performance and parallelism, the AVR uses a Harvard architecture- which separates memories and buses for program and data.

4.2.1pin Out of Atmega 16

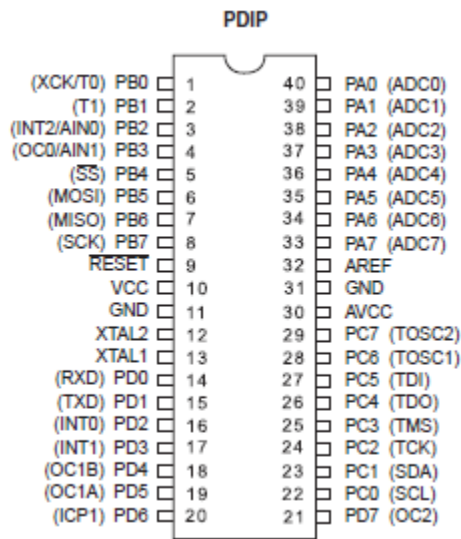


FIGURE 4.2.1 Showing Pin Out of ATMEGA 16

4.2.2 Features of Atmega 16

1. 32x8 general purpose working register.
2. 512 K Bytes EPROM.
3. Programming lock for software security.
4. Extensive on-chip Debug support.
5. 8-channel, 10-bit ADC.
6. Operating voltages; 4.5-5.5 V for ATMEGA 16.
7. Speed Grades; 0-16 Mhz for ATMEGA16.

V. APPLICATIONS

1. This project can be used in Industries to control various devices from a remote distance.
2. This project can be use in home for domestic use.

VI. ADVANTAGES

1. This project is simple and easy to access.
2. It can be accessed from remote areas.
3. There is low power consumption.
4. It can be operated from a long range.

VII. FUTURE ENHANCEMENT OF THE PROJECT

1. It can be used as controlling speed of fan.
2. It can be used to control room temperature.
3. It can be also used for security purposes burglary, gas detection, smokedetection.

VIII. ACKNOWLEDGEMENT

Authors are highly thankful to Head of Deptt., (EI) , M.J.P.R.U., Bareilly and all the faculty members of EI Deptt., for their invaluable help and kind co-operation to complete our project and for providing necessary facilities.

IX. CONCLUSION

We have developed the project “AN ADVANCED HOME AUTOMATION SYSTEM USING MOBILE PHONE” In this project, the home appliances are controlled by a mobile phone that makes a call to the mobile phone attached to the robot. It receives DTMF tone with the help of the phone attached to the robot. The received tone is processed with the help of DTMF decoder. The DTMF decoder then transmits the signal to the microcontroller to operate the relay. It provides the advantage of robust control, working range as large as the coverage area of the service provider. In this way, we have developed a robot which is capable of receiving & decoding the commands and control signals from the distant areas and can work according to our instructions.

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