

Telephone Controlled Home Automation System Using DTMF

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Abstract : *In this paper there is a home automation system using mobile and telephone connection. In this system first we have to dial programmed standard telephone system from any landline or any mobile phone that would ask for PIN no. or password for a secure transaction. After authentication the telephone would wait for a number to be entered from a user and according to the entered electrically, therefore it does not create any effect on telephone line. With PIN check system non authorized people number it would generate a dual tone multi frequency signal. According to this signal DTMF IC MT8870 decoder decodes the signal and converts it into a 4 bit number and transmit to a AT89S52 controller. AT89S52 controller would interpret the signal from the DTMF decoder and control the device using relays. Remote control system by telephone presented in this project is based on ATMEL controller and has very secure designed circuit is isolated both optically.*

IndexTerms - DTMF ,decoder, ATMEL, Optocoupler,Multisim

I. INTRODUCTION

Most often, the users would like to have remote control on some preliminary operations of their home appliances before they go back to home. These operations may be the turn on or off the air conditioner, the cooker, the light, the video, or the security system, or even some things that he or she forgot to do before leaving, etc. It will be comfortable and convenient for people to live in such a modern house with the above functions. Besides, phone is an important bridge of two parties. Sometimes it is important to keep the information of conversations to protect the family. In this case, it is useful to have extra functions to monitor the usage of phones. These functions include automatic warning and recording.

Home automation systems may designate electronic systems in homes and residential buildings that make possible the automation of household appliances. The new stream of home automation systems has developed into a vast one and the current market is flooded with a flurry of home automation systems and device manufacturers.

This system is designed to provide control of home appliances through landline by dialing the designated number for the particular load. Dialing can be done from the home phone or a call made to the home number from outside. This system is designed without engaging a programmable microcontroller but is based on digital logic using DTMF technology (Dual Tone multiple frequency) which receives the command from the landline phone to develop digital output.

This digital signal is further processed to actuate switching mechanism through relay driver to turn on/off the loads/appliances. It can be used to switch appliances from anywhere, overcoming the limited range of other infrared and radio frequency type controls. This proposed system gives a new direction to the development of home automation. .

II. BLOCK DIAGRAM & CIRCUIT DIAGRAM

The basic principle involves Dual Tone Multiple Frequency. It involves the generation of sine wave with high frequencies and low frequencies, for each number pressed on the keypad of the phone. In other words each decimal number or digit is represented by linear addition of frequencies. The frequencies in the column side are the high frequencies whereas the frequencies in the row side are the low frequencies.

Thus for each digit pressed, a sine wave signal with dual frequency is generated. This signal is decoded to get the corresponding BCD equivalent using DTMF decoder. This BCD signal is again decoded using a Decoder and obtained signal is inverted and then latched to drive the corresponding relay.

Here block diagram (Figure 1) home appliances like lights and water pump from your office or any other remote place. So if you forgot to switch off the lights or other appliances while going out, it helps you to turn off the appliance with your cell phone. Your cell phone works as remote control to your home appliances. You can control the desired appliance by presetting the corresponding key. The system also gives you voice acknowledgement of the appliance status.

This circuit” has different sections such as:

1. Microcontroller
2. DTMF decoder
3. Relay

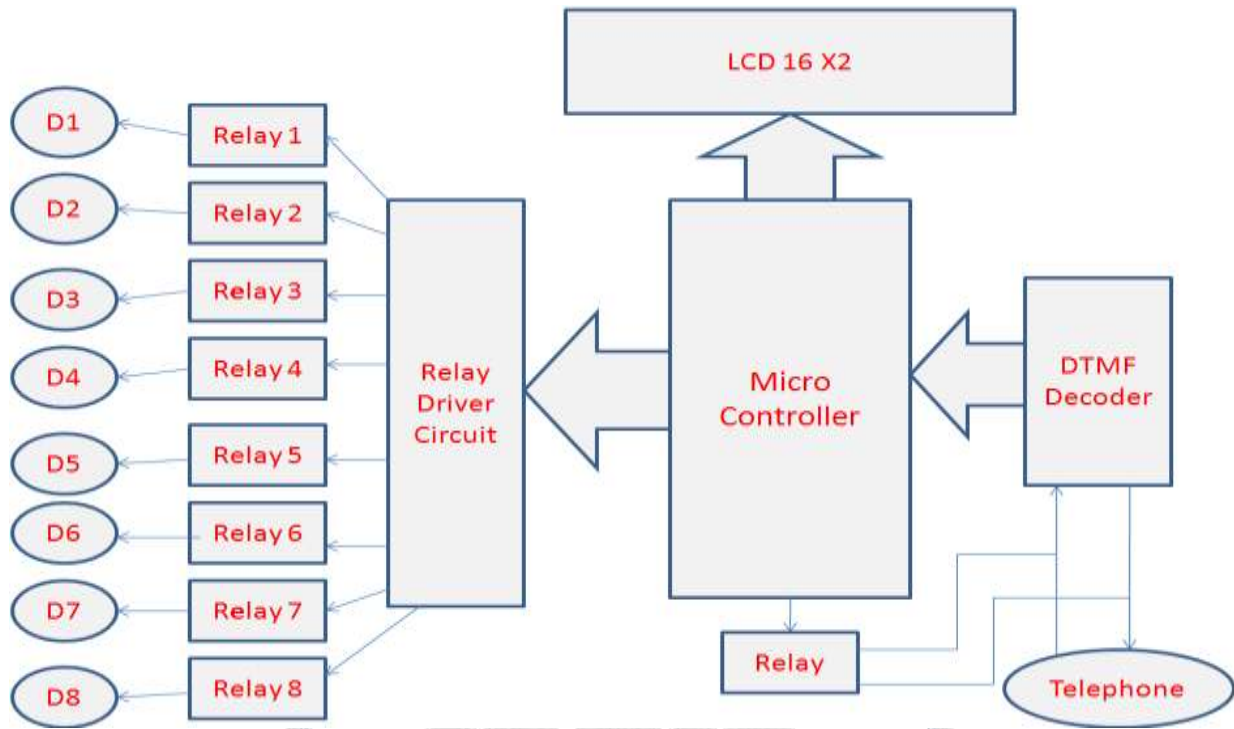


Fig.1 block diagram of home automation system

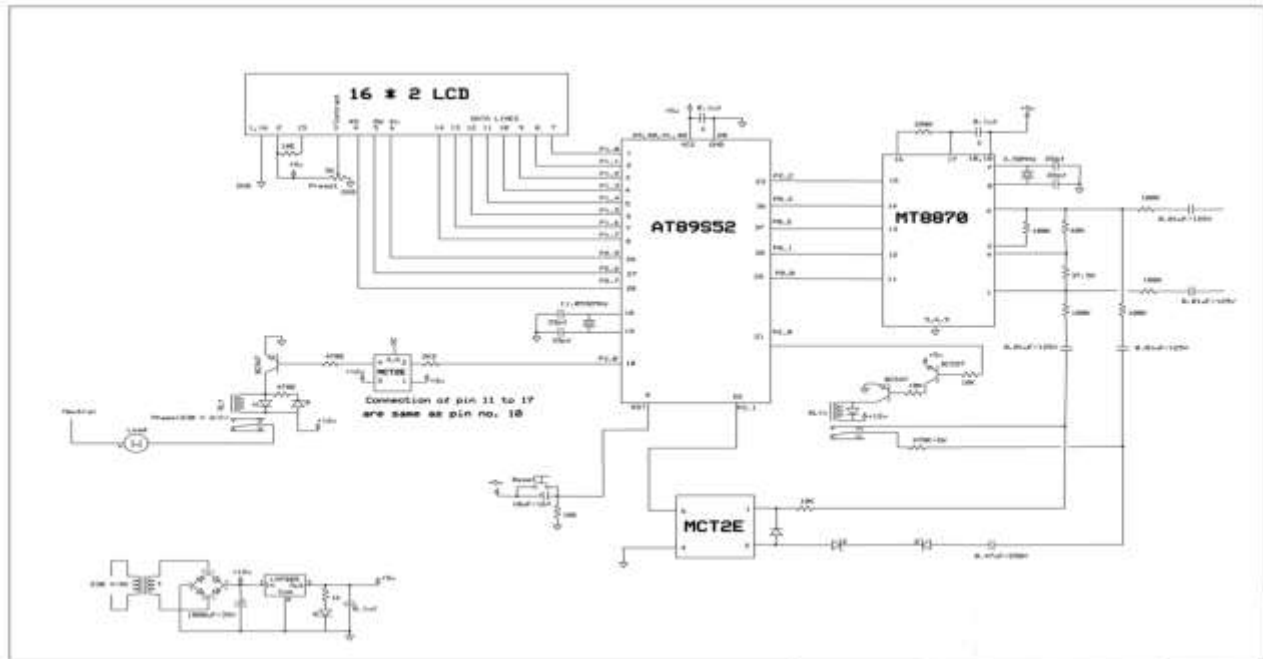


Fig.2 Circuit diagram of home automation system

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel’s high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

MT 8870 - Dual-tone multi-frequency (DTMF) signaling is used for telephone signaling over the line in the voice-frequency band to the call switching center. The version of DTMF used for telephone tone dialing is known by the trademarked term Touch-Tone and is standardized by ITU-T Recommendation Other multi-frequency systems are used for signaling internal to the telephone network.

As a method of in-band signaling, DTMF tones were also used by cable television broadcasters to indicate the start and stop times of local commercial insertion points during station breaks for the benefit of cable companies

MCT2E devices consist of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon phototransistor detector.

A relay is an electrically operated switch. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

III. WORKING OF HOME AUTOMATION SYSTEM

In DTMF there are 16 distinct tones. Each tone is the sum of two frequencies: one from a low and one from a high frequency group. There are four different frequencies in each group. Phone only uses 12 of the possible 16 tones. If you look at your phone, there are only 4 rows (R1, R2, R3 and R4) and 3 columns (C1, C2 and C3). The rows and columns select frequencies from the low and high frequency group respectively. The exact value of the frequencies is listed in Table 1 below:

Table 2.1: DTMF Row/Column Frequencies

LOW-FREQUENCIES	
ROW	FREQUENCY (HZ)
R1: ROW 0	697
R2: ROW 1	770
R3: ROW 2	852
R4: ROW 3	941
HIGH-FREQUENCIES	
COL #	FREQUENCY (HZ)
C1: COL 0	1209
C2: COL 1	1336
C3: COL 2	1477
C4: COL 3	1633
C4 not used in phones	

IV. SIMULATION RESULT

4.1 LCD Interfacing with AT89s52

Figure 3 shows simulation result of LCD Interfacing with AT89s52 in Multisim Software as well as in hardware .

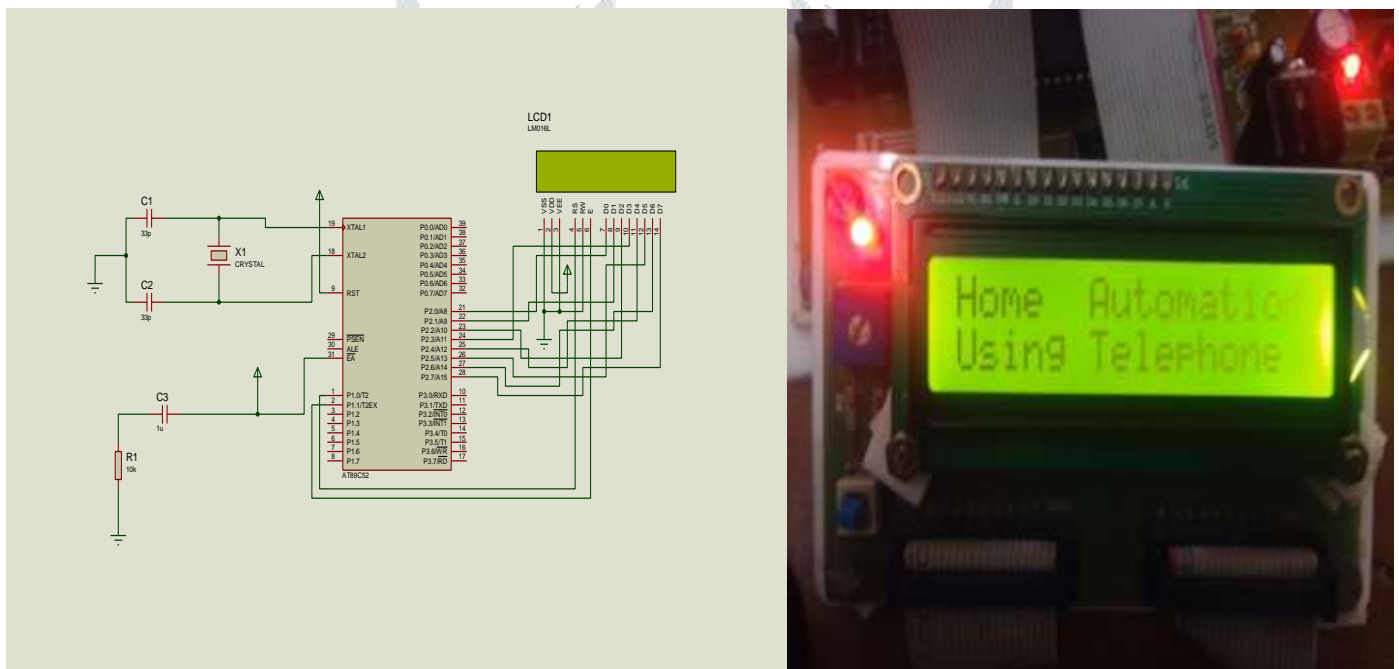


Fig.3 LCD Interfacing of home automation system

4.2 Relay Interfacing with AT89s52

Figure 4 & Figure 5 shows simulation result of Relay Interfacing with AT89s52 in Multisim Software.

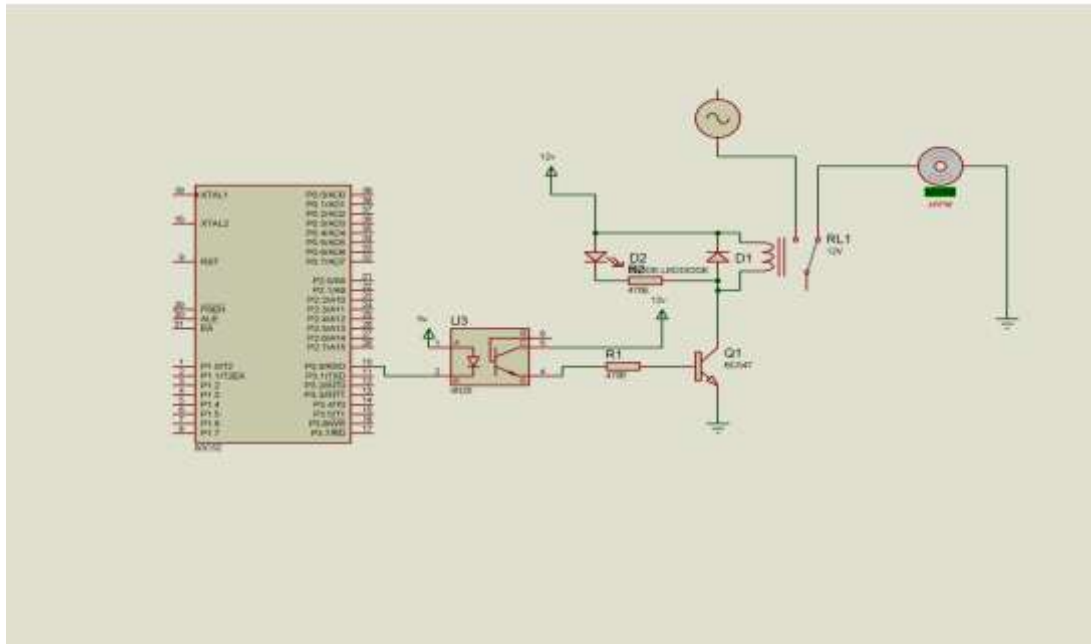


Fig.4 Relay Interfacing with AT89s52

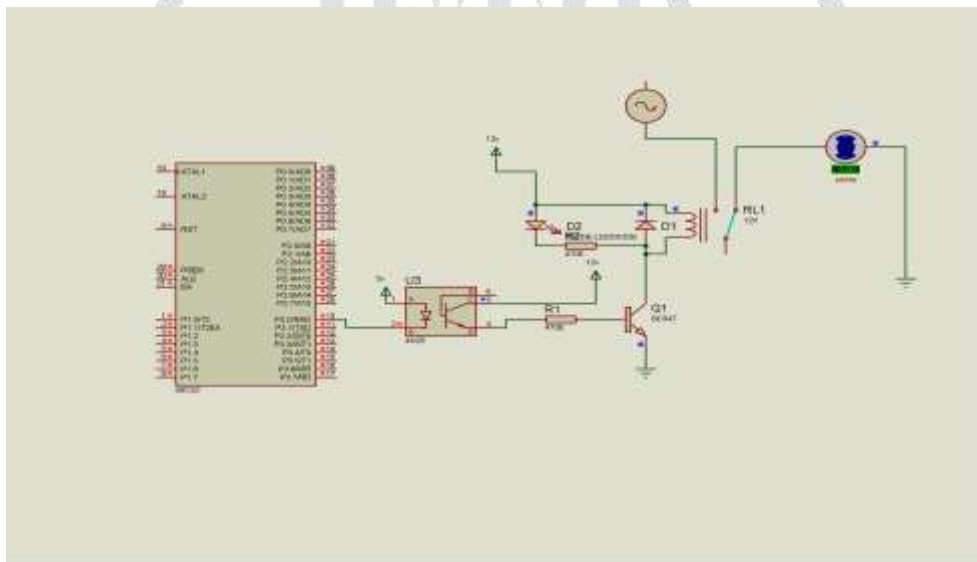


Fig.5 Relay Interfacing with AT89s52

V. HARDWARE RESULT



Figure 3 shows final Hardware model of home automation system using microcontroller & DTMF

Fig.6 Hardware model of home automation system using microcontroller & DTMF

VI. CONCLUSION

This paper describes the design and implementation of a home automation system using Microcontroller, DTMF decoder & Relay. This is especially important if they need such a control when they are far away from the location of their homes. This control style can also be applied to the control of factories. A careful design can possibly reduce the operation cost. People can have better control on their house and their lives even they are traveling in another country. In this paper, we present a Home Automation System using landline & mobile phone. The system used the Dual Tone Multi-frequency signals to control the operations of various appliances. The hardware and software are designed based on the landline & mobile phone. The Phone Monitoring system provides convenient services for the user to better monitoring the usage of their phones.

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