DTMF Based Home Automation

M.Krishna[1], Lekkala Vikram[2], Md. Waseem[3], K.S.V.Saikumar[4]

(Assistant professor [1] EEE students [2,3,4])

Electrical and Electronics Engineering, St. Peters Engineering College Opp. Forest Academy,Kompally Road, Dullapally, Maisammaguda, Medchal, Hyderabad – 500100,Telengana,India

Abstract:

Now a day's technology is running with time, it completely occupied the life style of human beings. Even though there is such an importance for technology in our routine life there are even people whose life styles are very far to this well-known term technology. So, it is our responsibility to design few reliable systems which can be even efficiently used by them. This basic idea gave birth to the project DTMF controlled electrical appliance controller. The aim of this project is to provide an efficient solution for remote electrical appliances control through mobile phone using DTMF technology.

Keywords:

PIC Microcontroller (PIC16F873), DTMF module, Relays.

1. Introduction:

Modern homes are getting smarter with the advancements in engineering and technology. Physical operation of wall switches placed in different corners of the house is not convenient especially for the elderly and physically disabled members present in the home. World's population is ageing, considering the increasing percentage of older persons almost in every nation of the world as a result of advanced health care technologies. A Home Automation System (HAS) uses various sensors and components for controlling and monitoring the home environment. Several papers on Home Automation System have used Speech recognition, Bluetooth, GSM and a number of other ways of operation of the system.

In this paper we present a DTMF controlled electrical appliance controller. Here the automation process is done through the microcontroller-based technology.

2. LITERATURE SURVEY:

1. Implementation of home automation and security system using touch screen, remote control and web based operation: by Dhiraj Sunehra This research paper by the author presents the implementation details of a Home Automation and Security System (HASS) that uses a RF remote controller, temperature sensor, humidity sensor and touch screen to control electrical devices. The user can conveniently control the devices in the home by using this System.

2. Bluetooth based home automation system: by H.Kanma This paper shows the implementation of the home automation system using Bluetooth that can be accessed through GPRS. The researchers use a cellular phone, Bluetooth communication adapters for the appliances and the cellular phone separately .The home appliances and cellular phone can be connected by using Bluetooth as a communication medium.

3. Implementation:
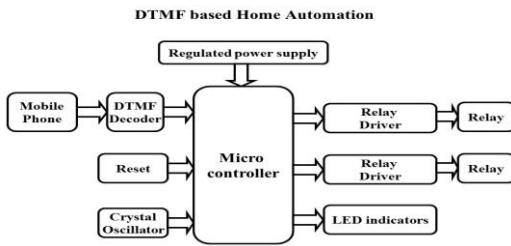
3.1 Block Diagram of DTMF based home automation

The main controlling device of the whole system is a Microcontroller. DTMF decoder, relay switch are interfaced to the microcontroller. User needs to make a call to the dedicated mobile phone at the system and it will be answered automatically. User need to input the numbers dedicated for ON/OFF the electrical appliances. The DTMF decoder receives the pressed number information and feds this information to microcontroller. Microcontroller decides whether to ON/OFF the electrical appliances through relay switch, depending on information from DTMF decoder. To perform this intelligent task, Microcontroller is loaded with an intelligent program written using embedded 'C' language.

4. Related Work:

The brief introduction of different modules used in this project is discussed below:

4.1. PIC (16f873) Microcontroller.
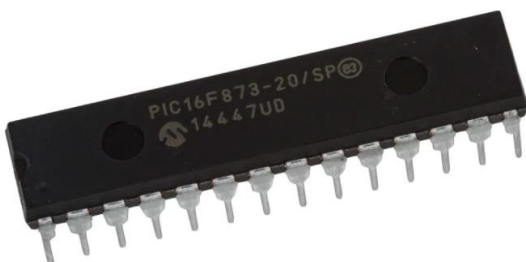
4.1.1 PIC Microcontroller

The PIC16F873 family of microcontrollers is based upon Microchip's Mid-Range core with an 8 level deep hardware stack and 35 instructions. These MCUs provide up to 5 MIPS, 3.5 Kbytes program memory, 128 bytes RAM and EEPROM of 64 bytes.

Features:

RAM	192
Memory Type	Flash
Program Memory K Bytes	7
I/O Pins	22
Pin count	28
Max. CPU Speed MHz	20
Timers :	2 - 8-bit & 1 - 16-bit
Temperature Range	-40 to 125

4.2. DTMF module:

DTMF stands for Dual Tone Multiple Frequency; it is used to send information through phone lines to and from your local exchange.

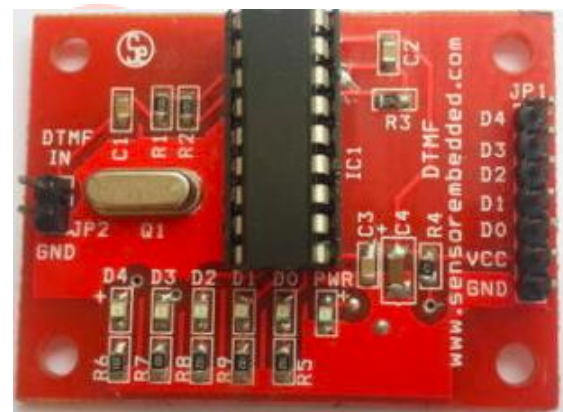Dual Tone Multiple Frequency (DTMF) is also known as Touch-tone, Tone Dialing, VF Signaling and MF Dialing.

Fig: DTMF decoder

DTMF Decoder is also used for receiving data transmissions over the air in amateur radio frequency bands. The following are the frequencies used for the DTMF (dual-tone, multi-frequency) system, which is also referred to as tone dialing. The signal is encoded as a pair of sinusoidal (sine wave) tones from the table below which are mixed with each other. DTMF is used by most PSTN (public switched telephone networks) systems for number dialing, and is also used for voice-response systems such as telephone banking and sometimes over private radio networks to provide signaling and transferring of small amounts of data. DTMF decoder connected to GSM module.

The MT8870 is a complete DTMF receiver integrating both the band split filter and digital decoder functions. The filter section uses switched capacitor techniques for high and low group filters; the decoder uses digital counting techniques to detect and decode all 16 DTMF tone-pairs into a 4-bit code. External component count is minimized by on chip provision of a differential input amplifier, clock oscillator and latched three-state bus interface.

Each DTMF tone consists of two simultaneous tones (one from the high group and one from the low group), which are used to indicate which number or symbol you press on your telephone's keypad.

4.3. Relay:
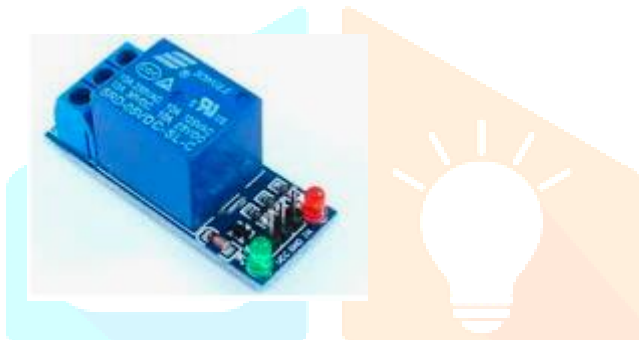
Relay is an electromagnetic switch. . It consists of a coil of wire surrounding a soft iron core, an iron yoke, which provides a low reluctance path for magnetic flux, a movable iron armature, and a set, or sets, of contacts; two in the relay pictured. The armature is hinged to the yoke and mechanically linked to a moving contact or contacts.

When an electric current is passed through the coil, the resulting magnetic field attracts the armature and the consequent movement of the movable contact or contacts either makes or breaks a connection with a fixed contact.
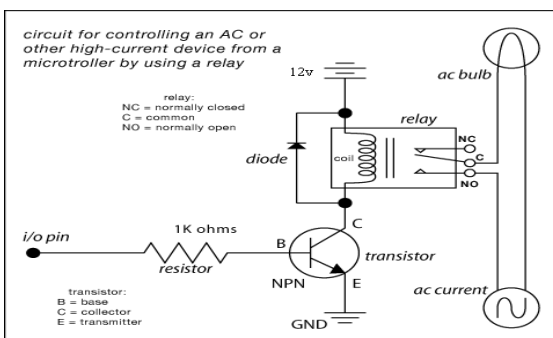

Fig: Relay circuit

In this project we are using two relays for devices which is interfaced to the PIC Microcontroller. Microcontroller continuously read the data from DTMF module based on that the microcontroller control the devices through Relays.

5. CONCLUSION:

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

6. ACKNOWLEDGEMENT

We would like to thank all the authors of different research papers referred during writing this paper. It was very knowledge gaining and helpful for the further research to be done in future.

7. RESULTS:

The project "**DTMF Based Home Automation**" was designed to operate devices using mobile phone through DTMF technology
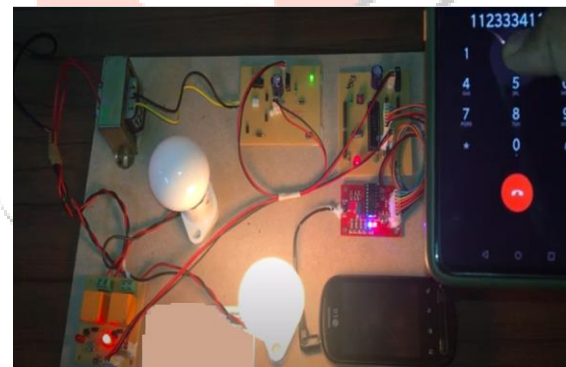

Fig: 7.1 Device control through DTMF

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