DTMF BASED HOME AUTOMATION

Course name : Microprocessor interfacing & Assembly Language
Section: 01
Group: Gryffindors

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Introduction

The main objective of this project is to develop a home automation system using an Arduino board with Dual Tone Multi-Frequency (DTMF). This project lets us operate our home appliances like lights, doors and other electrical appliances from our office or any other remote place. So, if we forgot to switch off the lights or other appliances while going out, it helps us to turn off the appliance with our cell phone.

Methodology

DTMF works by assigning eight different audio frequencies to the rows and columns of the keypad. The columns on the keypad are assigned high-frequency signals, while the rows are assigned low-frequency signals.

When we press a key—which corresponds to a number or symbol—the phone generates a tone that simultaneously combines the high-frequency signal from the column that key is in with the low-frequency signal of the row it's in. This unique signal pair is then transmitted over telephone wires to the local phone exchange, where the two signals are decoded to determine which numbers we are dialing. So when we press the "5" key on our phone's keypad, for example, a combined signal tone of 1336 Hz and 770 Hz is sent to the phone company, which then knows that we've just pressed "5." Once they receive the full number that we dialed, they can automatically route our call to it.

The signal pair is needed because It also helps to prevent interference from being received at the local exchange building by other non-DTMF signal frequencies.

Procedures

- Call the phone which is connected to the project. Receiver phone is set as auto answer mode i.e. call is received automatically after some time.
- When we press keys in calling cell Phone when the call is in progress, the other person will hear some tones with respect to keys pressed. These tones are based on the DTMF technology.
- And Just connect your cell phone headset (headphone) jack to the mobile phone.
- The tones produced by the mobile keypad which have some frequency.
- DTMF Decoder converts the desired frequency into analog signals and gives to PIC microcontroller.

1. The microcontroller is used for switching the load equipment according to the frequency received by the DTMF receiver by using a combination of Relays.
2. The working of the project is when we press 1 in the calling phone then the frequency is sent from the received phone to DTMF decoder IC and decode the incoming frequency and give it a microcontroller in the binary code.
3. For key 1 is pressed device 1 is on and for key 2 is pressed device 1 is off, same working follow as remaining devices.

DIAGRAMS

PIN DIAGRAM OF DTMF DECODER IC

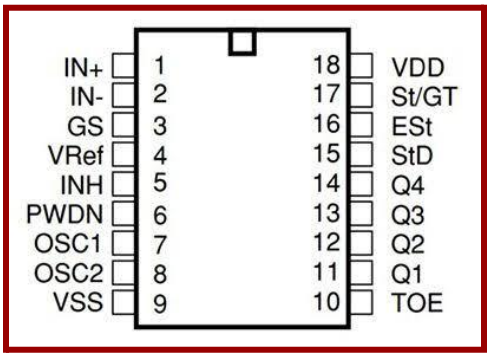
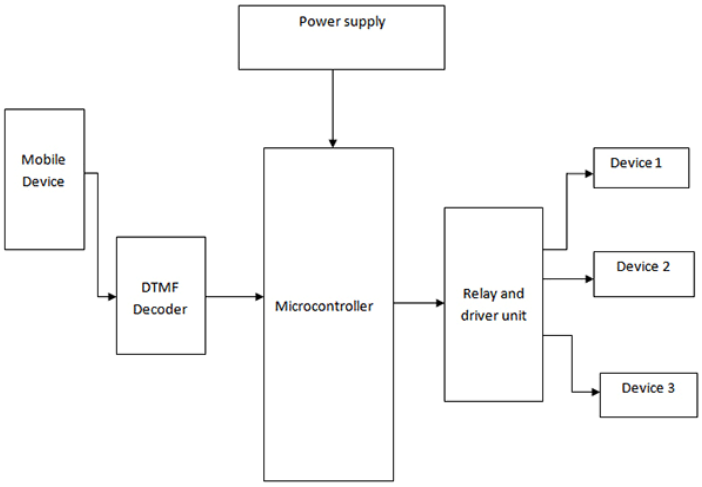
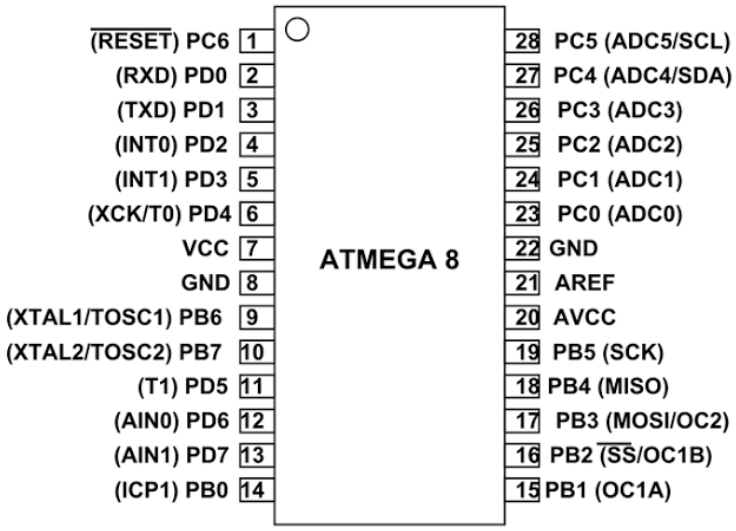


Fig: Pin Diagram of DTMF decoder ic

BLOCK DIAGRAM





Pin Diagram of ATmega8 microcontroller

CIRCUIT CONNECTIONS

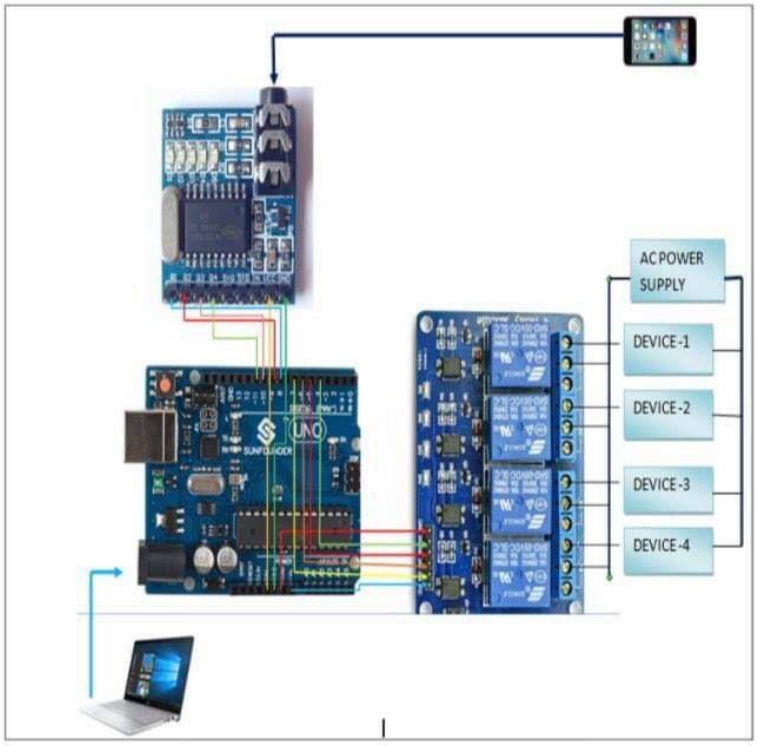


Fig.12: Connection Layout of the Hardware

The above figure (5) depicts the connection of the entire system. When the user dials the home mobile number the phone at home rings and if nobody picks the

call, then the system picks up the call automatically. When we press any number on the phone keypad it generates a particular frequency, which is received by the other phone and then the code/number is decoded by the DTMF decoder /receiver. Here the decoder decodes the frequency of the tone generated by the particular code/number. The DTMF decoder generates a binary output which is given to the microcontroller. Here a program code is fed to the microcontroller which activates the relay module according to the key pressed by the user. At the output of the microcontroller the

devices are connected to a 4-channel relay module. It is a driver which drives the appliances based on the microcontroller output. Thus, when the relay drive is activated by the microcontroller, the device either gets ON or is switched OFF as per the requirement

The DTMF Decoder, Arduino UNO and the relay module gets the DC supply from the power supply unit. The DTMF decoder (MT8870) is connected to the Arduino UNO which in turn is connected to the relay module. The output of the relay module is connected to various loads. In our project we have used four loads (bulbs) for demonstration. The entire connection is made through jumper wires.

Project Code:

Simulation:

Results

Discussion

Conclusion and Recommendations

This system employs DTMF technology to control home appliances allowing it to be operated from anywhere in the world. It's a fantastic device for controlling electronic equipment from afar. When the user at the transmitter dials the number on the receiver's mobile phone and pushes the key on the keypad, he is able to manage the device from any location using low-cost technology. This system may be very useful in rural regions, and the device control can be used in a variety of fields such as agriculture, homes, factories, and so on. The use of mobile

communication in device control has been adequately justified, and the previously mentioned limitations and issues have been addressed.

Reference

- https://circuitdigest.com/electronic-circuits/dtmf-based-home-automation-system
- https://www.electronicshub.org/dtmf-controlled-home-automation-system-circuit/