DTMF BASED HOME AUTOMATION
Overview

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Introduction

• Design a system that allows users, upon authentication, to remotely control multiple home appliances using a cell phone-based interface.

• Controlling of home appliances using Dual Tone Multi Frequency (DTMF) technology.
DTMF (Dual Tone Multi Frequency)

- A signaling system for identifying the keys or better says the number dialed on a push button or DTMF keypad.
- A multi-frequency tone dialing system used by the push button keypads in phone and mobile sets to conveys the number or key dialed by the caller.
- DTMF has enabled the long distance signaling of dialing numbers in voice frequency range over telephone lines.
- DTMF as name suggests uses a combination of two sine waves tones to represent a key.
<table>
<thead>
<tr>
<th>Low Frequency Group</th>
<th>High Frequency Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>697 Hz</td>
<td>1209 Hz</td>
</tr>
<tr>
<td>770 Hz</td>
<td>1336 Hz</td>
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<tr>
<td>852 Hz</td>
<td>1477 Hz</td>
</tr>
<tr>
<td>941 Hz</td>
<td>1633 Hz</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
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<td>4</td>
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<td>8</td>
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Hardware requirements

- Mobile Phones
- DTMF Decoder Module - HT9170D
- 12V Relay
- Relay driver - ULN2003
- Power Supply
DTMF Decoder-HT9170D

- Operating voltage: 2.5V~5.5V
- Minimal external components
- No external filter is required
- Low standby current
- Excellent performance
- Tristate data output for MCU interface
- 3.58MHz crystal or ceramic resonator
- 18-pin SOP package
Relay

- Relay is basically an electromagnetic switch which can be turned on and off by applying the voltage across its contacts.

- In this project a 12V 4-channel relay is used.
How Relay Works?
Relay Driver (ULN2003)

ULN2003A driver IC pin configuration and internal logic diagram

www.circuitstoday.com
Why Relay Driver?

- Relay safely driven by ULN2003 IC
- Protect microcontroller from relay kick back using integrated clamping diodes.
- Has 7 high current Darlington arrays each containing 7 open collector Darlington pairs with common emitters.
- Supplies sufficient current for driving the relay.
Power Supply

230 V AC
50 Hz

12V step down transformer

Bridge rectifier

Filter (470μf)

5v Regulator

5V DC

Diagram:

Transformer 12-0V
Bridge Rectifier (+12V)
Voltage Regulator

{+5V} 40
(OF EACH VC)

GND 20

Components:

- Transformer
- Bridge Rectifier
- Voltage Regulator
- Capacitor (470μf)
- 805
- LED (RED)
- Resistor (330R)
- Capacitor (10u)
- Circuit Connections
Advantages

• It is a robust and easy to use system.
• There is no need for extra training of that person who is using it.
• All the control would be in your hands by using this home automation system.
• One can control home appliances from anywhere.
• It reduces wastage of electricity if someone forgets to switch off any appliance connected to the system if we were away.
• It is very low cost compared to other technologies like GSM.
Disadvantages

- Lack of security. Anyone can control the appliances by connecting to the mobile connected to DTMF module.
- Number of appliances is limited as our mobile can generate only 16 tones.
- One mobile phone should always be connected to the system.
Future Work

• Memory can be used to store the appliance status during power failure.
• Appliance scheduler/timer can be implemented using RTC (Real Time Clock)
• Can be converted to an IoT device using WiFi connectivity.
Conclusion:

- DTMF Based Home Automation has been designed and setup
- It has been possible to control all home appliances automatically using our own mobile phones
- The control of all appliances is possible even from a wide range.
References

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Questions
THANK YOU