

DTMF BASED REMOTE CONTROLLING SYSTEM FOR HOME APPLIANCES

M.W.K Priyashantha*, K.P. Vidanapathirana

Department of Electronics, Wayamba University of Sri Lanka, Kuliyaipitiya, Sri Lanka
*kasunpriyashantha@gmail.com**

ABSTRACT

In many cases it is desirable to turn on or off some appliances such as air conditioning and heating units at the time of arriving and leaving home and this is one part of home automation. This project utilizes the Dual-Tone Multi Frequency (DTMF) technique used in touch tone telephones to control multi electronic devices from a long distances using a mobile phone. A DTMF detector, decoder, inverter and relays are used to develop the system. The system was designed to control home appliances. It includes a mobile phone which is connected to the system via a head set. To active the mobile phone unit on the system, a call is to be made and as the call is answered, in response the user would enter a two/three digit password to access the system to control devices. As the caller press the specific password, it results in turning ON or OFF specific device. The device switching is achieved by relays. Security preserved because these dedicated passwords owned and known by selected persons only. The automation features of this work makes it possible for home owners to remotely control several appliances, indoor and outdoor lamps and lights, landscape sprinkler timers and more using their mobile phones.

Keywords: Dual Tone Multi Frequency, Mobile Phone, Remote Controlling, Relays

1.0 INTRODUCTION

The electricity wastage and damaging home appliances caused by leaving the electrical appliances in the ON state despite not being in use. The simplest yet most overlooked way of electrical energy conservation is by switching off of the electrical appliances when not required. Nowadays, several DTMF technology based home automation systems are

developed to control home appliances when the home owners away from the home. But these systems are based on programmable ICs and are more complex equipments. In this case home owners have to spend more money to install this type of systems. And also they should have technological knowledge to control the system. This paper report on a system developed to overcome these difficulties.

The developed system is a cost effective and used only DTMF detector, decoder, inverter and relay driver to control the system, by replacing the IC's. In this system home owner who has only basic electronic knowledge can install and maintain the system.

2.0 EXPERIMENTAL

The block diagram of the designed system to control home appliances is shown in the Figure 1.

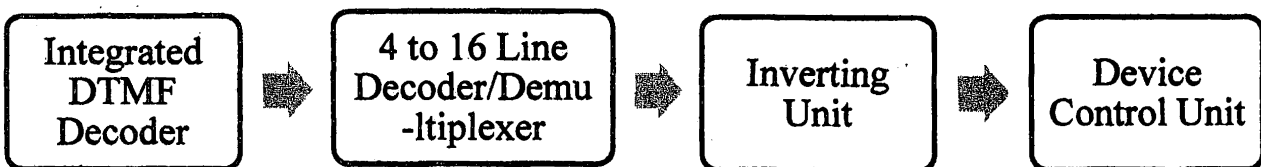


Figure 1 Block diagram of designed system

2.1 Integrated DTMF decoder

The integrated DTMF decoder is the device that receives the incoming DTMF data and converts it into a respective 4-bit BCD numbers. The MT8870 integrated DTMF decoder was used for this project. This DTMF IC is a complete DTMF receiver integrating both the band split filter and digital decoder functions¹.

2.2 4 to 16 Line Decoder/Demultiplexer

The 74HC154AP is a high speed CMOS 4 to 16 line decoder/demultiplexer fabricated with silicon gate CMOS technology. It achieves the high speed operation similar to equivalent Low-Power Schottky Transistor-Transistor Logic while maintaining the CMOS low power dissipation. A binary code is applied to the four inputs. Depending on the binary code, one of the sixteen outputs to will to go low².

2.3 Inverting unit

A DTMF decoder output is connected to the 4 to 16 line decoder 74HC154 IC. This IC takes the BCD number and decodes. According to that BCD number it selects the active low output

line from 1 to 16 which is the decimal equivalent of the BCD number present at its input pins. To get a logical high output, the output of the 74HC154 needs to get inverted. This inversion is carried out by an inverter, as in the hex inverter IC 74ACT04. This IC inverts the data on its input terminal and gives inverted output³.

2.4 Device control unit

The device control unit consists of relay driver IC and relays. The main object of this unit is to provide access to the relay driver circuit when the controlled devices needed to be turned on/off.

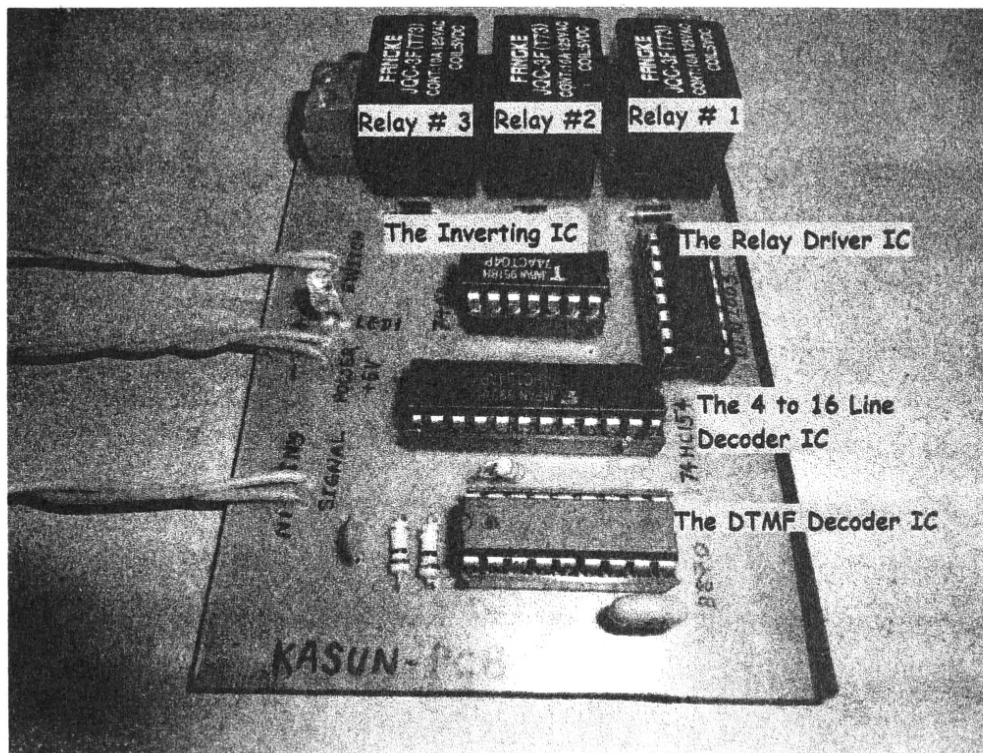


Figure 2 Circuit diagram of the system

3.0 RESULTS AND DISCUSSION

The DTMF signal sends to the system via headset. After that DTMF detector converts signal into four bits, that output connected to 4 to 16 decoder and low decibel output get activated. This output goes through the inverter to activate high output. After that it is connected to relay driver IC. The system works according to the key pressed by the user.

By using this system, home appliances can be controlled from a remote location. It's a great privilege to home owners to protect their equipments and save electricity. In this system, there are several advantages and disadvantages.

Advantages

- It is simple to control the operation of any appliances from anywhere by exploiting the existing mobile network, i.e. it's not necessary to install a specific network.
- Any type of mobiles can be used.
- The control circuit is reliable and simple to build.
- System is secure.
- A low cost system.
- No programming and easy to maintain.
- Will provide significant long-term savings in electricity costs.
- Improved metrics.
- Low probability of errors.

Disadvantages

- The limited number of appliances can be controlled by using this system.
- There is no feedback available. When a key pressed for an action, it will not send any acknowledgment indicating whether the task has been carried out.

4.0 CONCLUSION

The developed system is based on four ICs which have different functions to detect DTMF signal and control home appliances. The DTMF detector and decoder converts input signal into an active low decimal value, that value converted to active high and controlled home appliances by inverter and relays. A user is able to control any electrical devices with a simple cell phone. This makes it possible for users to manage their electrical appliances and also reduce the electricity cost. The end product will be a simple design making it easy for users to interact with.

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