# Wireless Controlling of Appliances through Voice

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## ABSTRACT
Home Automation industry is growing rapidly. Automation systems must comply with the household standards and convenience of usage.

This paper involves the design and construction of wireless control of home devices using microcontroller. The automation centers on voice commands and uses low-power RF wireless communication modules which are relatively cheap. The home automation system is intended to control all lights and electrical appliances and residential house features like doors, gate and windows in a home or office using voice commands.

## Keywords
Microcontroller, RF frequency, Transmitter, Receiver, PCB, Schematic

## 1. INTRODUCTION
Automation is the use of control systems and information technology to control equipment, industrial machinery and processes, reducing the need for human interference.

Automation plays progressively more important role in the global economy and in daily occurrence.

The aim of this project is to design and create a wireless home automation system that will switch on or off any household appliance connected to it, using a microcontroller through voice commands.

The objective of this project is to put into practice a low cost, reliable and scalable home automation system that can be used to switch on or off any household appliance, using a microcontroller through voice to achieve hardware simplicity.

## 2. RELATED WORK
[1] Various means are proposed to control home appliances, e.g. through power-line-communication, remote controlling through timer etc. this paper proposes the technique to control appliances through voice.

[2] Categorically, the work can be divided into two parts. One focuses on the use of software development tools to design schematic and PCB designs. The second part focuses on development of hardware.

[3] PIC16F877 Microcontroller is used for experimental work. The development of schematic and PCB design is done in Easy-PC software.

[4] Transformation of schematic design into PCB design is done.

[5] At the end the hardware is designed according to PCB design

[6] The Author presents the system, in which the voice commands are input through microphone which is connected with transmitter, the receiver side accepts the voice command's frequency, then sends to the sender-side circuitry and according to the defined frequencies of particular appliance executes electrical pulse to the appliance as the flowchart is shown in fig. 1. Frequency ranges are defined in controller's programming written in C language.

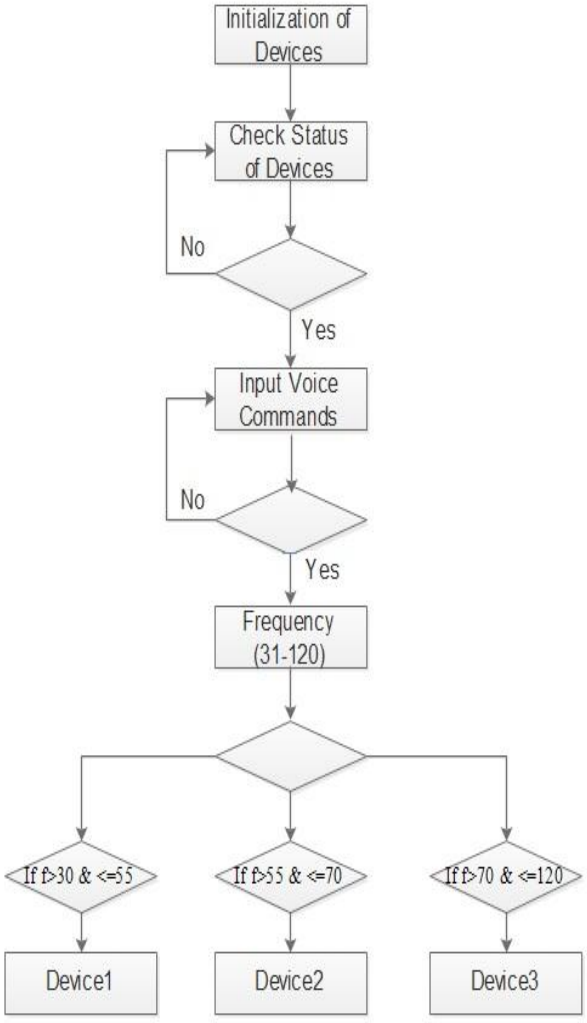


**Fig 1: Decision making in voice commands**

# 3. PROPOSED METHOD

## 3.1 PCB / Hardware Design of Transmitter

The PCB and hardware design of transmitter circuitry is shown in fig. 2 and fig. 3 respectively.

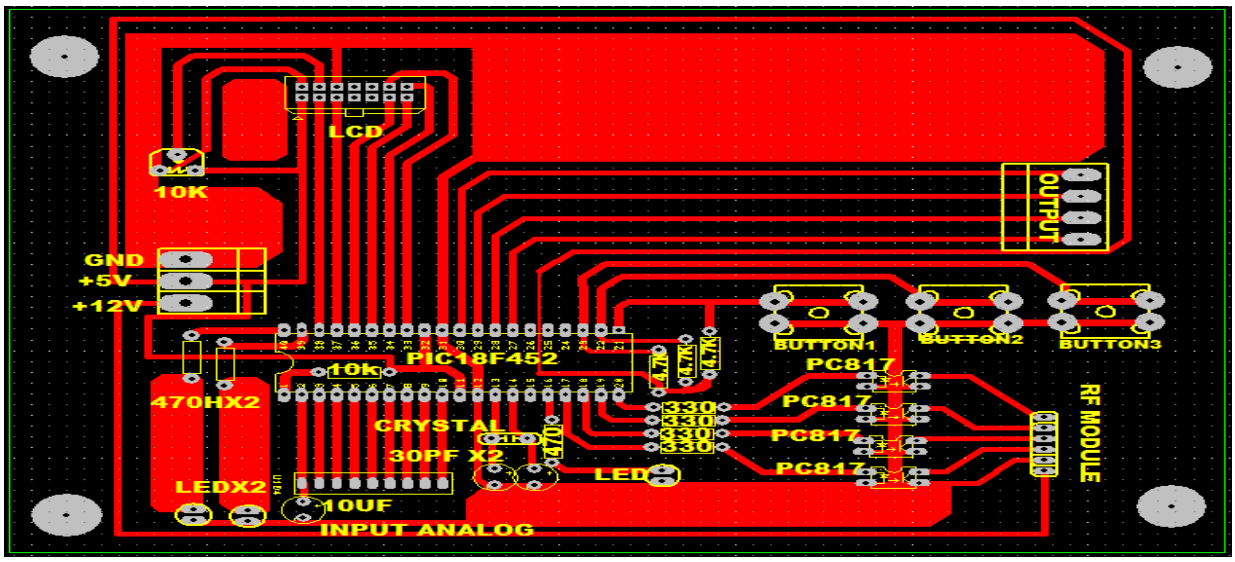


**Fig 2: PCB design of transmitter**


**Fig 3: Hardware design of transmitter**

## 3.2 PCB / Hardware Design of Receiver

The system model is designed in such a way that the user gives voice command through mike to receiving circuitry. The RF Module comprises of an RF Transmitter/sender and an RF Receiver. The RF transmitter is used to send the signal. An RF transmitter receives and transmits it wirelessly through RF through its antenna connected at pin 4. The PCB and hardware design of Receiver is shown in fig. 4 and fig. 5 respectively.

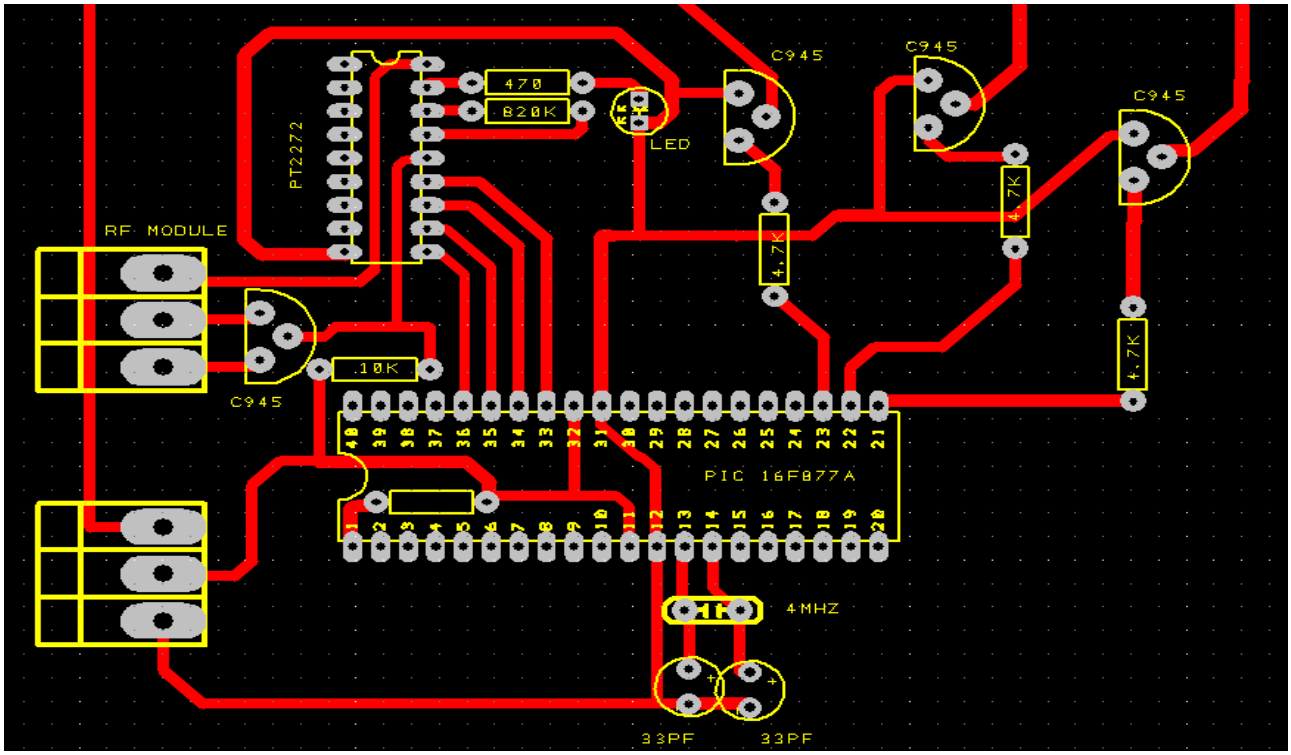


**Fig 4: PCB design of Receiver**


**Fig 5: Hardware design of Receiver**

## 3.3 Working of Transmitter

The crystal of 4MHz is attached with PIC16F877 microcontroller. Microcontroller has 40 pins. The first ten pins are analog pins. Pin1 is pull up and pin2 to pin9 have AC supply. Pin2 (analog) is used for input. Pin 12 and pin31 are grounded. Pin17, 18, 19 are for opto-coupler. Microcontroller works at 5V.

It will set that pin according to configuration when the input (voice command) is given to microphone. Microphone sends frequency as an input to the controller where the range of frequencies for different appliances is defined in program for microcontroller. The ranges of frequency are shown in table.1. The term frequency is denoted by *f* in the table 1.

**Table 1. The ranges of frequency to select device**

| Frequency | Device Selection |
|---|---|
| If f>30 & <=55 | Device 1 |
| If f>55 & <=70 | Device 2 |
| If f>70 & <=120 | Device 3 |

## 3.4 Working of Receiver

When signal is received by RF receiver, which sends it to PT2272 decoder at pin18 which decodes the signal and sends it to microcontroller by four data pins 10, 11, 12, 13. The microcontroller then decides which device should be on according to programming and sends current to desire relay

due to which magnetic field is produced in coil and switch moves its position and thus required output device is turned on.

## 3.5 The logic of Program

The program sample is shown below in which the ranges are defined at transmitter side.

```
 if(lenth){lcd_gotoxy(2,1);print_val(lenth);
if(lenth>30
&&lenth<=55){Dev1bFlag=!Dev1Flag;Dev1Flag1=1;}
if(lenth>=56
&&lenth<=70){Dev2Flag=!Dev2Flag;Dev2Flag1=1;}
if(lenth>=70
&&lenth<=120){Dev3Flag=!Dev3Flag;Dev3Flag1=1;}
lenth=0;count=0; }

if(input(Sw1)==0)
{                    Dev1Flag=!Dev1Flag;
                     output_high(Dev11);
                     delay_ms(350);
                     output_low(Dev11);
                     Dev1Flag1=0;
```

# 4. CONCLUSION AND DISCUSSION

The system implements the control of home devices using microcontroller through voice commands via microphone. The response of circuit for different inputs of voice frequencies as shown below in Table. 2.

**Table 2. The response of the circuit at output according to voice input frequencies**

| Voice command | LCD output | Devices' Status |
|---|---|---|
| 'One' | Device1 | Device1 switched on |
| 'Two' | Device2 | Device2 switched on |
| 'Three' | Device3 | Device3 switched on |
| 'One' | Device1 | Device1 switched off |
| 'Two' | Device2 | Device2 switched off |
| 'Three' | Device3 | Device3 switched off |

The graphical analysis of the system is shown in fig. 6 in which the spots show the selected device.

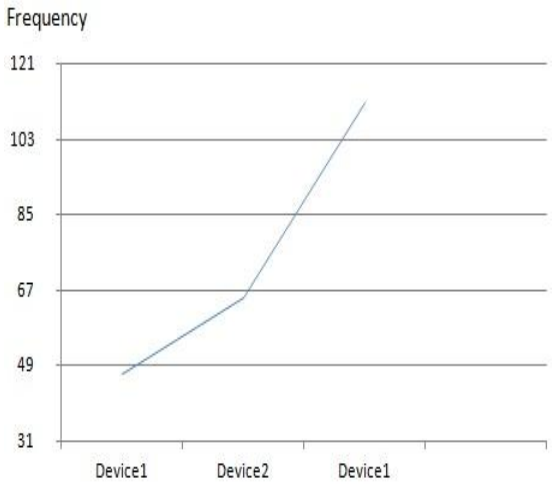


**Fig 6: Graphical Analysis for selected device**

The technique can be extended to more options and for more devices as well. This model can also be used for disabled people. Besides that it may also be used for the people who are uneducated. The proposed technique can also be used for voice recognition using AVR shield.

# 5. REFERENCES

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