

VMC System with Overload Status of Home Appliances for Elderly and Disabled People

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ABSTRACT: The project aims at presenting the Android based Voice Message Control (VMC) system of home loads using the Bluetooth technology. The various AC appliances like lamp, fan, television, computer etc. at home or office, can be controlled through voice commands using Bluetooth terminal present in smart phone. The system design of this project uses nearly two commands as ON/OFF to switch the home loads and also detects the fault as "Overload". This system is particularly designed for disabilities and aged persons to turn their home appliances using VMC and Bluetooth wireless system.

KEYWORDS: PIC C compiler, Smart mobile phone, Bluetooth module, Overload, CT sensor.

I. INTRODUCTION

Over a decade, the researchers in the Home load industry have paid more attentions to bring an idea to control the electronic appliances available at home or industries. This idea helps the people with disabilities to switch their home loads using the commands given through their voice. This system adds as many as commands to work with it. But this project consists of only two loads (bulbs) with two commands as ON/OFF the load. For example, if 20 loads are considered then it requires 40 commands to be generated and tested. Here the system uses Android phone instead of Personal computer to control and automate the loads using speech/voice messages. The speech/voice accuracy is effective through smart phone than PC. This system also detects the fault as the Overload status, predicted by Current Transformer when the current value of the particular load exceeds its limit or threshold value [4]. The speech/voice signal through PC reduces the accuracy by 25 percent when unauthorized person uses the user's PC.

This system is based on wireless Bluetooth technology where the application of Bluetooth is installed in the android phone. This application communicates the voice signal with the Bluetooth module and sends the message to the microcontroller. When the text of this voice message is matched with the text of PIC microcontroller, the home AC load turns ON/OFF depending on the message text. The system gives the Overload status which is considered as Fault detection when the Current of the particular device crosses its capability. The VMC system has various other features available such as to turn any home appliances, play media, send the mail etc. [3]. The Bluetooth technology not only provides the communication of the voice signal but also secures the system by enabling or disabling the password. It means that the unauthorised person cannot use the mobile device to control the load unless he/she knows the password.

In Bluetooth application, the voice is captured by tapping the record button from Google. Nowadays, Google has proclaimed an ambitious role for home automations [1]. The Android phone runs the operating system and made available to send the messages through the input as from keypad with several characters present in it. The LCD is used to display the status of overload of the particular load. The incitement of this work provides the supportive nature to the people with disabilities who even cannot help themselves in their needs. So this VMC module presents the helpful job to elderly or paralysed people. The BT application converts the voice into text form so that the microcontroller can understand the text format and compares with its programmed text form [5]. In this project, PIC microcontroller is programmed using Embedded C language and compiled by PIC C Compiler software and dumped the code into the controller. By which the device or load turns ON/OFF depending on the voice command given by the user.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Special Issue 9, May 2016

The wired systems afford the high cost and maintainability. So to overcome this disadvantage, the wireless technology has been popularized in recent years. The Wireless Bluetooth is given importance in this work due to its low cost and low power transceiver feature. [2]. Finally, it aims to control the home load by the voice message through BT application installed in the Smart phone of the user.

II. VMC SYSTEM OVERVIEW

The work in this system needs the power supply to switch the loads or to automate the loads. Here there are various blocks meant to control the overall system and achieve the output of the load. This section explains briefly about these blocks The Wireless Bluetooth module pairs the voice signal coming out through the smart phone and sends the voice signal into text form to the microcontroller. This microcontroller block tries to match the data in text form with the data already been stored in it. When the data is equally matched, the microcontroller drives the relay part of the circuit to switch the load. The current transformer is the sensor which sense the current passing through the AC supply and the status as normal load is displayed on LCD. If the current crosses the threshold value of the particular load and exceeds the value then the status as Overload is shown on LCD. The system is programmed in Embedded C language (Proteus) and the code is dumped to match the data and switch the devices/loads.

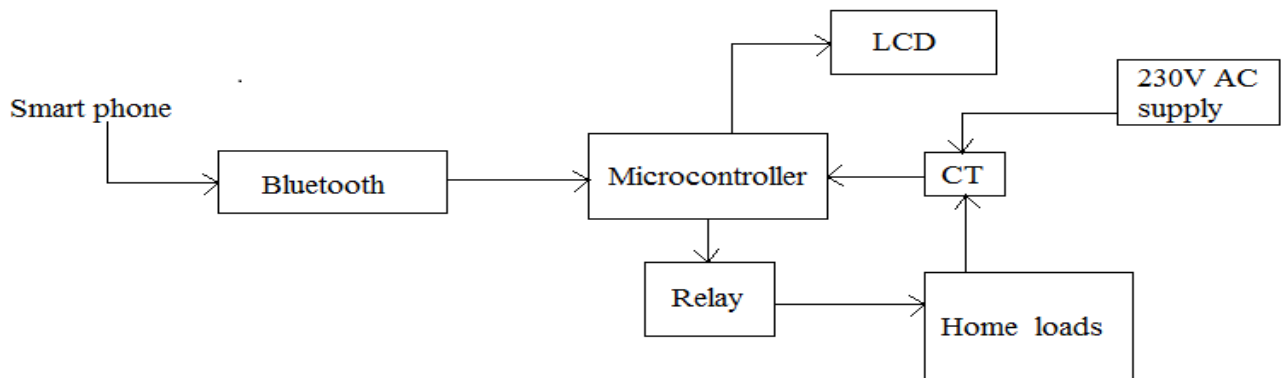


Figure 1: Block diagram of VMC system

III. HARDWARE DESCRIPTION

A. Transmitter Side:

Tx section

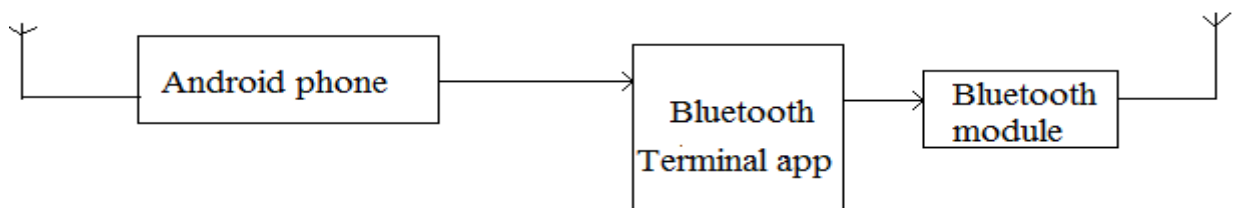


Figure 2: Transmitter block

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Special Issue 9, May 2016

The above figure 2, shows the transmission side of the system which includes Android smart phone, BT application and BT module. This section explains how the voice signal or voice command is passed to the receiver block. It first captures the voice through the application by tapping the voice record and the voice is converted into text format. This text format is then sent to the receiver using Bluetooth modules by pairing the Bluetooth devices. Thus the receiver waits to receive the text to proceed further.

B. Receiver side:

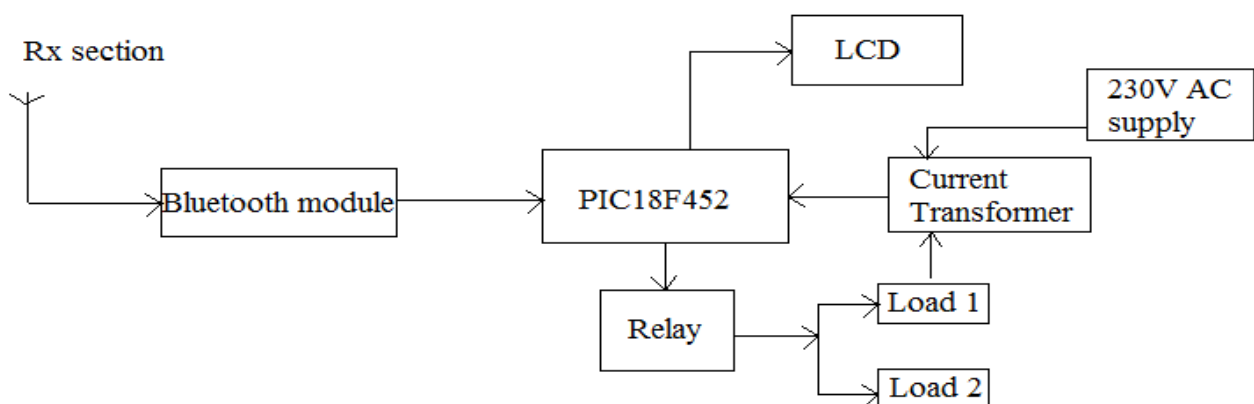


Figure 3: Receiver block

The above figure 3 shows the receiver side which includes Microcontroller, Overload occurrence-fault and Load control unit. The receiver receives the voice command converted into text through the module of wireless system and passed to the PIC18F452 microcontroller. When the text of the BT modules and PIC gets matched, this drives the relay and in turn drives the relay driver to turn the home load either ON or OFF. The CT (current transformer) senses the current supplied by the 230V AC supply and in this work CT value is defined as 30A and passed to the controller. By the time when both the loads are made to turn ON, if the current of these load exceeds the CT value then the device /home loads gets tripped which means overload or fault has been detected. The fault value is also shown as overload value on the LCD. Finally, in brief, the voice messages passed to control unit drives the relay and the loads are controlled to switch them.

IV. SOFTWARE DESCRIPTION

The software design is performed using the Proteus software to write the program in Embedded C language and compiled using PIC C Compiler where the c code is converted to the hex code. Thus the code is dumped into controller using PICKit2 dumper to get the final output.

V. RESULTS

The following results are obtained by passing the voice messages/commands to the microcontroller to switch the home appliances. CT value is taken as 30A (threshold value).

Result 1: Voice message given as 'ONE' to switch ON or OFF the load 1. The CT value obtained is 4A for zero watt bulb, shows as normal load on LCD.

International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 5, Special Issue 9, May 2016

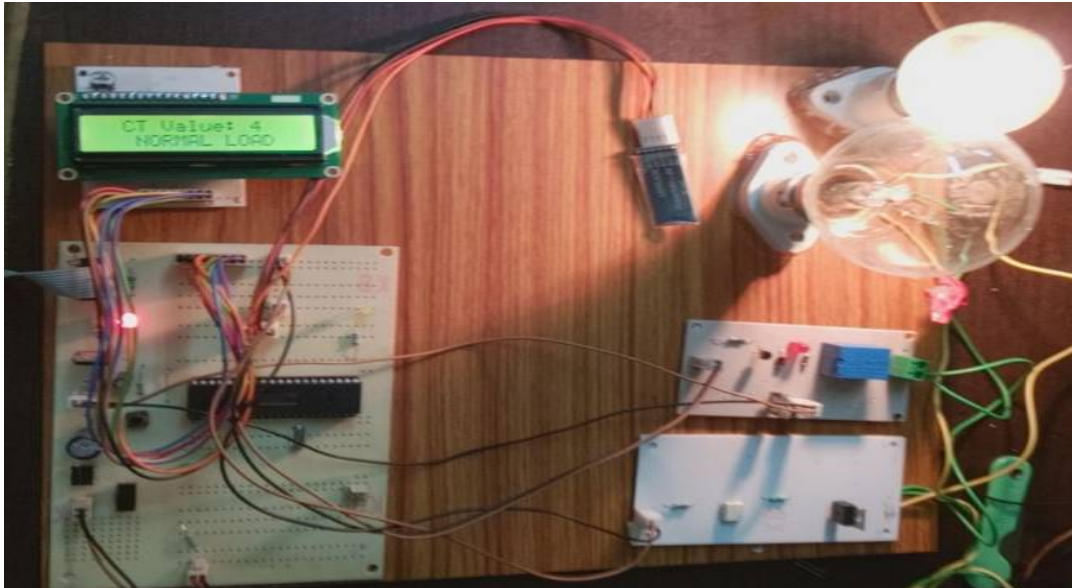


Figure 4: LOAD 1- ON/OFF with same command- 'ONE'

Result 2: Voice message as 'TWO' to switch ON/OFF the load 2. CT value obtained as 19A for 60 watt bulb (normal load)

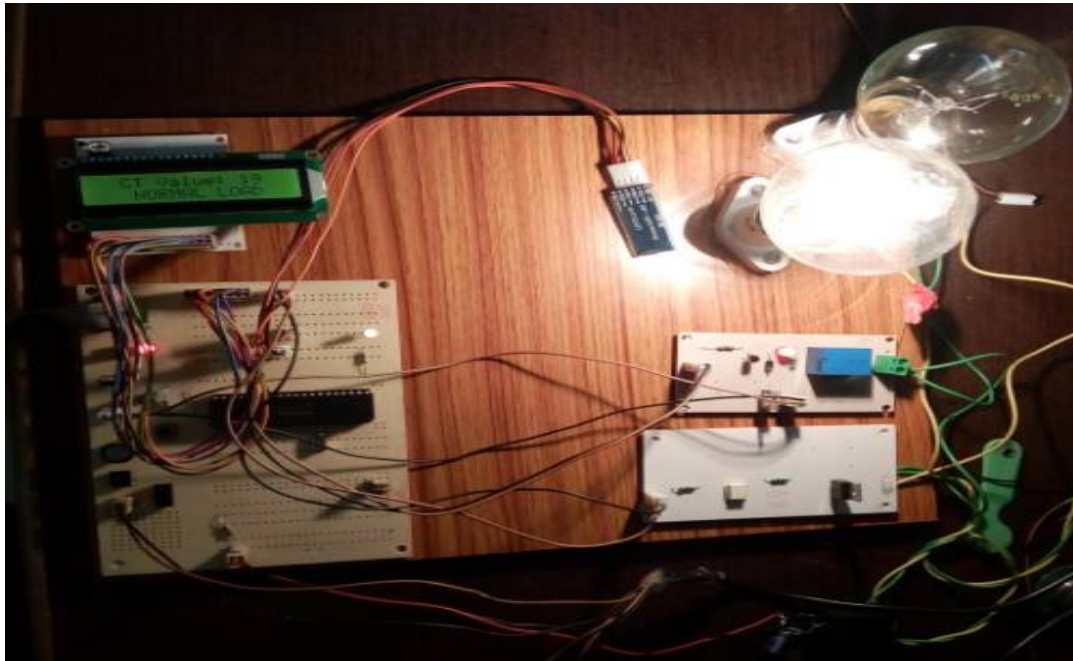


Figure 5: LOAD 2- ON/OFF with same message- 'TWO'

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Vol. 5, Special Issue 9, May 2016

Result 3: Voice message – ‘ONE’ and ‘TWO’ to switch both the loads with CT obtained as 20A for both zero and 60 watt bulbs and it shows as Normal load.

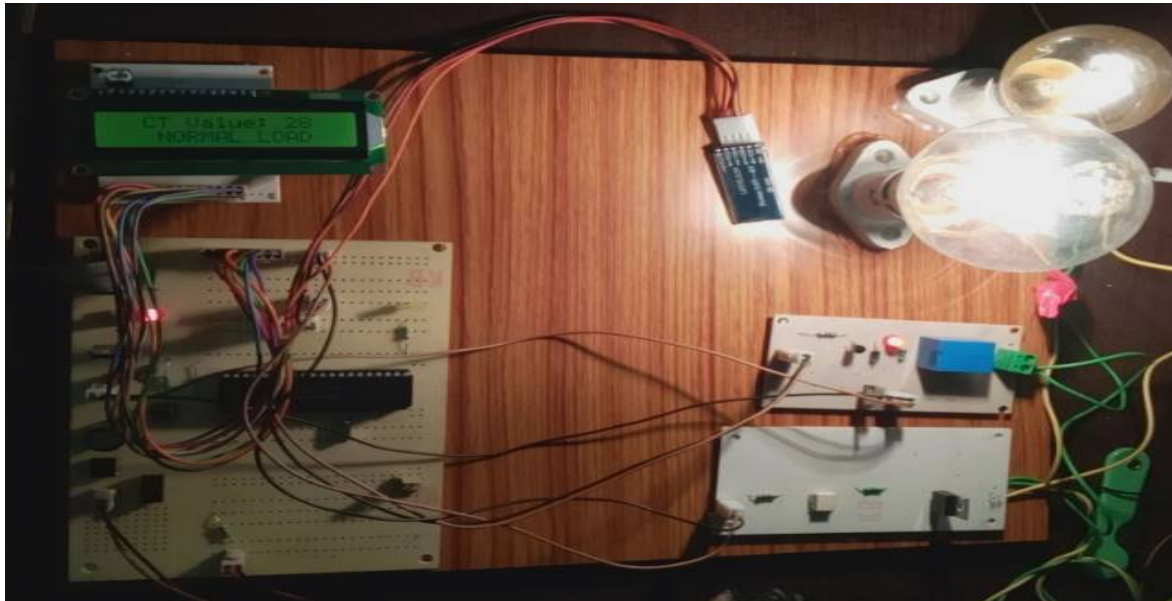


Figure 6: Both the LOADS- ON/OFF with command- ‘ONE’ and ‘TWO’

Result 4: Overload Status- FAULT, the CT value exceeds 30A and reaches up to 47A where the loads gets tripped due to heavy current. It shows ‘OVERLOAD’ on LCD.



Figure 7: Overload- FAULT

International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 5, Special Issue 9, May 2016

VI. CONCLUSION

The VMC system is implemented with Smart phone Bluetooth technology to control the home appliances using voice messages. This system should take the precautions for the reason of high voltage passing to the home AC loads. The results are finally tested only for 2 loads with 4 voice messages using BT application (from any phone unless password is known) when paired with Bluetooth module. The speech/voice accuracy of smart phone is very much better when compared with the personal computer. The future scope is to build more commands for other application such as to play media, send emails etc.

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