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Voice Command Control System with Fault detection of Home Loads for Paralysed and Aged

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Abstract: This paper aims to design the VCC system which makes possible for operating home appliances through the Android mobile phone. The controlling of home AC appliances/loads such as lamp, fan, mixer, television, is carried out wirelessly through the application of Bluetooth voice connectivityin android phone by using Bluetooth feature technology present in any smart phone. In this paper, the android phone is used as voice based remote control for controlling the electrical appliances. This system is mainly designed to help the people who are aged and disabled so that they can control all their home appliances through voice commands or by giving a voice messages. There is no need of any attender or any people around for their help. This design acquires two commands as ON/OFF for controlling of home load appliances and to detect Fault at the load .Fault occurs when power supply cuts down for the particular load or when it exceeds the limit of the given load capacity. There are major various wireless technologies which are used to design this system such as Wavenis, Bluetooth, Wi-Fi, and Zigbee. Bluetooth is used due to low power consumption and it's a low cost transceiver.

Keywords: Android smart phone, Bluetooth, voice messages, Current Transformer, home loads.

I. INTRODUCTION

Over the last two decades, the speech/voice technology has witnessed the constant and remarkable advancement. This voice system enables the machine to respond accurately and gives reliability to human voices. Recently the research is focussed on developing the systems which is tougher in opposition to environment's variability, announcer and language. Normally, each home appliances has the load with nearly two commands as ON and OFF considering the automation of mainly 20 loads which are tested using 40 voice commands/messages through smart phone Bluetooth application. Instead of Android smart phone, a Personal computer used then the disabled/aged user who can automate the voice command to the accuracy of 90 percent and if other user (unauthorized) uses the aged user PC, the voice accuracy meets the reduction of 75 percent. The accuracy parameter overcomes by using smart phone which gives good voice accuracy or good accurate results. Home automation system of household appliances controls the environment using voice command, which helps to provide supporting system for elderly/aged and the disabled persons.

In this project, Fault identification [3] isdesigned to help the particular user to see that the appliances in their home are exactly switching ON/OFF or there is some detection of fault condition. The project uses Bluetooth (wireless system) for security purpose so that unauthorized person couldn't use the mobile phone unless the person knows the password. Wireless network system reduces the complexity when compared with wired system when its related to installation and the maintenance of its counterpart.

The methodology takes the help of PIC microcontroller with Bluetooth wireless communication technique [1][4]which includes voice Bluetooth application, relay to switch the load. The Bluetooth pairing to any smart phone sends the voice commands/messages to the microcontroller unless the particular mobile is paired by knowing the password, this application provides security to the system along with it sends the commands by tapping record mode in the application to control the devices used in home. In a Practical mode of view, the voice commands are preferred to solve problems that improve reliability, sensitivity, and switch the way we lead our lives. The incentive back in this work is to afford supportive systems for aged and paralysed people who depend on the voice given by the disabled user through Android smart phone. This design includes a microcontroller of PIC family, programmed in Embedded C language that is interfaced with voice coming through the smart phone using BT application and Bluetooth module [5]. Microcontroller is applicable due to its low consumption of power and cheaply available in the market when compared with Programmable Logic Controller (PLC). The Android is nothing but software [2] used by the smart phones available in market includes operating system to run the device and some key applications to send the messages by typing the keyboard. Android phones provide the array of connectivity by some options through any wireless

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connectivity path, also has libraries useful for wide range and the tools that are used to build deep insight their application. Finally the voice is transmitted to controller and the faultcurrent status of the overload is displayed on LCD display.

II. OVERALL SYSTEM STRUCTURE

The system structure needs the power supply circuit to power the loads or to monitor the system. In this project, there are various modules. The brief description explains about these modules that aim to control the load output. The wireless transmission module- Bluetooth transfers the data from smart phone by pairing between them. That data contains voice given by the Android device to the microcontroller unit, which then compares the data already given to it. When the data gets matched, the control unit activates the relay. CT module senses the current coming out of power supply and display the current status on LCD. If the load or device which acts as output undergoes the limit capacity the overload appears and the devices get tripped. The system runs the code in Embedded C language and matches the commands to turn the home AC loads.

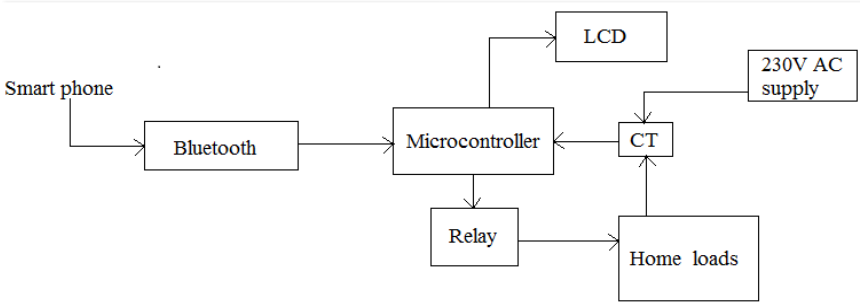

Figure1: System Block diagram

III. HARDWARE SYSTEM DESCRIPTION

Tx section

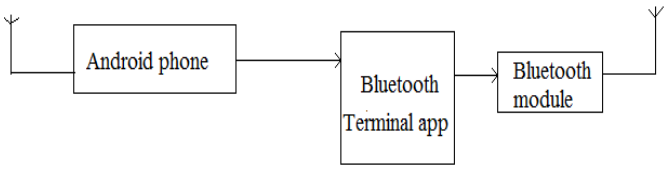

Fig: 1 Transmitter part

The Transmission section includes the Android phone, Bluetooth application and Bluetooth module to transmit the voice signal to the receiver side. This application records the voice and also converts the voice to text form and transmits to the Bluetooth module. This module again sends the text form to the receiver section for further process.

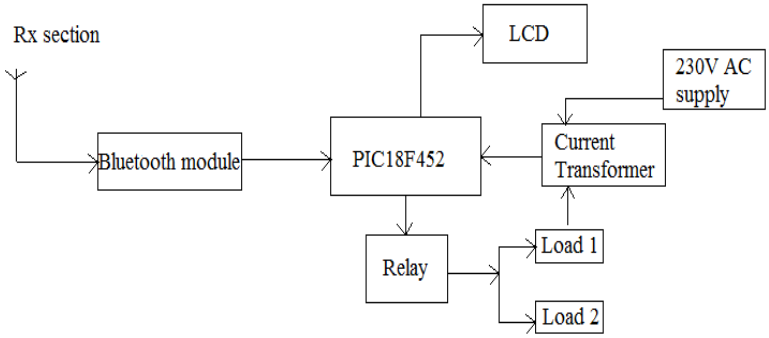

Fig 2: Receiver part

The Receiver section includes;

A. Microcontroller unit

The voice signal, transmitted through Bluetooth module from an application passes the command to the controller PIC18F452 which tries to match the commands already present in the data given to the microcontroller. Whenever the commands are matched drives the relay which in turn is connected to a relay driver to drive the loads.

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B. Fault occurrence

The current transformer unit senses the current of the particular load from the power 230V supply and the CT value for the loads is taken as 30A and fed this value to the microcontroller. When both the loads are turned ON, if current exceeds the limited value-30A which is given to the controller, then the loads are tripped nothing but detects some Fault in the loads and the CT value with text as overload is displayed on LCD.

C. Load control

Once the voice commands/messages are recorded from the mobile using the Bluetooth application and send to the controller which drives the relay and control the home loads to turn ON/OFF.

IV. SOFTWARE SYSTEM DESCRIPTION

The microcontroller code is written based on Embedded C language in Proteus and compiled using PIC C compiler which converts c code into hex code and dumped into the controller using dumper to achieve the output.

V. SOFTWARE SIMULATION RESULTS-PROTEUS

The software simulation results are examined without voice signal using Proteus software by dumping the hex code into microcontroller to get the following output cases;

The Virtual terminal asks for the input commands to switch the loads as ON/OFF and detects the overload alert as FAULT in the load.

Case 1: Load 2- turn ON with open CT switch as in fig 3.

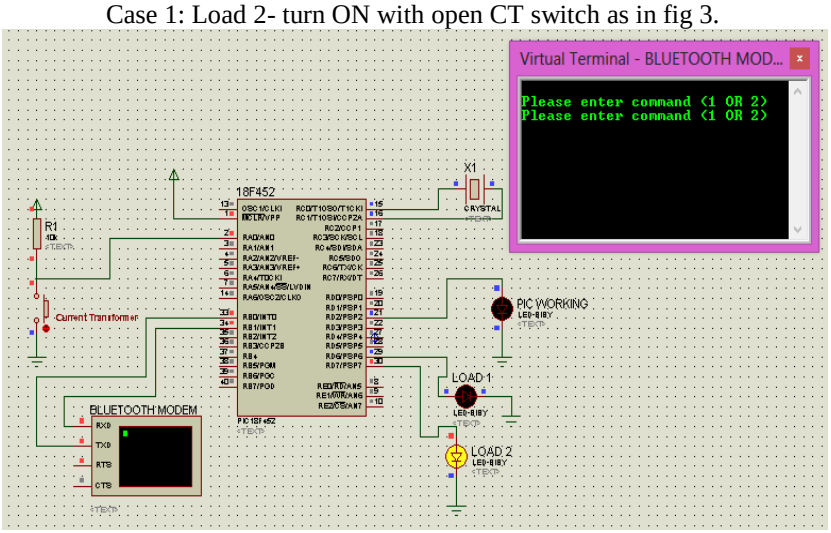

Fig 3: Load 2 is ON

Case 2: Both the loads- turn ON: CT kept open shown in fig 4

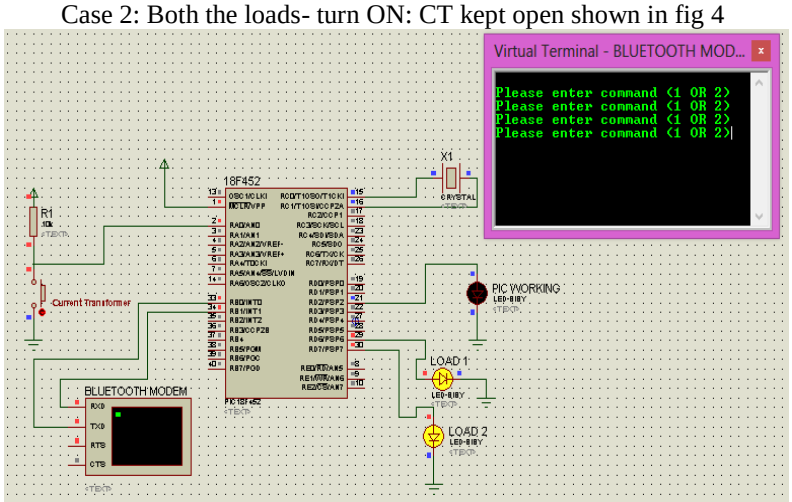

Fig 4: Turn both loads

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Case 3: Load 1- switch ON and CT switch is opened as shown in below (fig 5)

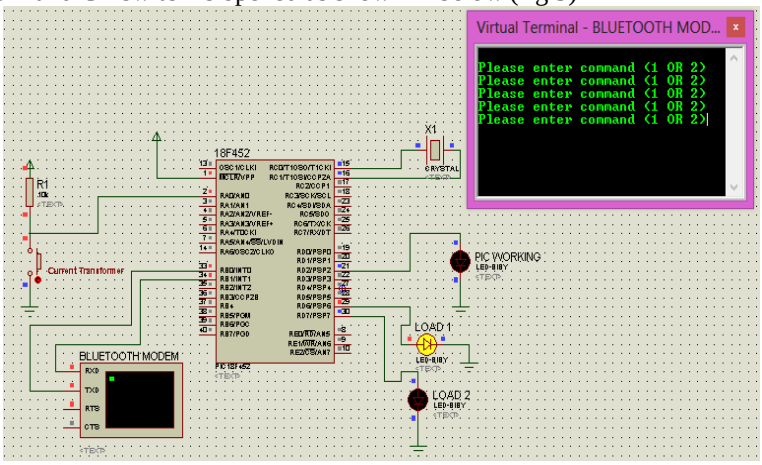

Fig 5: Load 1 is ON

Case 4: Fault-Overload status when CT closed as shown (fig 6)

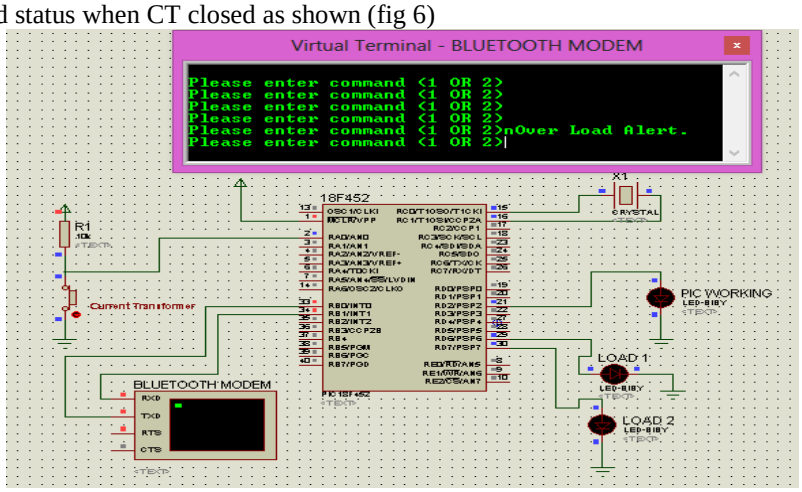

Fig 6: Overload alert- Fault

VI. HARDWARE RESULTS OBTAINED

The following results are carried out by giving the voice commands to turn the loads. The current transformer value is set to 30A.

Result 1: Voice command given as ONE to turn ON/OFF the load 1 with CT value 4A for zero watt bulb (normal load).

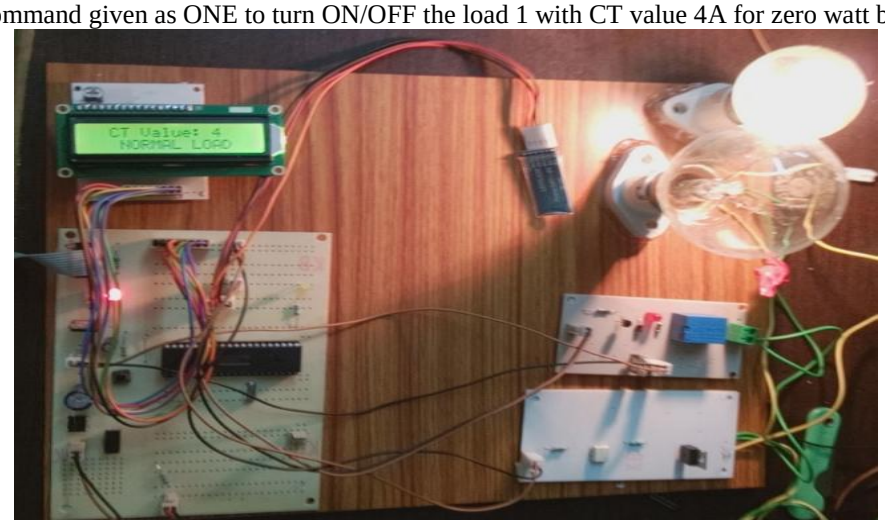

Fig 7: First load- ON/OFF

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Result 2: Voice signal given as TWO to turn ON/OFF load 2 with CT value 19A (normal load) for 60 watt bulb

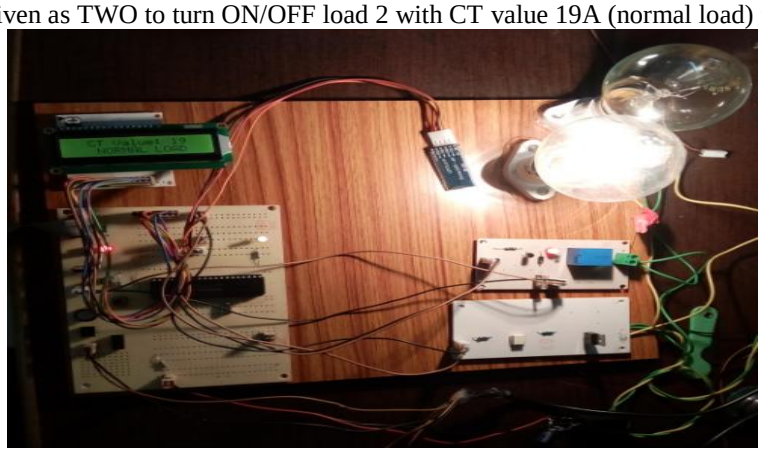

Fig 8: Second load- ON/OFF

Result 3: Voice command/message given as ONE-TWO to switch both the loads (zero watt and 60 watt) with normal load of Current value 20A.

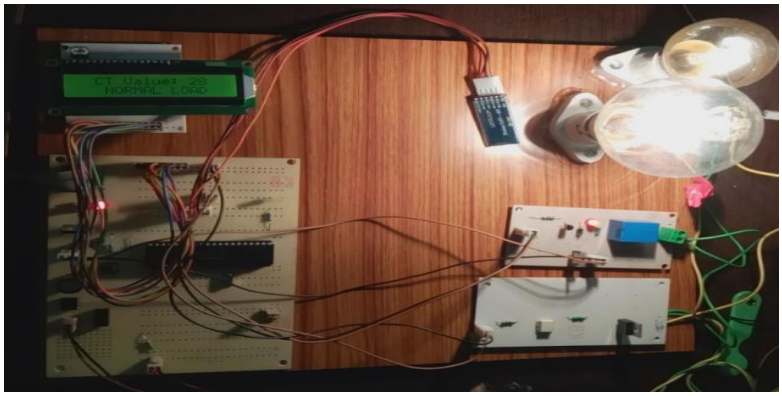

Fig 9: Turn both the loads- ON

Result 4: Current transformer value goes beyond the limited current as 30A when 60W and 100W bulb are connected. The CT value exceeded is 47A which detects the Fault in the loads.

Fig 10: Displays the overload status as Fault detect

VII. CONCLUSION

The voice control system is implemented with android phone and developed to control the home appliances by voice through wireless Bluetooth technology. The speech/voice gives good accuracy on mobile rather than PC based system. This command control system by voice/speech should be taken good care due to fluency of high voltages passing to the

AC home appliances. The final results are tested only for two loads with four commands send through bluetooth application by pairing blue tooth device with any mobile phone. This system is implemented only to the disabled users to control the AC loads present in their home through voice. The overall scope of the design can be extended to add more commands and can control the loads by timer module.

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