IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

OFFLINE VOICE DETECTION SYSTEM WITH ELECTRICAL PERIPHERAL CONTROL

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***Abstract*: Sound intelligence or voice detection is added to a home automation system based on acoustics for sophistication of physically challenged people and luxurious designing of auto and voice controlled houses as a broad perspective of this paper. Home automation is already in the practice, is done by switching on or off a device through wired networks. But this is inefficient for people with impairment in mobility. This project is implemented by using voice recognition module (V3) by interfacing Arduino uno in an offline manner. As the usage of module V3 gives us an advantage of offline voice detection and no need of Wi-Fi unlike other forms of voice detection systems. Human voice is converted into digital signal and it is sent to Arduino uno. As it is a speaker dependent system the voice commands are trained by using the v3 module. Hence the controlling of electrical peripherals is done according to the voice commands.**

Keywords: ARDUINO UNO, Automation, Impairment in mobility, Motor, Relay, Voice recognition Module.

1. INTRODUCTION

With advancements in information technology, the next generation of user interface is desired to be more user friendly and powerful. Speech recognition is an alternative to traditional methods of interfacing with a computer, such as textual input through a keyboard. Speech recognition systems are of two types. They are speech dependent system and speech independent system. Speech dependent system is general for security purpose it works for the only commands which we have trained. Speech independent system on other hand is desirable to many applications. An effective system can replace, or reduce the reliability on, standard keyboard and mouse input. There are three many stages involved in speech recognition preprocessing, recognition and communication. Preprocessing involves taking the speech input and converting it into something the computer can use. During the recognition stage the computer must identify what has been said. Finally in the communication stage, the computer acts upon the translated input. The one main advantage of a speaker dependent system is their flexibility. Techniques utilizing Dynamic Time Warping, Hidden Markov Modeling, Neural networks, and expert systems have all shown varying degrees of success in recognizing spoken words and phrases. So many articles and papers came up using voice recognition systems but almost all the systems use internet which is called online voice recognition system. This paper presents an offline voice detection system using V3 voice recognition module.

2. METHODOLOGY

Offline voice detection system with electrical peripheral control is an advance project to control the devices through human voice commands. We have used voice recognition module V3 in this system. This V3 module is interfaced with Arduino UNO for controlling the electrical appliances. We need to download the voice recognition software and this zip file is added to Arduino library and chooses the correct serial port. In that we have an option such that we can train the commands after writing the source code. Once the hardware is implemented then connect Arduino to the pc and dump the source code into it after verifying the errors. Then train the system by giving some commands for turning on and off of the electrical devices. As this system is speaker dependent system we need to be aware of the commands before we use it.

The components used are
1. Arduino uno
2. Voice recognition module V3
3. Relays
4. DC motor
5. Transformer
6. Lamp
7. Bridge rectifier

2.1. Voice Recognition Module (V3):

Fig.1. **Voice recognition module V3**

V3 Module is compact in size. In this module speak recognition board is very easy to control. This is a speaker-dependent voice recognition module which means the voice of the speaker through commands has been used to train the module so that this module will be responding to those commands to which it is trained. After the training this module can be used for voice detection. It supports 80 voice commands at maximum. Maximum of 7 voice commands could work at a time. Any sound or work could be trained as command.

In two ways, we can control the module: Through Serial Port (full function) and through general Input Pins (part of function). In this work, serial port has been used.

2.2. Arduino Uno:

Arduino is an physical computing platform which is of open source, based on a simple input/output board and with a process implemented by development environment. This Arduino got popular in automation industry over the typical micro controllers for standalone or computer/software related collaboration projects. Figure 2 shows a new Arduino UNO which is similar to the Arduino, except the FTDI chip is replaced with ATmega8U2 processor. The programming interface , that is open source IDE, is free to download.

Fig.2. **Aurduino UNO Board**

2.3. RELAY:

Relays are more like switches which controls an electric circuit by opening and closing positions in another circuit. Relays are an electromechanical switch that opens and closes switches. Figure 3 shows a NO/NC contact of relay.
If a relay said to be NO that means it is normally in open position and when relay gets energized, it will get closed. As in the same way, if relay is of NC type, it is normally in closed position, when relay energized, it gets open. By using relays high voltage contacts can be operated open and close by using low voltage energized relay switches. Likewise relay is providing amplifying effect.

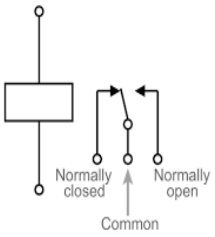

Fig.3. **Relay contacts**

2.4. DC Motor:

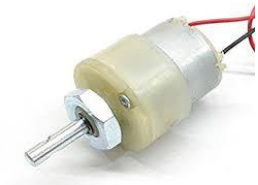

Fig.4. **DC Motor**

A DC motor is used as a one of the peripheral device to be controlled by voice recognition module. Normally in home automation, to be controlled peripherals are lights, fans, Washing Machines, Air conditioners, Mixer and Grinders and so on. These been normalized to light (Incandescent) and a DC Motor.

3. SOFTWARE AND TRAINING OF THE MODULE

Download voice recognition v3 library (zip file) and that is added to the Arduino sketches/library. And then to train open vr_sample_ train and chose right serial port. We need the give the command in such a way sigtrain 0,sigtrain 1,..etc so on till the 7 commands because max 7 commands are taken at a time in total 80 commands.

In figure 4, LED of the module indicates that the command is recorded or not. After sending the training command, the SYS_LED (yellow) is blinking fast which remind you to get ready [3]. Voice command should spoke immediately after the STATUS_LED (red) light gets on. When the STATUS_LED (red) lights off, The recording process ends. When the SYS_LED is blinking again, it got ready for next recording process. When the training process ends successfully SYS_LED and STATUS_LED blink together [3]. If the training gets failed, both SYS_LED & STATUS_LED blink together, quickly.

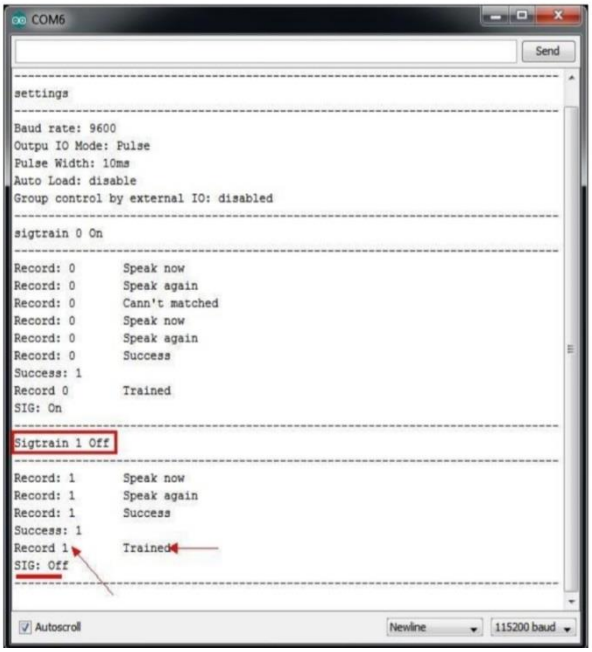

Fig.5. **Voice Training**

4. HARDWARE DESIGN:

After installing Arduino IDE 1.6.4 we need to add the zip file voice recognition library to the Arduino library. Hardware design is implemented in a such way that, 230v,50hz ac supply is given to the step down transformer. It step down the voltage to 12v ac supply. That is given to the bridge rectifier across it filter is connected in order to get pure dc as output and to reduce the harmonics. That is connected to the Arduino uno and relay channels. When the command is given through mic of v3 module it is send to Arduino and then to the relay channel. In this systematic order controlling of the devices takes place respectively.

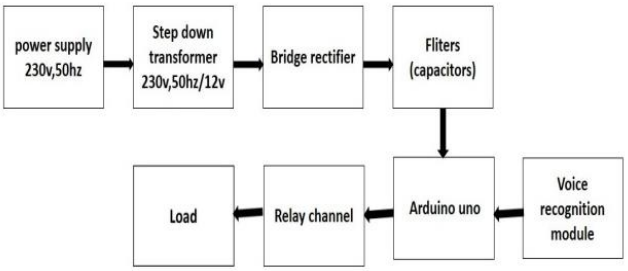

Fig.6. **Block diagram**

5. RESULTS:

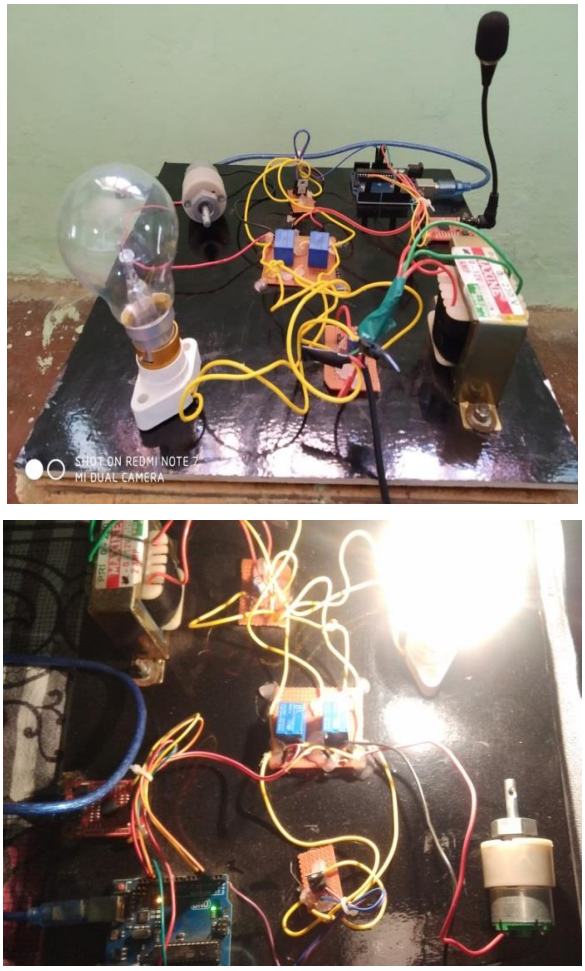

Fig.7. **Hardware setup**

The offline voice detention system has a panel arrangement in such a manner that it can receive human voice without any internet and work according to the trained commands. The voice recognition module v3 converts human voice into digital signal that is given to the arduino to control electrical peripherals respectively. As it is a speaker dependent system we need to train the commands according to the control of equipment. We need to download voice recognition zip file and add it to the arduino library and then open file and next examples then go to the added zip file voice recognition v3. then we will find the vr_sample_train and choose serial port and also set baud rate as 115200 and upload the code. Train according to ON and OFF records. After completion of hardware implementation, upload and verify the source code, once its verification is done connect the arduino to the pc and upload the source code. Whenever the command is given through human voice it is given to arduino in digital signal and it sends signal to relays. Accordingly the control of the electrical equipment light and a DC motor is done through voice commands like ‘ON’, ‘OFF’, ‘LIGHT ON’ and ‘LIGHT OFF’.

6. CONCLUSION

This system has facility to control the electrical equipments through human voice. There were already many technologies in existence which works maximum through internet. But here in this paper the system is implemented with offline voice detection, which is main advantage. As it is a speaker dependent system the user must be aware of the words and phrases used during the training process. The physically challenged people can use this kind of voice recognition systems to assist them.

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