

Voice Controlled Robotic Vehicle

G. Venkata Praveen¹, G. Maneesh Kumar², D. Mukesh³, D. Vineeth⁴

^{1,2,3,4}UG Student, Department of Electronics & Communication Engineering, Audisankara College Of Engineering & Technology, Gudur, India

Abstract: This project Voice Controlled Robotic Vehicle helps to control robot through voice commands received via android application. The integration of control unit with Bluetooth device is done to capture and read the voice commands. The robotic vehicle then operates as per the command received via android application. For this Arduino is integrated in the system which makes it is possible to operate the vehicle via android application. The controlling device may be any android based Smartphone/tab etc. having an android OS. The android controlling system provides a good interactive GUI that makes it easy for the user to control the vehicle. The transmitter uses an android application required for transmitting the data. The receiver end reads these commands and interprets them into controlling the robotic vehicle. The android device sends commands to move the vehicle in forward, backward, right and left directions. After receiving the commands, the Arduino then operates the motors I order to move the vehicle in four directions. The communication between android device and receiver is sent as serial communication data. The Arduino program is designed to move the motor through a motor driver IC as per the commands sent by android device.

Keywords: Robotic Vehicle

1. Introduction

“In proposed design, we wish to control the movements of the vehicle using voice commands from the user. These commands will be issued at the Android Application on the user’s phone which is connected to the robot using a Bluetooth Module. The commands issued will then be relayed over an RF channel and will be received by the Module. The goal of Voice Controlled Robotic Vehicle (VCRV) is to listen and act on the commands received from the user. Here, the system will require the training from the user (for the accent) after which the device will start understanding the commands issued. This is done by adding commands to the controller through a code.”

A. Voice Recognition

The process of enabling a computer to identify and respond to sound produced in human speech. Voice recognition is the process of taking spoken word as an input to the program. Voice recognition is the ability of the machine to receive and interpret dictation, or to understand and carry out spoken commands.

B. Voice Recognition

Both speech and voice recognition use recordings of human voice, but they do different things with it. Voice recognition stripes out personal differences to detect the words. Speech recognition typically disregards the language and meaning to

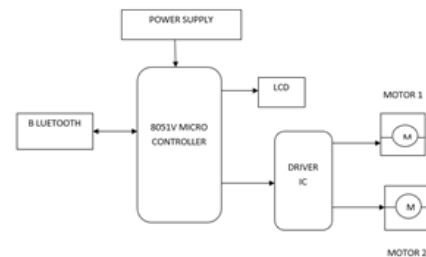
detect the physical person behind the speech. For our project, if we want to make it user friendly than Voice Recognition is the best methodology to control this robot.

C. Briefing

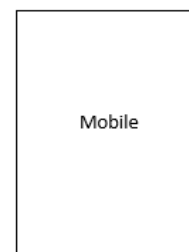
The proposed topic involves voice recognizing. Voice recognition is the process of capturing spoken words and commands using a microphone or telephone and converting them into a digitally stored set of words. Two factors decide the accuracy of the proposed voice recognition system: Accuracy in detecting the human words and processing those words at the desired speed so that the commands are executed with the least delay.

2. Block diagram

A. Receiver Section



B. Transmitter Section



3. Hardware requirements

- Arduino
- Power supply
- LCD
- Bluetooth
- Motor driver IC
- Motors

A. Arduino

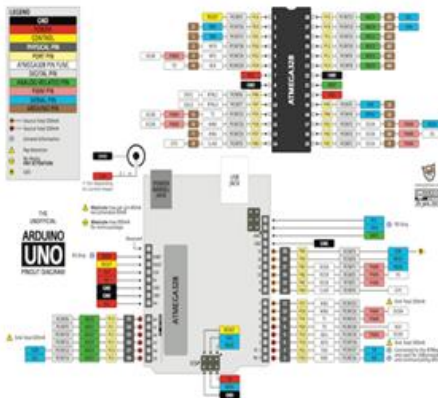
Open Source electronic prototyping platform based on flexible easy to use hardware and software.



Arduino Family



Pin Description of Arduino UNO



B. Bluetooth Module HC-05

HC-05 Bluetooth Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication which makes an easy way to interface with controller or PC. HC-05 Bluetooth module provides switching mode between master and slave mode which means it able to use neither receiving nor transmitting data.

Specification:

- Model: HC-05
- Input voltage: dc 5V
- Communication method
- Serial Communication
- Master and Slave mode can be switched

C. HC-05



Sample Hardware Installation and Sample Source Code

Below is the example of interfacing between Arduino UNO and PC via HC-05 Bluetooth Module. In this example, the communication mode is used.

*Note: For AT mode (use to change the default setting or etc), please refer to this link [Modify The HC-05 Bluetooth Module Defaults Using AT Commands](#). Diagram below shows the hardware connection between HC-05 Bluetooth Module and Arduino UNO. Besides Arduino, it may interface with any microcontroller such as PIC and etc.

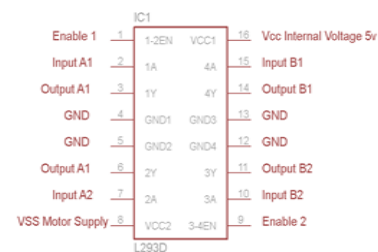
- VCC... Arduino 5V
- GND... Arduino Ground
- TXD... Arduino pin RX
- RXD... Arduino pin TX
- KEY... Connect to the air for communication mode

D. L293D

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge Motor Driver integrated circuit (IC). The l293d can drive small and quiet big motors as well, check the Voltage Specification at the end of this page for more info.

You can Buy L293D IC in any electronic shop very easily and it costs around 70 Rupees (INR) or around 1 \$ Dollar (approximate Cost) or even lesser cost. You can find the necessary pin diagram, working, a circuit diagram, Logic description and Project as you read through.

E. Pin Diagram



There are 4 input pins for l293d, pin 2,7 on the left and pin 15 ,10 on the right as shown on the pin diagram. Left input pins

will regulate the rotation of motor connected across left side and right input for motor on the right hand side. The motors are rotated on the basis of the inputs provided across the input pins as LOGIC 0 or LOGIC 1.

In simple you need to provide Logic 0 or 1 across the input pins for rotating the motor.

4. Voice control robot program using Arduino programming

```
#include<LiquidCrystal.h>
LiquidCrystal lcd(13,12,11,10,9,8);
Int mtr00=4
int mtr01=5;
int mtr10=6;
int mtr11=7;
int temp=0,i=0,x=0,k=0;
char str[100],msg[32];
void setup()
{
  lcd.begin(16,2);
  Serial.begin(9600);
  pinMode(mtr00, OUTPUT);
  pinMode(mtr01, OUTPUT);
  pinMode(mtr10, OUTPUT);
  pinMode(mtr11, OUTPUT);
  lcd.setCursor(0,0);
  lcd.print("Voice Controlled");
  lcd.setCursor(0,1);
  lcd.print(" Robot-HC05  ");
  delay(2000);
  lcd.setCursor(0,1);
  lcd.print("System Ready");
}
void loop()
{
  for(unsigned int t=0;t<60000;t++)
  {
    serialEvent();
    if(temp==1)
    {
      x=0,k=0,temp=0;
      while(x<i)
      {
        while(str[x]!='*')
        {
          x++;
          while(str[x]!='#')
          {
            msg[k++]=str[x++];
          }
          x++;
        }
        msg[k]='\0';
```

```
lcd.clear();
lcd.print(msg);
delay(1000);
temp=0;
i=0;
x=0;
k=0;
if(!strcmp(msg,"front"))
{
  lcd.clear();
  lcd.print("forward");
  digitalWrite(mtr00,HIGH);
  digitalWrite(mtr01,LOW);
  digitalWrite(mtr10,HIGH);
  digitalWrite(mtr11,LOW);
}
if(!strcmp(msg,"back"))
{
  lcd.clear();
  lcd.print("backward");
  digitalWrite(mtr00,LOW);
  digitalWrite(mtr01,HIGH);
  digitalWrite(mtr10,LOW);
  digitalWrite(mtr11,HIGH);
}
if(!strcmp(msg,"left"))
{
  lcd.clear();
  lcd.print("leftward");
  digitalWrite(mtr00,HIGH);
  digitalWrite(mtr01,LOW);
  digitalWrite(mtr10,LOW);
  digitalWrite(mtr11,LOW);
}
if(!strcmp(msg,"right"))
{
  lcd.clear();
  lcd.print("rightward");
  digitalWrite(mtr00,LOW);
  digitalWrite(mtr01,LOW);
  digitalWrite(mtr10,HIGH);
  digitalWrite(mtr11,LOW);
}
if(!strcmp(msg,"stop"))
{
  lcd.clear();
  lcd.print("robot stop");
  digitalWrite(mtr00,LOW);
  digitalWrite(mtr01,LOW);
  digitalWrite(mtr10,LOW);
  digitalWrite(mtr11,LOW);
}
}
```

```
}  
void serialEvent()  
{  
  while(Serial.available())  
  {  
    char ch=(char)Serial.read();  
    str[i++]=ch;  
    if(ch == '*')  
    {  
      temp=1;  
      lcd.clear();  
      lcd.print("Message Received");  
      delay(1000);  
    }  
  }  
}
```

5. Applications

- The robot is useful in places where humans find difficult to reach but human voice reaches. E.g. in fire situations, in highly toxic areas
- It is the one of the important stage of Humanoid robots.
- Command and control of appliances and equipment
- The robot can be find for surveillance or reconnaissance.
- Telephone assistance system.
- Command and control of application and equipment.

6. Advantages

- The robot is small in size, so space required for it is small.
- We can access the robot from the distance of meters as we are using Wi-Fi for the connection between robot and the server PC.
- As we are using smart phone which is attach to the robot so it will capture video which will be used for security.
- Cost of system is low as we are using smart phone which is nearby available to everyone.

7. Disadvantages

- Even the best speech recognition systems sometimes make errors. If there is noise or some other sound in the room the number of errors will increase.
- Speech Recognition works best if the microphone is close to the user will tend to increase the number of errors.
- In Speech recognition system, there is a possibility of unauthorized usage. Since this doesn't depends upon which person is speaking.

8. Conclusion

The proposed system shows how the android smartphone can be used as remote controller for robot and various embedded technologies with the help of the Bluetooth technology. At the same time, this program uses blue-tooth connection to communicate with robot. The proposed system also shows that how a robot can be used for travelling purpose. The operating system of smartphone is Android, and it can develop effective remote control program and by using WiFi wireless network, the communication between smartphone and robot can be realized, which makes it simple and convenient to control robot. dedicated to the same.

References

- [1] Byoung-Kyun Shim; Yoo-Ki Cho; Jong-Baem Won; Sung-Hyun Han Control, Automation and Systems (ICCAS),2011 A study on real-time control of mobile robot with based on voice command, 11th International Conference on Publication, 2011.
- [2] Sung-Won Jung; Ki-Won Sung; Moon-Youl Park; Eon-Uck Kang; Won-Jun Hwang; Jong-Dae Won; Woo-Song Lee; Sung-Hyun Han, "A study on precise control of autonomous driving robot by voice recognition, 44th International, Symposium, 2013
- [3] K. Kannan and J. Selvakumar, "A paper on Arduino Based Voice Controlled Robot."
- [4] Chopra and Harshad Dange, "A report on Voice Controlled Robot."
- [5] Jonathan Malkin, Jeff Bilmes, "The Voice Bot: A Voice Controlled Robot Arm."