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PROJECT REPORT
ON

VOICE CONTROLLED ROBO CAR

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in partial fulfilment of the requirements for the award of the degree of Bachelor of Technology in ELECTRONIC AND COMMUNICATION ENGINEERING (ECE) of the INDIAN INSTITUTE OF INFORMATION TECHNOLOGY UNA, HIMACHAL PRADESH, during the year 2021 - 2025.

under the guidance of

DR. TANU

Project viva-voce held on: _____

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ABSTRACT

This project was developed in a way that the robot is controlled by voice commands. An android application with a microcontroller is used for required tasks. The connection between the android app and the vehicle is facilitated with Bluetooth technology. The robot is controlled by buttons on the application or by spoken commands of the user. The movement of the robot is facilitated by the two dc servo motors connected with microcontroller at the receiver side. The commands from the application is converted in to digital signals by the Bluetooth RF transmitter for an appropriate range (about 100 meters) to the robot. At the receiver end the data gets decoded by the receiver and is fed to the microcontroller which drives the DC motors for the necessary work. The aim of Voice Controlled Robotic Vehicle is to perform the required task by listening to the commands of the user. A prior preparatory session is needed for the smooth operation the robot by the user. For the same a code is used for giving instruction to the controller.

***Keywords*:** Android application, Bluetooth technology (HC-05), Arduino, DC motors, L298D motor Driver.

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LIST OF ACRONYMS

SPP	Serial port protocol
USB	Universal
TTL	time-to-live
IDE	Integrated Development Environment

LIST OF FIGUREs

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Chapter 1

Introduction

1.1 Hardware parts

The hardware part consists of the mechanical design of the robot, the adequate choice of the motors, and the electronic devices to properly drive the robot joints.

1.1.1 Arduino

Figure 1 shows Arduino UNO is an open source micro controller board placed on the micro chip ATmega328p micro controller and developed by Adruino.cc. The board has 6 Analog pins, 14 digital pins programmable with Arduino IDE via a Type B USB cable. It can power by external main volt battery.

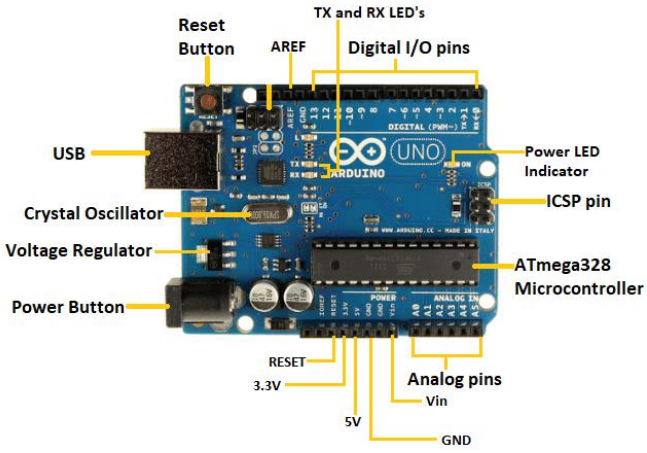

Fig-1: Arduino

1.1.2 L298D Motor Driver

The L298 Driver is a high voltage high current dual bridge driver designed to accept standard TTL Logic levels and drive inductive loads. The emitter of the lower level transistors of each bridge are connected together to the corresponding external terminal can be used for the connection of an external sensing resistor Figure 2. Shows the L298D Motor Driver.

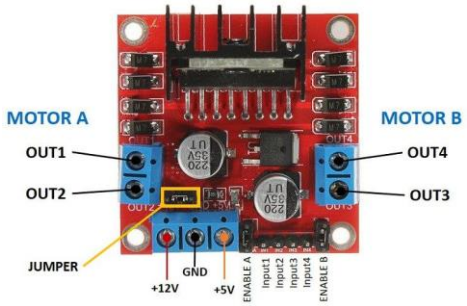

Fig-2: L298D motor

1.1.3 HC-05 Bluetooth module

Figure 3. Shows HC05 module is a simple Bluetooth module is a simple Bluetooth serial port protocol (SPP) module designed for wireless serial connection setup. It has a footprint as small as 12.7mm X 27mm. It will simplify the overall design cycle.

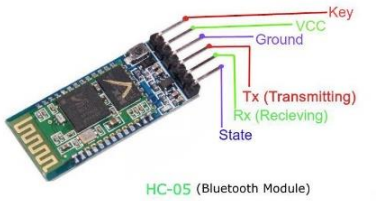

Fig-3: Bluetooth module

1.1.4 Gear motor

A DC motor is a class of rotary electrical machine that converts t\direct current into mechanical energy. All types of DC motors have some kind of internal mechanism either electronic or electro mechanical, so it can change the direction of flow of current in path of motor periodically.

1.1.5 Wheels

A wheel is circular block of durable and hard material which is placed in axil about which the wheel rotates when a moment is applied by torque or gravity, thereby making one of the simple machines. When placed under a load baring platform, the wheel turning on the horizontal axil makes it possible to transport heavy loads Figure 4. Shows the Gear Motor and wheel of this voice control robotic vehicle.

Fig-4: Gear and wheels

1.2 Software parts

The software part contains the high level algorithms that convert the desired word to a sequence of target points, and the control algorithms that ultimately make the robot move according to the specifications. Here the writing mechanism is made by speech recognition technique. This speech recognition can be provided through either by using microphone or by using android applications.

1.2.1 Android app

The application to control the vehicle was coded and created using app available on the Google play store known as “Automation”. The app contains the option to connect to Bluetooth and access the Bluetooth settings of the phone.

Fig-5: Android application

Chapter 2

Review of Literature

2.1 Arduino

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board -- you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package. The Uno is one of the more popular boards in the Arduino family and a great choice for beginners.

2.1.1 Code

```
#define led3 4
void setup()
{

Serial.begin(9600);
pinMode(led1,OUTPUT);
pinMode(led2,OUTPUT);
pinMode(led3,OUTPUT);
}

void loop()
{

if (Serial.available())
{
  val= Serial.read();
  Serial.println(val);
  if(val=='A')
  digitalWrite(led1,HIGH);
  else if (val=='a')
  digitalWrite(led1,LOW);
  else if (val=='B')
  digitalWrite(led2,HIGH);
  else if (val=='b')
  digitalWrite(led2,LOW);
  else if (val=='C')
  digitalWrite(led3,HIGH);
  else if (val=='c')
  digitalWrite(led3,LOW);

}
}
```

Fig-6: LED code

These few lines of code are all you need to blink the 3 LED connected to the Bluetooth module.

2.1.2 Advantages

The project has several advantages and some of the are discussed below:

- It can be developed into a real-world vehicle tor transportation purposes.
- The robotic vehicle can be used where humans find difficult to reach but human voice reaches like in a small pipeline, in fire situations, in highly toxic areas Etc.
- It can be integrated with wheelchairs for assisting disabled persons.
- It can be used to bring and place small objects.
- In military applications such as observation of enemy camp using cameras, rescue mission, medical assistance etc.

References

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2. P. Mahesh Reddy, Suram Pavan Kalyan Reddy, G R Sai Karthik, Priya B.K,2020, Intuitive Voice Controlled Robot for Obstacle, Smoke and Fire Detection for Physically Challenged People, International Conference on trends in Electronics and Informatics (ICOEI), ISBN: 978-1-7281-5518-0.
3. Svitlana Maksymova, Rami Matarneh, Vyacheslav V. Lyashenko,2017, Software for Voice Control Robot: Example of Implementation, Open Access Library Journal.

Appendix A

Code Attachments

The following is the partial of the code. Code of some module(s) have been wilfully supressed.

A.1 Sample Code

```
#define m1 2
#define m2 3
#define m3 4
#define m4 5
void setup()
{
  pinMode(m1, OUTPUT);
  pinMode(m2, OUTPUT);
  pinMode(m3, OUTPUT);
  pinMode(m4, OUTPUT);
  Serial.begin(9600);
}

void loop()
{
  if (Serial.available())
  {
  String voice = Serial.readString();
  Serial.println(voice);
  if(voice == "forward")
  {
    digitalWrite(m1, HIGH);
    digitalWrite(m2, LOW);
    digitalWrite(m3, HIGH);
    digitalWrite(m4, LOW);
   }
   if(voice == "backward")
  {
    digitalWrite(m2, HIGH);
    digitalWrite(m1, LOW);
    digitalWrite(m4, HIGH);
    digitalWrite(m3, LOW);
   }
   if(voice == "left")
```

```
  {
    digitalWrite(m1, LOW);
    digitalWrite(m2, LOW);
    digitalWrite(m3, HIGH);
    digitalWrite(m4, LOW);
   }
   if(voice == "right")
  {
    digitalWrite(m1, HIGH);
    digitalWrite(m2, LOW);
    digitalWrite(m3, LOW);
    digitalWrite(m4, LOW);
   }
  else if(voice == "stop")
  {
    digitalWrite(m1, LOW);
    digitalWrite(m2, LOW);
    digitalWrite(m3, LOW);
    digitalWrite(m4, LOW);
  }
 }
}
```