MINI PROJECT ON

VOICE CONTROL HUMANOID ROBOT

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Under the guidance- Prof.Y.R.Bachkar

Submitted By :

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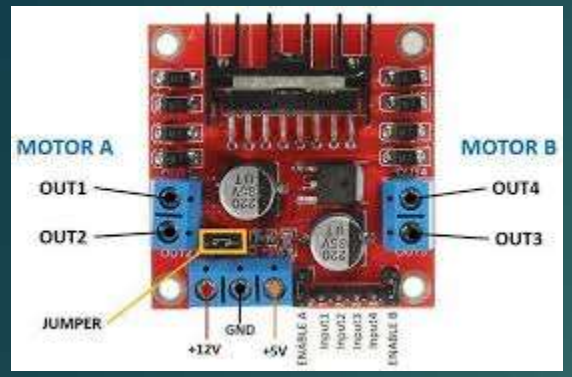
Introduction:

- The project aims to demonstrate a hands-free control mechanism for robotics applications, allowing users to navigate the robot remotely using simple voice commands.
- The voice command robot project utilizes an ATmega328 microcontroller, an HC-05 Bluetooth module, a motor driver, and motors to create a robot that can be controlled via voice commands sent over Bluetooth.
- Smart phone is a very good interface for remotely automating the robot. It contains many features that can be helpful.
- The connection between the application and the robot is facilitate with Bluetooth technology. The objective of voice controlled robotic vehicle (VCRV) is to listen and act on the commands of the user.

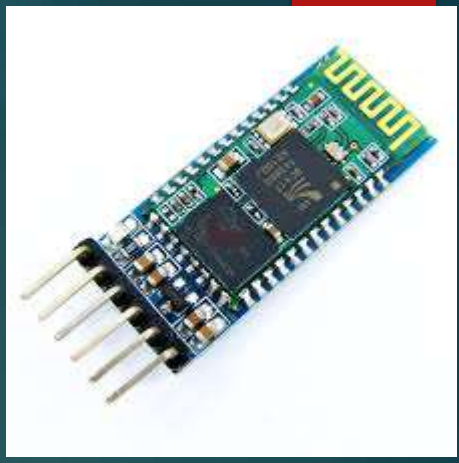
Components:

- L298Motor Drive Shield
- HC-05 Bluetooth Module
- Accuplus sealed lead acid battery
- Jumper Wires
- DC Motors (4)
- Android App (Android Bluetooth RC Controller)

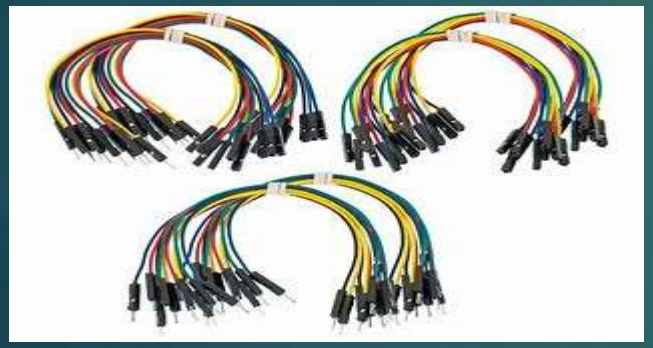


Motor driver

Accuplus sealed lead acid battery



HC-05 Bluetooth Module



Jumper wires

DC motors

Wheels

Specifications

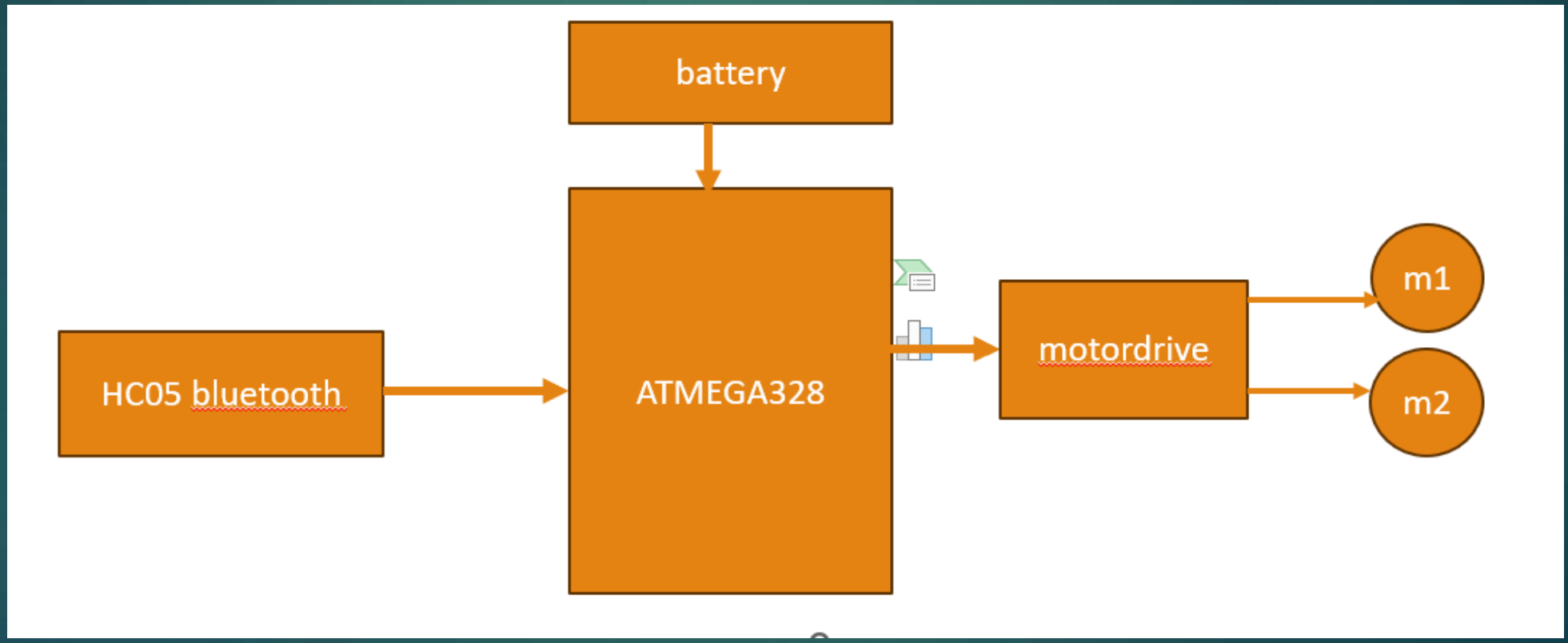
- HC 05 Bluetooth module –
  - Bluetooth version: 2.0+EDR (Enhanced Data Rate)
  - Operating voltage: 3.3V

- Motor driver l298
  - Power Supply: DC 5 V - 35 V
  - Operating current range: 0 ~ 36mA

- Accuplus sealed lead acid battery
  - Power : 12V.
  - Capacity: 1.3Ah.

❖ Block Diagram

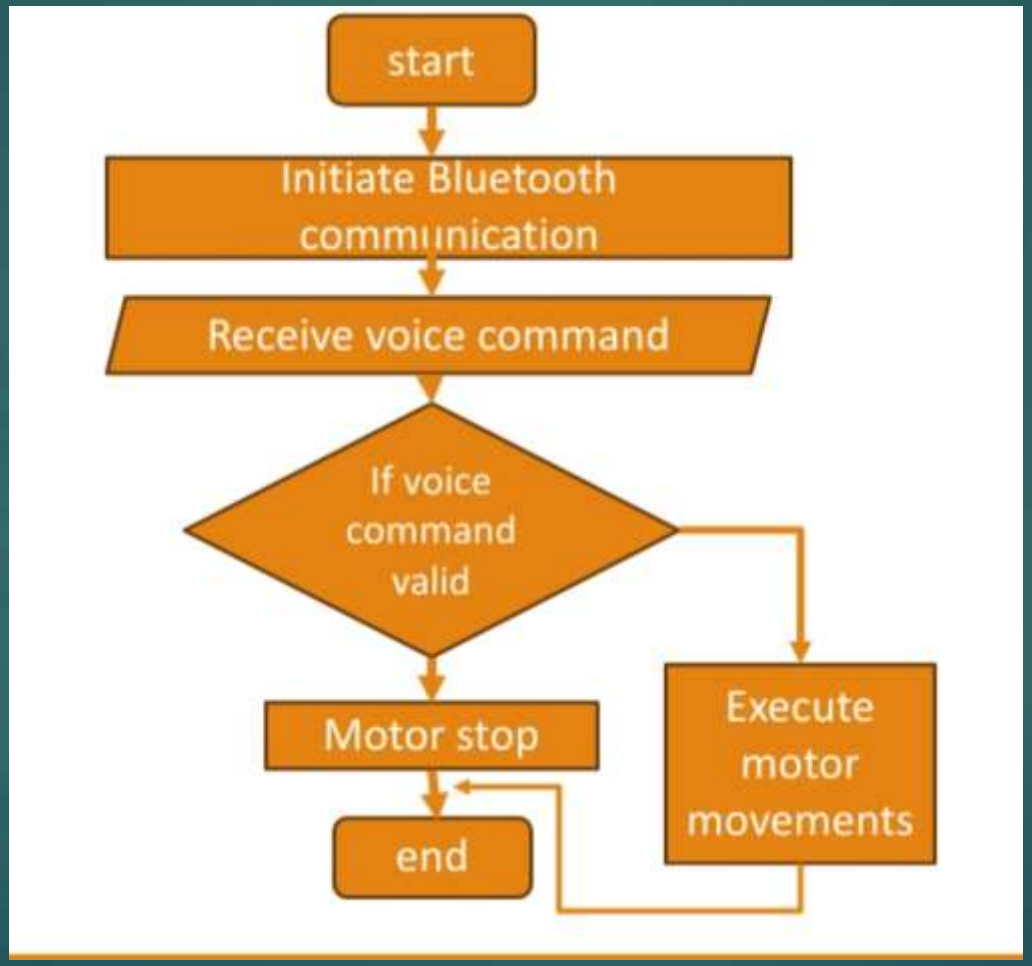
- The block diagram of the voice controlled robotic vehicle is as follows. Shows the connections in the circuit are made as per the following diagram.



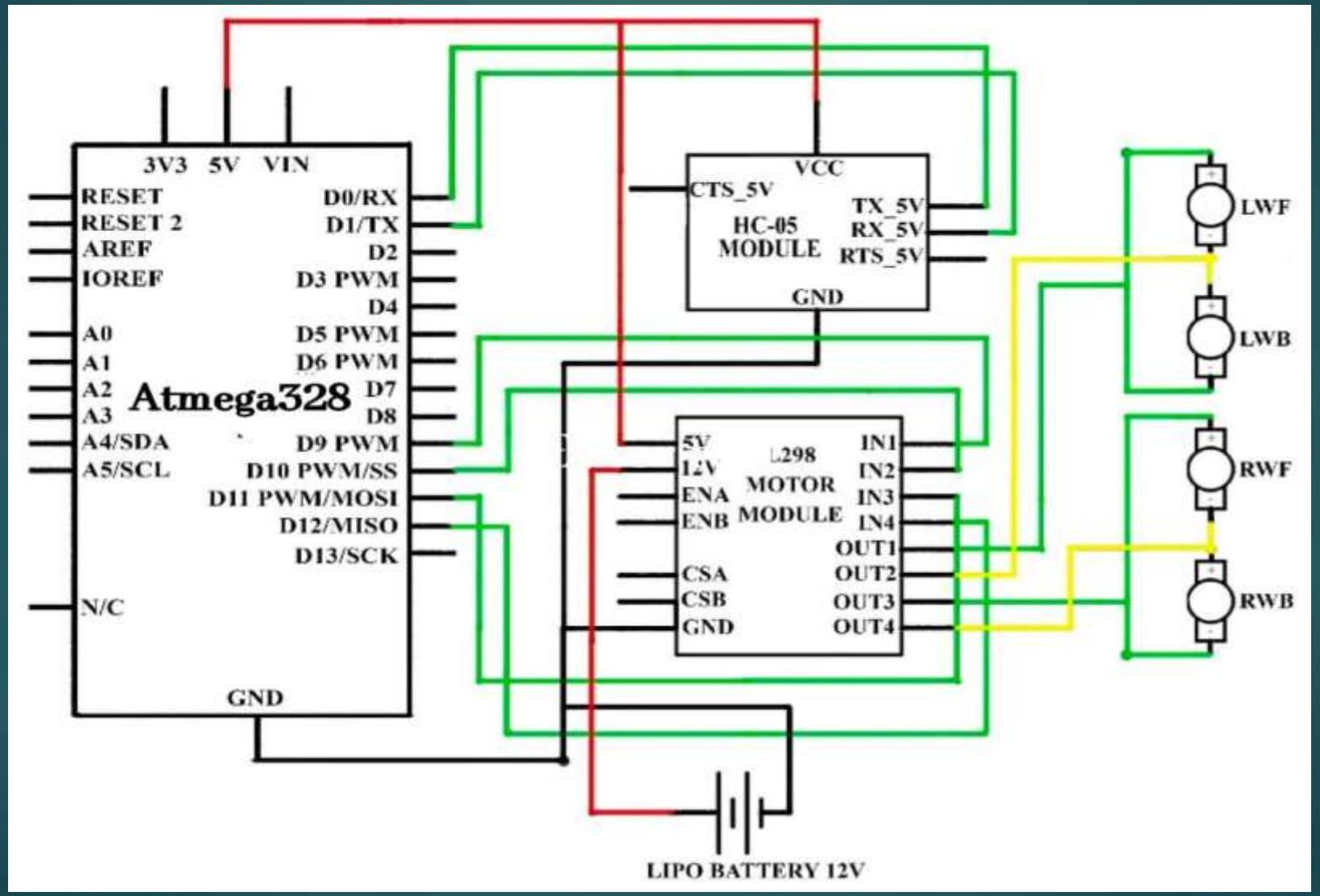
Block Diagram description

- The block diagram illustrates the system architecture and data flow between components.
- Voice commands transmitted via Bluetooth are received by the HC-05 module and forwarded to the ATmega328 microcontroller.
- The microcontroller interprets the commands and generates corresponding motor control signals, which are then sent to the motor driver.
- The motor driver regulates the power supplied to the motors, enabling movement according to the received commands.
- The HC-05 Bluetooth module facilitates wireless communication between the user's device and the robot.
- The ATmega328 microcontroller processes incoming voice commands and generates motor control signals accordingly.
- The motor driver amplifies the control signals and regulates the power supplied to the motors, allowing for precise movement control.

Flow chart

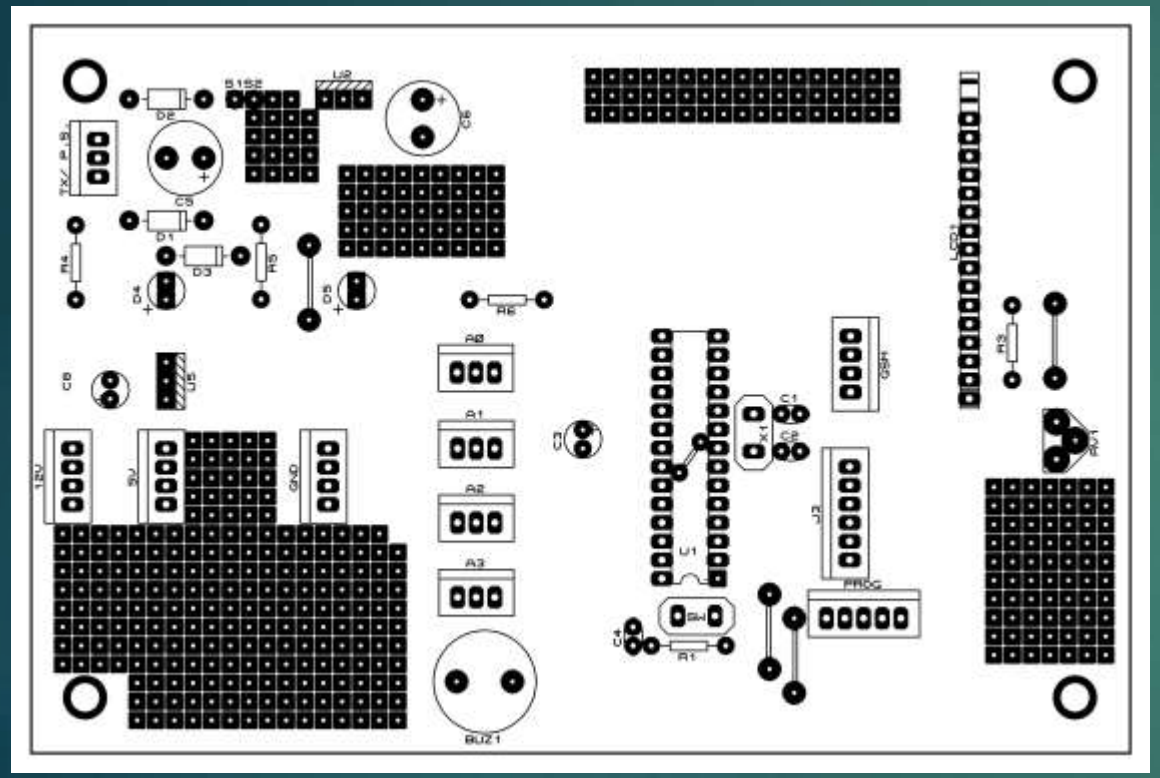

start
Initiate Bluetooth communication
Receive voice command
If voice command valid
Motor stop
Execute motor movements
end

Circuit Diagram for Voice Controlled humanoid robot



- The voice-controlled robo car circuit diagram typically consists of several key components:
- Microcontroller: Such as an Arduino or Raspberry Pi, which processes the voice commands and controls the car's movements.
- Voice Recognition Module: This module captures and interprets the voice commands given by the user.
- Motor Driver: It's responsible for controlling the motors of the car based on the commands received from the microcontroller.
- DC Motors: These drive the wheels of the car and are controlled by the motor driver.5. Power Supply: Usually a battery pack or another power source to provide energy to the entire system.
- Optional Components: These may include sensors for obstacle avoidance, LED indicators, or any additional features.
- In operation, the voice commands are captured by the voice recognition module, processed by the microcontroller, and translated into specific motor commands. These commands are then sent to the motor driver, which controls the direction and speed of the DC motors, allowing the car to move accordingly.

PCB Design


D2
5192
U2
C6
C5
D1
D3
R4
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D4
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R6
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U5
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A2
A3
12V
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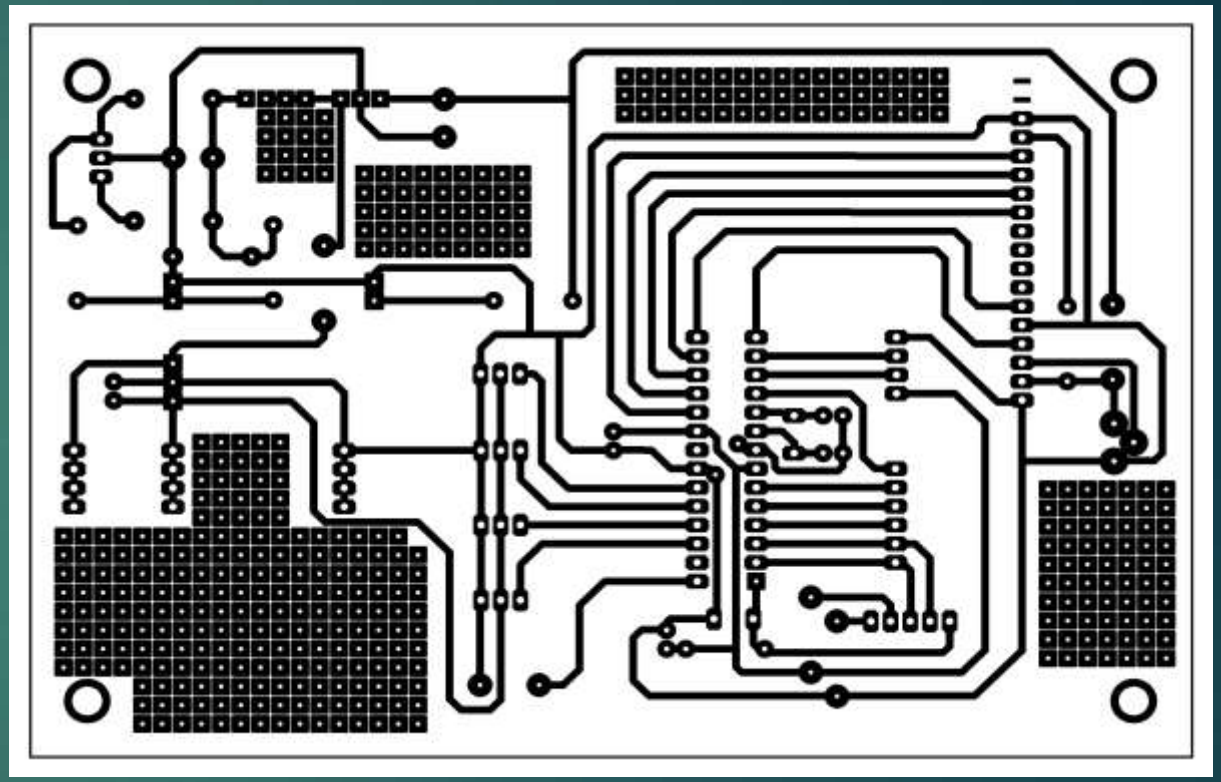


Working Of Voice Control Humanoid Robot:

- **The project begins with the integration of hardware components including the ATmega328 microcontroller, HC-05 Bluetooth module, motor driver, motors, and power supply system.**
- **The microcontroller receives voice commands wirelessly via Bluetooth and translates them into motor control signals.**
- **The motor driver interfaces with the motors to execute the desired movements based on the received commands.**

Advantages

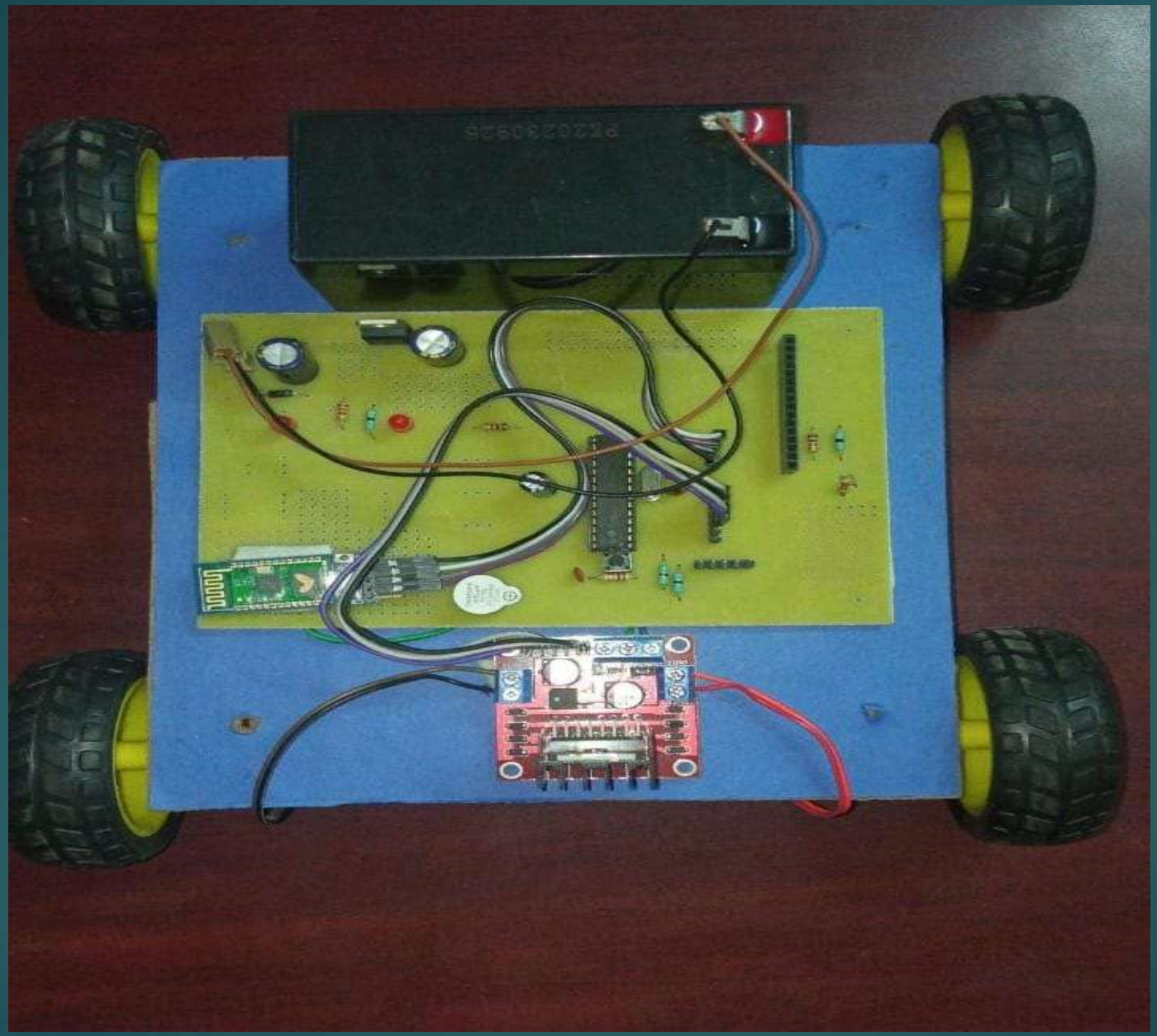
- Hands-free control mechanism
- Wireless operation via Bluetooth
- •Intuitive interaction through voice commands
- Flexibility in robotics applications

Application

- Remote surveillance and monitoring
- Home automation and assistance
- Educational robotics projects
- Industrial automation and logistics

Conclusion:

- Today we are in the world of robotics. Knowingly or unknowingly, we have been using different types of robots in our daily life.
- The project is "**Voice Control Humanoid Robot**" is practically proved by using the Ultrasonic sensor for sensing the robot, Bluetooth Sensor for operating it on android mobile phone, Motor Shield Driver for the driving the dc motors, dc motor is used for the movement of the robot with the help of the Arduino Microcontroller.



Result:

- Devices Experimental testing confirms the functionality and reliability of the voice command robot in accurately interpreting voice commands and executing corresponding movements.
- Real-world simulations demonstrate the robot's responsiveness to user inputs, highlighting its potential for practical use in different environments.
- The project showcases the effectiveness of microcontroller-based control systems in enabling intuitive interaction and remote operation of robotic .

Future Recommendations:

- 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
- Integration with loT platforms for remote monitoring and control
- Implementation of advanced voice recognition algorithms for enhanced command interpretation
- Expansion to multi-robot coordination systems
- Incorporation of additional sensors for environment perception

REFERENCES:

- [1] Sharan, S., Nguyen, T.Q., Nauth, P. and Araujo, R., 2019, July. Implementation and testing of voice control in a mobile robot for navigation. In 2019 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM) (pp. 145-150). IEEE.
- [2] Barbosa, D.S., Araujo, A.F. and Gutierrez-Huampo, E., 2021, October. Voice commanded system for navigation of mobile robots. In 2021 IEEE International Conference on Systems, Man, and Cybernetics (SMC) (pp. 1087-1092). IEEE.
- [3] John, L., Vishwakarma, N. and Sharma, R., 2020, June. Voice control human assistance] robot. In National Conference on Technical Advancements for Social Upliftment, Proceedings of the 2 nd VNC