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Voice Control Robot

Mr. B.S.MOHITE SIR¹, Saurabh Manoj Raut², Bhimashankar Balaji Ammashette³,
Rushikesh Sudam Ghatul⁴

Department of Electronics and Telecommunication Engineering, JSPM University of Bhivrabai Sawant Polytechnic,
Wagholi, Pune, Maharashtra, India

UG Student, Department of Electronics and Telecommunication Engineering, JSPM University of Bhivrabai Sawant
Polytechnic, Wagholi, Pune, Maharashtra, India

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 app, Bluetooth

I. INTRODUCTION

Our goal is to create a robot car that can be operated by a person's voice command. These systems are sometimes referred to as Speech Controlled Automation Systems (SCAS) . The above-mentioned system is a prototype of our design. The concept is to build a robot that will be controlled by voice instructions. A mobile phone is used to control the robot; there are numerous publications that demonstrate the communication between a robot and a smart phone. For remotely automating the robot, a smart phone is an excellent interface. It has a lot of features that can be useful. For the needed work, an android application with a microcontroller is employed in this design.

Bluetooth technology facilitates the connection between the application And the robot. The commands will be passed via the channel to the module,Which will receive them. The goal of a voice controlled robotic vehicle (VCRV) Is to listen to and respond to the user's commands. The system will require Accent training after which the gadget will begin to grasp the commands given; The commands have been added via codes.

II. LITERATURE SURVEY

A literature survey on voice-controlled robots involves reviewing existing research, articles, and papers related to the field. It would include topics like speech recognition, natural language processing, hardware implementation, and applications of voice-controlled robots. Additionally, consider looking into specific platforms or frameworks commonly used in this area. It's important to keep an eye out for the latest advancements and trends in voice-controlled robotics to provide a comprehensive overview.

III. PROBLEM STATEMENT

Robot typically outlines the specific challenges or issues that researchers or developers aim to address in this field. It may include aspects such as improving speech recognition accuracy, enhancing the robot's ability to understand complex commands, optimizing real-time processing capabilities, ensuring robustness in noisy environments, or exploring novel applications for voice-controlled robots in various domains. The problem statement serves as a clear definition of what needs to be solved or improved in the context of voice-controlled robotics.

IV. METHODOLOGY

Speech Recognition System Selection: Choose an appropriate speech recognition system or technology, such as ASR (Automatic Speech Recognition), that can accurately convert spoken language into text.

Natural Language Processing : Implement NLP techniques to process and understand the meaning behind the recognized text. This may involve tasks like intent recognition, entity extraction, and syntactic analysis.

Hardware Selection and Integration: Choose the necessary hardware components for the robot, including microphones, speakers, and processing units. Ensure compatibility and seamless integration.

Programming Platform or Framework: Select a programming platform or framework to develop the software architecture of the robot. This could include languages like Python, C++, or specialized platforms like ROS (Robot Operating System).

Signal Processing and Pre-processing: Apply signal processing techniques to enhance the quality of the audio input. This may include noise reduction, echo cancellation, and other filters.

Training and Testing Data: Gather and curate a diverse dataset of voice commands to train and validate the speech recognition and NLP models. This dataset should cover a wide range of possible inputs.

Model Training: Train the speech recognition and NLP models on the collected dataset using appropriate machine learning algorithms. Fine-tune the models to improve accuracy and performance.

Integration with Robot Hardware: Connect the speech recognition and NLP components to the robot's hardware, including microphones and actuators, to facilitate bidirectional communication.

1]Bluetooth Module:-

The HC05 module is a simple Bluetooth serial port protocol module designed for setting up a wireless serial connection. It has a modest footprint of 12.7mm x 27mm. It will make the entire design process easier.

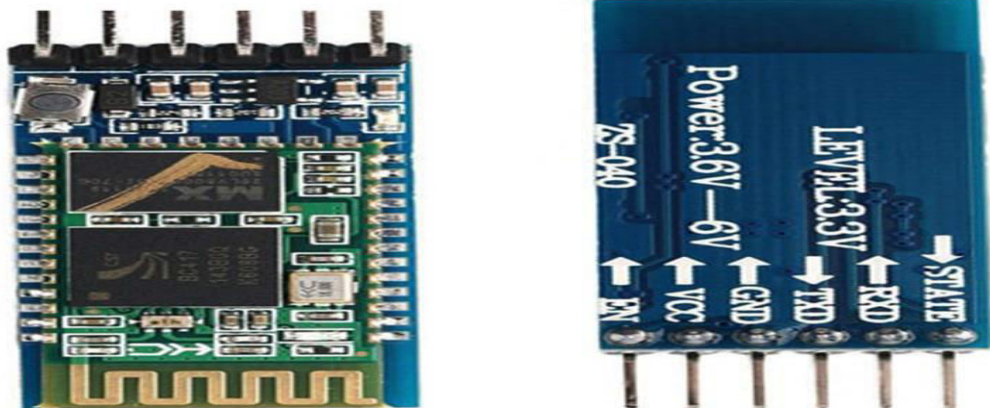


Fig. Bluetooth Module HC05

Features:-

Bluetooth Version: It typically supports Bluetooth version 2.0+EDR (Enhanced Data Rate), which allows for faster data transfer rates compared to older versions.

Operating Voltage: Voltage between 3.3V -6V.

Range : Approximately 10 meters.

Baud Rate : 9600 bps

2]Arduino UNO :-

UNO Board by Arduino Figure 4 depicts Arduino UNO is an open-source microcontroller board designed by Arduino.cc and based on the ATmega328p microcontroller. The board features 6 analogue pins and 14 digital pins that may be programmed using Arduino IDE and a USB Type B connector. It can be powered by a mains voltage battery.

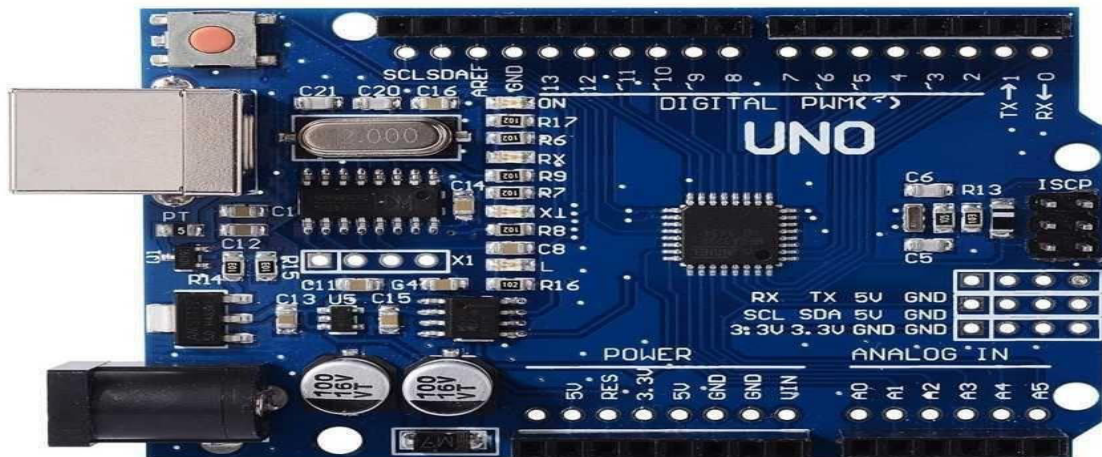


Fig:- Microcontroller

Features:-

- 1) **Microcontroller:** ATmega328
- 2) **Operating Voltage:** 5V
- 3) **Input Voltage** (recommended): 7-12V
- 4) **Input Voltage** (limits): 6-20V
- 5) **Digital I/O Pins:** 14
- 6) **Analog Input Pins:** 6
- 7) **DC Current per I/O Pin:** 40 mA
- 8) **DC Current for 3.3V Pin:** 50 mA
- 9) **Flash Memory:** 32 KB
- 10) **SRAM:** 2 KB
- 11) **EEPROM:** 1 KB
- 12) **Clock Speed:** 16 MHz

3]L293D Motor Driver :-

An L298 Driver is a high-voltage, high-current twin bridge driver that can drive inductive loads and accepts typical TTL logic levels. Each bridge's lower-level transistors' emitters are connected to the matching external terminal, which can be used to connect an external sensing resistor.



Fig . L293D MOTOR DRIVER

Features -:

Dual H-Bridge Configuration

High Voltage Capability:-36V

High Current Capability:-600mA-1.2A

Logic Compatibility:- TTL/CMOS

Block Diagram:-

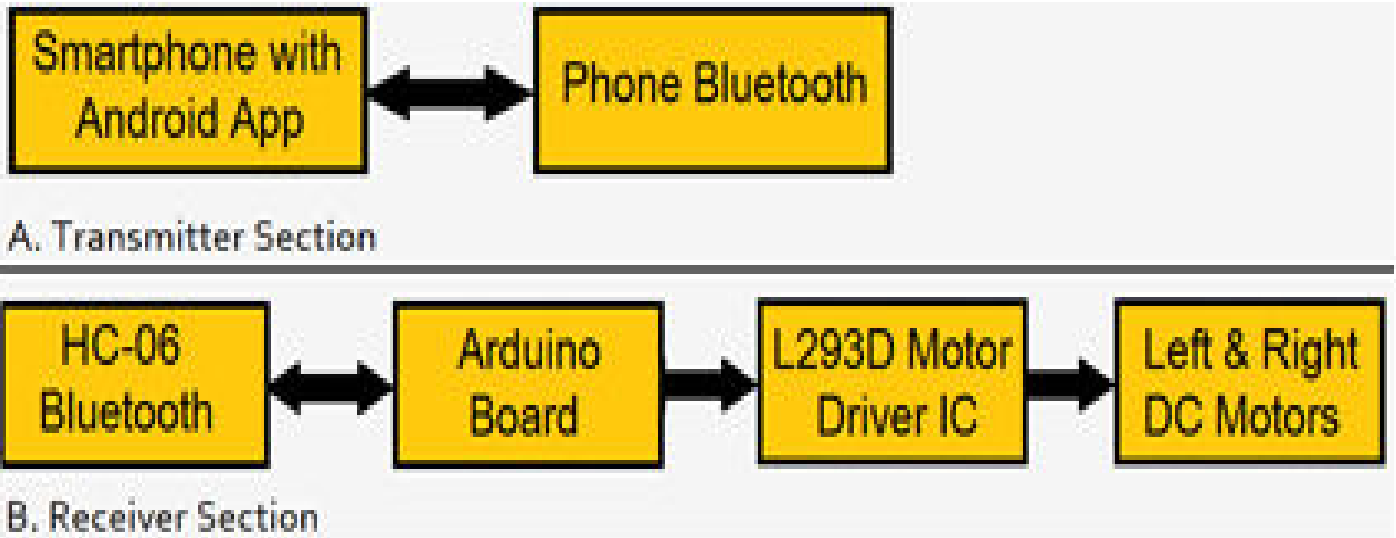


Fig:- Block Diagram of Voice control robot

Circuit Diagram:-

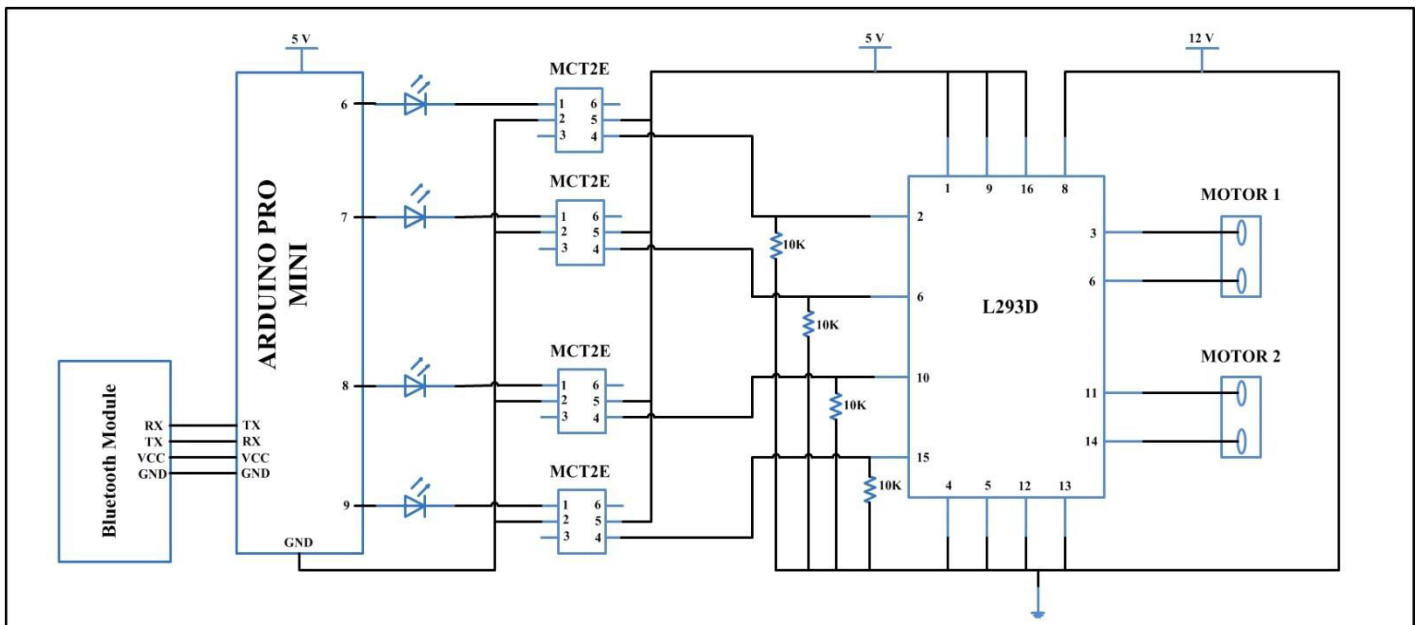


Fig:- Circuit Diagram of Voice control robot



Advantages:-

Hands-Free Operation: Users can interact with the robot without the need for physical contact, allowing for a more convenient and sanitary interaction, especially in environments where hygiene is crucial.

Multi-Tasking: Users can control the robot while performing other tasks, allowing for efficient multitasking.

Enhanced Safety: In situations where physical interaction with a robot may be hazardous, voice control allows for safe operation from a distance.

V. CONCLUSION

The project Voice Controlled Robotic Vehicle has numerous uses both now and in the future. In the future, improvements can be added to the project to make it more effective. The project has a wide range of applications, including military, home security, rescue missions, industry, and medical support. Using the given resources, we were able to create a rudimentary model of a voice-controlled robotic car. Because this project is simple to implement, this robot is advantageous to human life.

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9940 572 462 6381 907 438 ijirset@gmail.com



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