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Voice Controlled Robot Vehicle Using Arduino

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Abstract: ***This project was created in such a way that voice instructions are used to control the robot. For required duties, an android application with a microcontroller is employed. Bluetooth technology facilitates the connection between the android app and the automobile. The robot is operated by the user's spoken orders or buttons on the application.***
The two dc servo motors attached to the microcontroller on the receiver side aid the robot's movement. The Bluetooth RF transmitter converts the commands from the application into digital signals at a range of about 100 metres to the robot. The data is deciphered by the receiver and supplied to the microcontroller, which controls the DC motors to perform the required job. The goal of a Voice Controlled Robotic Vehicle is to complete a task by listening to the user's commands.
For the user to operate the robot smoothly, a prior preparation session is required. A code is used to give instructions to the controller in the same way.
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. The Voice Control Robot is beneficial for monitoring and assisting disabled persons. It is simple to use because it operates with basic voice commands. It is effective in locations where humans are unable to reach.
As a result, we can employ this robot to spy on people. It has the potential to be utilised for surveillance. For security purposes, we can incorporate a web cam into this robot. The voice recognition software is highly sensitive to background noise and has a high accuracy for identifying a voice command.
Keywords: Arduino, Bluetooth, DC Motor, Servo Motor, Transmitter, Receiver.

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.

The primary goal of developing a VCRV is to analyses human speech and respond to pre-programmed commands. Backward, forward, right, left, and halt the robot are the most fundamental orders. The car will be controlled wirelessly using an Android smartphone; our goal is to create a robotic vehicle using advanced smartphone technology in a simple and cost-effective manner. Vehicles are now operated manually, and everything is done by the person operating the vehicle. Every action, such as starting and stopping, applying brakes, shifting gears, and accelerating, necessitates human effort. However, new technologies have been created in recent years that can be merged with traditional vehicles to create new vehicle forms. In this technological age, the advent of the gesture notion brings the physical and digital worlds closer together. We prefer technology over people for all perilous tasks. Although these robots were first operated manually, they can now be commanded through voice and gestures. The interface between the computer and human body language can be defined as this technology of gesture and voice recognition. This establishes the technological-human communication relationship. The goal of this project is to improve the robot's overall security while also simplifying the control method.

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II. HARDWARE AND SOFTWARE REQUIREMENTS

A. Hardware Components

1) Arduino UNO
2) Ada Fruit Motor Drive
3) Bluethoot Module
4) DC Motor
5) Wheels

B. Software Components

1) Arduino IDE software.
2) MIT AI2 Companion

III. BLOCK DIAGRAM

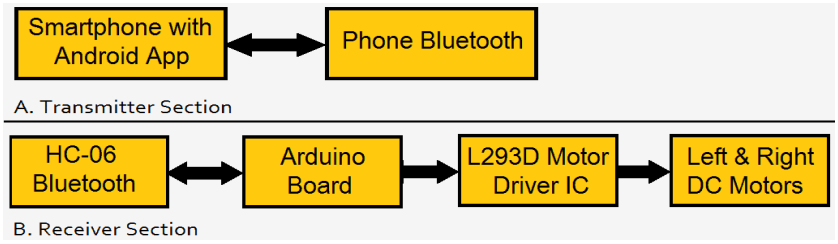

Figure 1: Block Diagram of project.

IV. WORKING PRINCIPLE

The android smart phone's microphone is used to recognise human voices. Using the Android operating system and Artificial Intelligence software, this voice is processed and transformed into English words. Speech recognition is a multidisciplinary subfield of computational linguistics that explores approaches and technology that allow computers to recognise and convert spoken language into text. Automatic speech recognition (ASR), computer voice recognition, and speech to text are some of the other names for it (STT). It blends languages, computer science, and electrical engineering expertise and study. Speech recognition has a long history in terms of technology, with multiple waves of key advancements. Advances in deep learning and big data have recently improved the field. The improvements are proven not only by the increasing number of academic articles published in the subject, but also by the widespread industry acceptance of a range of deep learning approaches in the design and deployment of voice recognition systems around the world.

V. HARDWARE DESCRIPTION

A. Arduino UNO

UNO Board by Arduino Figure 4 depicts Arduino UNO is an open-source microcontroller board designed by Adruino.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.

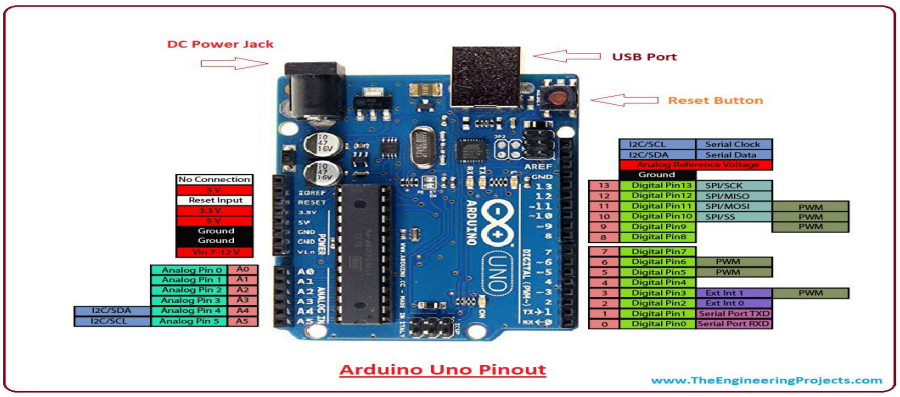

Figure 2: Arduino UNO Microcontroller.

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B. L293D Motor Driver Shield

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.

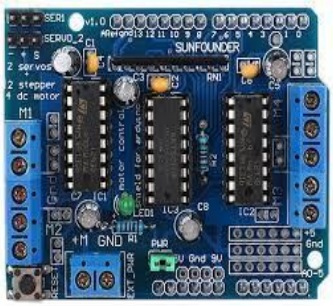

Figure 3: L293D Motor Drive Shield.

C. Bluetooth module HC05

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.

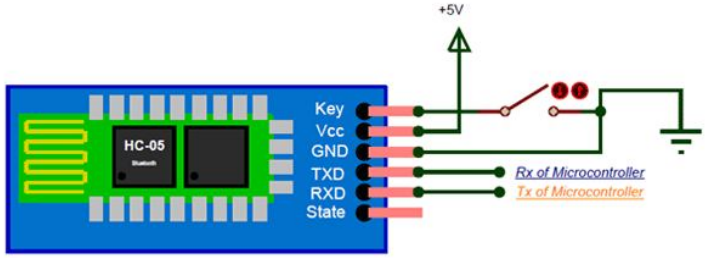

Figure 4: Bluetooth Module HC-05.

D. DC Motor

This type of rotary electrical equipment that transforms direct current into mechanical energy. All types of DC motors contain an internal mechanism, either electronic or electromechanical, that allows it to change the direction of current flow in the motor's path on a periodic basis.

Figure 5: DC Motor.

E. Wheels

This are simple devices that consist of a circular block of sturdy and hard material that is put in an axil around which the wheel revolves when a moment is imparted by torque or gravity. The wheel turning on the horizontal axil allows huge loads to be transported when it is positioned under a load-bearing platform.

Figure 6: Wheels.

VI. SOFTWARE DESCRIPTION

A. Arduino IDE Software

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called sketches

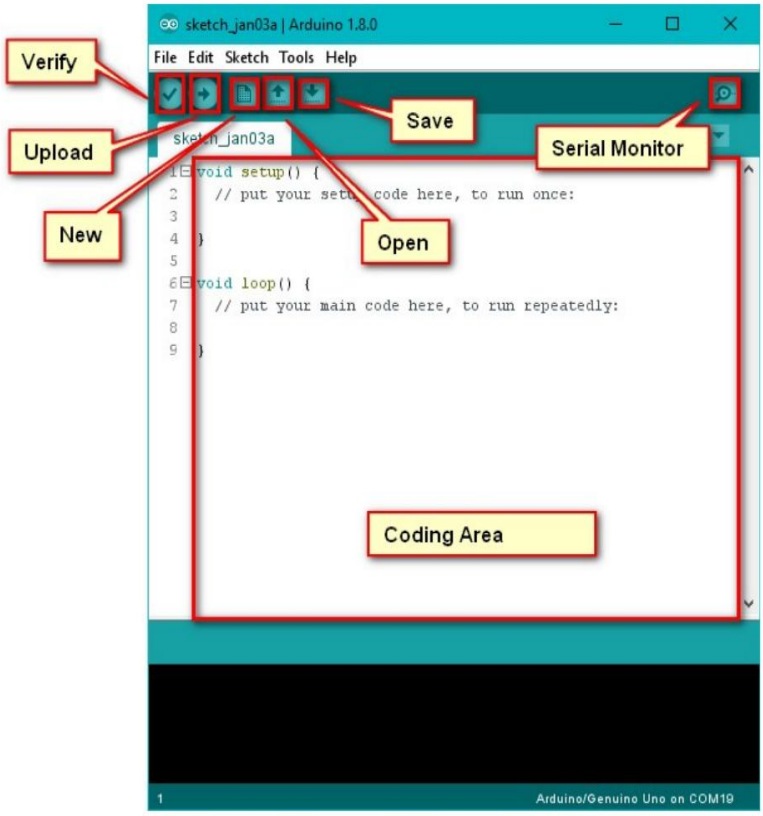

Figure 7: Interface of the Software.

B. MIT AI2 Companion

Development of Apps The vehicle control application was coded and created using the MIT AI2 Companion software, which is accessible on the Google Play market. MIT is the creator of this app.

Figure 8: MIT AI2 Companion App.

AMR VOICE Shows has developed an Android app. We created an Android app with the help of the app and named it AMR VOICE. The app includes the ability to connect to Bluetooth and view the phone's Bluetooth settings. An Android app has been developed by AMR VOICE Shows. With the help of the app, we produced an Android app called AMR VOICE. The app allows you to connect to Bluetooth and examine the Bluetooth settings on your phone.

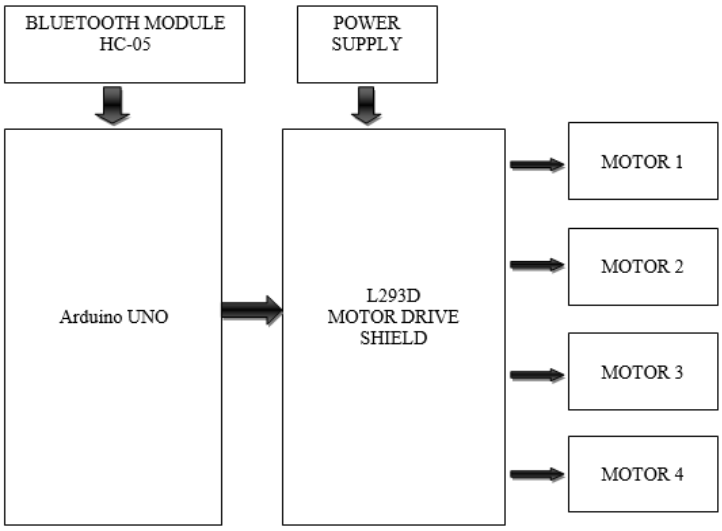

Figure 9: Circuit Diagram

VII. RESULT AND DISCUSSION

The android smart phone's microphone is used to recognise human voices. Using the Android operating system and Artificial Intelligence software, this voice is processed and transformed into English words. Speech recognition is a multidisciplinary subfield of computational linguistics that explores approaches and technology that allow computers to recognise and convert spoken language into text. Automatic speech recognition (ASR), computer voice recognition, and speech to text are some of the other names for it (STT). It blends languages, computer science, and electrical engineering expertise and study. Speech recognition has a long history in terms of technology, with multiple waves of key advancements. Advances in deep learning and big data have recently improved the field. The improvements are proven not only by the increasing number of academic articles published in the subject, but also by the widespread industry acceptance of a range of deep learning approaches in the design and deployment of voice recognition systems around the world.

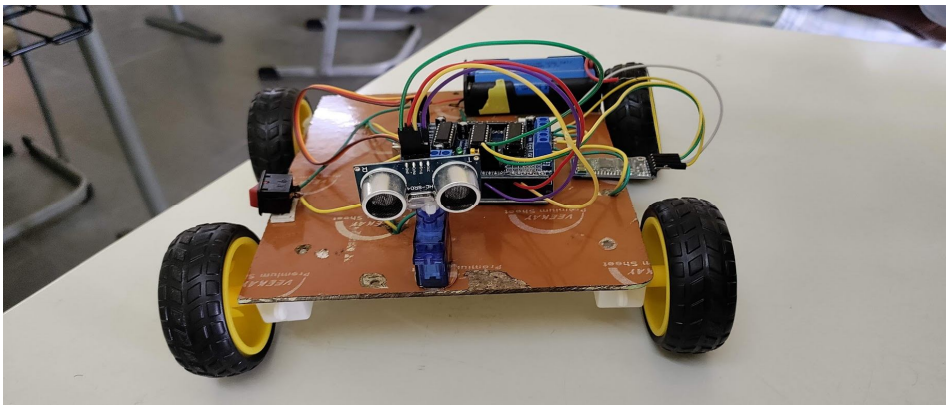

Figure 10: Assembled Image.

The project was performed in accordance with the requirements and specifications. The voice can be used to control simple movements. The suggested system is based on a Voice Controlled Robotic Vehicle that allows the robot to be controlled using voice instructions received through an Android application. The Vocal Controlled Vehicle is operated by using voice commands delivered by the project's operator. These voice commands must be issued via an Android app installed on the user's Android device. Within the android app, speech recognition is performed, and then a command is delivered to the voice-controlled robot car. The vehicle's microcontroller decodes these commands and sends the appropriate command to the motors connected to it.

A. Application

1) It has the potential to be turned into a real-world vehicle for transportation.
2) The robotic vehicle can be utilised in places where humans find it impossible to reach but where human voice can be heard, such as a small pipeline, a fire, or a particularly poisonous environment.
3) It can be used in conjunction with wheelchairs to aid impaired people.
4) It can be used to transport and store tiny items.
5) In military uses, such as utilising cameras to observe an enemy camp.

VIII. 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. The Voice Control Robot is beneficial for monitoring and assisting disabled persons. It is simple to use because it operates with basic voice commands. It is effective in locations where humans are unable to reach. This robot is modest in size. This robot can be used to spy on people. It has the potential to be utilised for surveillance. For security purposes, we can incorporate a web cam into this robot. The voice recognition software is accurate and sensitive to background noise, allowing it to distinguish a voice command.

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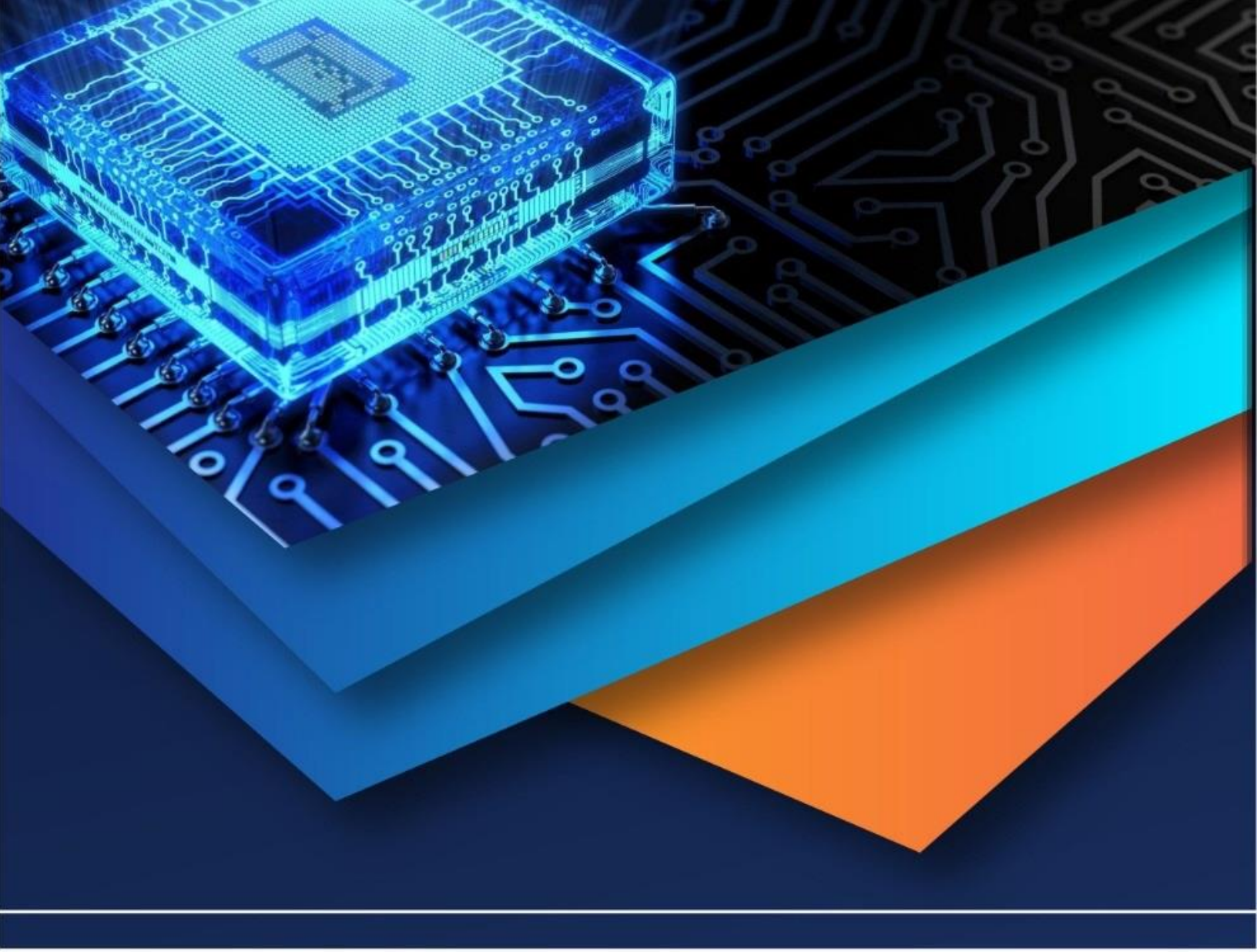

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