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VOICE CONTROL ROBO CAR

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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.

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. METHODOLOGY

Hardware Setup

Required Components:

ESP32 (with built-in Bluetooth)

L298N Motor Driver Module

4 Gear Motors + Wheels

12V Power Supply (Battery or Adapter)

Jumper Wires

Chassis (Robot Base Frame)

Software Installation

Step 1: Install Arduino IDE

Download and install Arduino IDE from official website.

Open the Arduino IDE after installation.

Step 2: Install ESP32 Board Package

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Open Arduino IDE and go to File → Preferences.

In the Additional Board Manager URLs, enter:

https://dl.espressif.com/dl/package_esp32_index.json

Click OK.

Go to Tools → Board → Board Manager and search for ESP32.

Click Install.

Step 3: Install Bluetooth Serial Library

Open Arduino IDE.

Go to Sketch → Include Library → Manage Libraries.

Search for BluetoothSerial and install it.

Uploading the Code to ESP32

Steps to Upload the Code:

Connect ESP32 to PC via a USB cable.

Open Arduino IDE and select ESP32 Dev Module from Tools → Board.

Select the correct Port from Tools → Port.

Copy and paste the code (from Section 7) into the Arduino IDE.

Click Upload and wait for the process to complete.

Open the Serial Monitor and set the baud rate to 115200 to check for debugging messages.

Installing the Mobile App (MIT App Inventor)

Step 1: Install MIT App Inventor on Your Mobile

Open MIT App Inventor in your browser:

https://appinventor.mit.edu

Create a new project and design a Bluetooth control interface with buttons and voice commands.

Add the BluetoothClient component in MIT App Inventor.

Step 2: Configure Bluetooth Communication in the App

Pair your ESP32 Bluetooth with your mobile.

Use the MIT App Inventor blocks to send commands (F, B, L, R, S) when the user presses buttons or uses voice commands.

Install the APK on your mobile and run the app.

Testing the Robot

Step 1: Connect to Bluetooth

Open the mobile app and connect to ESP32 Bluetooth.

If connected successfully, the app will display "Connected to ESP32_Robot".

Step 2: Control the Robot

Press Forward (F) → Robot moves forward.

Press Backward (B) → Robot moves backward.

Press Left (L) → Robot turns left.

Press Right (R) → Robot turns right.

Press Stop (S) → Robot stops.

III. MODELLING AND ANALYSIS

When you mention modeling and analysis for a voice-controlled robot car project, this typically refers to the design, simulation, and evaluation of the car's movement, control systems, and overall behavior. This involves various disciplines, such as control theory, electrical and mechanical modeling, system dynamics, and sometimes machine learning, if the project involves advanced decision-making or adaptive systems. Once the

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system is modeled, we need to analyze its behavior to ensure it performs optimally and predictably under different conditions.

IV. 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..

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. 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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