

Robotic Vehicle Control by Voice Command

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Abstract—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 utilized 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.

Index Terms—Robot, Design, Fabrication, Sensor, Automation

I. INTRODUCTION

Our aim is to make a robot vehicle which can be controlled by the voice command of a person. Normally these types of systems are called as Speech Controlled Automation System (SCAS). Our design is a prototype of the above-mentioned system. The idea is to create a sort of robot which going to be driven by voice commands. The robot is remotely controlled by a mobile phone; there are many articles that show the communication between a robot and smart phone.

Smart phone is a very good interface for remotely automating the robot. It contains many features that can be helpful. In this design, an android application with a micro controller is used for the required task. The connection between the application and the robot is facilitate with Bluetooth technology. The commands issued will be relayed over through the channel and will be received by the module. The objective of voice controlled robotic vehicle (VCRV) is to listen and act on the commands of the user. Here the system requires accent training, post which the device will start understanding the commands issued and the commands have been added by codes.

II. OBJECTIVES

The objective is to build a voice-controlled robotic vehicle is to analyse the human voice and act according to the programmed commands. Moreover, the voice-controlled robot facilitates the work compared to the manual execution, so one of the objectives is to facilitate the work. Making the robot at cheapest cost, because the Arduino-based voice robot does not have any higher cost to make or implement on the robot.

III. PROPOSED SYSTEM

Voice recognition and speech processing is not a new field in robotic industry. Voice recognition system having the ability to work for the disabled people by recognising the commands and work accordingly for the disabled people is the main idea of the project. Purposed system having the arduino uno voice control system. In which the arduino is connected to L298D motor drier shield which is integrated in between the

arduino and the motor driver and Bluetooth module HC05. Our system consists of a vehicle having two servo motors which are connected to L298D motor proving the signal through the arduino uno by the Bluetooth module voice control app. Also, system is designed for people who are disabled by feet so they can move freely with the vehicle by passing voice commands to the vehicle.

IV. LITERATURE REVIEW

“Arduino based voice-controlled robot” is a paper by Aditya Chaudhry, Manas Batra, Prakhar Gupta, Sahil Lamba, Suyash Gupta. In this paper, a system is presented that focuses on the concept of controlling a robot with human voice. Voice-activated robots are just a practical example of controlling movement of simple robots by giving voice commands for everyday use. In this system, an android application is used as a medium to transmit human commands to microcontroller. The controller can be connected to Bluetooth module via uart protocol. Speech is received by the android application & processed by voice module. [1]

The system aims to create a prototype of a futuristic automated personal assistant for home and industrial use.

The google text-to-speech API and grassfire algorithms are used to control the basic movement of the system. The robot consists of a gripper arm which is used to pick up and grab objects as needed by the operator. [2]

“Design and development of voice controllable wheelchair” is a paper by Polash Pratim Dutta, Abhishek Kumar, Aditi Singh, Kartik Saha, Bitupon Hazarika, Ansuma Narzary, Tonmoy Sharma in this paper this post features a voice-operated wheelchair designed for people with physical disabilities or those whose hind limbs do not function properly. So, he or she can control the wheelchair with their own voice commands or the commands of their family members. To perform this task, an Arduino microcontroller board is used, which receives voice commands from a Bluetooth module via a smartphone, or from a voice recognition module to which a microphone is connected. [3]

“Robotic car using Arduino with Bluetooth controller” by Vijayalakshmi S & Archana M in this paper the device can be controlled by any smart device with android. Air droid is an application designed for android that allows you to connect your device to your computer through a Wi-Fi controller over a wireless network. It is used to connect the cell phone camera and watch it on our computer after fixing it in the car. It is also used to see where the car is. The robotic car detects the temperature via a mobile app. [4]

“Voice controlled car using arduino and Bluetooth module” is a paper by Telugu Maddileti, Manideep Jammigumpula, H. Jagadish Kumar, K.V Sai Sashank this project is related to a voice-controlled car, this makes this project an essential part of recognizing commands and transmitting them to the car via the wireless system. Speech recognition is also known as “automatic speech recognition (Asr)”. The enterprise has many elements such as the interaction between the laptop and the microprocessor, the capture and understanding of speech, the wireless distribution of digital data from one microprocessor to another, the use of microprocessors to control various cars. [5]

“Voice controlled robot car using arduino” by Shubh Srivastava and Rajanish Singh they developed a robot car whose working is based on arduino micro-controller, motor drivers, a Bluetooth module. The coordination of the control unit with the Bluetooth device is done by using the Bluetooth module to receive and read voice commands. The remote is a smart android device with a Bluetooth app. The frame equipment consists of a controller equipped with a Bluetooth communication module. It will connect to car engine and other spare parts. When the Bluetooth app is opened and connected to the current system via Bluetooth, users use the functions already programmed in the app to issue commands wirelessly from the app to drive the car. The vehicle will move in four directions: Forward, backward, right and left. [6]

“Robot for the physically challenged” By H Asitha, Sai Chinmayi, Sravya and v. K. Mittal in this paper they development of a robot that can be controlled in two modes of voice control and remote control. For a visually impaired person, it would be more convenient to control a robot or their own wheelchair if they could use their natural voice commands. Therefore, a robot is developed which is controlled by voice commands and can perform some specific tasks. For anyone with

impaired hearing or speech, it is more convenient to control the movement of the robot forward/Backward or left/Right etc. Using a remote control such as a joystick. If the person is disabled and immobile, they can use these command options to control their wheelchair. [7]

“Arduino based voice-controlled robot vehicle” by M Saravanan, B Selvababu, Anandhu Jayan, Angith Anand and Aswin Raj in this paper developed in such a way that the robot is controlled by voice commands. An android application with a microcontroller is used to perform the required tasks. The connection between the android application and the vehicle is made via Bluetooth technology. The robot is controlled by buttons on the app or verbal commands from the user. The movement of the robot is facilitated by two DC servo motors connected to a microcontroller on the receiver side. App commands are converted into digital signals by a Bluetooth rf transmitter to be sent to the appropriate range of the robot. On the receiver side, the data is decoded by the receiver and passed to the microcontroller which drives the DC motor to do the required work. The purpose of voice-activated robotic vehicles is to perform required tasks by listening to user commands. In order for the user to operate the robot smoothly, a preparation step is required. Again, code is used to give instructions to the controller. [8]

V. PURPOSE

The motivation for the project is to build a voice-controlled robotic vehicle that will be helpful to disabled people because it can be used in wheelchairs. It also aims to make voice automation easier and use it in daily life to facilitate complex tasks. The main motive for building a voice-controlled robotic vehicle is to analyse the human voice and act according to the programmed commands. The vehicle can be controlled by the mobile application, so another motive is to use more wireless machines.

VI. SYSTEM ARCHITECTURE

The android smart phone's microphone is used to recognize 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.

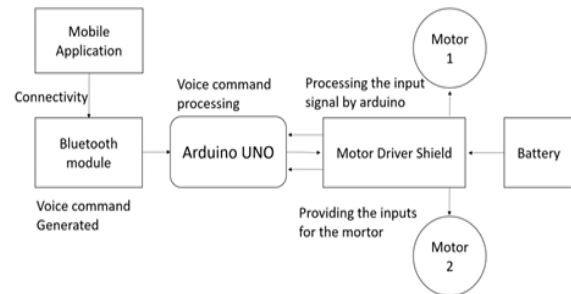


Fig. 1 Block Diagram of the Proposed system

VII. WORKING

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.

A. 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.

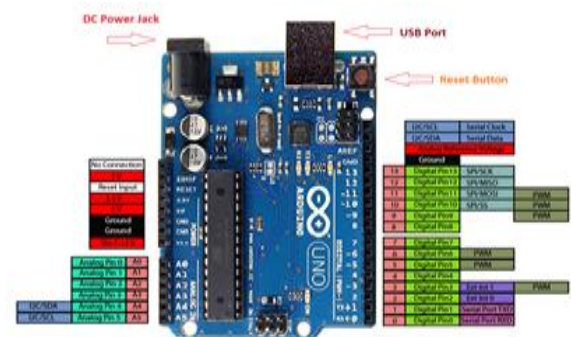


Fig. 2 Arduino UNO

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.



Fig. 3 Motor Driver 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.

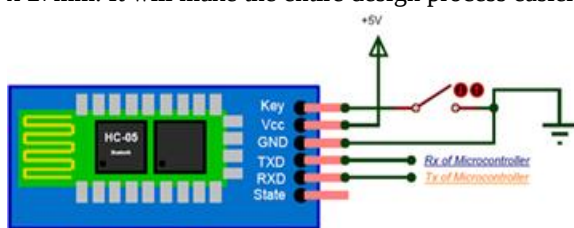


Fig. 4 Bluetooth Module HC05

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.



Fig. 5 D.C. 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.



Fig. 6 Robotic Wheels

VIII. SOFTWARE DESCRIPTION

A. Arduino IDE Software

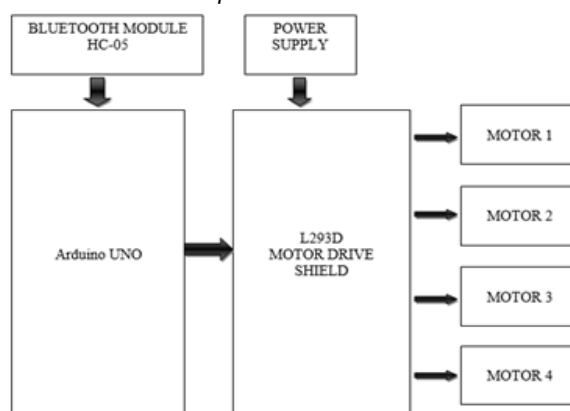


Fig. 7 Arduino Working Digram

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. 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.

IX. 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.

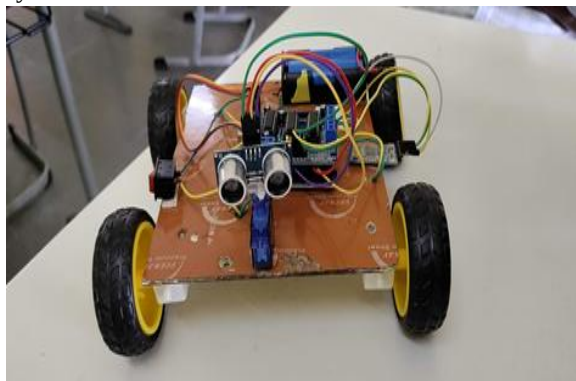


Fig. 8 Voice Control Based Robot

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.

X. CONCLUSION

Since we had to pass the ADC output through all of the filters faster than our sample time; the time it took to do all the filter calculations was very important. We were able to run through 9 filters in under 4000 cycles, which is the amount of cycles available when sampling from the ADC at 4 KHz. The fingerprint comparison function did not have a speed requirement and so the cycle time for that was unimportant. The program was able to recognize five words, but sometimes it would become confused and match the incorrect word if the word that was spoken varied too much from the word stored in the dictionary. As a rough estimate the program recognized the correct word about 70% of the time a valid word was spoken. The program achieved success using Choragus voice, and with sufficient practice a person could say the same word with a small enough variation for the program to recognize the spoken word most of the time. For the general person though the recognition program would have a much lower percentage of success.

Also, the words in the dictionary are words spoken by only one person. If someone else said the same words it is unlikely the program would recognize the correct word most of the time, if at all. The project's 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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