Smart Control of Robotic Vehicle by Voice Command

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Abstract **—Voice signal plays a major role in the communication among human beings. Robots reduce the human efforts in their day-to-day tasks. In this project, a voice-controlled robotic vehicle is developed. The human voice commands are taken by the robotic vehicle through an android application with a micro controller. The voice signal commands are directly communicated to the robotic vehicle using Bluetooth. The robotic vehicle is controlled by voice commands received from the user. The development of the robotic vehicle is carried out using two DC gear motors associated with micro-controller at the collector side. The commands from the application are changed over in to computerized signals by the Bluetooth RF transmitter for a fitting reach (around 100 meters) to the robot. At the receiver end the information gets decoded by the receiver and is taken care of to the micro-controller which drives the DC motors for the fundamental work. The voice-controlled robot is designed and implemented to reach out the necessary undertaking by paying attention to the commands of the user. An earlier preliminary meeting is required for the smooth activity of the robot by the user. A code is utilized for offering guidance to the user. Performance valuation is carried out with appreciable results of the initial experiments.**

Keywords: Robot, Plan, Voice control, Micro controller, Automation, Bluetooth, Fabrication.

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 objective 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 consist of an 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

[1] Single-Equipment with Multiple-Application for an Automated Robot Car Control System by Saleem Ullah, Zain Mumtaz, Shuo Liu, Mohammad Abubaqr (2019).

This paper is deals about the innovative element of the proposed work in this paper the integration of greater functionalities into vehicles increase the complexity of car-controlling.

The proposed system has capability to identity voice commands and makes them to move using Bluetooth technology. They have used two modes of transmission and controlling of the robot car. The first mode is to control a robot car with an android mobile application when the user presses the corresponding touch button in mobile application , a signal is transferred to the micro-controller that is attached to the car through the built-in mobile Bluetooth device motor module to move the wheels of the robot car accordingly to the received signal .The second mode is the hand-gesture system in that accelerometer first senses the acceleration forces from the direction of the hand and sends them to the micro-controller that is attached to the hand. After receiving the data, micro-controller converts it into different angles, between 0-450°, and sends it to the RF receiver of the Arduino Uno that is attached to the robot car through the RF sender. After receiving the signal, it will process the data and sends the signal to motor module to move the wheels of the robot car accordingly to the angles.

[2] Voice-Controlled Autonomous Vehicle Using IoT (2019) by Sumeet Sachdeva, Joel Macwana, Chintan Patela, Nishant Doshia.

This paper deliberates about the concept of Internet of things which can be accessed by any others part of the world. In this project, the motor will be controlled using voice commands through google assistant in smartphones. To use the google assistant, they use the software called “IFTTT”. In this “IFTTT”, we can create the simple programs to control the devices. They also used the Adafruit.io for storing the data, viewing the data and control devices.

[3] Design of Voice Controlled Smart Wheelchair (2015) by Ali A. Abed

The motivation behind the project to help the handicapped people and patients to control the wheelchair using voice commands. In this project, they use new component called “voice recognition board with HM2007”. This will enable the system to recognize different voices, inflections and enunciations of the target word so that it will recognize the different languages .More interesting part in this project , in order to not respond to some similar words spoken randomly in an environment, secret voice key is preferred to be a word with complex pronunciation in order to not pick up by others and also by utter the words twice in order to respond the system The direction and velocity of the chair are controlled by pre-defined Arabic voice commands.

[4] Arduino Based Voice Controlled Robot Vehicle by M Saravanan et al 2020

This paper deliberates to create voice controlled robotic vehicle (VCRV) is to listen and act on the commands of the user. For that, they have developed the
android app AMR voice for the voice control robot using MITA2 app. The developed app contains the option to connect to Bluetooth module and access the Bluetooth setting of the phone .

[5] Design and Fabrication of a Voice Controlled Wheelchair for Physically Disabled People by G Azam and M T Islam (2015).

The authors have used CAD/CAE tools to eliminate the early flaws and to improve the quality of the Wheels and their mechanism. With the combination of these mechanical and electrical parts, the manual wheelchair is turned to be an electrical wheelchair. They have utilized a PIC controller manufactured by Microchip Technology to control the system operations. They have programmed the

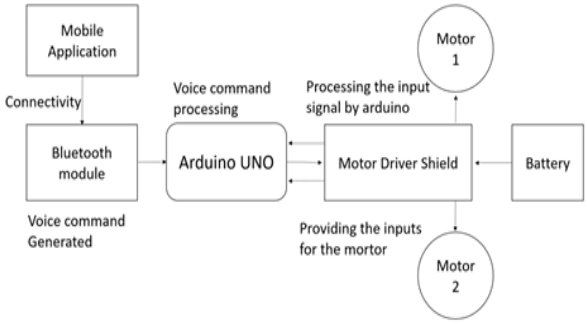
assembly level code and stored in controller's memory. In this project, they have developed a cost effective and efficient movable and easily controllable Wheelchair that can be controlled via voice commands. By using PIC, they are controlling the motors and using voice recognition board to identify the voice commands. It was allowed to move in a straight line. In voice recognition board, we have to train the board to recognize the voice.

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. METHODOLOGY

The Voice Controlled bot is designed to provide a mobility to the disability. The whole process is controlled by the Arduino Uno microcontroller. The user will control the bot with the mobile application. The mobile application will provide the user to input their voice to recognize. For adjusting the orientation, they can use various commands to control the bot. The aim of the project is to build a bot with voice controlled and of low cost. The hardware's implementation has been structured is been selected accordingly to achieve the goal.



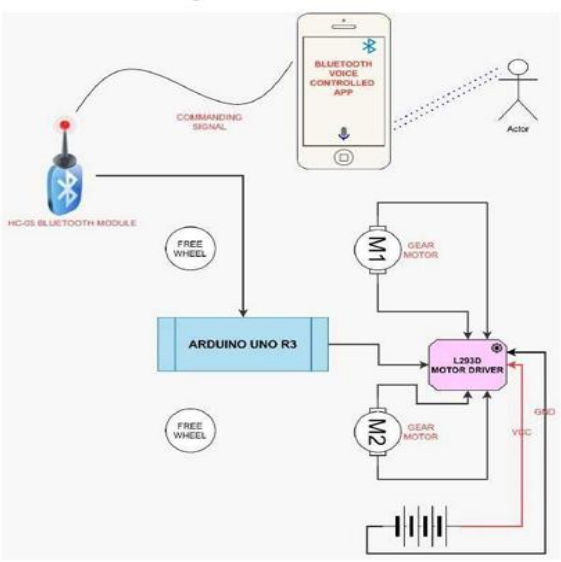


Fig. 1 (a) & (b) Block Diagram of the Proposed system

VII. WORKING

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.

When the voice-controlled bot is connected to the power supply, the bot gets initialized. At the initial stage we have connect the Bluetooth module with mobile application. Once it connected, we will start the commanding the bot by voice. We have four basic commands which send to microcontroller through Bluetooth which uses mobile application. Mobile application will process the input data converted into commanding signal. This signal is processed by Arduino UNO then signals the motor driver. Gear motors will start rotates according to signal received

from motor driver. 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 UN O is an open-source microcontroller board designed b y Adruino.cc and based on the ATmega328p microco ntroller. The board features 6 analogue pins and 14 di gital pins that may be programmed using Arduino ID E 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.

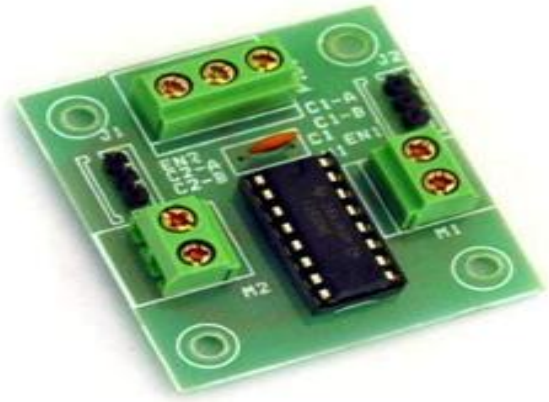


Fig. 3 Motor Driver Shield

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

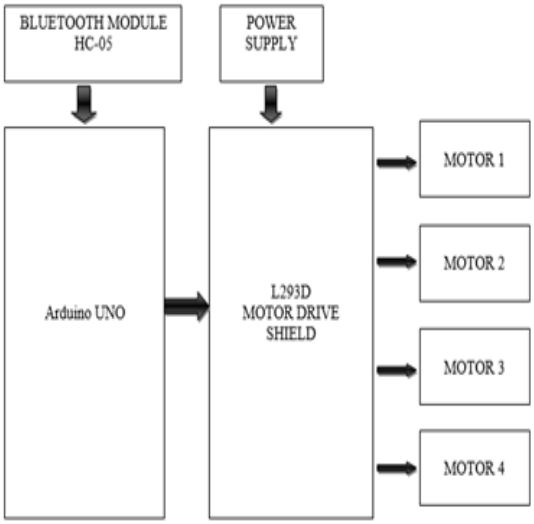


Fig. 7 Arduino Working Digram

The Arduino IDE software consists of two main parts, Editor and compiler. An editor area in the software is used to write the required code for the project. The Arduino IDE software consists of three sections, (1) Menu bar: The bar located at the top of the window is the menu bar. This contains five options, File, Edit, Sketch, Tools, Help. In this, the file option contains twelve options New, Open, Open recent, Sketchbook, Examples, Close, Save, save as, Page set up, Print, Preferences, Quit. The menu bar also has an option called the Serial monitor which is used to debug the written code of the respective project. To use the serial, monitor option, the Arduino board should be connected with the computer. (2) Text editor: The area below the menu bar is a text editor. (3) Output pane: the bar located at the bottom of the software is the output pane. This bar displays the error messages if there are any.

If any components to be integrated with the Arduino board, the library of the respective component need to be chosen. This can be done using this command,

Sketch -> Include library -> choose the required library.

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.

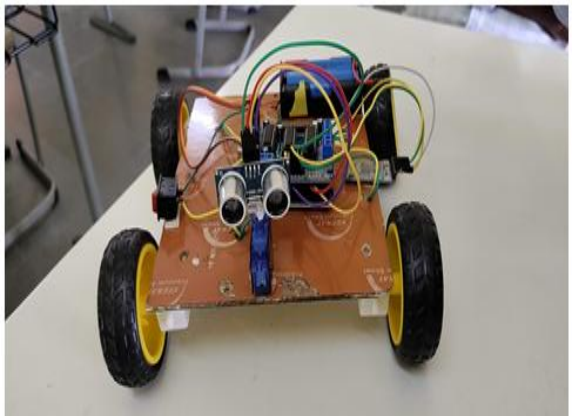


Fig. 8 Voice Control Based Robot

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.

IX. CONCLUSION

Since we had to pass the ADC output through all of the filters faster than our sample time; the time it took 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 ough 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" 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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