

VOICE CONTROLLED ROBOTIC VEHICLE WITH SPEECH RECOGNITION**Deepapatnaik**

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Abstract: Because of innovative advances, unmanned vehicle contemplates are proceeded with consistently. This venture shows the plan and usage of a vehicle which can be controlled and explored by our voice. The building included is voice-controlled structure. The Voice Controlled vehicles are regularly utilized in land, ocean, air, and so forth where individuals can't enter or entering might be risky for human life they can likewise be utilized in specific circumstances where the individual isn't in a situation to drive. They can likewise be utilized in numerous undertakings, for example, military, modern, and so forth. The benefits of voice-initiated vehicles are sans hands and quick information input tasks. The voice directions explore the vehicle in the necessary course. The mode of cooperation among people and Vehicle is through Internet of Things based stages. Since we needed the robot to be remote, we utilize the ESP32 Wi-Fi module. The voice directions can be sent through google right hand utilizing advanced.

Keywords: Robot, Voice command, Arduino, Android, Bluetooth module, Motor driver, Motor.

1. Introduction

Speech signals are the most important means of communication in human beings. Almost every conversation to interact is done by means of voice signals. Sounds and various speech signals can be converted into electrical form using a microphone. Voice recognition is a technology

which is used to convert the speech signals into a computer text format. This voice recognition technology can be used to control and generate speech acknowledgement using some external server.

Robot voice has the ability to understand thousands of voice commands and perform required action. The voice recognition is a bit difficult task because each person has his own accent. For that, Robot voice uses Bit Voicer Server which supports 17 languages from 26 countries and regions. These robotic assistants can be used for shaping, manufacturing and tooling purposes in various sectors such as manufacturing, defence etc. In hospitals, these robotic assistants can be used for the purpose of performing surgeries and operations with high precision. In this paper, we develop an assistant robot that can be operated using speech commands

2. Literature Review

In the existing system, the robot is initially controlled through wired networks like switches, buttons etc. later it is controlled through wireless networks like remote etc. But in wireless network, there is no proper acknowledgement for the transmitted signal. As a result, there is no reliability and robustness

M Saravanan [1] developed “Arduino Based Voice Controlled Robot Vehicle” (October 2020) The main goal of this device is to create a robot vehicle that can be powered by a person's voice order. These systems are commonly referred to as Speech Controlled Automation Systems (SCAS). The abovementioned device is a prototype of our design. The concept is to build a robot that will be controlled by voice commands. A cell phone is used to operate the robot; there are several articles that demonstrate the contact between a robot and a smart phone. For remotely automating the robot, a smart phone is an excellent interface. It has a lot of functionality that can be useful. The specified task is carried out in this design using an android application and a microcontroller. Bluetooth technology facilitates communication between the software and the robot. The module will receive the commands that are sent over the channel. The aim of a voice-controlled robotic vehicle (VCRV) is for it to listen to and respond to the user's commands.

H. Jagadish Kumar [2] wrote “Voice Controlled Car using Arduino and Bluetooth Module” (December 2019). The objective of this report is to build a voice-activated car that reacts speech commands. Enhancements in the areas of disturbance and range handling are, nevertheless, needed. Simple voice commands such as left, right, forward, back, and stop are used to navigate the vehicle. These signals are sent to the Bluetooth module by an Android application. A Bluetooth module and a control device are used to record and analyse the voice input. In this suggested method, they conducted research on the different control type configurations for robots. It shows that real-world manuscripts can be effectively researched and replicated using only speech (human voice) as a means of control.

The aim of this lookup is to develop a basic robotic hardware implementation so that this

structure can concentrate on Bluetooth smart grids. When the app is running, a transmitter on the smartphone is used to identify user voice commands. The app characterizes commands and translates voice to text using Google's speech-recognition technology. The text would then be transmitted through Bluetooth to the receiver component.

Aditya Chaudhry [3] implemented “Arduino based voice controlled Robot” (June 2019) This research paper proposes a method that focuses on the idea of controlling a robot with a voice signal. The voice control robot is merely an example of how to control the movements of a simple robot using common voice commands. In this system they have used ATmega3898P It's a microcontroller on a single chip. It has an 8-bit RISC processor core based on Harvard architecture. To monitor a robotic vehicle with our voice, we used a very reliable interface. First, all user signals are converted to script using Google's speech to text converter, that is built into the app. The command's text form will be sent to the robotic car's Bluetooth module. This Bluetooth module enables the car's microcontroller to the Android app for transmitting data. When the micro-controller receives the text signal, it directs the robotic car to drive in the appropriate direction.

Parichart Leechor [4] wrote “Operation of a Radio-Controlled Car by Voice Commands” (March 2010) The purpose of this research is to drive a radio-controlled car via voice commands (RC car). The experiment involved sending a user's voice commands to a device, which then converted them into digital data. Thereafter, the data output was converted into radio signal commands. Finally, an RC car was functioned using radio wave commands. The first feature is voice command recognition, for that they have adopted the Hidden Markov Model (HMM), which is one of multiple voice recognition technologies. The second part is the hardware, which involves a system dual port and RC car communication. To commence, we use signal processing theory to convert the human voice into a system digital signal.

Vipul Mehta [5] gave “Robot Controlled Car Using Wi-Fi Module” (May 2016) In this review, we'll glance at using a Wi-Fi module and an Android phone program to command a robot-controlled vehicle. We'll also demonstrate how to operate the appliances without an Android phone by sending a regular SMS. The aim of this paper is to show how to operate a robot-controlled vehicle using a Wi-Fi module and an Android Smart Phone application. It also demonstrates that the devices can be operated by sending a regular SMS even if the user does not have an Android phone. This role can be easily modified to include a covert agent camera that streams the recordings to the client through Wi-Fi.

3. System Design

This project Voice Controlled Robotic Vehicle helps to control robot through voice commands received via android application. The integration of control unit with Bluetooth device is done to capture and read the voice commands.

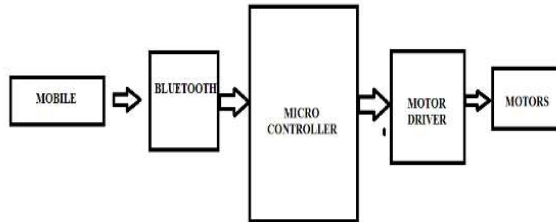


Figure 1. The block diagram of proposed system design.

The robotic vehicle then operates as per the command received via android application. For this 8051 microcontroller is integrated in the system which makes it possible to operate the vehicle via android application. The controlling device may be any android based Smartphone/tab etc having an android OS. The android controlling system provides a good interactive GUI that makes it easy for the user to control the vehicle. The transmitter uses an android application required for transmitting the data. The receiver end reads these commands and interprets them into controlling the robotic vehicle. The android device sends commands to move the vehicle in forward, backward, right and left directions. After receiving the commands, the microcontroller then operates the motors in order to move the vehicle in four directions. The communication between android device and receiver is sent as serial communication data. The microcontroller program is designed to move the motor through a motor driver IC as per the commands sent by android device.

4. Hardware

Various hardware that are used in this project are,

- Arduino Uno.
- Bluetooth module.
- Motor drivers.
- Motors.

Now, let us learn about each of the hardware modules used briefly.

A. Arduino UNO:

Arduino uno is an open-source platform based on easy-to-use hardware and software. The micro controller board placed on the microchip ATmega328p micro controller and developed by Arduino.cc. The board has 6 Analog pins, 14 digital pins programmable with Arduino IDE via a Type B USB cable. It can power by external main volt battery.

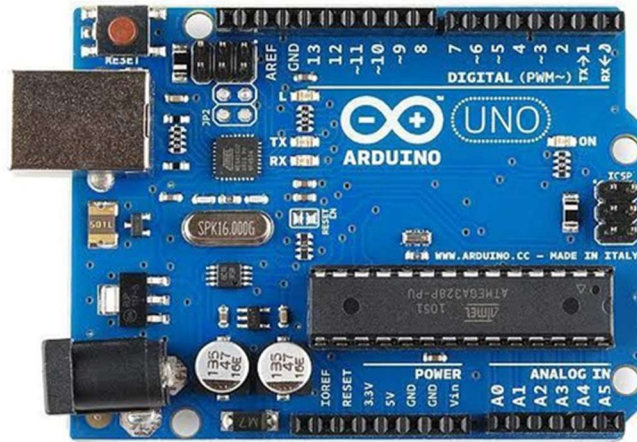


Figure 2. Arduino UNO

B. Bluetooth module:

HC-05 Bluetooth Module is an easy-to-use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication which makes an easy way to interface with controller or PC. HC05 module is a simple Bluetooth module is a simple Bluetooth serial port protocol module designed for wireless serial connection setup. It has a footprint as small as 12.7mm X 27mm. It will simplify the overall design cycle.

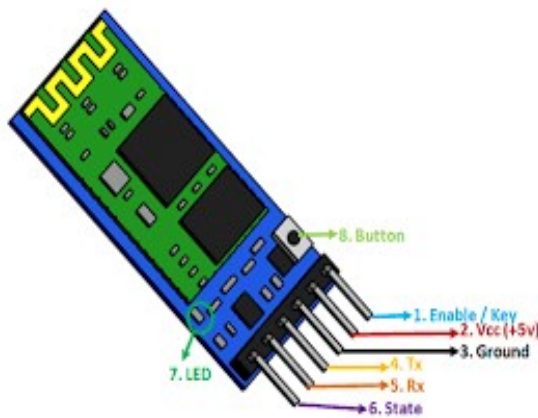


Figure 3. Bluetooth module

C. Motor driver:

A motor driver is an integrated circuit chip which is usually used to control motors in autonomous robots. Motor driver act as an interface between Arduino and the motors. The most commonly used motor driver IC's are from the L293 series such as L293D, L293NE, etc. The L298 Driver is a high voltage high current dual bridge driver designed to accept standard TTL Logic levels and drive inductive loads.

The emitter of the lower-level transistors of each bridge are connected together to the corresponding external terminal can be used for the connection of an external sensing resistor to the L298D Motor Driver.

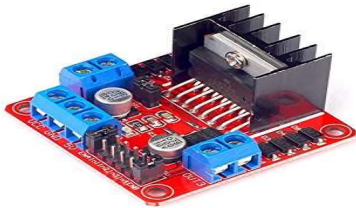


Figure 4. Motor driver

D. Motor :

An electric motor is an electrical machine that converts electrical energy into mechanical energy.

Most electric motors operate through the interaction between the motor's magnetic field and electric current in a wire winding to generate force in the form of torque applied on the motor's shaft.



Figure 5. Motor

5. App Development

A. Arduino Bluetooth Controller

Figure 6. Shows Developed Android app with the help of the app we developed an app and named it as Arduino Bluetooth Controller. **Arduino Bluetooth controller can connect a mobile phone with any hardware. Although it may sound complicated, it's actually quite easy.** Don't worry if you have no experience in programming microcontrollers.

In this post, I will show you how to create simple Bluetooth communication between our [Android](#) phone and Arduino. [Arduino](#) is an open-source electronics platform based on easy-to-use hardware and software. This is absolutely for everyone who would like to build their own creative toys involving hard electronics and software skills.

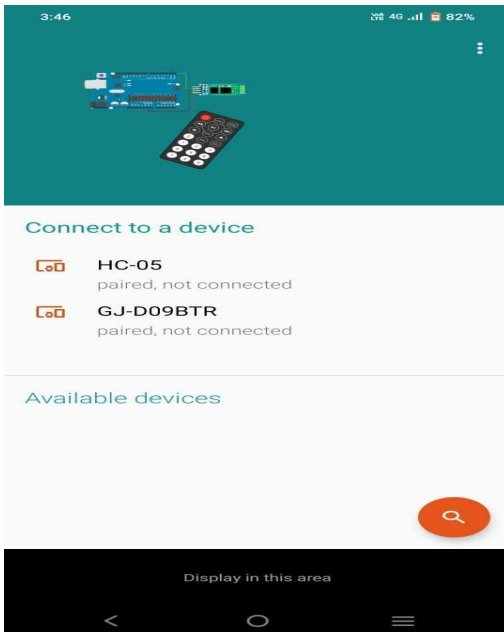


Figure 6. Arduino Bluetooth Controller

B. Arduino Voice Control

Figure 7. Shows Developed Android app with the help of the app we developed an app and named it as AMR_VOICE. The app contains the option to connect to Bluetooth and access the Bluetooth settings of the phone. Android smartphone with an app is the transmitter end. The Android speech-recognition app used here was developed using MIT App Inventor. Initially, there needs to be pairing of Bluetooth HC-05/HC-06. Once pairing is done, then it needs to be connected. When the app is running in the smartphone, the user's voice commands are detected by the phone microphone.

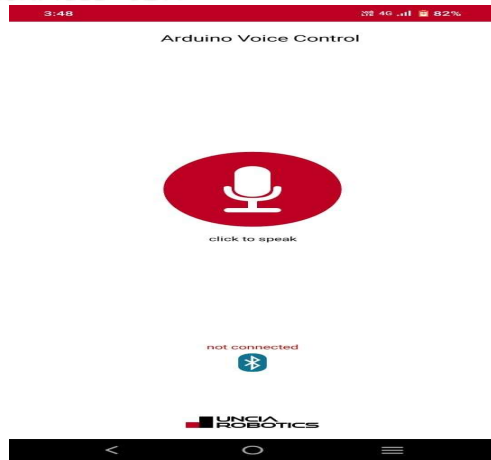


Figure 7. Arduino Voice Control

APPLICATIONS

- 1.The robot is useful in many places where human find difficult to reach but human voice reaches.
2. Used in Constraction sites to transfer material
- 3.Used for home applications
- 4.Used for military applications.
- 5.Used in industrial applications.

Eg: In fire situations, In highly toxic areas etc.

ADVANTAGES

- 1.The robot is small in size so it can be used for spying.
- 2.Easy to operate..
- 3.Low cost.
- 4.User friendly

6. Result

Figure 8. shows the voice controlling commands are successfully transmited via bluetooth module; the desired operations successfully take place.Voice Controlled Robotic Vehicle helps to control robot through voice commands received via android application. The integration of control unit with Bluetooth device is done to capture and read the voice commands. The robotic vehicle then operates as per the command received via android application.

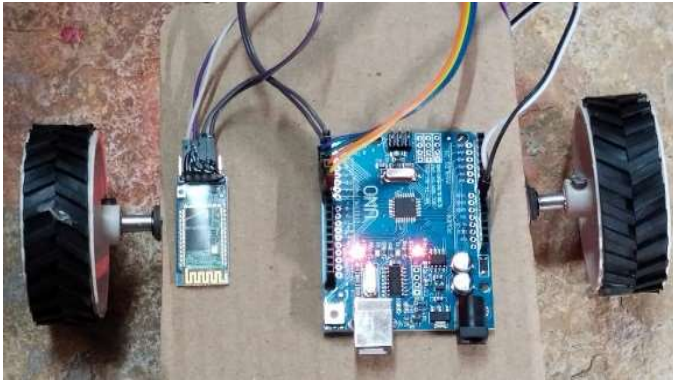


Figure 8. Assembly Image

7. Conclusion

In this paper, a device is controlled with the speech commands. Speech commands are taken by a microphone to the google assistant. The recognized command converted to the form in which the device can recognize. The final form of the commands is sent to the device and the device moves accordingly. This study has achieved the objectives set at the beginning of Rating and it's attractive because it can interact with the robot, naturally. Although the developed application still has limitations and shortcomings, but these applications can be modified in the future for other uses such as wheelchair controlled by voice, entertainment robot which reacts with human voice and so forth.

A number of advantages and constraints of the application were detected to enable the improvement of this application in future. Application development is expected to help students who wish to develop similar applications using another language.

ACKNOWLEDGEMENT

Special thanks for the guidance to our Asst professor Mrs. Deepa Patnaik.

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