



VOICE BASED ROBOTIC VEHICLE WITH OBSTACLE AVOIDANCE

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Abstract: The major principle of the robotic vehicle is to examine the user voice command and perform the given user task and without the human presence in particular area can control the robot via user voice input. To control the robot through user voice input it requires android app to communicate via Bluetooth HC-05 module. Subsequently, the robotic vehicle has skill-ability to sense the object and tells the user to keep away from the object with the aid of selecting another way with the help of Ultrasonic sensor module. Therefore, this paper offers mainly for physically disabled peoples. Thereby in future, they drive their own vehicle with a more safety and security from unexpected attempt at sudden hit-and-run cases due to automatic braking or slow down feature. For the hardware, customized Arduino will give the control over the motors that use to run the robotic vehicle. Ultrasonic sensors interact with the Arduino help in automatic braking of a vehicle on sudden obstacle detection.

Keywords—voice command, obstacle, Bluetooth module, Arduino, Ultrasonic ranging sensor.

I. INTRODUCTION

Generally, robots are made by different frameworks such as mechanically, electrically, and computing technology which can be utilized to perform various operations in mechanical or residential use. These robots can reduce the human efforts and have more interaction with user.

To achieve such robots can be controlled via user voice inputs or commands. These robots can help the user to free up their hands and perform on various operations within the vehicle. To perform the various task given by user it requires Smartphone to communicate with robot. To process the voice commands a simple and efficient method is to utilize a smartphone. Smartphones are incredible gadgets fit for performing numerous functions like PC. Here, the proposal focuses in an issue faced by specially abled people who wish to drive their vehicle on their own but they cannot because of the natural cause. In this proposed system, the emphasis is on voice control of robot with automatic braking, speed slow down and avoidance of obstacles consequently or physically (through voice command).

In this paper, we will use an android app to pass on the voice commands to the Arduino through Bluetooth communication using Bluetooth module. Ultrasonic sensor will act as the obstacle detector, which will act as a mediator for Arduino microcontroller (or the CPU) and the proximal environment, and it would eventually lead to

slowing down the vehicle or to fully break its motion. It would be a great aid for the safety of people driving it.

II. LITERATURE SURVEY

Ritika Pahuja and Narender Kumar [5], they discussed about how the robot can be controlled by using remote buttons in the android applications in smartphone via specified conventional components.

Nitin Bhuvania, S R Madkar and Maitri Parida [4] explained that how the robotic vehicle is controlled by using Wi-Fi module via android application and it can also be controlled by sending an ordinary message.

Kalane, Pathak, Javed, Aarushi Koul, Raunak Varshney [3] mentioned that some basic commands such as upwards, reverse, left and right side to control the robotic vehicle via Bluetooth module by android application in smartphone.

III. SYSTEM DESIGN AND ANALYSIS

A. Block Diagram

At first the order is given utilizing android application. The order is as voice utilizing Google assistant strategy. Initial the robotic vehicle waits for user voice input, when the user gives voice command that can be transmitted into

Arduino via Bluetooth module. Then Arduino executes the user inputs and the robot start user actions, ultrasonic sensor transmits sound waves if sound waves hit any object then obstacle is found and immediately the robot stops. At this state, the robot is in hold position until the user gives next voice command.

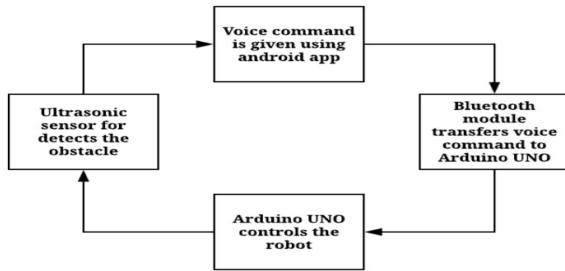


Figure1. Block diagram of robot

B. System Flow

The general flow of the robot is defined below,

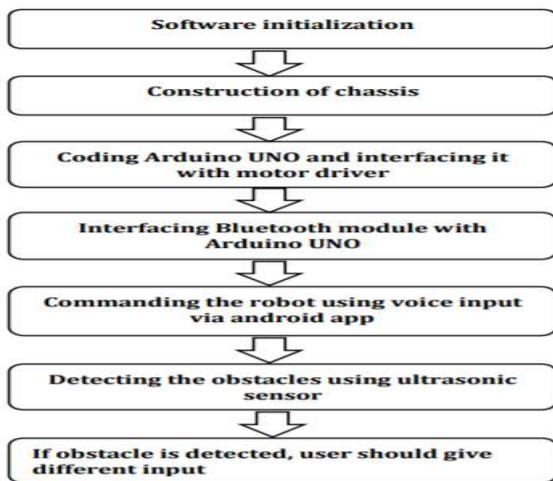


Figure 2. System Flow of robot

IV. SYSTEM REQUIREMENTS

The system design consists of following components:

- A. Arduino uno
- B.L298N DC Motor Driver
- C. Bluetooth
- D. Ultrasonic detecting sensor
- E. 300RP Motors

F. Connecting Wires

G. Power supply (or battery)

H. Arduino Ide

I. BT Voice Control for Arduino(SMART PHONE APPLICATION)

A. Arduino Uno



Figure3. Arduino Uno

Microcontroller is the major part of the robot. Arduino uno is programmed with help of Embedded C programming language.The board has 14 digital input/output pins, 6 analog input/output pins and programmable with the Arduino ide.

B. L298N Motor Driver

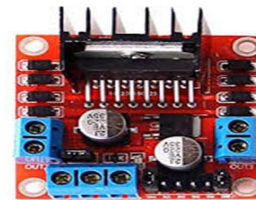


Figure 4. L298N Motor Driver

This dc Motor derives controls motors as well as regulate the speed and direction of dc motor given by user input.

C. Bluetooth



Figure 5. HC-05

The Bluetooth HC-05 module is utilized to transfer given user voice command from Smartphone to microcontroller. The Bluetooth HC-05 can be used as either transmitter or

receiver. This module is automatically reconnects within 30 minutes and disconnected when the vehicle is out of range.

D. Ultrasonic detecting sensor



Figure 6. Ultrasonic Sensor

Ultrasonic sensor consists four pins. It transmits sound waves, if sound waves hit any object the vehicle will stop immediately. This module is used to detect the object in front of the robot and alert the microcontroller. This module also includes an ultrasonic transmitter, receiver and control circuit.

E. 300RP Motors



Fig.6: 300RP Motors

This motor is used to generate the motion. The speed of the DC motor can be controlled by changing supply voltage. This dc motor is used for movement of the robot vehicle.

F. Connecting Wires



Figure 7. Connecting Wires

A wire is a single, flexible and usually cylindrical in shape. Wires are used to bear or pass the electricity and telecommunications signals. These wires are used to connect the components of the robot.

G. Power supply (or battery)



Figure 8. Power Supply

This power supply is used to power the DC motor.

H. Arduino Ide

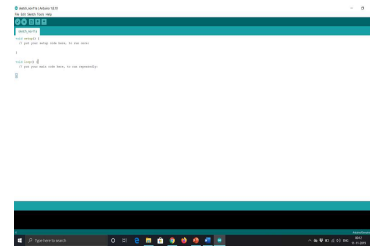


Figure 9. Arduino Ide

The open-source Arduino Software (IDE) makes it easy to write code and transfer it to the board. Arduino IDE software runs on Windows Operating System, Mac Operating System, and Linux Operation System. In Arduino IDE, the written code is transfer into microcontroller via type B USB.

I. Bluetooth Voice Control For Arduino



Figure 10. Application for Bluetooth Voice Control

This application is used to send the user voice command to the robot via smartphone through Bluetooth module.

V. METHODOLOGY

Our proposed system consists of the three sections:

A. Input section

The voice commands are sent to robot through Android device via Bluetooth.

B. Microcontroller Section

These commands are sent to the microcontroller by Bluetooth. The microcontroller process these commands and Ultrasonic sensor transmits sound waves, if sound waves hit any object the vehicle will stop immediately. At this state, the robot is in hold position until the user gives next voice command.

C. Output Section

Based on the command received by the microcontroller the robot moves in different direction. And also, Ultrasonic sensor used to detect the obstacle.

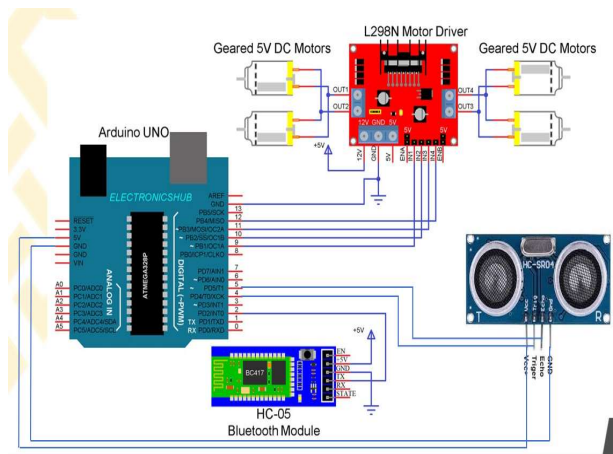


Figure 11. Circuit Diagram of Robot

VI. RESULT

At the point when the robot gets voice order or command, the robot begins to move.

- The commands of the user can be "Forward", "Backward", "Left", "Right" and "Stop".
- Depending upon the order given by the user, the robot works as indicated by it.
- When the obstacle comes before the robot with the distance less than 100cm, the Ultrasonic

sensor senses the obstacle, if it is detected immediately robot stops.

- At this state, the robot is in hold position until the user gives next voice command.

The voice commands given the robot are as follows:

TABLE I. User Commands

INPUT (User command)	Voice	OUTPUT (Robot executes given user command)
Move forward direction		It goes Front
Move backward direction	backward	It goes Back
Move left		It takes Left
Move right		It takes Right
Stop		It stops
Garba		Rotation of the robot vehicle in square shape

Thus, our robot makes movement according to user commands.

TABLE II. Presence of obstacle

S.no	Conditions	Present of obstacle	Possible voice commands
1	Distance is greater than or equal to 100cm	Yes	"Forward" "Backward" "Left" "Right" "Stop"
2	Distance is less than 100cm	Yes	"Backward" "Left" "Right" "Stop"
		No	"Left" "Right" "Stop"

Case1: When distance is greater than or equal to 100cm and present of obstacle, the possible voice Command are "Forward", "Backward", "Left", "Right", "Stop".

Case2: When distance is less than 100cm and present of obstacle, the possible voice Command are “Backward”, “Left”, “Right”, “Stop”.

VII. Comparison

- In paper [1] robot is designed which can detect obstacles in its path and to be avoided.

-The proposed paper deals with detection obstacles in its path and stops Automatically and also using “stop” command manually.

- In paper [2] robot is designed to move in different direction by avoiding obstacles using ultrasonic sensor.

- The proposed paper deals with collisions avoidance automatically by using Ultrasonic sensor and navigate the car through various voice commands manually.

- In paper [3] robot is designed wirelessly controlled by using smart phone via Bluetooth module.

- The proposed paper deals with designing a car with Bluetooth module which take voice commands from user using Android application.

- In paper [5] robot motion is controlled by using remote buttons in the android application in smartphone.

-The proposed paper deals with designing the control system of car through voice commands manually and an Automatic Sensor which stops when an obstacle is in its path.

- In paper [6] robot is controlled in desired position by using user voice commands or push buttons.

-The proposed paper deals with designing a car to take voice commands from user through Bluetooth and respond manually. And also respond automatically by stopping the vehicle when objects are near-by using ultrasonic sensor.

A. Advantages

- The proposed model is cheaper than the Artificial Intelligence (AI) technology used today.
- Easy to install in vehicles.

B. Limitations

- This can only be used where similar technology vehicles are running.

C. Disadvantages

- A voice error will occur if the voice input is not accuracy provided by the user or near to smartphone.

D. Application

- Home automation
- Physically handicapped
- Industrial Robots
- Low range Mobile Surveillance Devices
- Military Applications
- Assistive devices

VIII. CONCLUSION

Usage of the proposed system will reduce the accidents. It deals with the regular issues of the drivers, prevention of whether they are completely fit for differently abled. Unused drivers would not confront the issue of changing the paths every now and again. Be as many as possible, this innovation must be applicable on the streets having vehicles of the latest innovation running on it. This can be expected as the demand or limitation of the proposed model. These robotic systems reduce human efforts as well as helps the military, research purposes and industries.

IX. FUTURE ENHANCEMENT

Our project can conclude that the robot is controlled by giving user voice commands. So, it is simply implemented or used in future scope for many fields and also reduces human effort. This may use for some mechanical application and residential purpose. Bluetooth communication technique works efficiently with some time delay after several runs and test. This can only be used where similar technology vehicles are running.

REFERENCES

[1]Tabassum F, Lopa S, Tarek MM,Ferdosi BJ ,“Obstacle avoiding robot”. Global J. Res. Eng., 17(1). Version 1.0 , 2017.

[2] Kirti Bhagat, Sayalee Deshmukh, Shraddha Dhonde, Sneha Ghag, “Obstacle Avoidance Robot”, Volume 5, Issue 2, February 2016.

[3]Mrumal.K. Pathak, Javed Khan, “ROBOT CONTROL DESIGN USING ANDROID SMARTPHONE”,2 Feb 2015, ISSN :2347-5471.

[4]S R Madkar, Vipul Mehta, Nitin Bhuwania, Maitri Parida,“Robot Controlled Car Using Wi-Fi Module”. ISSN: 2277 128X Pg:31-33.

[5] Narender Kumar,Ritika, “Android Mobile Phone Controlled Bluetooth Robot Using8051 Microcontroller”, ISSN: Page:2345 – 3879.

[6] Preeti M,Soniya Z, Rupali, Aishwarya, Megha, “Voice Control Robot Using Android Application”.Vol-3, Issue-2, 2017, ISSN: 2453-1361.

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