



VOICE CONTROLLED ROBOT CAR USING ARDUINO WITH VARIABLE SPEED

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Abstract : *The main motive of this paper is to construct a cost effective and flexible voice controlled Robo Car using Arduino. The working of the project is based on Arduino micro-controller, motor drivers and a Bluetooth module. In this system, there is an android application to give specific voice commands to the robot. And the robot has the Arduino board with a Bluetooth transceiver module which receives the commands and the robot car will follow according to the voice command.. Our proposed technique will be useful for applications such as assistive robots for people with disabilities or in industrial applications such as work robots.*

Keywords – Arduino UNO, Voice Control, Variable Speed

I. INTRODUCTION

In this emerging world, science and technology plays an important role in communication which thereby improves the social connections amongst human beings. Robotics is an interdisciplinary sector of science and engineering dedicated to the design and construction. The invention of mobiles and computers have modified the lives of people. Due to advancement in vehicle automation nearly about 90% of death rate is reduced. Vehicle automation is increasing with increase in technology. An autonomous car is a vehicle capable of sensing its environment and operating without human involvement. It decreases the mental pressure. In ancient time, traditional wheel chairs were used by most of the physically challenged people in which they used to require a helping hand.

This paper aims to design a voice-controlled Robot car in which the vehicle is controlled by the inputs provided by the user through voice. This voice control robot consists of an Android Smartphone as a transmitter and Robot with Arduino and Bluetooth module as a receiver. The Arduino board communicate serially with HC-05 Bluetooth module to read the commands. Arduino also checks the command. Now Arduino board controls the movements of the robot accordingly voice commands. It will be further bridged to motors and different components of the car. When the Bluetooth app is turned on and is connected with the current system via Bluetooth, one will operate the car by giving wireless commands from the app using the functions already programmed in the app. The vehicle will motion in four directions: Forward, Backward, Right and Left with a variable speed. In forward movement, all four motors will move in the same direction and for backward motion; movement of the motors will be in opposite direction. For left and right movements, either of the motors will rotate and to stop the motors will stop. The motors are instructed by the user through the Bluetooth app of Android Smartphone.

The robot can either maintain preset linear speed or can be have variable speed on flat surfaces. The voice recognition is maintained with help of a micro controller; an Arduino (MEGA). Five basic commands are used to steer the robot that are forward, right, left, reverse and stop to guide the robot. Building on these, a few more commands allow the robot to change speed or perform a particular movement

II. LITERATURE REVIEW

We have searched and read different papers from Internet and other sources and also we have referred other conference papers to gather more information which would help us in designing and developing our project.

Table.1

Sr.no	Title	Authors	Methodology
1	Arduino Based Voice Controlled Robot	Aditya Chaudhry, Manas Batra, Prakhar Gupta, Sahil Lamba, Suyash Gupta,	In this research paper, a system is being proposed, which focuses on the concept of how a robot can be controlled by the human voice.
2	Design and Implementation of a Voice Controlled Robot with Human Interaction Ability	Humayun Rashid, Sayed Bin Osman, Qader Osman, Uddin Ahmed	The paper presents the research of the designing & development of a voice controlled talking robot using mobile phone based on Arduino Uno microcontroller. A SD card module along with a SD card which will consist some pre-recorded human voice as audio file will be used by the robot for the development of the robot's talking system.
3	Voice Controlled Robotic System using Arduino Microcontroller	Vedant Chikhale, Raviraj Gharat, Shamika Gogate, Roshan Amireddy	This paper emphatically describes the structural design of the robot control system. this paper present a review of current robots controlled by mobile phone and discuss a closed loop control systems using audio channels of mobile devices. In this work, the robot moves upward, backward, left and right side by the android application such as Arduino Bluetooth RC Car. The microcontroller to be used in the project is PIC 16F877 from Microchip family.
4	Arduino Based Voice Controlled Robot Vehicle	M Saravanan, B Selvababu, Anandhu Jayan, Angith Anand and Aswin Raj	The paper aims on the design, development and the commands from the application is converted in to digital signals by the Bluetooth RF transmitter for an appropriate range (about 100 meters) to the robot.

5	Development of voice controlled robotic vehicle using Arduino processor for unmanned environment	Durairaj Ramamoorthy Iyer Balasubramanian ⁰⁾ , G. Mageshwaran, M. Jayaprabakar Jayaraman, Arvind, and M. A. Mohamed Abubacker	This paper focuses on development of voice controlled robotic vehicle for unmanned environment for picking and placing an object.
6	Implementation of voice-controlled robot using android application	Mamatha K R Shalini Ragothaman, ,Krithika Raj D, Susmi Zacharir Anusha N	The system proposes a brand new attempt to substitute humans in diverse agricultural operations like detection of the presence of pests, spraying of pesticides, spraying of fertilizers, etc. thereby providing safety to the farmers and accurate agriculture. This project involves usage of PIC Microcontroller to control the movement of robot with the help of joystick (transmitter) and a receiver. The wireless camera mounted on the top of the vehicle tracks the path taken by the robot. This cost effective robotic vehicle can improve productivity, safety in agricultural applications.

III. METHODOLOGY

The current power wheelchair control interfaces are still not enough to provide truly independent mobility for substantial number of people with disabilities. A physically challenged person with locomotive disabilities needs a wheelchair to move around and he does so manually by pushing the wheelchair with his hands. Thus a solution that can be derived from this is to introduce a voice control interface that would enable the users to interact with the controller with just the help of voice commands. The Voice controlled robot, a prototype to demonstrate the voice control mechanism that can be implemented for a wheelchair, is controlled with the help of voice activated -Arduino Uno microcontroller board. This system utilizes an Arduino Uno, a Bluetooth module-HC05 and a smartphone to control the motors driving the robot. The commands for the robot are sent via Android speech recognition. These voice commands are sent through the app via Bluetooth as a string of data to the Arduino. The microcontroller then processes these data strings and correspondingly controls the motors of the robot.

Block Diagram

It consists of android application that identifies the voice commands that are transferred through the Bluetooth module HC05. The module then converts the commands to text and the string of characters are sent to the Arduino for further processing. The Arduino microcontroller decodes the string obtained and correspondingly performs further functions. The signals are sent to the motor shield that hence powers and drives the motors connected to it.

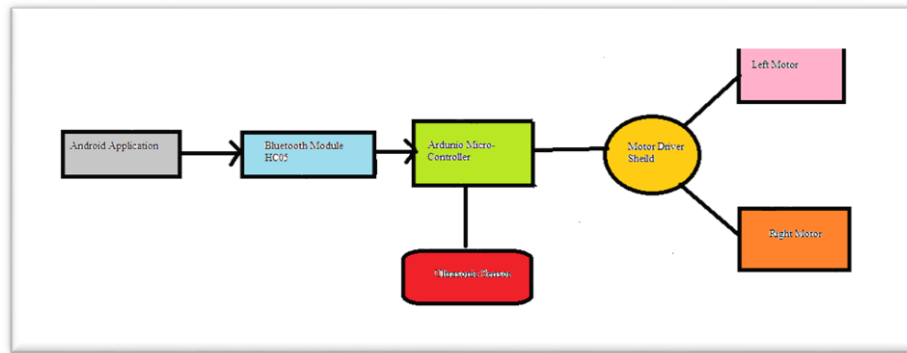


Fig.1 Block Diagram

The block diagram of operation of robot car using android application in fig 1. it consists of

1. Arduino uno: Arduino uno a microcontroller board based on the ATmega328P.



Figure 1.1: Arduino UNO

2. Bluetooth module (HC-05 module): HC-05 module is an easy-to-use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup.



Figure 1.2: HC-05 Bluetooth Module

3. L293D motor driver: A motor driver is an integrated circuit chip which is usually used to control motors in autonomous robots.
4. Android Application: Voice is sent through this application and then sent to the Bluetooth module.
5. Ultrasonic sensor: An ultrasonic sensor is an instrument that gauges the separation to an object utilizing ultrasonic sound waves. An ultrasonic sensor utilizes a transducer to send and get ultrasonic heartbeats that hand-off back data about an item's nearness. High-recurrence sound waves reflect from limits to create unmistakable reverberation designs.

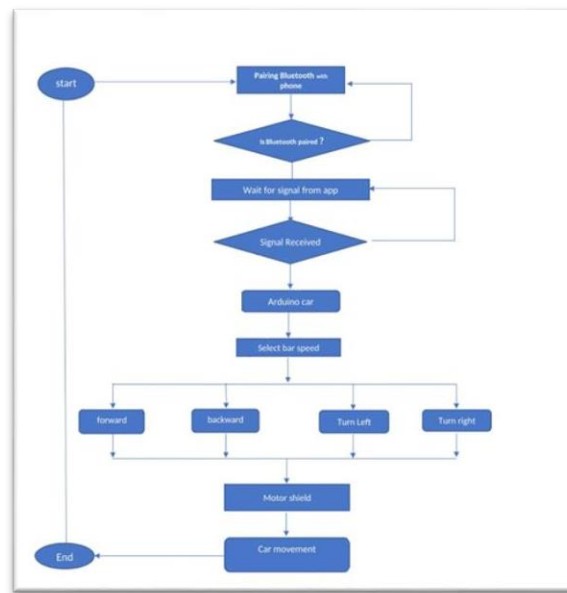


Fig.2 flowchart

The flow chart in Fig.2 explains the algorithm of working of the Robo Car. the robot will receive the commands in text form. This is done by the connected Bluetooth receiver at the robot end. Initially the robot will wait for an incoming connection. When available, the text will be parsed character by character to the robot. The Arduino will then build the characters into a single word. A small delay of 100 milliseconds is implemented in building the word, so as to prevent overwriting or loss of any character. Once the command has been received the Arduino then compares the text to the pre-programmed instruction set as follows:

Algorithm for the robot is as follows: -

Step 1: Start

Step 2: To Switch on the Vehicle power supply will give to the Arduino board and then further to Bluetooth module.

Step 3: Pairing the Bluetooth device with the mobile phone

Step 4: Robot should wait until it receives signal from the app.

Step 5: If it receives signal, robot works accordingly like if signal is received for movement and follow the following commands.

- a. Slow Forward: Activates both motors and Moves Robot forward at low speed.
- b. Fast Forward: Activates both motors Moves Robot forward at full speed.
- c. Slow Backward: Activates both motors and Moves Robot backward at low speed.
- d. Fast Backward: Activates both motors and Moves Robot backward at high speed.
- e. Sharp Right: Activates both motors (Right Motor Reverses and Left Motor forward) and makes a 90-degree point turn.
- f. Slow Right: Activates left motor and makes a 90-degree wide turn.
- g. Sharp Left: Activates both motors (Right Motor forward and Left Motor reverse) and makes a 90 degree point turn.
- h. Slow Left: Activates right motor and makes a 90 wide turn.
- i. Zigzag: Activates both motors alternatively to move forward in a zig zag pattern.

Step 6: If the signal is not received go to step 4

Step 7: universal OFF signal is used to deactivate.

IV. RESULTS



Fig.3 top view

Fig.4 front view

The voice controlled robot was implemented using the right algorithm, the robot was manoeuvred effectively using voice commands. The robot was able to move forward, backward, right, left using the variable speed and stops when initiated .

V. CONCLUSION

The proposed framework of our project shows that how a robot can be control utilizing Bluetooth. The voice controlling orders are effectively transmitted through Bluetooth innovation and the desired activities effectively happen. In a nutshell we can conclude that voice controlled robots can certainly be a future market for many industrial and domestic purposes related to automating daily tasks.

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