VOICE CONTROLLED ROBOTIC VEHICLE

Arti Paswan[1], Ajay Kumar Gautam[2], Bhartendu Vimal[3],

Farheen[4], Arun Kumar Mishra[5]

1, 2, 3, 4(E&C Deptt., BIT, GIDA, Gorakhpur, India)

5(Astt Prof. E&C Deptt., BIT, GIDA, GIDA, Gorakhpur, India)

ABSTRACT

In this paper a robotic vehicle controlled by voice commands for remote operation is presented. Speech recognition technology is a prominent technology for Human-Computer Interaction (HCI) and Human-Robot Interaction (HRI) for the future. Speech can be used efficiently for robotic control and communication. The speech recognition circuit has been designed to work independently from the robot's main intelligence. To control and command an appliance by speaking to it, will make it easier, while increasing the efficiency and effectiveness of working with that device. At its most basic level speech recognition allows the user to perform parallel tasks, (i.e. hands and eyes are busy elsewhere) while continuing to work with the computer or appliance. The proposed topic involves voice recognition. Voice recognition is the process of capturing spoken words and commands   using a microphone or telephone and converting them into a digitally stored set of words.

*Keywords***:** *Human-Computer Interaction (HCI), Speech Recognition,Arduino, UART*

I.   INTRODUCTION

In this project a robotic vehicle operated by human speech commands has been designed. A robot is usually an electro-mechanical machine that is guided by computer and electronicprogramming. Many robots have been built for manufacturing purpose and can be found in factories around the world. Designing of the latest inverted ROBOT which can be controlling using an APP for android mobile. And in which we use Bluetooth communication to interface Arduino UNO and android. Arduino can be interfaced to the Bluetooth module though UART protocol. According to commands received from android the robot motion can be controlled. The consistent output of a robotic system along with quality and repeatability are unmatched. This robots can be reprogrammable and can be interchanged to provide multiple applications.

In this project, the system operates with the use of a android phone Bluetooth device which transmits voice commands to an Arduino UNO to achieve this functionality. An ARM series microcontroller is used together with an Android Application for the desired operation. The Android Application is connected to the Bluetooth module (HC-05) present on the Robot via Bluetooth. The commands are sent to the robot using push buttons or voice commands present on the android application. At the receiving end two dc servo motors are interfaced to the microcontroller where they are used for the movement of the vehicle. The RF transmitter of the Bluetooth can take

either switch press or voice commands which are converted to encoded digital data for the advantage of adequate range (up to 100 meters) from the robot. The receiver decodes the data before feeding it to another microcontroller to drive DC motors via motor driver IC for necessary work.

II.   METHODOLOGY

2.1.Hardware & Software Requirements

The required hardware for this project is ArduinoUNO, Motor Driver IC, Bluetooth Device Module, DC Motor,Battery,and Voltage Regulator. WheelsSoftware requirements are Keil µ Vision IDE, MC Programming Language: Embedded C, Bluetooth Voice Controlled for Arduino app.

2.2.Project Block Diagram
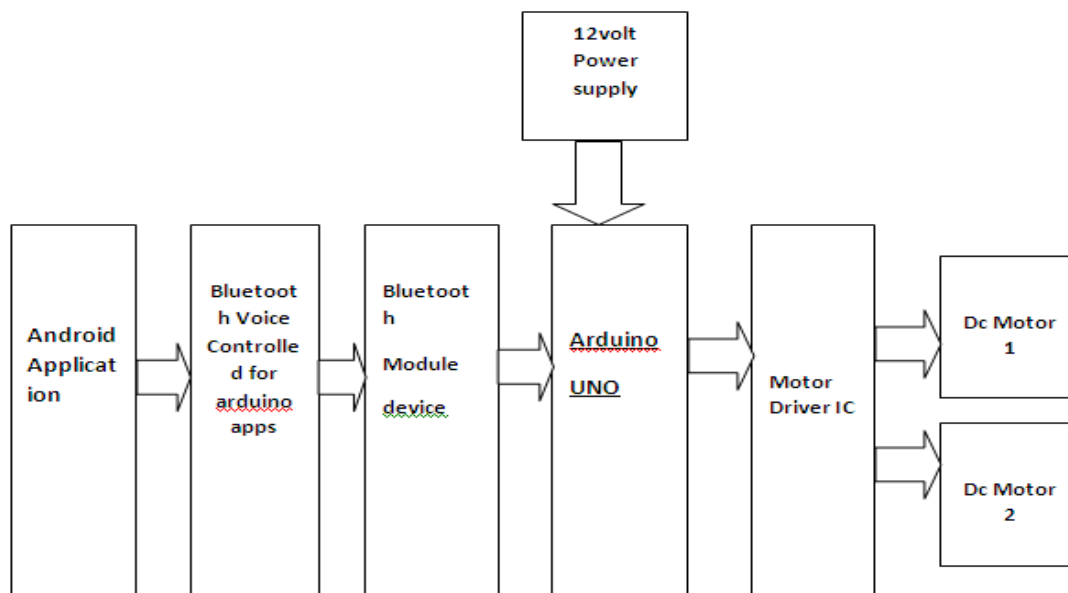
Fig.1 **Functional block diagram of voice controlled robotic vehicle**

The basic block diagram of the simple voice controlled robotic vehicle is given it consists of the smartphone that recognises the voice commands and are being wirelessly transferred to the Bluetooth module HC05. The module then converts the command 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 that hence powers and drives the motors connected to it. On the Transmitter section, commands are given to the Mobile Application through the micro-phone of the mobile handset. This mobile handset is connected to the moving vehicle via Bluetooth module. The mobile application used, is programmed in such a way that the voice commands given to the handset are received by the micro-phone and these analog voice commands

are converted to digital word sequences (A to D conversion). These stored sequences are than transmitted to the robotic vehicle via Bluetooth transceiver module and are sent to the transceiver controller. Android application transceiver is used to decode the received signal with the Bluetooth module. The controller compares these digital signals with the stored programme commands in it and convert them into voice strings. The voice strings are then used to run the servo motors for the desired interval of time

2.3. Circuit Diagram
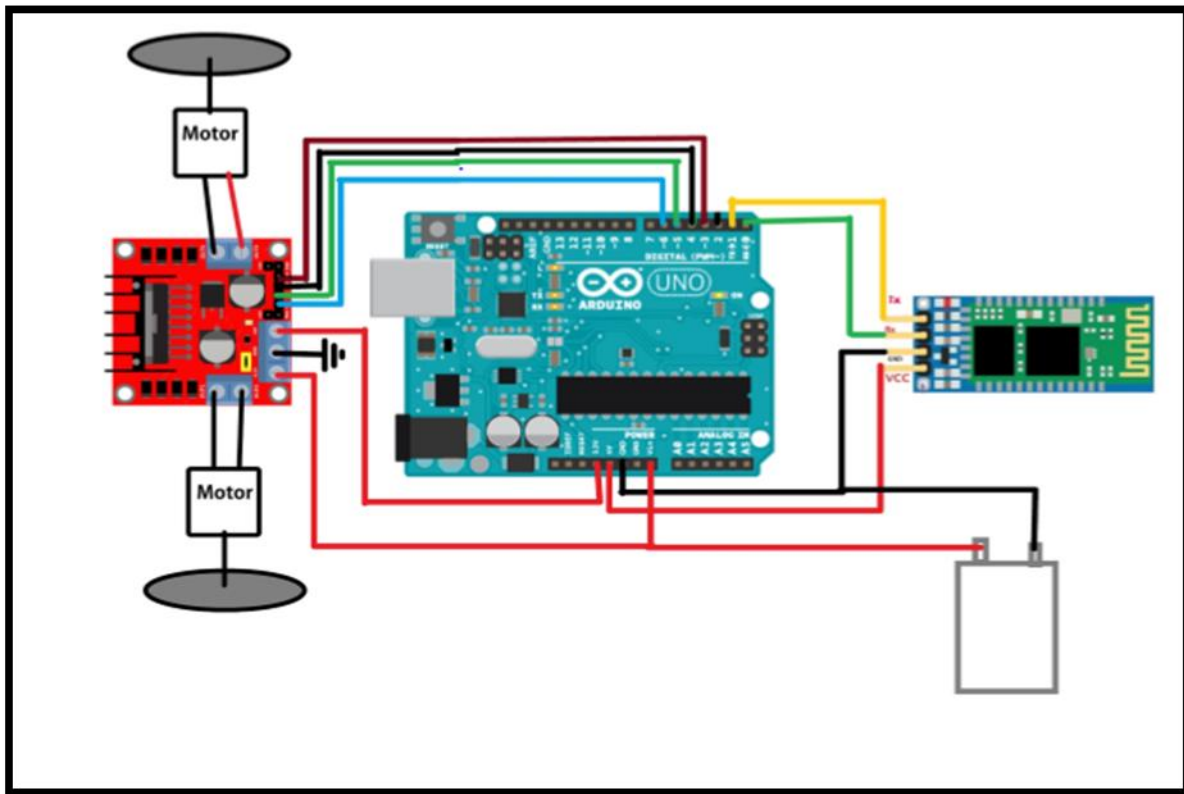
Fig-2 Circuit Diagram

A DC power supply is required to run the system. The DC power supple feeds the Microcontroller and the Bluetooth module. The Bluetooth module receives the signal sent from an android smart-phone, where the application software coded in C language is installed. The microcontroller, thereby, sends instructions, which when executed, helps in functioning of the motor driver. The movement and functioning of the motor can be controlled by using the android based application software. Hardware of this project consists of Arduino UNO, Bluetooth module and a motor driver IC. The Bluetooth module is connected with the Arduino UNO board for the connection with the user. Through the Bluetooth module for monitoring and controlling the particular motor reaches the board and process accordingly and the output of the Arduino goes to the motor driver IC and it controls the particular motor.

2.4 Controlling of Robotic Vehicle

Here are the steps for how to use android application to control the robotic vehicle.

1) Download the application "BT VOICE CONTROL FOR ARDUINO" from Google play store and install it.

2) First make sure your HC-05 Bluetooth module is paired with your mobile. The default password for pairing is "1234" or "0000".

3) Check once you get started with the application, the Bluetooth of the mobile is automatically enabled.

4) Click on "connect robot" option present in options menu.

5) Now select HC-05 to get paired with the module. After pairing it is ready to use.

6) Now click on the "MIC" icon and speak or instruct the robot verbal.

7) When you speak "left" your speech gets recognized and converted into text. That text is transferred to robot through Bluetooth.

8) The robot receives the string, decodes it and compares it with the Instructions that are described in the program and moves the robot in forward direction.

9) The same in the case of Up, Left, Right, down Stop.

10) As per command given from android app, motor is drive in up, down, left, rightand stop in this way.

III.   APPLICATIONS

- Speech and voice recognition security system.
- Telephonic assistance system.
- On board digital assistant for automobiles.By putting webcam and GPS device you can controlling your robot wireless.
- Commands and control of appliance and equipment. The robot is useful in places where humans find difficult to reach but human voice reach. Such as- in fire situations, in highly toxic areas.
- It is the one of the important stage of Humanoid robots.
- The robot can be used for surveillance or reconnaissance.
- The voice controlled robotic car can be easily drive by unskilled driver by using voice commands with the help of android application in smart phone.

IV.   ADVANTAGES

- The robot is small in size, so space required for it is small.
- We can access the robot vehicle from the distance of meters as we are using Wifi for the connection between robot and the server PC. As we are using smart phone which   is attach to the robot so it will capture video which will be used for security.

- Low power consumption.

- No accident is done by improper driving of people and also available for elderly and disabled people

V.   FUTURE SCOPE

- This project work has been narrowed down to short range Bluetooth module. Using a long range modules and other connectivity devices will result in connectivity with the robot for long distances.

- Power Optimization such sleep and wakeup schedules can be incorporated.

- Image processing can be implemented in the robot to detect the color and the objects.

- A thermal camera can be installed to sense the heat emitted by bodies useful in military purposes to detect enemies on the lines.

- Automatic Targeting System can be implemented in the robot for tracking the target.

- Further enhancement in project can be used for Home security and military purposes where the commands can be given to robot without risk by increasing the range and by installing cameras.

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- It is the one of the important stage of Humanoid robots.

- Speech and voice recognition security systems.

- The robot can be used for surveillance or reconnaissance.

VI.   CONCLUSION

The integration of voice recognition and navigation system into robotic vehicle which helps for disabled people. This speech control system, though quite simple, shows the ability to apply speech recognition techniques to the control application. Our robot can understand control Commands spoken in a natural way, and carry out action. The method is proved for real-time operation. Simply in this system an android application is used to recognize human voice and is converted to text, text is further processed and used to control robotic movements.The prototype revealed the simplicity of a voice controlled system such as the wheelchair. It depicts how control mechanism can be obtained without having to use any other control mechanism such as buttons or joystick. By improving the voice reception and inducing further commands, the devices can be automated to the fullest.With few additions and modifications, this robot can be used in army for detecting and disposing hidden land mines. The robot can be used for surveillance. In future we can interface sensors to this robot so that it can monitor some parameters and we can improve the efficiency using Internet of Things (IoT) technology. We can also add wireless camera, in order to incorporate other security features.The Wireless control is one of the most important basic needs for all the people all over the world. But unfortunately the technology is not fully utilized due to a huge amount of data and

communication overheads. Generally many of the wirelesscontrolled robots use RF modules. But our project for robotic control makes use of Android mobile phone which is very cheap and easily available. The available control commands are more than RF modules. For this purpose the android mobile user has to install a designed application on her/his mobile. Then he/she needs to turn on the Bluetooth in their mobile.

VII.   REFERENCES

[1].   Othman M.K. Alsmadi, Anas A. Al Jallad, Zaer S. Abo-Hammoud, and Fares J. Al Majali "Arduino-Based Automatic Safety Vehicle Control " 2nd ICRSET pp.140 March 21-22, 2014 Dubai (UAE)

[2].   Nelson Rai1, Deepak Rasaily 2, Tashi Rapden Wangchuk3, Manoj Gurung4, Rit Kr. Khawas5 "Bluetooth Remote Controlled Car using Arduino" IJETT pp.381 Volume 33 Number 8, March 2016

[3].   Mr. Vedant Chikhale, Mr. Raviraj Gharat, Ms. Shamika Gogate, Mr. Roshan Amireddy "Voice Controlled Robotic System using Arduino Microcontroller" IJNTR Volume- 3, Issue-4 pp. 92-94 April 2017

[4].   Prof. Bhuvaneshwari Jolad1, Mohnish Arora2, Rohan Ganu3, Chetan Bhatia"VOICE CONTROLLED ROBOTIC VEHICLE" IRJET Volume: 04 Issue: 06 pp.191 June-2017

[5].   Soniya Zope1Preeti Muluk2, Rupali Mohite3, Aishwarya Lanke4,Megha Bamankar5 "Voice Control Robot Using Android Application" IJIR pp.1723 Vol-3, Issue-2, 2017

[6].   K. Kannan1, Dr. J. Selvakumar2 "ARDUINO BASED VOICE CONTROLLED ROBOT" IRJET Volume: 02 Issue: 01 pp.49 Mar-2015.

[7].   Subankar Roy #1, Tashi Rapden Wangchuk#2, Rajesh Bhatt#3 "Arduino Based Bluetooth Controlled Robot" IJETT – Volume 32 Number 5- February 2016.

[8].   P R Bhole1, N L Lokhande2, Manoj L Patel3, V D Rathod4, P R Mahajan5 "Voice Command Based Robotic Vehicle Control" IJRASET ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887 Volume 5 Issue XI November 2017.

[9]. .   http://.android.com/about/versions/index.html.

[10].   L298N MOTOR DRIVER:http://buy.flyrobo.in/hc05

[11].   Bluetooth Module:http://buy.flyrobo.in/l298n

[12].   DC Motor:http://buy.flyrobo.in/dc300