Voice Controlled Robotic Vehicle Using Arduino & Android Device

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Abstract - This project was developed in a way that the robotic vechicle is controlled by voice commands. An android application with a microcontroller is used for required tasks. The connection between the android app and the vehicle is facilitated with Bluetooth technology. The robot is controlled by buttons on the application or by spoken voice commands of the user. The movement of the robot is facilitated by the four dc motors connected with motor driver and microcontroller at the receiver side. The commands from the application is converted in to digital signals by the Bluetooth RF transmitter for an appropriate range (about 10 meters) to the robot. At the receiver end the data gets decoded by the receiver and is fed to the microcontroller which drives the DC motors for the necessary work. The aim of Voice Controlled Robotic Vehicle is to perform the required task by listening to the commands of the user. A prior preparatory session is needed for the smooth operation the robot by the user. For the same a code is used for giving instruction to the controller.

*Key Words***:** Arduino, Android, Bluetooth, Robot, Motor Driver.

1.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. The main motive to build a VCRV is to analyze the human voice and act according to the programmed commands. The most basic commands are backward, forward,

right , left and also stop the robot. The vehicle is to be controlled wirelessly with the use of android smartphone; our intention is to make a robotic vehicle with use of advanced smartphone technology in a very simple and economic way. In current scenario vehicles are manually controlled and all are done by the person who is driving the vehicle.

2. Block Diagram

The block diagram of this project is given in Fig.1. The basic block diagram of Voice control robotic vechicle using arduino & anroid device is given below which consists of an android phone that recognize the command and transmit to the Bluetooth module via Bluetooth link. The user gives the command via Adaptive Multi-Rate(AMR)voice and this command is transferred to the Bluetooth Device. According to the given command Arduino UNO receive the command and operates on it.
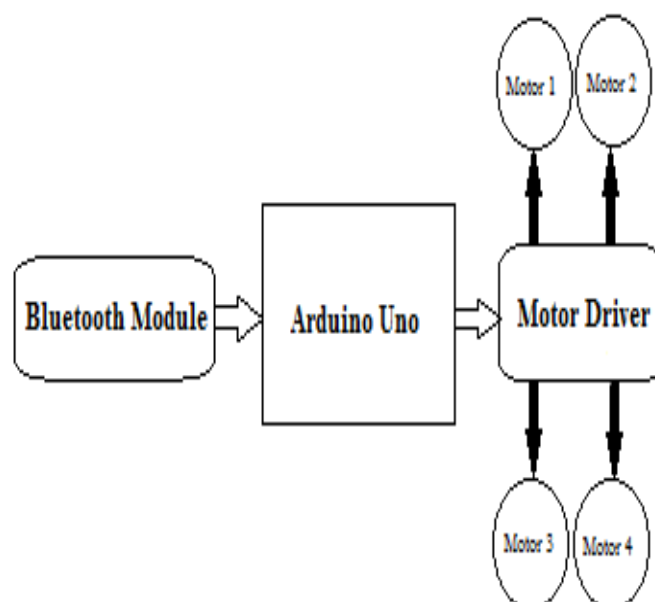

Fig -1: Block Diagram

3. Circuit Diagram

The circuit diagram of this project is given in Fig.2. To run the system, we need DC power supply. The DC power supply is given to Arduino UNO, Bluetooth Module and motor driver. Hardware of the project is Arduino UNO, Bluetooth Module and motor driver is used. The commands are given to through the Android application which works as transmitter and received via Bluetooth Module which works as a receiver. This Bluetooth module is connected by Arduino Uno, which perform the operation as the command is given. The Arduino ATmega328p is programmable. We can use C or Java Language for programming of the Arduino ATmega328p. The DC motor is connected to the motor driver and Arduino. The Bluetooth module is connected to Arduino UNO.
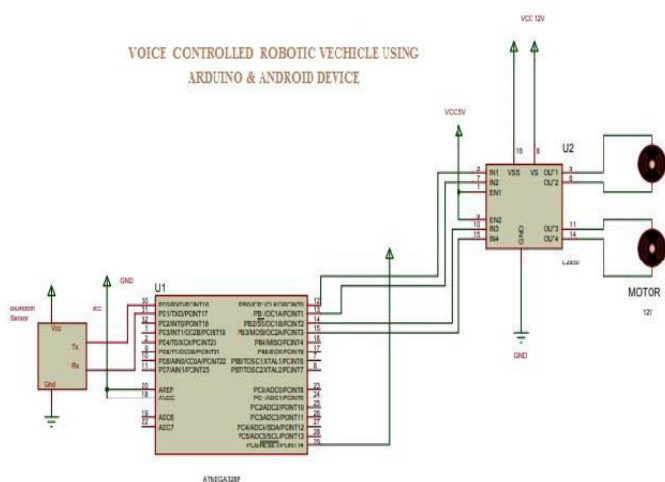

Fig -2: Circuit Diagram

4. Hardware Description

4.1 Arduino Uno: The Arduino Uno is an open-source microcontroller given in Fig.3 board dependent on the Microchip ATmega328 microcontroller and created by Arduino.cc. The board has 6 Analog pins, 14 digital pins programmable with the Arduino IDE through a kind B USB cable. It can be controlled by the USB link or by an outside 9-volt battery, however it acknowledges voltages between 7 and 20volts.

Fig -3: Arduino Uno

4.2 ATmega328p microcontroller: Arduino Uno is an AVR ATmega328p microcontroller given in Fig.4 (MCU)-based development board with six analogue input pins and 14 digital I/O pins. The MCU has 32kb ISP flash memory, 2KB RAM and 1KB EEPROM. The board Provides the capability of serial communication via UART, SPI and I2C. The MCU can operate at a clock frequency of 16MHz. In this project, digital I/O pins 2, 3, 4 and 5 of Arduino are configured as output pins. Pins 0 and 1 of Arduino are used for serial communication with HC-05 Bluetooth module.
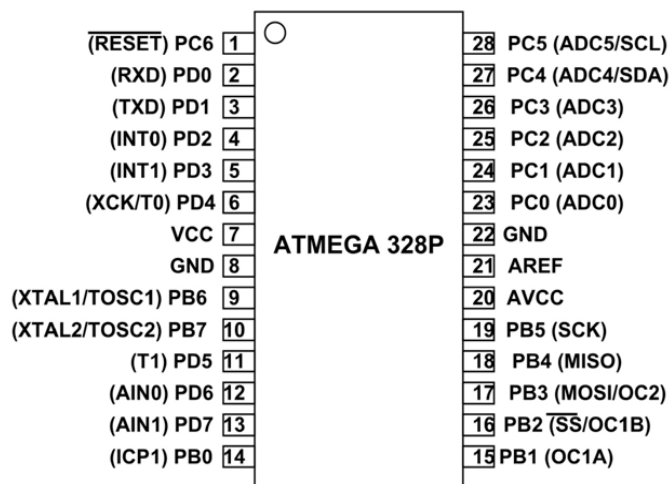

Fig -4: ATmega328p

4.3 L293D: L293D Motor Driver The L293D 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 Fig.5 Shows the L293D Motor Driver.
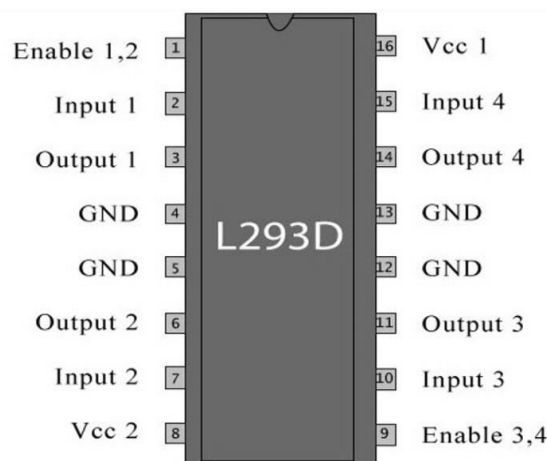

Fig -5: L293D

4.4 Bluetooth Module: HC-05 given in Fig.6 module is simple to use Bluetooth SPP (Serial Port Protocol) module, designed for clear wireless serial association setup. The HC-05 Bluetooth Module is utilized in a Master or Slave configuration, creating it a good resolution for wireless communication.
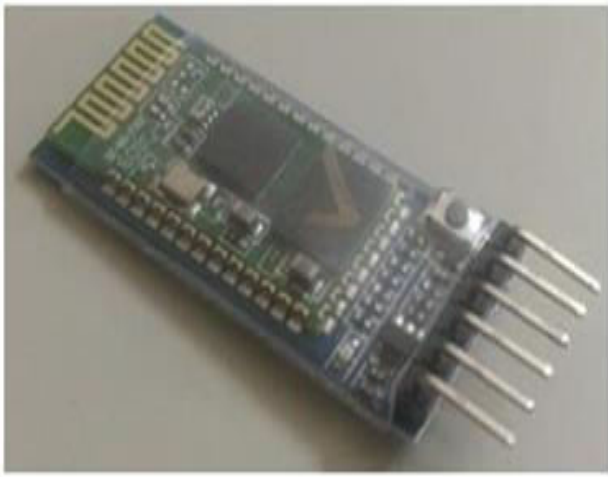

Fig -6: Bluetooth Module HC05

4.5 DC Motor: A DC motor is a class of rotary electrical machine that converts t\direct current into mechanical energy. All types of DC motors have some kind of internal mechanism either electronic or electro mechanical, so it can change the direction of flow of current in path of motor periodically.

4.6 Android App: Arduino Bluetooth Voice Controller (AMR) Figure 7,8. Shows Android app with the help of the app we connect to the Voice Control Robotic Vechicle (VCRV) and gives command to Robotic Vechicle The app contains the option to connect to Bluetooth.

Fig-7: Android App

Fig-8: Android App

5. Steps to control the robotic vehicle.

Install Bluetooth Application for Arduino
- Pair HC-05 Bluetooth module with the mobile Default password is "1234" or "0000"

- Click on the "MIC" icon and speak instruct the robot On speaking our speech gets recognized and converted into text by (google speech to text converter). That text is transferred using Bluetooth

- The Bluetooth Module receives the string, decodes it and compares it with the Instructions that are described in the program and moves the robot in forward, backward, left, right direction.

6. Results

Through our Design of our Voice Controlled Robotic Vechicle Using Arduino & Android Device (VCRV) system, we are able the to achieve following as results.

Robot is controlled through voice commands given by the user who is operating the project. These voice command needs to be given through an android app which is installed on the users android mobile. Speech recognition is done within the android app and then a respective command is sent to the voice-controlled robot vehicle. Microcontroller fitted on the vehicle decodes these commands and gives an appropriate command to the motors connected to the vehicle. some pictures of our project shown below Fig 9,10,11.
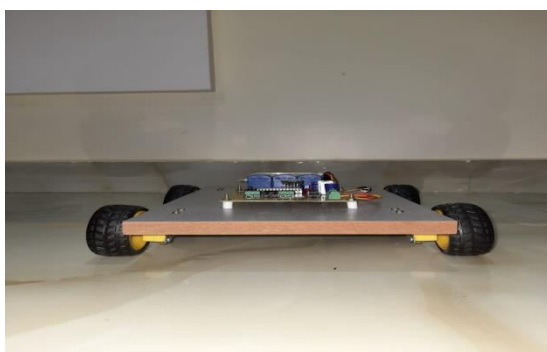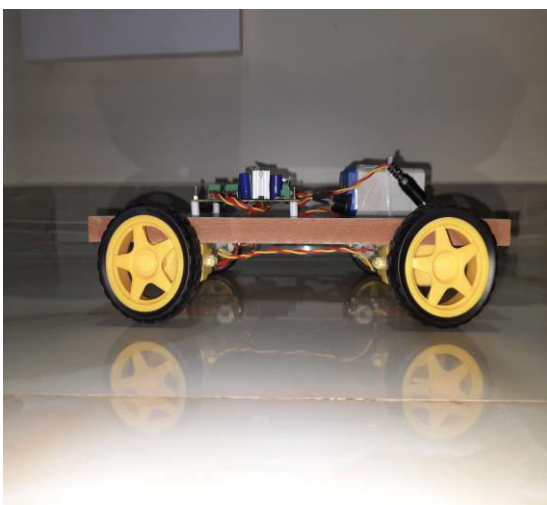
Fig-9: Project(VCRV)

Fig-10: Project(VCRV)

Fig-11: Project(VCRV)

6. CONCLUSIONS

We are going to develop a technology which is useful for the modern and developing society. We can reduce the maximum number of accidents and also have a pleasant driving . This robotic vehicle works on the principle of Arduino programming and speech Recognition technology. The vehicle can be operated by using some simple voice commands.

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