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Voice Controlled Robot Vehicle

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ABSTRACT

This project builds a voice-controlled robot vehicle which can be controlled by voice commands by the user simple voice commands like forward, backward, right, left and stop this command is used to run the vehicle this command is given by using Bluetooth module followed by Arduino uno microcontroller. Whenever receives a command for the robot vehicle movement that time Arduino operates based on the coding. Coding is written and designed to move the motors through motor driver circuit as per command given by the user voice command can give through to mobile phone using inbuilt microphone.

Keywords: Robot, voice commands, Arduino uno, Bluetooth.

1. Introduction

Voice signals is the one of the most important of communication in human beings. At most every conversation is done by means of voice signals. Sounds and various speech signals can be converted into electrical form using a microphone transducer. Voice recognition technology is used to convert the voice signals into a computer text format. voice recognition technology can be used to control and generate speech acknowledgement using some external server. these types of systems are called as Speech Controlled Automation System robot is controlled by a android mobile phone, android phone is a very good interface for remotely automating the robot vehicle in this design, an android application with a micro controller is used for the giving the commands for required specific task. The development of a voice-controlled robot is demonstrated in this article which has the ability to followed voice command from operator and does communicate with user byvoice commandsof humans. The technique to give voice command using based android smart phone using Bluetooth is presented to construct the robot based on Arduino microcontroller. robot can accept instructions from users verbally and interact with user by speaking various commands which will make it user friendly.

1.1. Literature survey

Worldwide investment in 2003 of industrial robots up to 19 percentage, in 2004 orders for robots were up another 18% to the highest level ever recorded in 2004 first half. in Worldwide growth in period of 2004-2007 forecast an average annual rate of about 7percentage. Across 600,000 household robots in use - several millions in the next few coming years.

The existing robotic vehicle models that using by an Arduino microcontroller platform in their project. Bluetooth Robot and voice controlled is wireless supported robot which can control by operator or user within limited ranging area, without control by operator ultrasonic sensors which provide obstacle detection to avoid from accidents.

The first paper we referred on communication system from" VOICE CONTROLLED ROBOTIC CAR" is author was Rohan Ganu and Chetna Bhatia. They both are defined how a Robot communicate.

• One-way communication: In this each user spoking input is acted upon

• Natural dialogue systems: In which the machine conducts conversation between the speaker and solicits inputs, acts in response to operator inputs, or even tries to clarify ambiguity in the conversation.

The second paper was "SPEECH RECOGNITION FOR ROBOTIC CONTROL" author is Prof. BuvaneshwariJolad&Mohnish Arora.

They both defined in this paper is how to recognised the voice of Robots.

Speaker dependent systems which has been custom tailored to each and every Individual talker.

• independent Speaker systems which work on the broad populations of speeches, most of this system has never adapted too.

• adaptive Speaker systems which customised their knowledge to each individual operator over time while the

system in use.

1.2. Components

Component	Quantity	Value
Arduino Uno	1	
Motor driver	1	L293D
Bluetooth module	1	HC-05
Ultrasonic sensor	1	
Servo motor	1	
Gear motors with wheels	4	
battery	1	7.4V DC

1.3. Methodology

1.1 Arduino Uno

Arduino uno is a micro controller board based on the ATmega328P and It has 14 digital ip/op pins. It also has 6 analog inputs, a 16 MHz quartz crystal, a USB connection, power jack, and a reset button. It is the most widely used and user-friendly micro controller. Simply connect it to acomputer with a USB cable or power it with an AC-to-DC adapter or battery to get connection.

1.2 Motor Driver L293D

Motor driver L293D circuit has a quadruple high current half-H driver, Wide Supply-Voltage Range: 4.5V to 36V, High-Noise-Immunity Inputs. And Output Current is 600mA Per Channel Peak Output Current is1.2A Per Channel.

1.3Bluetooth Module HC05

Bluetooth module HC-05 is a typical -80dBm sensitivity and up to +4dBm Radio frequency transmit power. And It has a PIO control, UART interface with programmable baud rate, integrated antenna and an edge connector. It also having a auto-pairing pin is called "1234" as default code or pin and it auto-reconnect with in 30minutes.

1.4Ultrasonic Sensor

ultrasonic ranging sensor HC-05 is a sensor provides 2cm to 400cm of non-contact measurement

functionality with a ranging accuracy that can reach up to 3mm. Each HC-05 module includes an ultrasonic transmitter, a receiver and a control circuit. There are only four pins on ultrasonic sensor HC-05: - VCC, Trigger, Receive, & GND pins.

1.5Servo motor

Servo motor is an electromechanical device that produces torque and velocity based on the supplied voltage and current & it can access linear actuator or rotary actuator allows for control of angular or linear position velocity and acceleration. It can consist for position feedback of a suitable motor coupled to a sensor. If we want to rotate an object or thing at some specific angles or distance, then we have to use a servo motor module.

1.6Gear motors with wheels

Gear motors with wheels is used for move the vehicle from one point to another point, by using the help with gear motors. Gear motors are controlled by the Arduino uno bord with the help of coding,

1.4. Commands

• Forward= vehicle moves in forward direction.

- Backward= vehicle moves in backward.
- Left= moves the vehicle towards left direction.
- Right=moves the vehicle towards right direction.
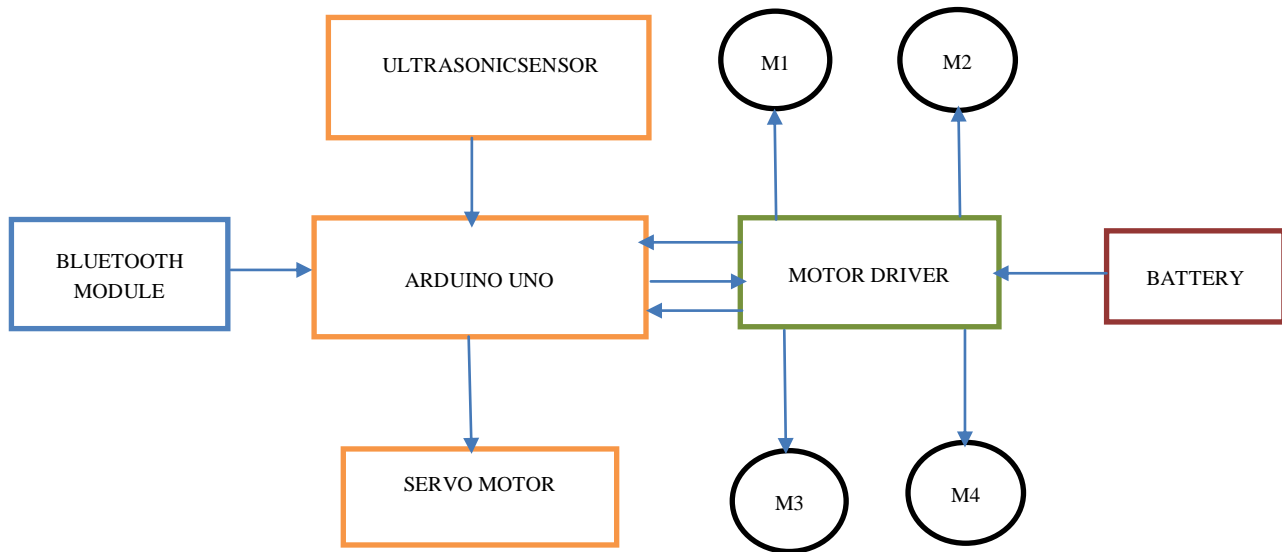- Stop= stops the running vehicle.

2. Block diagram

Fig. 1–voice controlled robot vehicle block diagram

3. Implementation

In this proposed system a voice recognition module is not required to recognize human voice to control robot. In this project an android application is used to recognize and process human voice which is further converted into text (using of google speech to text converter). Using the in-built microphone in android smartphones and text is received by the robot using Bluetooth. This text is further processed by the Arduino microcontroller to control the robot wheels accordingly the program or coding.

3.1 Algorithm

The voice commands are trained to the serial communication module.
• The stored speech or voice commands are represented in the form of binary value numbers is shown below

       forward –001
       backward – 010
       left-011
       right-100
       stop-101, like this

• The command binary values are transmitted through Bluetooth is a transceiver module.
• The binary values are transmitted then received by another Bluetooth module which is present on the receiver side.
• Arduino uno Controller will take those binary values and performs the action required to DC motors according to the binary values.

4. Conclusion

A microphone in the android smart phone used to identify Human voice. This voice is analysed and converted into English words using the android operating system codes and AI (Artificial Intelligence) software.

The development of this robot is able to move in any direction according to the voice command received from the operator or user by android smart phone and Bluetooth application. Voice commands has able to control the robot to like move forward, backward, left and right direction. For stop the robot vehicle from any kind of movement can be done by the voice command "Stop" at any time of running.

This project reduces human efforts at places or situations where human cant entire are difficult places. Such systems can be brought into use at places such as military, industries and research, defence etc.

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