VOICE CONTROLLED ROBOT

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Bachelor of Technology
in
Computer Science & Engineering

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It is certified that the work contained in the seminar report titled "VOICE CONTROLLED ROBOT" by "S. ROHITH (20UECS0815) E. SAGIN SANDOZ FERNANDO (20UECS0825) M. G. SANDEEP PRASAN KUMAR (20UECS0836)" has been carried out under my supervision and that this work has not been submitted elsewhere for a degree.

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DECLARATION

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APPROVAL SHEET

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ABSTRACT

It was developed in a way that the robot is controlled by voice commands. An android application with a micro controller 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 commands of the user. The movement of the robot is facilitated by the two dc servo motors connected with micro controller at the receiver side. The commands from the application is converted in to digital signals by the Bluetooth RF transmitter for an appropriate range to the robot. At the receiver end the data gets decoded by the receiver and is fed to the micro controller which drives the DC motors for the necessary work. The aim of the Voice Controlled Robotic Vehicle is to perform the required task by listening to the commands of the user by using Bluetooth module. Arduino is an open-source hardware used for building digital devices. The idea is to first design the Hardware of the Robot Car and then code the entire working using our previous knowledge of programming. The code will then be simulated on software (IDE) and later be interfaced with the hardware. The coordination of control unit with Bluetooth gadget is accomplished utilizing a Bluetooth module to catch and read the voice orders. The controlling remote is an android device with Bluetooth Application.

Keywords: Android, Arduino, Bluetooth, DC Motor, IDE, Robot, Sensor

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

ASR   Automatic Speech Recognition

DC   Direct Current

IDE   Interactive Development Environment

IoT   Internet of Things

IR   Infra-Red

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Chapter 1

INTRODUCTION

1.1   Introduction

The use of robots in the present day has moves from industries to the normal day to life . The use of voice commands to control a robot is much easier for domestic as well as industrial users . This project proposes the use of an android mobile to control a robot via voice commands. Arduino Uno, Bluetooth module is controlled by using an Arduino blue control android application. voice commands is used to control car/robot in forward, backward, left and right directions. So here Arduino blue control android application is used as a transmitting device and the Bluetooth module placed in the Arduino Uno is used as a receiver. Arduino blue control android application will transmit command using Bluetooth to the Arduino Uno so that it can move in the required direction like moving forward, reverse, turning left, turning right and stop. To achieve the obstacle avoidance in the system we are using an Ultrasonic distance sensor which is connected to the L298D motor shield followed by Arduino UNO. This sensor is used to detect any object at some certain distance using sonar. This non-contact ultrasound sonar is used to measure the distance between the object and the sensor. It consists of two transmitters, a control circuit and a receiver for emitting and receiving pulse data respectively.

A high ultrasonic sound is emitted by transmitters which will get reflected by any nearby object and the sensor will return echo. The distance for object detection can be subsequently changed by our own means in the coding algorithm. The distance will get calculated of the transmitted signal and receive echo in the control system. The ability of the machine to receive and interpret the human voice or to understand and carry out spoken commands can be concluded as speech recognition. It works on the basis of algorithms codes that match the sound of the detected speech or voice with word sequences and interpret it as a command in Arduino IDE which is a coding platform for Arduino UNO. With the help of these we can command around our system as per the desired needs.

1.2   Aim of the Seminar

The aim of the project is to make a Voice Control Robot. The working is based on Arduino micro-controller, motor drivers, a Bluetooth module. Arduino is an open-source hardware (single-board micro controllers and kits) used for building digital devices. The idea is to first design the Hardware of the Robot Car and then code the entire working using our previous knowledge of programming.

1.3   Scope of the Seminar

The Voice controlled robots can certainly dominate the future market for many industrial and domestic purposes related to automating daily tasks though it requires several tests but the robot works quiet well with very less errors in recognizing voice commands Best for

handicapped people who can rely on this robot as there is very less chance of accident. The robot will stop instantly by slowing down once identifies an obstacle. Use of Artificial Intelligence along with voice commands will take this research to a new dimension

1.4 Methodology

It presents a review of robots controlled by mobile phone via moving the robot upward, backward, left and right side by the android application such as Arduino, Bluetooth.

Chapter 2

LITERATURE REVIEW

S. Takahashi et al., were proposed the Robot torso deployed with an IoT device, to control and simulate the process of assistive robotic workload. Equipment used for Experiments - Echo Dot - Odroid XU4 - Servo motors. Limitations of this work is the torso's body sections were lack of stiffness and very fragile against the repetitive tasks and hardware/tool works. Applications of this robot Search-and rescue missions - distance awareness - law enforcements - home uses - health care industry [1].

A. Shalini et al., were proposed the Voice Recognition Robot Control Using Android Device which uses low acoustic features of voice, especially frequency analysis result. Equipment used for Experiments are PC - Microphone - DOF robot arm. This is an effective way for simple tasks through experiments of grasping and reaching. Limitations of Study is does not operate the robot with more than three degrees of freedom by nonverbal voice [2].

Erol et al., were proposed Voice Activation and Control to improve Human Robot Interactions with IoT Perspectives analysis of perfor-

mance of a voice command interpretation and authorisation system using voice print to identify the human commander.Equipment used for Experiment is MATLAB APP of this robot are Public safety in network and security [3].

Ye et al., were proposed the Voice Control Platform of Mobile Robot through ROS is a Vehicle, which can be controlled by voice commands via smart phone using Arduino Uno processor and Bluetooth sensor was made. Equipment used for Experiments are Arduino UNO - Android, HC-05 - L298N Motor driver [4]. Limitations is the number of people which are used to test the robot was not sufficient.

M. Saravanan et al., were proposed the Robot vehicle which can be controlled by the voice command of a person. Equipment used for Experiments are Chassis - Gear Motor - Wheels - HC05 Bluetooth module - L298D Motor Driver -Adruino UNO Board. Automatic speech recognition (ASR) to computer speech recognition or speech to text (STT). Limitations is Robot vehicles do not include obstacle detection which can lead to other problems. Applications are Mobile robot computing - speech recognition of robots [5].

Chapter 3

SEMINAR DESCRIPTION

3.1   Existing System

An Arduino interfacing with Bluetooth module is to provide the communication channel with device through which we will give the voice commands. For the circuitry, programmed Arduino will give control over the motors that are used to run the robotic vehicle. Ultrasonic sensors interfaced with the Arduino help in automatic slowdown or braking of a vehicle on sudden obstacle detection, and after a delay, it will help in the avoidance of the obstacle.

Advantages

The Robot is small in size; therefore, less space is required. As we are our camera which is attached to the robot 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.The voice controlled robotic car can be easily driven by unskilled drivers by using voice commands with the help of application in smart phone.

Disadvantages

The result from humanoid robots will be that many people are going to lose their jobs.Even the best speech recognition systems sometimes make errors. If there is noise or some other sound in the room the number of errors will increase. Speech Recognition works best if the microphone is close to the user will tend to increase the number of errors.In Speech recognition system, there is a possibility of unauthorized usage. Since this doesn't depend upon which person is speaking

3.2 Feasibility Study

This project proposes an IoT based system model to collect, process and store real-time traffic data. The objective is to provide real-time traffic updates on traffic congestion and unusual traffic incidents through roadside message units. The early-warning messages will help citizens to save their time, especially during peak hours. The experiments' results show good accuracy in vehicle detection and a low relative error

Chapter 4

METHODOLOGIES

4.1   Micro-controller

Robot Control Design using Android Smartphone will provide powerful computational android platforms with simpler robots' hardware architecture. A robot-using mobile through Bluetooth communication, some features about Bluetooth technology, components of the mobile and robot. It presents a review of robots controlled by mobile phone via moving the robot upward, backward, left and right side by the android application such as Arduino, Bluetooth.

4.2   Arduino Uno with Bluetooth

The suggested robot's mobility will be controlled by the user's spoken command. To provide voice commands, the user will need an Android smartphone. A software that converts voice commands into text may be used to retrieve the command. A Bluetooth module will be used to link the phone to the micro controller. After converting the voice command to text, the app will use the phone's Bluetooth to send the necessary data to the micro controller, and the micro controller will

receive the data using the Bluetooth module. The robot will move forward, backward, left or right depending on the command. The robot will be driven by four geared DC motors with gripped Tyres, which will be controlled by a motor driver. An ultrasonic and infrared sensor will be used to identify obstacles. The Arduino Uno will transmit signals based on the ultrasonic and infrared sensors' readings to give data about any impediment in front and behind the robot that is within a certain range. The robot will halt when the obstacle is within a certain distance.

As more sensors for voice control robots become available or as trends develop, more variables may be detected and monitored, significantly increasing the efficiency of wireless voice control robots. The robot's speech recognition can be observed as it detects the direction provided to it through text-to speech conversion and responds by moving in that direction. The whole voice-activated robot vehicle has been intended to fit into a tiny, compact space. This would allow users to carry the voice control robot with them wherever they went. This voice-controlled robot may be utilized in a variety of settings, including industrial and military applications, among others. In addition, sensors such as ultrasonic sensors, infrared sensors, and others may be used.

4.2.1   Circuit Diagram

The Arduino UNO Board, HC-05 Bluetooth Module, L293D Motor Driver, IR Ultrasonic sensor, Servo Motor, 4 DC Geared Motors, and 2 Li-on Batteries are shown in Figure 2. Figure 3 indicates the circuit diagram of voice control robot. The Arduino's TX and RX pins are

connected to the Bluetooth Module's Rx and Tx pins. 5V is supplied to the Bluetooth Module. Essentially, the left DC engine is connected to pins 3 and 6 of the L293D, while the right DC engine is connected to pins 14 and 11 of the L293D.
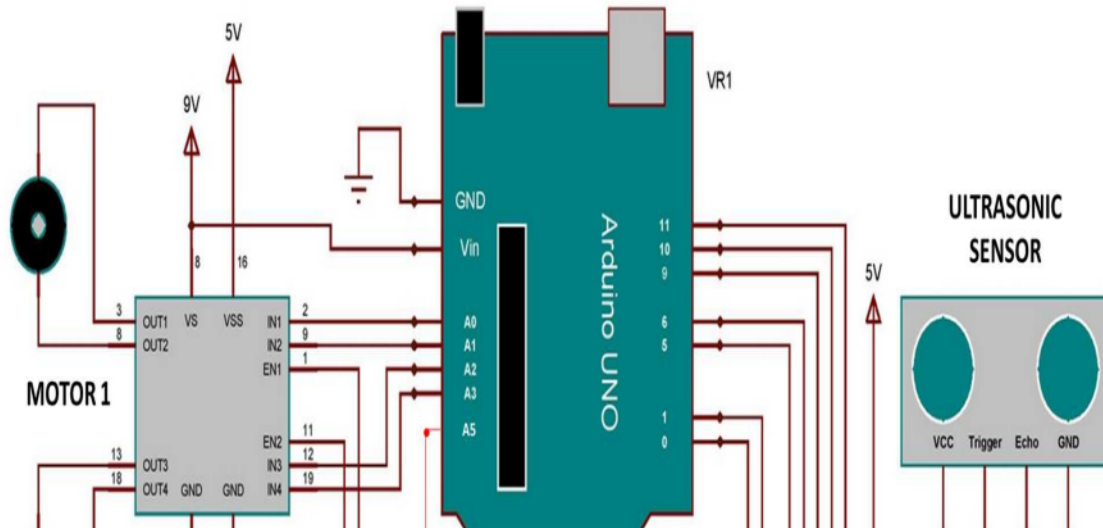

Figure 4.1: Arduino Uno I/O Process
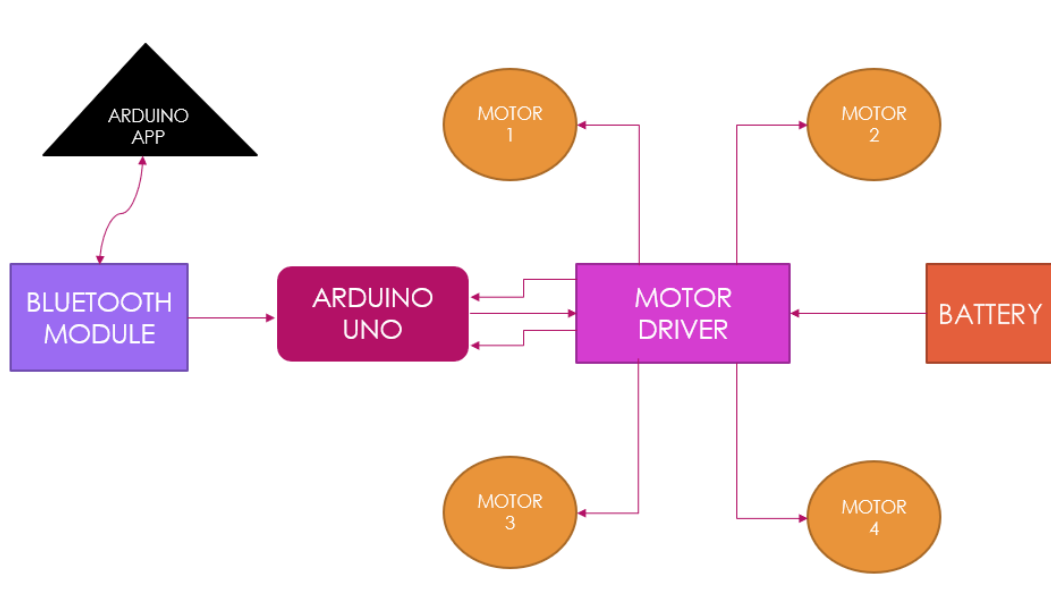
4.2.2 Block Diagram

Figure 4.2: Working structure of Robot

Figure 4.2.1 shows the modified IR sensor with the Voice Controlled Robot. It is a mobile robot that is controlled by voice instructions. The smartphone application can recognize four commands: "Move ahead," "Move backwards," "Turn left," and "Turn right." This project involves the creation of a four-wheeled robotic vehicle that can be operated via voice commands through a mobile application. The application listens for instructions and transmits them to the Bluetooth Module, which then passes the data to the Arduino, which then sends it to the motor driver shield. The Motor Driver Shield is powered by two Li-on Batteries and controls four motors for the robot's mobility.

Chapter 5

RESULTS AND DISCUSSIONS

5.1   Consequences

Humans cannot work for a long hour and not strong enough to lift a heavy object.In industries, a worker must have a enough knowledge to control an object and must to be a educated so there are only few worker/employee are appointed

5.2   Solution

Voice controlled robot can be easily controlled and which its doesn't need any physical operations to control it. By knowing the command word is enough to control it.Compare to others robots and machines this is power efficient ,less maintenance, easy to operate , low cost and small space is required for components.

Chapter 6

CONCLUSION AND FUTURE ENHANCEMENTS

6.1 Conclusion

The Android smartphone can be used as remote controller for robots and various embedded technologies with the help of Bluetooth technology. At the same time, this program uses blue-tooth connection to communicate with robots. In proposed project also shows how a robot can be used for travelling purposes. The operating system of smartphone is Android, and it can develop effective remote-control program and by using Wi-Fi wireless network, the communication between smartphone and robot can be realized, which makes it simple and convenient to control robot.

6.2 Future Enhancements

Utilizing a long range module will bring about network with the robot for significant distances. Further upgrade in venture can be utilized for Home security and military purposes where the order scan be given to robot without chance by range and by introducing cameras.

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