

Bluetooth Car Control For Physical Challenged Person And Accident Prevention Using Arduino

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Abstract- The project aims is to design an android interface, Arduino bot and write program in to the arduino microprocessor. Arduino car contains Arduino microcontroller with basic mobility features. Arduino program contains instructions mediating between android controller and Arduino car. An appropriate program in the arduino microprocessor interact with the android controller has to be created. The program has been successfully complied through arduino IDE to the arduino microprocessor & loaded in to it after proper checking of logic to decrease any loss/damage of hardware. We have to create an android application that will provide user an interface to interact with the arduino powered car. The interface is easy to use and provide feedback from the arduino microprocessor through the Bluetooth after giving instruction to arduino for various actions through interface via Bluetooth module. The front and rear of the car are equipped with an ultrasonic sensor, which will detect the object. And also additionally used the Gas sensor and Fire sensor. The android application is to create with the help of android studio that provide us with more capability & stability. After doing all of this we have test this project thoroughly and find the maximum no. of error & wrong logic in the microprocessor program. After doing this only we can say that we have been able to create as per our goal described.

Keywords: Arduino Nano, HC-05 Bluetooth Module, Motor Driver Module L298N, Grippy Wheels, Jumper Wires, Ultrasonic sensor, Fire sensor, Gas sensor.

I. INTRODUCTION

This is an Arduino based, Bluetooth controlled car. It is controlled by a smart phone application. Bluetooth controlled car is controlled by using Android mobile phone instead of any other method like buttons, gesture etc. Here only needs to touch button in android phone to control the car in forward, backward, left and right directions. So here android phone is used as transmitting device and Bluetooth module placed in car is used as receiver. Android phone will transmit command using its in-built Bluetooth to car so that it can move in the required direction like moving Forward, reverse, turning left, turning left, turning right and stop.

Additionally the ultrasonic is measuring if there are obstacles in the direction straight on (the servo engine is turned off in this mode) The front and rear of the are equipped with an ultrasonic sensor, which will detect the object. And also used the gas sensor and fire sensor for safety purpose. Gas sensors (also known as gas detectors) are electronic devices that detect and identify different types of gasses. They are commonly used to detect toxic or explosive gasses and measure gas concentration. fire detector works by detecting smoke and/or heat. These devices respond to the presence of smoke or extremely high temperatures that are present with a fire. After the device has been activated, it will send a signal to the alarm system to perform the programmed response for that zone.

II. RELATED WORKS

[1] M Saravanan developed “Arduino Based Voice Controlled Robot Vehicle” (October 2020) The main goal of this device is to create a robot vehicle that can be powered by a person's voice order. These systems are commonly referred to as Speech Controlled Automation Systems (SCAS). The abovementioned device is a prototype of our design. The concept is to build a robot that will be controlled by voice commands. It has a lot of functionality that can be useful. The specified task is carried out in this design using an android application and a microcontroller. Bluetooth technology facilitates communication between the software and the robot. The module will receive the commands that are sent over the channel. The aim of a voice-controlled robotic vehicle (VCRV) is for it to listen to and respond to the user's commands. Srinivas Devarakonda et al. proposed a vehicularbased mobile system approach for analyzing the characteristics of air in real time. They presented two models: one which can be tied up in public transports and the other one is a personal sensing equipment. They also claimed that both the prototypes are workable, cost effective and also they are able to foretell the potential impacts on health postulated by the air quality.

[2] H. Jagadish Kumar wrote “Voice Controlled Car using Arduino and Bluetooth Module” (December 2019). The objective of this report is to build a voice-activated car that reacts speech commands. Enhancements in the areas of

disturbance and range handling are, nevertheless, needed. Simple voice commands such as left, right, forward, back, and stop are used to navigate the vehicle. These signals are sent to the Bluetooth module by an Android application. A Bluetooth module and a control device are used to record and analyse the voice input. In this suggested method, they conducted research on the different control type configurations for robots. It shows that real-world manuscripts can be effectively researched and replicated using only speech (human voice) as a means of control. The aim of this lookup is to develop a basic robotic hardware implementation so that this structure can concentrate on Bluetooth smart grids. When the app is running, a transmitter on the smartphone is used to identify user voice commands. The app characterizes commands and translates voice to text using Google's speech-recognition technology. The text would then be transmitted through Bluetooth to the receiver component.

III. SYSTEM DESIGN

This is an Arduino based, Bluetooth controlled car. It is controlled by a smart phone application. Bluetooth controlled car is controlled by using Android mobile phone instead of any other method like buttons, voice comment etc. So here android phone is used as transmitting device and Bluetooth module placed in car is used as receiver.

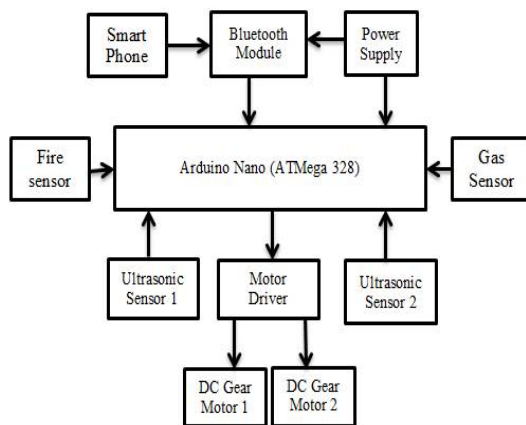


Figure 1. Block Diagram of Bluetooth Car Control.

Android phone will transmit command using its in-built Bluetooth to car so that it can move in the required direction like moving forward, reverse, turning left, turning right and stop. Then final the program is uploaded to arduino before connecting the bluetooth module. Additionally the ultrasonic is measuring if there are obstacles in the direction straight on (the servo engine is turned off in this mode).And also additionally used the Gas sensor and Fire sensor for safety purpose.

1. Android App

As mentioned previously the voice commands to the robot are processed via an android application and transferred via Bluetooth. A decision to use an Android OS interface as the speech processing platform was made, due to its flexibility and numerous features. Also it allows an easy and reliable connection with the Google Speech processing libraries for smooth and accurate speech recognition. To do this we constructed an application using MIT App Inventor 2.



Figure 2. RC Controls

MIT App Inventor 2 is a tool which allows easy creation of android Apps via drag and drop block programming. This provides people with little to no experience in Java programming, a way to develop simple applications to suit their purposes. Moving to our App; once the app launches the user has to connect to the robot via Bluetooth. Once connected the status of the application changes to 'connected'. Then clicking the microphone button opens up the speech recognizer. The recorded audio is processed after which the transcribed text is displayed and sent to the connected Bluetooth in the form of a string or character array.

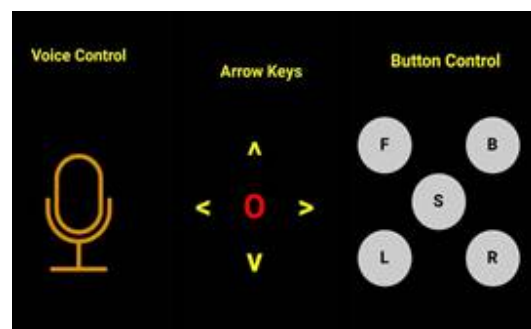


Figure 3. Controls

MIT App Inventor 2 was used for developing an android application. This is a tool which uses block a programming technique so that even beginners can experience android app development. It was essential to develop an

application to establish a wireless communication over a certain range via Bluetooth.

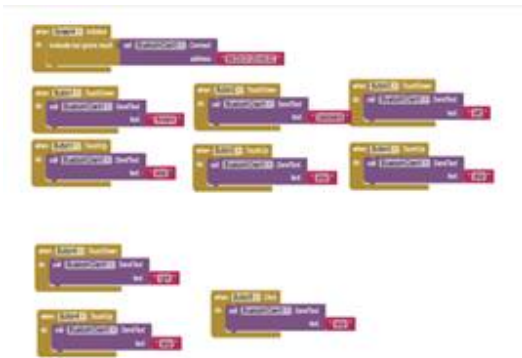


Figure 4. Programs

As mentioned above App Logic Command are processed by phone. Command is then sent to the receiver side via Bluetooth. Command received via Bluetooth is forwarded to Arduino Uno board using UART serial communication protocol. Arduino code checks the commands received. Whenever the command is a matching string, Arduino controls the movements of the robot accordingly in forward, backward, Turning Right, Turning Left & Stop. Signal logic levels at the different stages of the circuits for proper controlling of the robotic car are given below.

2. ARDUINO

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards ('shields') or breadboards (for prototyping) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs. The microcontrollers can be programmed using the C and C++ programming languages, using a standard API which is also known as the Arduino language, originated from the Processing language. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) and a command line tool developed in Go.



Figure 5. Arduino Nano

3. SMART PHONE

Android mobile phone instead of any other method like buttons, gesture etc. Here only needs to touch button in android phone to control the car in forward, backward, left and right directions.



Figure 6. Smart Phone

4. BLUETHOOTH MODULE

The HC-05 is a popular module which can add two-way (full-duplex) wireless functionality to your projects. You can use this module to communicate between two microcontrollers like Arduino or communicate with any device with Bluetooth functionality like a Phone or Laptop. There are many android applications that are already available which makes this process a lot easier. The module communicates with the help of USART at 9600 baud rate hence it is easy to interface with any microcontroller that supports USART. We can also configure the default values of the module by using the command mode. So if you looking for a Wireless module that could transfer data from your computer or mobile phone to microcontroller or vice versa then this module might be the right choice for you. However do not expect this module to transfer multimedia like photos or songs; you might have to look into the CSR8645 module for that.



Figure 7. Bluetooth Module

5. ULTRASONIC SENSOR

Ultrasonic sensors work by sending out a sound wave at a frequency above the range of human hearing. The transducer of the sensor acts as a microphone to receive and

send the ultrasonic sound. Our ultrasonic sensors, like many others, use a single transducer to send a pulse and to receive the echo. The sensor determines the distance to a target by measuring time lapses between the sending and receiving of the ultrasonic pulse. The working principle of this module is simple. It sends an ultrasonic pulse out at 40kHz which travels through the air and if there is an obstacle or object, it will bounce back to the sensor. By calculating the travel time and the speed of sound, the distance can be calculated. Ultrasonic sensors are a great solution for the detection of clear objects. For liquid level measurement, applications that use infrared sensors, for instance, struggle with this particular use case because of target translucence



Figure 8. Ultrasonic sensor

6. DC GEAR MOTOR

A Direct Current (DC) motor is a rotating electrical device that converts direct current, of electrical energy, into mechanical energy. An Inductor (coil) inside the DC motor produces a magnetic field that creates rotary motion as DC voltage is applied to its terminal.



Figure 9. Dc Gear Motor

7. MOTOR DRIVE

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16- pin IC which can control a set of two DC motors simultaneously in any direction. On the other hand, for controlling the rotation direction, we just need to inverse the direction of the current flow through the motor, and the most common method of doing that is by using an H-Bridge. An H-Bridge circuit contains four switching elements, transistors or MOSFETs, with the motor at the center forming an H-like configuration. By activating two particular switches at the same time we can change the direction of the current flow, thus change the rotation direction of the motor.



Figure 10. Motor Driver

8. BATTERY

A battery is a device that stores energy and then discharges it by converting chemical energy into electricity. Typical batteries most often produce electricity by chemical means through the use of one or more electrochemical cells.



Figure 11. Battery

9. GAS SENSOR

Gas sensors (also known as gas detectors) are electronic devices that detect and identify different types of gasses. They are commonly used to detect toxic or explosive gasses and measure gas concentration. This paper presents the design of a Carbon Monoxide (CO) gas leakage detector in vehicles. The number of sudden death incidents due to excessive CO inhalation has recently increased. Many cases are due to driver habits and awareness, for instance, air conditioning switches remain on while they are sleeping in the car. This habit is not a good practice because if there were gas leakage into the cabin, especially CO, the situation could result in sudden death. Basically the driver feels sleepy when excessive CO concentrations occur in the cabin. Based on that, a vehicle gas leakage detector system has been developed using a gas sensor and logic detector circuit. Subsequently, the signal from the sensor is fed to an 8-bit PIC16F84 microcontroller on-board system via appropriate interfacing devices, which will run on pre-programmed instructions.



Figure 12. Gas Sensor

10. FIRE SENSOR

A fire detector works by detecting smoke and/or heat. These devices respond to the presence of smoke or extremely high temperatures that are present with a fire. After the device has been activated, it will send a signal to the alarm system to perform the programmed response for that zone.



Figure 13. Fire Sensor

IV. RESULT

The result which we got while doing this project is very encouraging. At first receive command from the application by bluetooth module of the car and performs the commands instantly. The android application which was made is so simple that it can be installed in any android supported smart phone. So anyone can run it if he or she has the application. The program has been successfully compiled through arduino IDE to the arduino microprocessor. We have been able to successfully implement the ultrasonic sensor with servo motor in arduino car to save the car from collision. Car contain arduino and microcontroller with basic mobility features. Arduino programs contains instructions mediating between android controller and Arduino car. Android mobile controller uses different mobile sensors to supervise motion. This paper should be helpful in showcasing a server based application in developing a Bluetooth car controlled.



Figure 14. Bluetooth car

i) RESULT COMPARISON

Table: 1 Result Comparison

S.N O	PARAMETERS	EXISTING PROJECT	PROPOSED PROJECT
1	Application Control	Voice control	Voice, Arrow keys, buttons control.
2	Sensors	No Sensor	Ultrasonic Sensor , Gas and Fire sensor
3	Microcontroller	Arduino UNO(ATMega 168)	Arduino Nano(ATMega 328)
4	Car control	Driver controls the car through speaking comments.	The driver controls the car through speaking , joystick by use of smart phone.
5	Ultrasonic sensor	Nil	Sense the object or thinks.(ex. Wall, other cars)
6	Distance	Nil	1 feet distance between the vehicle
7	Gas sensor	Nil	Sense various gases
8	Fire sensor	Nil	Sense the smoke or heat

V. CONCLUSION

The smartphone is nowadays are growing into more and more powerful devices, which have the capacity to interact with other appliances through Bluetooth, wifi etc. Bluetooth being a cheap mode of communication, provide a powerful mode of connection. All our research and projects about controlling devices using application and finally leads us to the conclusion that Yes, it is possible for human beings to control their day to day appliances just by their application.

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