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BLUETOOTH VEHICLE USING ARDUINO UNO CHIPSET

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Abstract: *The project aims in designing a robot that can be operated using Android Apps. The controlling of the Robot is done wirelessly through Android smart phone using the Bluetooth module feature present in it. Here in the project the android Smartphone is used as a remote control for operating the Robot. Android is a software stack for mobile devices that includes an operating system, middleware and key applications. Android provides access to a wide range of useful libraries and tools that can be used to build rich applications. Bluetooth is an open standard specification for a radio frequency (RF)-based, short-range connectivity technology that promises to change the face of computing and wireless communication. It is designed to be an inexpensive, wireless networking system for all classes of portable devices, such as laptops, PDAs (personal digital assistants), and mobile phones. The controlling device of the whole system is a Microcontroller. Bluetooth module, DC motors are interfaced to the Microcontroller. The data received by the Bluetooth module from Android smart phone is fed as input to the controller. The controller acts accordingly on the DC motors of the Robot. The robot in the project can be made to move in all the four directions using the Android phone. The direction of the robot is indicated using LED indicators of the Robot system.*

Keywords: *BluetoothVehicle, Microcontroller, Robot system, Arduino Uno Chipset*

1. INTRODUCTION

Smartphone has quite changed the traditional ways of human to machine interaction. Smartphone is now a vital part of a person's life. Android is a software platform for mobile device that includes an operating system, middleware and key applications. Android is a safe and secure operating system. All of its essential tools are combined in software called SDK

which stands for Software Development Kit. We know that all manual operations have been replaced by automated mechanical operations. Our main objective of this system is to control the robot by sensing the temperature of the environment using Bluetooth app and view the direction of the car using mobile camera and also find the location of the robot. Bluetooth is used for its various advantages over other wireless technologies. Hardware technology utilized in smart phones has also greatly improved. Hence, we can say that Android smartphones will serve a great benefit for industrial, commercial and other general-purpose applications.

The DC motors are widely used for providing variable speed drive system in industrial applications resembling automation, electrical traction, military instrumentality, fixed disk drives, thanks to their high potency, noise-free operation, compactness, dependability and low maintenance and cost. Many connection technologies are used nowadays such as GSM, GPRS, Wi-Fi, WLANs and Bluetooth. Every technique has its own distinctive characteristics and applications. Among these wireless connections, Bluetooth and Wi-Fi technology is usually enforced. The system hardware consists of a controller equipped with Bluetooth communication module. It'll be connected to the motors and other alternative components of robotic car. When the robot app is turned on and is connected with the current system via Bluetooth, one will operate the car by giving wireless commands from the app using the functions already programmed in the app.

In the last decade, with the development of technology, sensors used with electronic devices have been used in many areas to facilitate life. Sensors are devices that convert energy forms into electrical energy. The sensors serve as a bridge connecting the environment and various electronic devices. The environment can be any physical environment such as military areas, airports, factories, hospitals, shopping malls, and electronic devices can be smartphones, robots, tablets, smart clocks. These devices have a wide range of applications to control, protect, image and identification in the industrial process. Today, there are hundreds of types of sensors produced by the development of technology such as heat, pressure, obstacle recognizer, human detecting. Sensors were used for lighting purposes in the past, but now they are used to make life easier. Thanks to technology in the field of electronics, incredibly fast developments are experienced. In this respect, it is possible to develop a new invention or a new application in every day and make life easier. Today, robot systems are developed with the use of artificial intelligence algorithms. The robotics field is one of them. The most important part of the robot is the perception. Perceive of the environment will be important for a robot design. For instance, it is very important to identify explosives by a robot to detect a terrorist in the military field by using sensors. A robot has to

perceive some variables (like heat changes) around it, interpret it, and then decide to act accordingly.

The vehicle will move all four told directions: left, right, front and back. For forward movement, movement of both the motors will be in the same direction and for backward motion; movement of the motors will be in opposite direction. For left and right movements, either of the motors will rotate and to stop both the motors will stop. Instructions are given to the motors through the mobile app by the user.

2. PROBLEM STATEMENT

The aim of this project is to design and implement the Bluetooth controlled vehicle using Arduino and Bluetooth enabled mobile APP.

3. OBJECTIVE

- To study techniques for Bluetooth enabled remote control robot
- To study and select the algorithm for proposed system.
- To design and implement the proposed system
- Evaluate the performance of the system.

4. PROPOSED SYSTEM METHODOLOGY

The project is implemented on bead board and the breadboard itself is used as the chassis for the robot car as shown in Fig.1. The Bluetooth module HC05 is connected to the Arduino board through simple single strand wires. The transmission pin of the Bluetooth module is connected to the receiver pin of Arduino and the receiver pin of the Bluetooth module is connected to the transmission pin of the Arduino. The Digital output pins 9, 10, 11 and 12 of Arduino board are connected to the pins 4, 10, 7 and 2 of the L298N motor driver IC respectively.

Two rechargeable batteries as supply is used which is connected to motor driver and Arduino respectively. When the circuit is energized, we will have to first pair the android phone with the Bluetooth module through the phones Bluetooth setting. The default password of the Bluetooth module will be 1234. Once the phone gets paired open the application "Bluetooth Remote Controller" which we can downloaded from Google play store. After connecting the mobile to HC05, four options will appear on the application- Controller mode, Switch mode, Dimmer mode and Terminal mode. We have to select the Controller mode from it. The controller mode will provide us a joystick interface. We will send ASCII values from the application to the Bluetooth module. As the user presses any control buttons, the controller will run programs move forward, backward, right, left, depending on the data sent by the mobile and the car moves likewise. The

Arduino also stores the program in its memory so it does not require re uploading of Program. The IN1, IN2, IN3 and IN4 are the inputs for the motor driver that receives command from the Arduino for the two motors respectively. The motor driver should be grounded with the Arduino ground pin (GND). The motor driver requires minimum of 6v and above to run, any voltage below 6v them to or remains off. The RXD pin of the Bluetooth module is for receiving commands from the Android devices and sends to Arduino through this pin and the TXD is for transmitting or sending dates or information's It is supplied with a 5v dc source from the arduino 5v pin. The main part of the above circuit diagram is arduino UNO. The power supply section is very important. It should provide constant voltage to the devices forsuccessful working of the project.

5. PROCESS DESCRIPTION

In this project, we will learn how to make Wireless Bluetooth Controlled Robot Car Using Arduino. The robotic car can be controlled wirelessly via a Smartphone. The smartphone has an Android app through which the user can send commands directly to Robot. The robot can move forward, backward, left, and right and can also be stopped.

The Arduino's Bluetooth-controlled robot car is interfaced with a Bluetooth module HC-05 or HC-06. We can give specific voice commands to the robot through an Android app installed on the phone. At the receiving side, a Bluetooth transceiver module receives the commands and forwards them

- **System Architecture**

The block diagram consists of Arduino shield, Bluetooth Module connected with batteries and two motors. The connection is given in the diagram with names of the corresponding pins on the chips. The Vcc and Gnd of the motor driver has been connected to the battery (12 V), also RX and TX pins in the Arduino are connected in TX and RX pins of the Bluetooth chip (HC-06) respectively. The motors are connected with the motor driver. We used Amarino app in our android phone to make the transmission. The signals from the Amarino are received by the Bluetooth which are then sent to the arduino where the processor processes it and according to the code give the instructions to the motor controller to control the motors.

Amarino is a toolkit that enables the rapid prototyping of such applications by connecting the Android operating system to the Arduino microcontroller platform. It consists of an Android application, an Arduino library. This suite of tools allows users to access Android events (ie: compass orientation, accelerometer data, and text messages received) and send them.

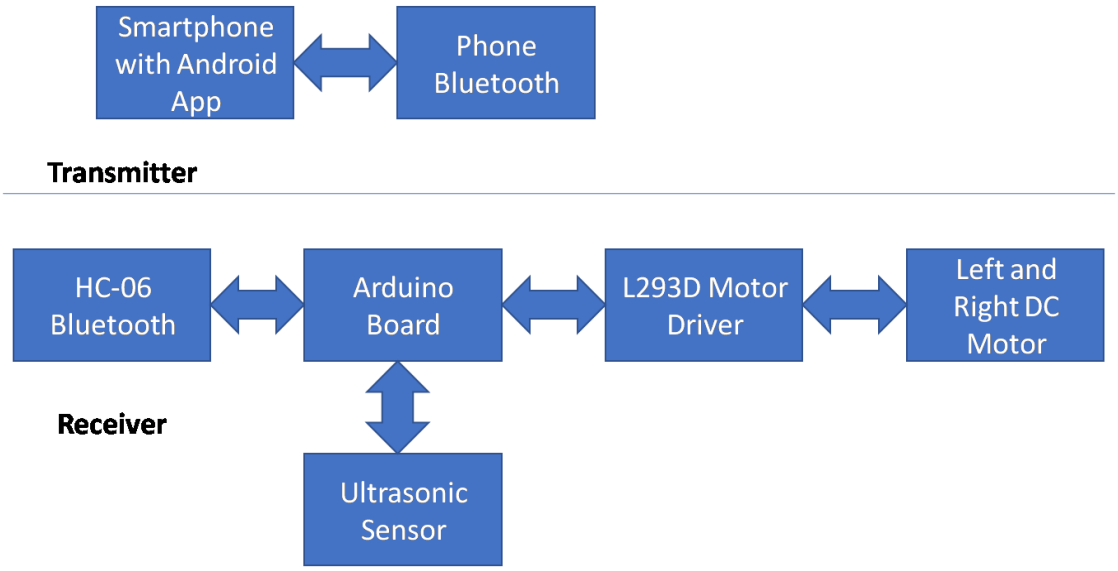

Fig.1: System Architecture

The path holes will be detected using ultrasonic sensor. Basically, ultrasonic sensor worked on the principle of sound wave. The ultrasonic transmitter sends the ultrasonic wave in the environment and receiver receives the wave which is reflected back from the obstacle. We can measure a distance through this sensor. If path hole is there then distance between ultrasonic sensor and ground surface would be more. If path hole is detected then we can reduce the speed of vehicle.

Limitations:

The Bluetooth range is less than 10m hence it is difficult to operate on long distance.

6. FUTURE SCOPE

For years, *Bluetooth*® technology has created connections between car and driver that brought new levels of safety to our roads and more enjoyment to the in-car experience. Bluetooth enabled hands-free calling and audio streaming help reduce distracted driving and provide a safer way to stay connected to the road.

Now, Bluetooth technology is again transforming the relationship between car and driver, becoming the new standard for automotive keyless entry.

7. CONCLUSION

In this project, the Bluetooth and mobile app-based car control system is developed. This works on the command given by the android app through Bluetooth connection. The vehicle automatically reduces the speed when there is dig on the road. The proposed system is built

using Arduino. The Android App consist of reverse, forward, left and right button to control the robot. The IR sensor is used to detect the potholes on the road and ultrasonic sensor to detect the obstacle. The proposed system achieves a promising result.

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