

Paper on Android Controlled Arduino Based Robot Car

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Abstract— The aim of our project is to design a Mobile Remote Control Robar. The working is based on Android OS, Adriano micro-controller, motor drivers, a Bluetooth module. Adriano is an open-source prototyping platform. This is a very simple remote control car, with an Adriano and Bluetooth module. The idea is to first code the entire working using our previous knowledge of programming. The code will then be simulated on software and later be interfaced with the hardware. The controlling remote can be any smart device with android. All the controls of the vehicle will be on the app on that device. We chose this for our major project as robotics has become a major part of our everyday lifestyle and also have a wide scope in the engineering field. It plays a vital role in the development of new technology.

Keywords: Robot Car, Robot App

I. 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 devices 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We know that all manual operations have been replaced by automated mechanical operations.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 writing this paper is to develop an Android app for controlling the robot using Bluetooth. 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, Wi-Fi, WLANs and Bluetooth. Every technique has its own distinctive characteristics and applications. Among these wireless connections, Bluetooth 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 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. 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.

II. LITERATURE SURVEY

Various researches have been made by different researchers in developing this project. However, they serve a different application and have different technologies implemented. Some of those papers are mentioned below stating their technology and application.

Jorge Kazacos Winter has developed android controlled robot automation. Main aim of his project was the transfer of information wirelessly between a smartphone and the robot and developing the robot and its communication system underneath a low price and open source philosophy. He used 3D design technique to style the structure of the robot with the facilitation of parametrical modelling software. The style, when fed to the 3D printer can print the parts of the robot in a layered manner one by one and can then use these parts to assemble the robot simply. He has used Arduino micro-controller and Wi-Fi technology in this robot.

M.Selvam in his paper has projected design to develop a robotic system which has a wireless camera attached to it for surveillance. Bluetooth was implemented in his project for providing connection between robot and smartphone. Wireless night vision camera was used for providing remote surveillance. The video which is recorded by camera is then transmitted to TV unit through Radio Frequency signal. He used 8051 micro controller for the robotic unit.

Vito M Guardi has evolved the method of Bluetooth technology by developing an android app for a robot which is driven by a microcontroller. The central idea of his work is to show that one android app can be operated using totally different electronic devices. Vito M Guardi has invented a communication protocol for android smartphone and robotic platform over a Bluetooth.

Ranjith Kumar Goud and B.Santhosh Kumar have invented a pick and drop robot. They wanted it to be used for diffusing a bomb remotely with safety. For the robotic arm, they used a pair of motors and another pair as the wheels of the robot for controlling the movement. Connectivity is established using Bluetooth. The micro-controller used is LPC2148. They had also attached a wireless camera for remote surveillance. They have worked on this project mainly for industrial and military applications.

Xiao Lu, Wenjun Liu, Haixia Wang, Qia Sun have published a paper based on a project in which the smartphone is capable of IFLYTEK voice as well as handwritten input. The design is therefore robust, suitable, and practical for use and it also ensures the reliability of the full system. For

connectivity between the smartphone and robot, wifi is used. Use of wifi makes it easy and absolutely convenient for controlling the robot so that it can act according to the commands.

Arpit Sharma, Reetesh Verma, Saurabh Gupta, Sukhdeep Kaur Bhatia have configured an android smartphone which can control a robot via Bluetooth technology. The phone uses motion sensors and records the gestures sent via an android mobile phone. It also has an inbuilt accelerometer and Bluetooth module for controlling the movements of a robot.

III. BLOCK DIAGRAM

The Block Diagram of our system consists of a Bluetooth module, an Arduino kit and a couple of motors for driving the car.

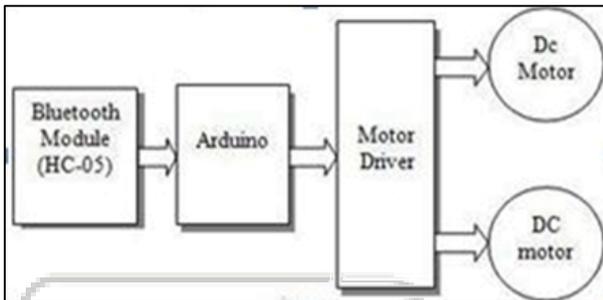


Fig. 1: Block Diagram of the circuit

A. Android Smartphone

Android is a very popular open source operating system (OS), based on the Linux kernel, used in mobile devices such as tablets and smartphones. Android has a very user friendly interface which relies on direct interaction between the user and the device i.e. by using touch gestures. These gestures are like real-world actions, which include swiping, tapping, scrolling and pinching, to control the on-screen objects, together with a virtual keyboard for taking input in text form. In the project, android smartphone has an installed appl which is used for controlling the robot unit. The smartphones already come with inbuilt technology to establish connection. The technology we have used is Bluetooth.

B. User Interface

The user interface, of the overall system, is provided using the custom made android app using Graphical User Interface (GUI). The GUI provides user, the various control modes, to Control dynamically the robot unit. When the app is started, we first establish the connection between the app and RC unit using Bluetooth. The GUI of android provides a user friendly real-time experience to the user, to control the robot.

C. The Android Application

An application was developed in the software Android Studio. App can be installed on an Android smartphone to control the RC unit. The app shows buttons for movement of the car in different directions. These commands are as follows: Left, forward, backward and right. The code for the app is written in java.

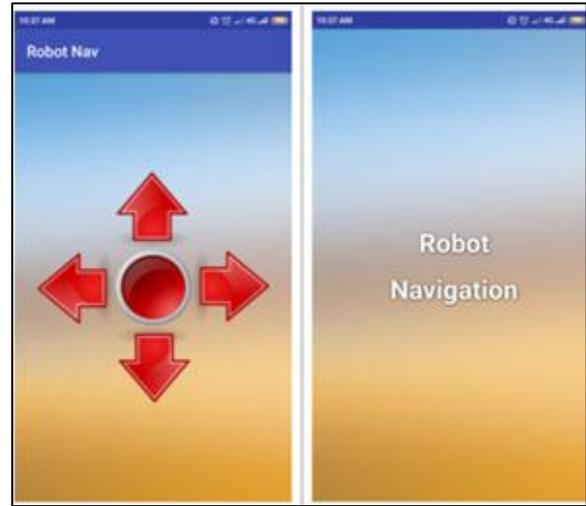


Fig. 2: Screenshot of the Application

D. RC Module

RC module is the main working unit of this system. This unit consists of the Arduino chip, the two motor drivers, and a Bluetooth module connected to the circuit. Motor drivers are used to control the dc motors. The Arduino Uno, which is a small android chip, resides at the center of the unit. It is responsible for communicating with android smartphone, using the Bluetooth module and controls the motors using the motor driver. The RC unit is powered using 9V battery connected to this Arduino chip. The command for controlling the module is received using Bluetooth module HC-05.

IV. CIRCUIT DIAGRAM

Below is the circuit diagram of the hardware which shows the connections between Arduino, Bluetooth and motors. It also shows a motor driver L293D which is responsible for movement of the motors in either direction. RxD pin of the Arduino is connected to the TxD pin of Bluetooth and vice versa. Supply of 5V is provided to the motors.

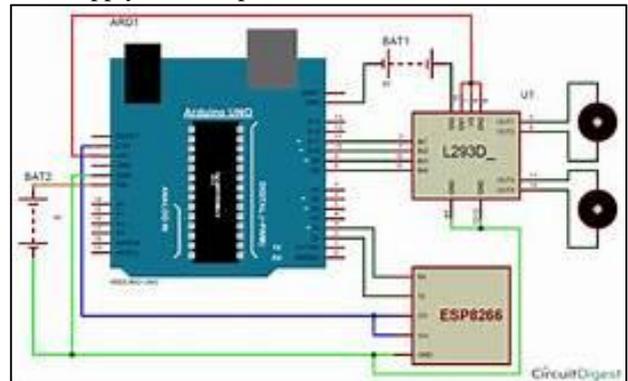


Fig. 3: Circuit Diagram of the hardware

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V. CONCLUSION

Thus in this project, we design an android app in software android studio to control RC.

VI. RESULT

After simulating the circuit connections in Proteus 8.0, following result was observed. Connections were made as per the circuit diagram and hex file of the code of arduino was attached to the arduino uno.



Fig. 4: Final Output

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