

# Cell Phone Controlled Robotic Vehicle

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**Abstract**—*Nowadays smartphones can be used to control a host of electrical and electronic devices including motors, music systems and lights. Here we present an Arduino based robot car, Arduino is an open-source prototyping platform Based on easy-to-use hardware and software. Since robotics has become a major part in our daily life and also in the engineering field and it plays a vital role in the development of new technology. This is a very simple and easy type form of remote-control car, where the ordinary micro-controller has been replaced by Arduino and IR sensors has been replaced by a Bluetooth module. The remote can be any android or IOS cell phones.*

**Indexed Terms**—*Arduino, Bluetooth, IR Sensor, Android, Robot.*

## I. INTRODUCTION

Robotics is an evolving technology. There are various approaches to build robots, and no one is sure which method or technology will be used 100 years from now. Robotics is evolving like the Darwinian evolutionary theory of survival of the fittest.

In this project, we will deliberate how to control robot-controlled car using Bluetooth module through Bluetooth application of an android mobile phone. The benefit of using robot-controlled car is it can be used to reduce manual work. This project can be modified quite easily to include a camera well that can stream the videos to the user over Wi-Fi using WiFi module.

Nowadays smart phones are becoming more powerful with reinforced processors, larger storage capacities, richer entertainment function and more communication methods. Bluetooth is mainly used for data exchange; add new features to smart phones. Bluetooth technology, created by telecom vendor Ericsson in 1994, shows its advantage by integrating

with smart phones. It has changed how people use digital device at home or office, and has transferred traditional wired digital devices into wireless devices. A host Bluetooth device is capable of communicating with up to seven Bluetooth modules at same time through one link Considering its normal working area of within eight meters, it is especially useful in-home environment. Thank for Bluetooth technology and other similar techniques, with dramatic increase in Smartphone users, smart phones have gradually turned into an all-purpose portable device and provided people for their daily use. In recent years, an open-source platform Android has been widely used in smart phones Android has complete software package consisting of an operating system, middleware layer and core applications. Different from other existing platform like iOS (iPhone OS), it comes with software development kit (SDK), which provides essential tools and Application. Using a Smartphone as the “brain” of a robot is already an active research field with several open opportunities and promising possibilities. In this paper we present a review of current robots controlled by mobile phone and discuss a closed loop control systems using audio channels of mobile devices, such as phones and tablet computers. In our work, move the robot upward, backward, left and right side by the android application such as Arduino Bluetooth RC Car. This article is organized as follow: Section 2 describes the motivation of the work, Section 3 describes our experimental setup, Section 4 depicts a discussion about our experimental setup and Section 5 presents our conclusions.

## II. LITERATURE SURVEY

*Smart Phone Controlled Robot Using ATMEGA328 Microcontroller.*

*Authors: Aniket R. Yeole, Sapana M. Bramhankar, Monali D. Wani, Mukesh P. Mahajan.*

In this paper have structured a robot that can be controlled using an application running on an android

smartphone. It sends control order by means of Bluetooth which has certain highlights like controlling the speed of the engine, detecting and sharing the data with telephone about the bearing and separation of the robot from the closest hindrance.

Android Controlled Bluetooth Robot Using 8051 Microcontroller.

Authors: Ritika Pahuja, Narender Kumar.

A robot is normally an electro-mechanical machine that is guided by PC and electronic programming. Numerous robots have been worked for producing reason and can be found in production lines around the globe. This paper builds up the remote fastens in the android application which control the robot movement with them. What's more, in which Bluetooth communication is use to interface controller and android. Controller is interfaced to the Bluetooth module however UART convention.

Robot Controlled Car Using Wi-Fi Module

Authors: S R Madkar, Vipul Mehta, Nitin Bhuwania, Maitri Parida

This paper, deliberate how to control robot-controlled vehicle utilizing Wi-Fi module through android application of an android Smart Phone. It is additionally show that the apparatuses can be controlled even without an android telephone by sending an ordinary SMS. This task can be adjusted effectively to incorporate a covert agent camera too that can stream the recordings to the client over Wi-Fi. Sunlight based cells are rather than the customary lithium-ion battery for the venture.

Robot Control Design Using Android Smartphone

Authors: Mrumal K Pathak, Javed Khan, Aarushi Koul, Reshma Kalane Raunak Varshney

The motivation behind this paper is to furnish amazing computational android stages with less difficult robot equipment design. This paper depicts how to control a robot utilizing portable through Bluetooth communication, a few highlights about Bluetooth innovation, segments of the versatile and robot. It

presents an audit of robots constrained by smart phone by means of moving the robot upward, reverse, left and right side by the android application, for example, Arduino, Bluetooth

### III. METHODOLOGY

The Arduino Wireless Mobile Controlled Robot comprises of a transmitter and a beneficiary segment. The transmitter end comprises of Smartphone Bluetooth and the Android application introduced on it. Thus, the Receiver area has Arduino board as a processor, HC-05 Bluetooth Module as a remote communication module, L293D for driving engines, and a couple of DC designed as a section for moving robot

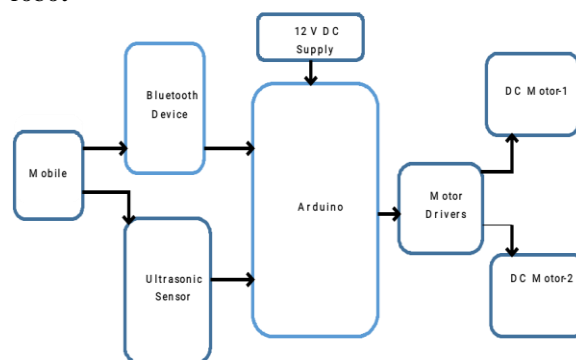


Fig: Block diagram of Mobile Controlled Robot using Arduino and IR Sensor

### IV. CIRCUIT DIAGRAM

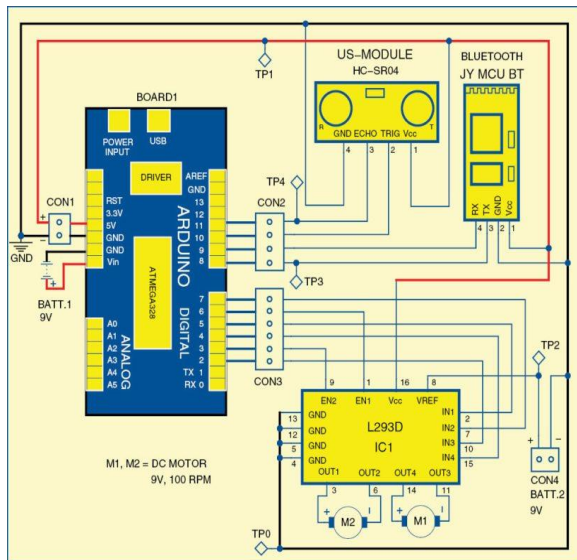
Android smartphones are undoubtedly the most popular gadgets these days. You will find various apps on the Internet that exploit inbuilt hardware in these mobile phones, such as Bluetooth and Wi-Fi, to control other devices. Presented here is a phone-controlled robot that can be controlled via an app on your mobile. The control commands are sent via Bluetooth and the robot has such features as:

1. It can be controlled from Android smartphones by touch or voice commands
2. It will also send information about the obstacles in front of robot which it is moving.

The above figure shows circuit diagram of the Android phone-controlled robot. The circuit is built around an Arduino UNO board (BOARD1), ultrasonic

transceiver module HC-SR04, Bluetooth module JY MCU BT, motor driver L293D (IC1), DC motors M1 and M2, and a few common components.

The circuit uses two 9V batteries—one to power the Arduino board and the other to power the motors, as shown in Fig. 3. Regulated 5V supply for rest of the circuit is provided by the Arduino board itself. LED on the board indicates presence of power supply.



## V. HARDWARE DESCRIPTION

Bluetooth module. Bluetooth module JY MCU BT used in the project can be connected to any device, via built-in UART interface, to communicate with other Bluetooth-enabled devices such as mobile phones, handheld computers and laptops. The module runs on a 3.6V to 6V supply.

Ultrasonic transceiver module. Ultrasonic transceiver module HC-SR04 uses sonar, like bats and dolphins, to determine distance to an object. It offers excellent non-contact range-detection of 2cm to 400cm with high accuracy and stable readings in an easy-to-use package. It comes complete with an ultrasonic transmitter and a receiver module.

Arduino Uno board. Arduino is open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It is intended for artists, designers, hobbyists and anyone interested in creating interactive objects or environments.

Arduino Uno is a board based on ATmega328 microcontroller. It has 14 digital input/output pins, six analogue inputs, a USB connection for programming the on-board microcontroller, power jack, an ICSP header and a reset button. It is operated with a 16MHz crystal oscillator and contains everything needed to support the microcontroller.

The board is very easy to use as the user simply needs to connect it to a computer with a USB cable, or power it with an AC-to-DC adaptor or battery to get started. The microcontroller on the board is programmed using Arduino programming language using Arduino development environment.

Pins 8 and 9 of BOARD1 are connected to pins Tx and Rx of the Bluetooth module, respectively. Pins 10 and 11 are connected to trigger (TRIG) and echo (ECHO) pins of HC-SR04, respectively. Pins 2 through 7 of BOARD1 are the output pins, which are connected to IC1 for controlling the motors. Pins 2, 3 and 4 of BOARD1 are connected to IN3, EN2 and IN4 of IC1 to control motor M1, and pins 5, 6 and 7 are connected to IN1, EN1 and IN2 of IC1 to control motor M2. EN1 and EN2 are used to control the speeds of the motors.

The control commands for the robot are sent from the phone using the app. You can send the commands either by touching on various options on the phone's screen or through speech commands. Corresponding to control commands you select on the app, the related data is sent through Bluetooth of the phone. Data transmitted by the phone is received by Bluetooth module at the robot end. The received data is fed to pin 8 of BOARD1. The microcontroller on BOARD1 processes the received data and drives motors accordingly.

The robot also sends back the status. In the app you can see label 'Robot Status,' below which you can see the direction in which robot is moving. The robot continuously sends back information about the distance from the closest obstacle to the phone, and if it reaches too close to an obstacle the robot stops automatically.

## VI. SOFTWARE DESCRIPTION

The software for the robot is written in Arduino programming language. The Arduino UNO is programmed using Arduino IDE software. Atmega328 on Arduino UNO comes with a boot loader that allows you to upload new code to it without using an external hardware programmer. It uses STK500 protocol to communicate. You can bypass the boot loader and program the microcontroller through ICSP (in-circuit serial programming) header, but using boot loader programming is quick and easy. Select the correct board from 'Tools→Board' menu in Arduino IDE and burn the program (sketch) through standard USB port in the computer.

The procedure for installing Android app on the phone is as follows:

1. Download the app (Android\_BOT.apk) from the link and copy it to your Android smartphone (or tablet).
2. Run the file, and when it asks you 'Complete action using,' click on 'Package installer' and then click 'Install.'
3. You also have to install voice-search and a text-to-speech app from play store if you want to control the robot through speech.
4. Please note, you have to change the baud rate of the Bluetooth module on the robot to 57600 using AT command.

- Construction and testing

An actual-size, single-side PCB layout for the phone-controlled robot is shown in Fig. 6 and its component layout in Fig. 7. Assemble the circuit on the recommended PCB to minimize assembly errors. Use IC base for motor driver IC1.

Follow the steps below to get the robot running the first time:

1. Provide power supply to the robot by connecting the batteries.
2. Pair the Bluetooth module with Android phone. While pairing it will ask you the password. Type 1234, which is the default password of Bluetooth module.
3. Run the already installed app in the phone. Press on the welcome screen to get the main interface.

4. Select 'Select Device' (make sure the Bluetooth is on), then select Bluetooth module from the list of Bluetooth devices scanned and select 'Connect.' It will take five to ten seconds to connect. After connection, it will notify you that Bluetooth is connected. Now it is time to start playing with the robot.
5. Slide the slider to the right (or left) to set the speed, and select the arrows to move the robot in corresponding directions.
6. To control the robot with speech commands (forward, backward, left, right and stop) select 'Say Command' on the app screen. You can also see the commands that are spoken by you. We need to pronounce the commands clearly.

To test the circuit for proper functioning, verify there is correct 5V supply for the circuit at TP1 with respect to TP0. Also verify the 9V supply for the motors at TP2. Transmitted data by the Bluetooth can be observed at TP3. Echo from the ultrasonic module can be checked at TP4 using an oscilloscope.

## CONCLUSION

With the help of wireless technology in combination with Bluetooth we can create wonders and this paper proposes an idea of moving car. This technology can be useful for parking cars at big places like malls etc. and we can reduce man power to park cars.

We can modify the rover as per our requirement. If we want to use this for surveillance purpose so we can implement the camera or thermal sensors along with others sensors. Further if we want to improve the accuracy of the rover, we can implement sonar sensors so controlling rover from remote place can be possible. We can also implement GPS system so it can be semi-autonomous. The proposed work can be enhanced with the help of more security function like passwords and so on

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