

# Android Based Robot Using Raspberry Pi

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**Abstract:** *This paper represents a method for controlling a robot using Raspberry Pi and an application built in the android Platform. We present a review of Robots controlled by mobile phone via moving the Robot upward, backward, left and right side by the android application and Raspberry Pi. The android phone and raspberry pi board is connected through wifi. A signal is generated from the android app and which will be received by the raspberry pi board and the robot works according to predefined program. The android app is command center of robot. The program is written in the python language in the raspberry pi board. The robot performs the same activity as the human hand works.*

**Keywords:** Raspberry pi, Android, Robot, wifi.

## 1. Introduction

Robots are being used increasingly in our everyday life and also in industrial applications. Robots are used in Hazardous work environment thus eliminating the harm to the human lives. These robots which work in such unfriendly conditions for humans are controlled wirelessly using wifi. In general robots can be classified into different fields industrial and service robotics. Service robots are a robot which performs semi or full autonomously to perform services usefully for the well being of humans and equipments, excluding manufacturing operation. The robot body is build mechanically and electrical components were also used to build the robotic arm. Mostly the robots are controlled by wired these wired robots have some space limitation. So to avoid the limitation, the robotic control is made wireless that is; it is controlled by Wi-Fi. Wirelessly also means using Bluetooth but the advancement used here is the WI-FI which is most widely used nowadays.

The raspberry pi is a credit-card-sized single-board computer which is developed by the UK based Raspberry Pi Foundation. The Raspberry Pi has 17 GPIO pins. Using L293 motor driver boards, the Robot is controlled through the GPIO pins. This robot can be controlled through a Smartphone and Raspberry Pi acting as communication media between them. An android application is developed in the android platform. Here Android application being the command centre of the robot as it commands the arm to move or grab specific things as the instruction is transferred to the arm through android JAVA language. The Robots are being used in variety of industrial applications for various activities like pick and place, painting, assembling of subsystems and in hazardous places for material handling etc.

## 2. Implementation

The aim of the project is to build a robot that can be controlled by an android phone. We are creating Wi-Fi network between the android phone and Raspberry Pi. Commands are given to the robot from the phone and robot works according to that commands. The DC motors are also interfaced with the raspberry pi for their control and

movement commanded from the android. DC motors are being used for the movement of robotic wheels i.e. to move right-left or to move in forward or backward direction. Some of the reasons for the proliferation of ARM-based processors include low cost, low-to-very-low power consumption, decent processing power, and open development environment. The Raspberry Pi is a credit-card sized computer that plugs into your TV and a keyboard. It is considered to be a small computer, highly capable that can be used in electronics projects, and for many of the things that your desktop PC does, like spreadsheets, word-processing and games.



Figure 1: Raspberry Pi Board.

Raspberry Pi has a strong processing capacity because of using the ARM11 architecture and Linux-based system. In terms of control and interface, it has 8 GPIO, 1 UART, 1 I2C and 1 SPI, which basically meet the control requirement. There are simple and easy-used open source peripheral driver libraries. The wheels are controlled by DC motors which are dependent on driving motor.

### 3. Proposed System

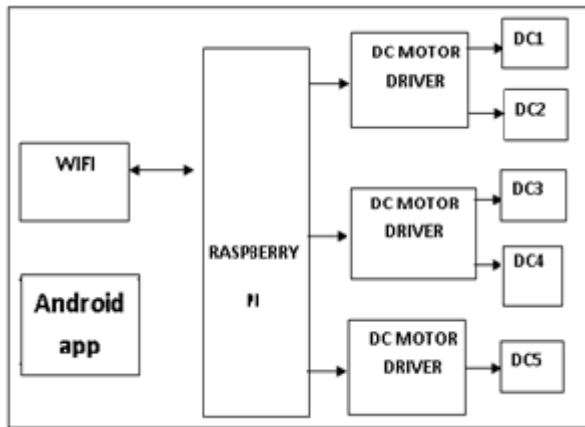


Figure 2: Block Diagram

Major components of the system:

The system consists of following parts-

- 1) Android Smartphone
- 2) Wireless network
- 3) Raspberry Pi
- 4) Driving motors
- 5) DC motors

#### 3.1 Android Application

An application is specially designed that interfaces the android with the robot. The input commands are entered into the android that may consist of left or right movement of the robot, or the command to pick and place some small item. These commands are then executed on the robot side.

#### 3.2 Wireless Network

A Wi-Fi dongle is connected to the Raspberry Pi which creates a network and is interfaced with the android phone. The Wireless LAN is provided with an IP address which is locally declared.

#### 3.3 Raspberry Pi

It is also known as microcomputer. It is central unit of the system. The program is written in the python language in the raspberry pi board and the robot works according to that predefined program.

#### 3.4 Driving Motors

A 12V battery is used as power supply for the robot. This supply is given to the regulator which steps it down to 5V and is then supplied to the Raspberry Pi that drives the motors of the robot. To drive a dc motor, we need a dc motor driver called L293D. Each single driving motor can drive two motors. Since five DC motors are used to run, therefore total three motor drivers are used.

#### 3.5 DC Motors

DC motors are used to drive the wheels of the robot and for driving robotic arm for the purpose of pick and place of an

object. 5V power supply is required to drive the motor which is provided from the driving motor.

### 4. Conclusion

The Raspberry Pi can be used for the control the Robot with Smartphone from a remote area. The present scenario wired controlled robot has several disadvantages such as wired restrictions and server problems. In this Smartphone technique the delay and server problems are reduced as the Wi-Fi is used. In present situation most of the people uses the Smartphone worldwide. The robot can perform nearly same movements using the stepper and DC motors having a precise control Smartphone.

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