

# Android Mobile Controlled Robotic Arm

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**Abstract**— The smart phones especially android are the most common things used by people around the globe. Integration of this commonly used terms android mobile and wireless technology can be used to develop a remote control robotic system. In this paper, we present the android mobile controlled robotic arm. The robotic arm can be used in many applications like hospitals, control systems, etc. Wireless medium is the most popular medium of communication and is the future of all the technologies.

**Key words:** Robotic Arm, Android Mobile

## I. INTRODUCTION

An android mobile and Bluetooth interfacing is done in the work before which is extended in this paper. The android mobile acts as the control panel for robotic arm. The robotic arm designed comprises of the gripper mechanism, elbow mechanism, shoulder mechanism and arm base rotation movement. Four servo motors are used for the four mechanisms. The use of servo motors gives us the liberty to rotate the motor in the specific angle by setting the PWM value. The servo motor operates on the 6V only hence the power consumption is also low.

The idea is to control the servo motor with the help of android mobile.

## II. BLOCK DIAGRAM

The figure 1 below shows the block diagram of the robotic system developed. The block diagram has the two main units control unit and the robotic arm unit.

The control unit is the android mobile while the robotic arm unit is the Bluetooth module interfaced with Arduino and the servo motors interfaced with the Arduino. The block diagram in details is as follows:

### A. Control Unit

Control unit is android mobile with a software install in it.

### B. Robotic Arm Section

The robotic arm section has four main components viz. Android mobile, Bluetooth module HC-05, Arduino Uno board and servo motors.

#### 1) Bluetooth HC-05

The Bluetooth module used for this project is HC-05. HC-05 module is an easy to use Bluetooth Serial Port Protocol module. It is designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth Version 2.0 with speed of 3 Mbps. The model number 05 indicates that the Bluetooth can be operated both as master and slave.

#### 2) Arduino Uno

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP

header, and a reset button. It contains everything needed to support the microcontroller, simply connect it to a computer with a USB cable or power it with an AC to DC adapter or battery to get started. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform.

#### 3) Servo Motor

The purpose of using the servo motors is the low power consumption and the control of the rotation. Servo motors that are used for the here are MG90S. Total 4 servo motors are used for gripper, elbow, shoulder and arm base respectively.

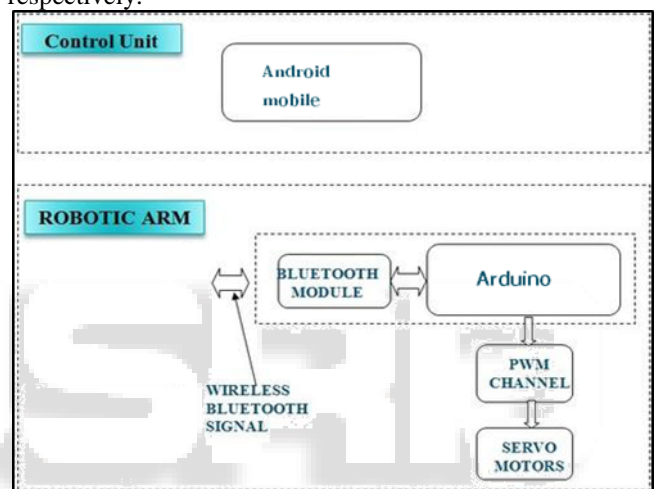


Fig. 1: Block Diagram

## III. IMPLEMENTATION

### A. Hardware Implementation

The figure 2 below shows the implementation of the robotic arm. The arm has gripper, elbow, shoulder and base. The gripper mechanism is used to pick and drop any object. Shoulder is used to move arm up or down. Elbow mechanism is used to move arm forward and backward. Base mechanism is used to move arm 180 degree

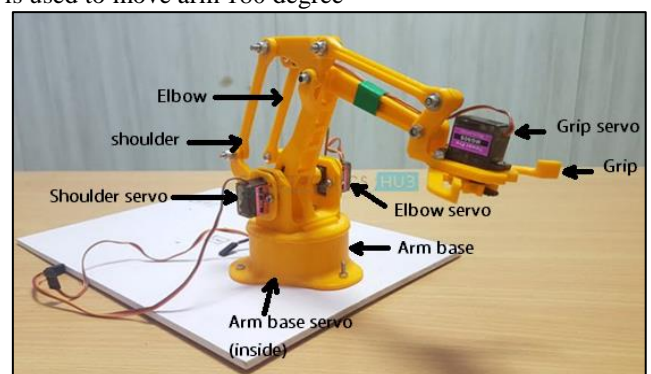


Fig. 2: Robotic Arm Showing the Gripper, Elbow, Shoulder & Base

### B. Software Implementation

The most important part of this work was the proper interfacing of the Bluetooth module with the Arduino Uno board.

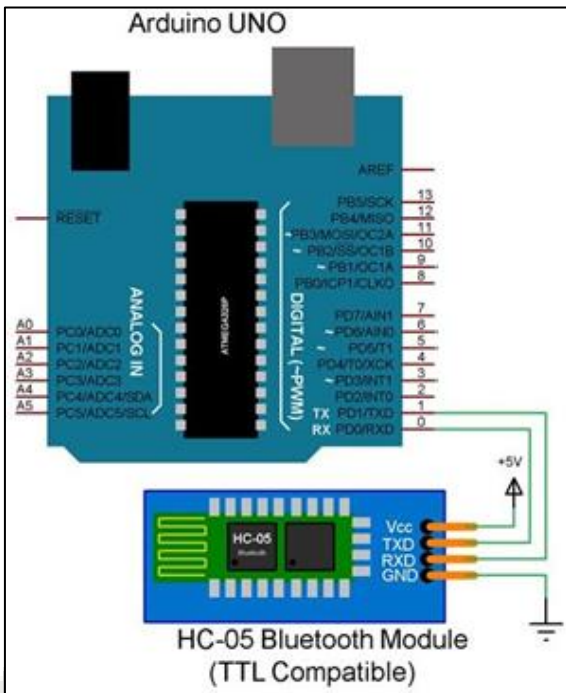


Fig. 3: Arduino & Bluetooth Interface

The Bluetooth serial controller is used to transmit the commands to the Arduino Uno board. The control panel includes 8 different buttons to control the servo motor as shown in the figure 4 below:



Fig. 4: Bluetooth Controller

### IV. CONCLUSION

It can be concluded that with the help of an android mobile a remote controlled robotic arm is developed. The robotic arm can be controlled from any place to perform the small tasks such as picking objects, dropping objects and arm rotation. This design can be extended to perform many remote operations with inclusion of more servo motors and innovative ideas.

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