

Project 1

Android + Bluetooth +Arduino pick and place robot

Aim: This bot will be controlled by an android app which will send commands to bot through Bluetooth. Servo motors will be used to move the arm of the bot.

Description for Pick and Place Robot Arm:

From this project, here I am assuming three axis arm for full function of pick and place robot. Overview of three axis arm are given in fig.1. Arm accuracy is not best possible but good enough for practice purposes. Using better quality servos, advanced programming and more sturdier building components, accuracy can be improved significantly. Placement of servos are given in fig. 2. For the measurements of all arm and position of servos refer 1st link in reference section.

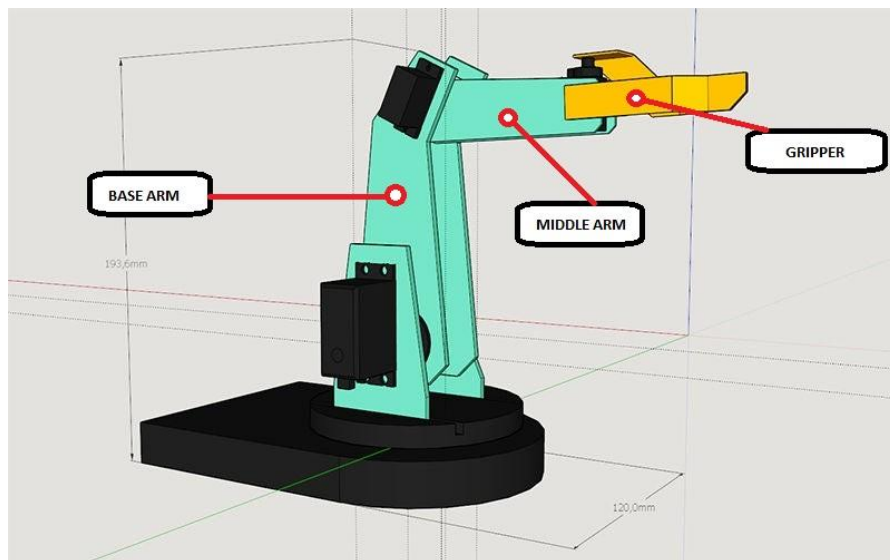


Fig 1. Three Axis Arm

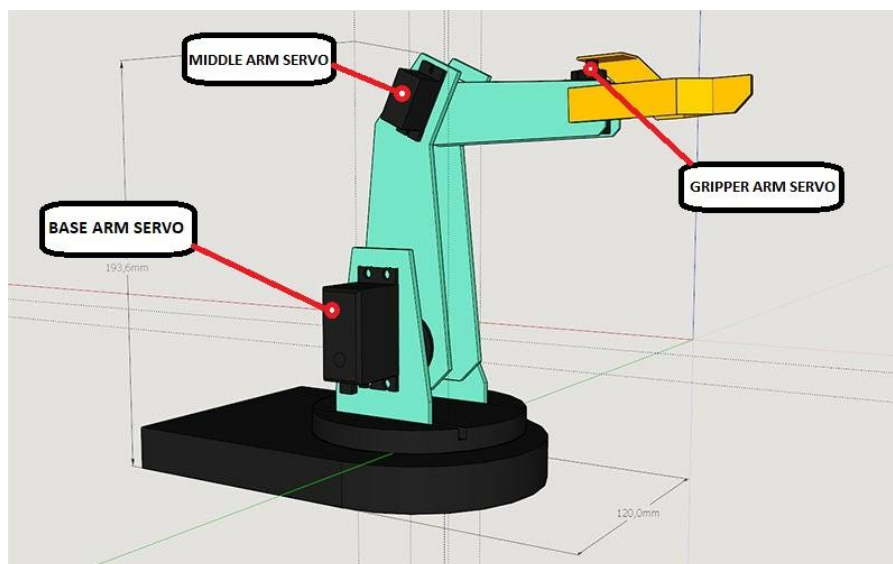


Fig 2. Placement of servo

Components:

1. Arduino uno



Fig 3. Arduino uno

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.

2. Bluetooth module (HC-05)



Fig 4. HC-05

HC-05 Bluetooth Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication which makes an easy way to interface with controller or PC.

3. Servos



Fig 5. Servo motor

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity, and acceleration. It consists of a suitable motor coupled to a sensor for position feedback.

4. Breadboard

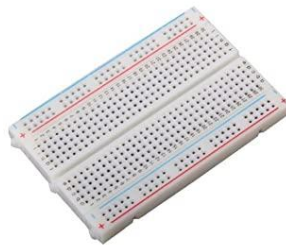


Fig 5. Breadboard

A breadboard is a rectangular plastic board with a bunch of tiny holes in it. These holes let you easily insert electronic components to prototype (meaning to build and test an early version of) an electronic circuit, like this one with a battery, switch, resistor, and an LED (light-emitting diode).

5. Jumpers



Fig 6. Jumpers

A jump wire (also known as jumper wire, or jumper) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering

Procedure:

Step 1: Parts Required

Required components are given in components section. One unit of all components required and some jumper wires.

Step 2: Build Three axis arm

To build three axis arm refer 1st link in “Reference” section.

Step 2: Connect the components

After the building the Three axis arm placed servo on proper placed and use breadboard and Jumper wire for connection. Connect the components and wire as shown in below fig 7.

Link: <https://www.tinkercad.com/things/82OINvzKQAA-3-axis-arm-using-servo-motor/editel?sharecode=olpQ70VoC8gFBPH0lm5tJRF4PR7DDop00revmVXJ9io>

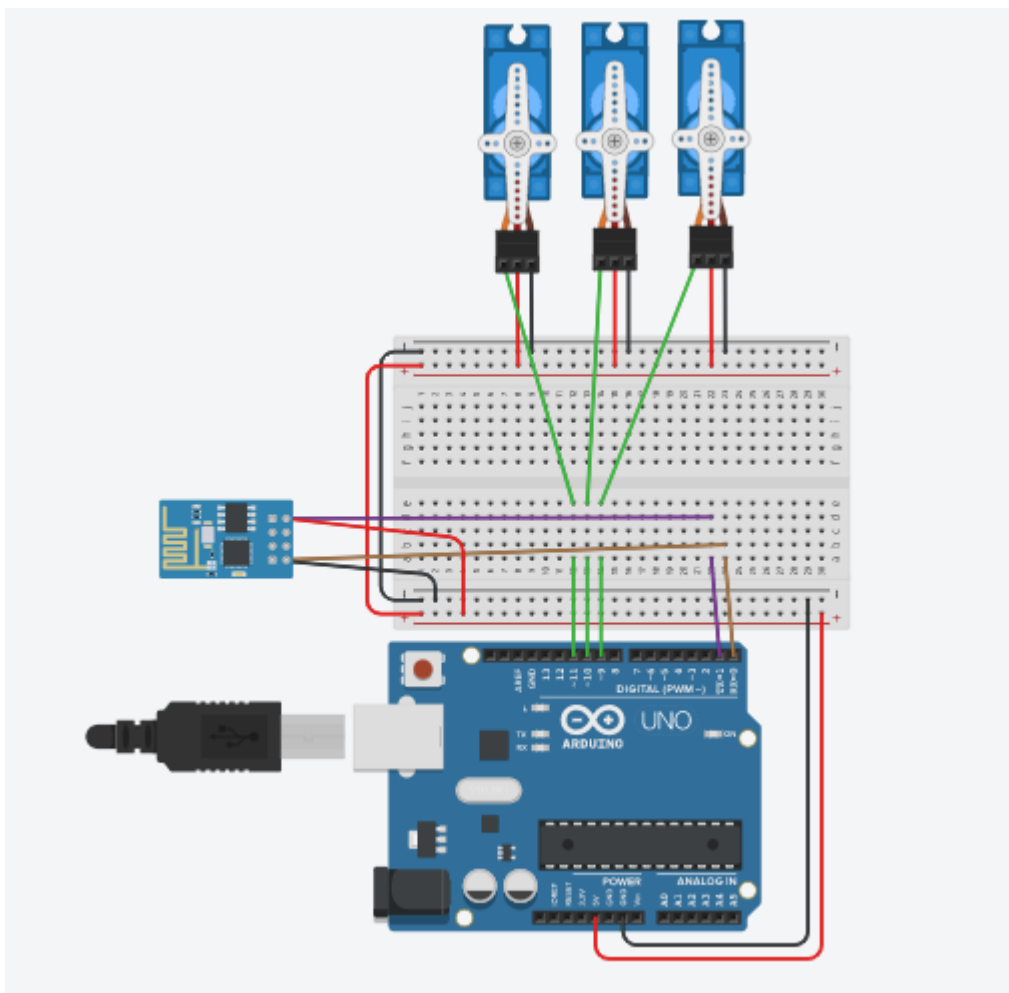


Fig 7. Connections

Step 3: Upload the code

Upload the sketch to your Arduino. Use code which is given in “Arduino code” section. Kindly check the perfect COM port.

Step 4: Configuration of Arduino Bluetooth app

Arduino Bluetooth app is available on google play store. Download and install this app and follow the instruction given in “configuration of android app”.

Step 5: Commands

After following instruction of configuration of android app. Communication between your phone and microcontroller is establish. Use controller given in fig 7. for controlling Three axis arm. Defined command are given in “Working of three axis arm” section.

Pin Connections:

PIN	CONNECTION
9	BASE ARM SERVO
10	MIDDLE ARM SERVO
11	GRIPPER ARM SERVO
RX	TX (HC05 BLUETOOTH MODULE)
TX	RX (HC05 BLUETOOTH MODULE)

Configuration of Android App:

For controlling this Three Axis Arm, here am using Arduino Bluetooth Controller app. Arduino Bluetooth Controller is officially available on Google Play Store as well as on Apple Store.

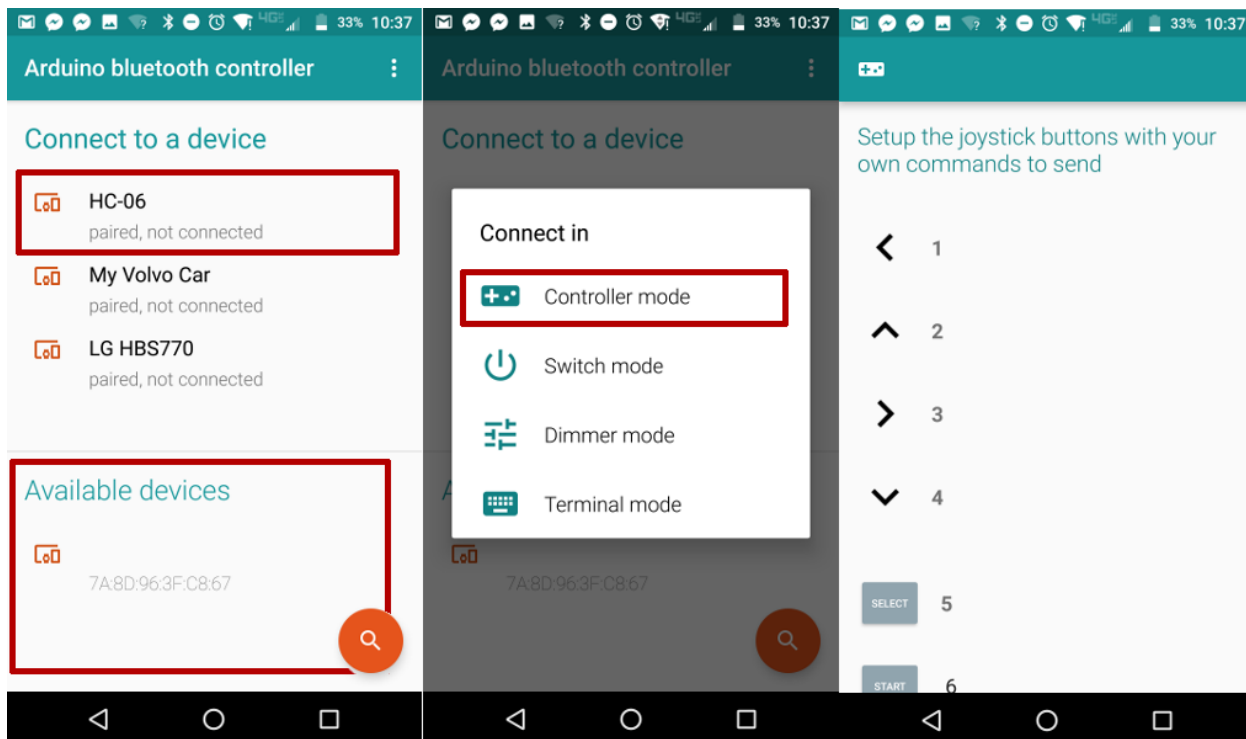


Fig 8. Overview of Arduino Bluetooth Controller App

If your HC-05 module doesn't immediately appear in the “Connect to a device” section, check the available device section. Click on your HC-05 module. If prompted for a password, use “1234”. This is the standard password. Connect in controller mode. When you attempt to use the controller, it may give you some flak about having not “configured” your controller yet. Follow the prompt or click the icon in the upper corner to configure. Custom “commands”. I went with 1-7 for the first 7 buttons, and ‘s’, ‘t’, ‘x’, and ‘c’ for square, triangle, cross and circle button respectively. You'll see why in the code section.

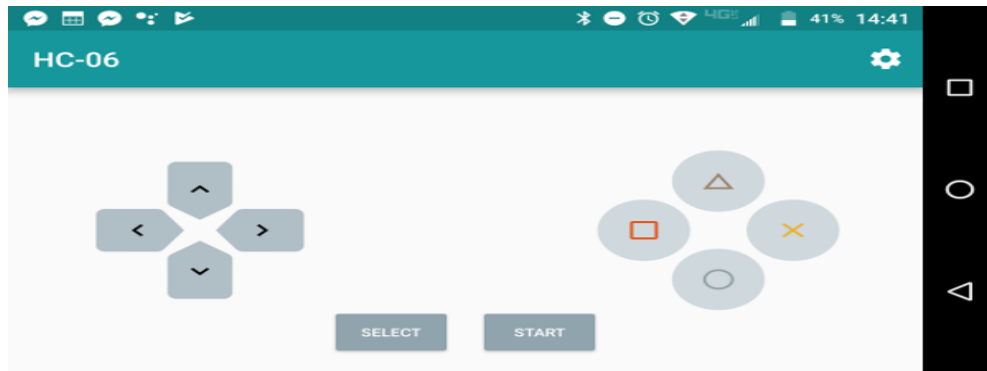


Fig 9. Controller

Working of Three axis arm

Three axis arm is controlled using servos. The three servos are using for each arm and gripper. Using Bluetooth module, we are receiving command from Arduino Bluetooth controller to the microcontroller which is already configured for each button. Based on this microcontroller assigning the value to the servo.

Buttons	Functions
UP	BASE ARM (MOVE ON ONE SIDE)
DOWN	BASE ARM (MOVE ON ANOTHER SIDE)
RIGHT	MIDDLE ARM (MOVE ON ONE SIDE)
LEFT	MIDDLE ARM (MOVE ON ONE SIDE)
TRIANGLE	GRIPPER OPEN
CROSS	GRIPPER CLOSE

Simulation Output of Proteus Software:

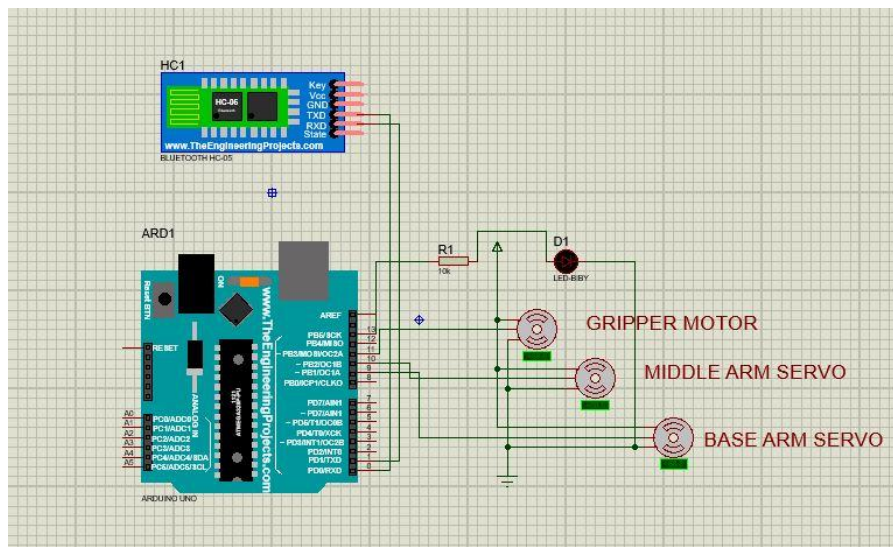


Fig 10. Output 1

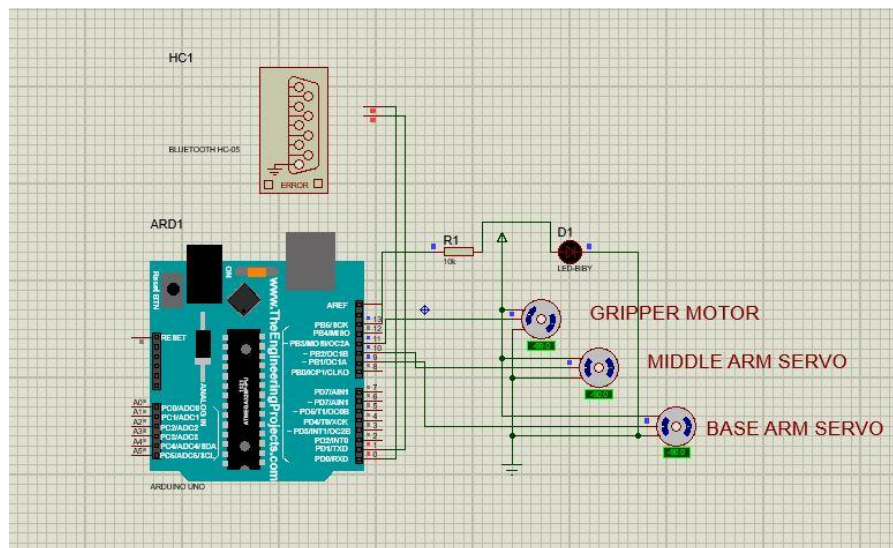


Fig 11. Output 2

References:

1. <https://www.instructables.com/id/4-Axis-Robot-Arm-DIY/>