

MOBILE CONTROLLED PICK AND PLACE ROBOT USING ARDUINO

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ABSTRACT

The work is designed to develop the pick and place robotic arm with a soft catching gripper that to lift hazardous object which cannot not be touched by human hands.The robot is controlled through Bluetooth using smartphone.It is built with servo motors. Arduino controller is used in robotic arm process ,the movement of the robot is either forward,backward,left or right.The robotic arm is designed using servo motors,and it is interfaced with micro controller.The main advantage of soft catching gripper is to lift a hazardous object.it is controlled by using Bluetooth in smart phone.

Keyword—Arduinouno,Bluetooth,servomotor

1. INTRODUCTION

The project aims in designing a Robot arm which is operated using bluetooth and also which is capable of Picking and Placing of many objects.The advent of latest high-speed technology and therefore the growing bluetooth capability provided realistic chance for brand spanking new automaton managements and realization of latest ways of control theory.This technical improvement at the side of the requirement for top performance robots created quicker, more accurate and more intelligent robots using new robots control devices, new drivers and advanced control algorithms.This project describes a brand new economical resolution of automaton management systems.The bestowed automaton arm system are often used for various refined robotic applications.The modules in the project are: Bluetooth interfaced to Microcontroller, Robot arm which is capable of Picking and placing objects, Servo motors is attached to the robot arm for themovement of mechanism andMicrocontroller that performsthe dominant operations of mechanism arm in choosing and putting of objects.The controlling device of the whole system is a Microcontroller to which bluetooth; Servo motors of robot arm are interfaced through a motor driver. Whenever the appropriate keys on mobile application then the data will be transmitted through bluetooth to the microcontroller.The Microcontrollerchecks the data with the program embedded in it and performs appropriate actions onthe robot arm. The Microcontroller is programmedusingClanguage.An embedded system may be a combination of software package and hardware to perform a zealous task.Some of the most devices employed in embedded product square Measure Microprocessors and Microcontrollers. Microprocessors square measure remarked as generalpurpose processors as they merely settle for the inputs, process it and give the output.In contrast, a microcontrollernotonlyaccepts the dataas inputs however additionally manipulates it, interfaces the information with numerous devices, controls the information and therefore finally offers the result.The “Bluetooth controlled pick and place robot” using Arduino microcontroller is an exclusive project which is used to control speed and direction of Servo motor using general purpose bluetooth unremarkably.

2.HARD WARE

Arduino UNO R3 board is used in this project. Arduino is a micro controller board based on AT Mega 328p. It has 14 digital input/output pins, 6 analog outputs, 16MHz quartz crystal, a USB connection, a power jack, an I2C header and a reset button. It powers with a AC-DC adapter or battery to get started. The Uno board has 1.0 of Arduino software. HC-05 module is a straightforward to use Bluetooth module (serial port protocol) designed for clear wireless serial communication setup. It can be utilized in Master Slave configuration, making it an excellent resolution for wireless communication. It uses CSR Bluecore04 single chip with CMOS technology and with Adaptive Frequency Hopping.

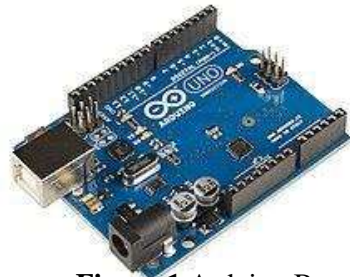


Figure 1. Arduino Board

The servo motor can rotate up to 180 degrees, and SG and MG servo motors are used in this project. It has a metallic gear, and it has a torque of 10 kg/cm.

Red-positive, Brown-Negative



Figure 2. Servo motor

3.ROBOTIC ARM

The basic joints found in typical robots. Every joint connects exactly two links; joints that simultaneously connect three or more links are not allowed. The revolute joint (R), also called a hinge joint, allows for rotational motion about the joint axis. The screw joint (H), also called a helical joint, allows simultaneous rotation and translation about a screw axis. Revolute, prismatic, and screw joints all have one degree of freedom. Joints can also have multiple degrees of freedom. The cylindrical joint is a two-dof joint that allows for independent translations and rotations about a single fixed joint axis. The universal (U) is another two-dof joint that consists of a pair of revolute joints organized so their joint axes are unit orthogonal. The spherical joint (S), conjointly referred to as a ball-and-socket joint, has 3 degrees of freedom and functions very similar to our ball-and-socket joint.

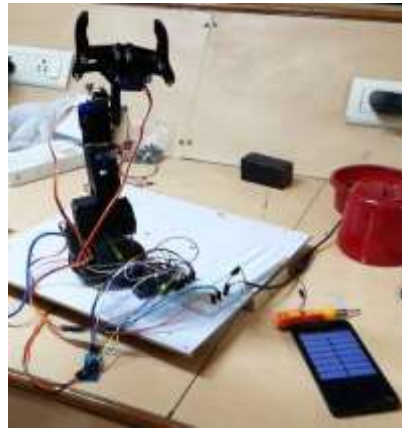


Figure 3.Robotic arm

4.SYSTEM ARCHITECTURE

The program is coded using c programming through arduino software and feeded into arduino board and the program is simulated through proteus softwareThe power supply is given through adapter and power bank when the board is energized smartphone Bluetooth connects with HC module The customized Application is made specially for robotic arm can operate the robotic armThree sg servo motors are used for wrist roll,wrist pitchand gripper.MG servo motors are used waist,shoulder and elbow.the HC module is connected in tx andRx port which are transmitter and receiver port 5V supply is given to the board.The whole robotic arm is made using 3D printing technology.it is made up of mixture of plastic and resin .The design of robotic arm is designed using solidworks software

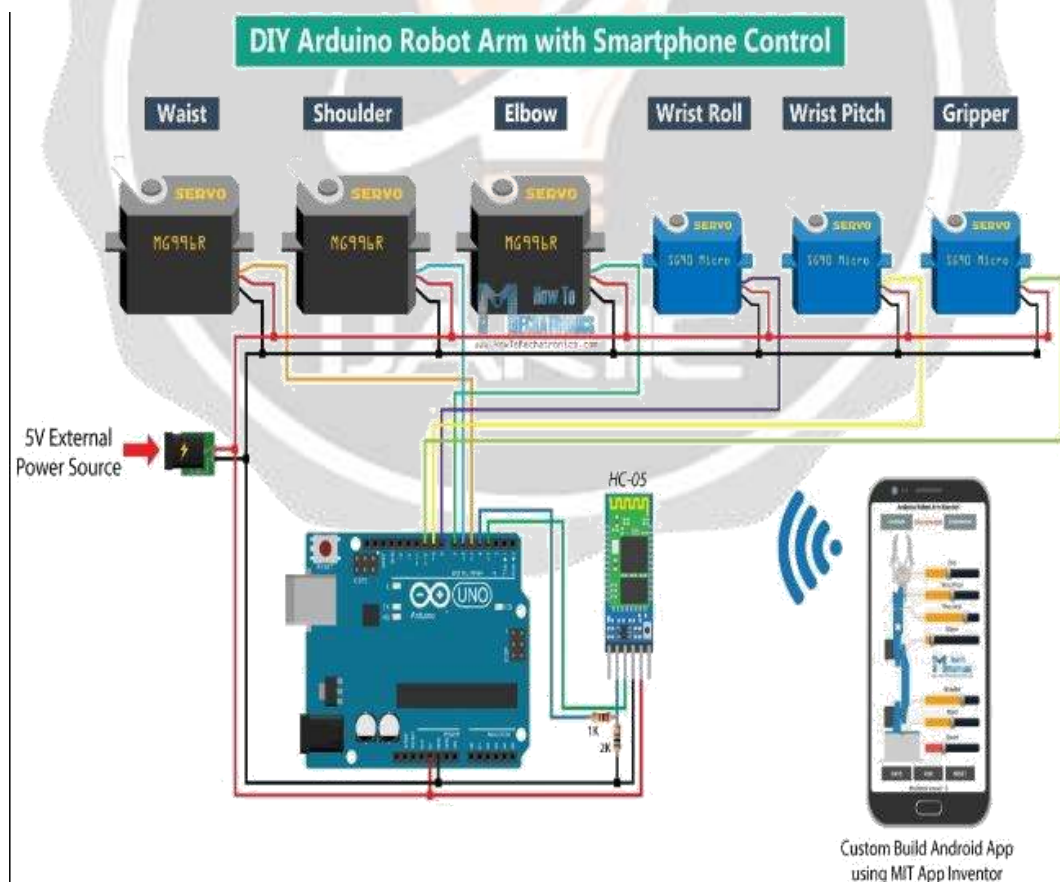


Figure 4.Block diagram

5.ANDROID APPLICATION

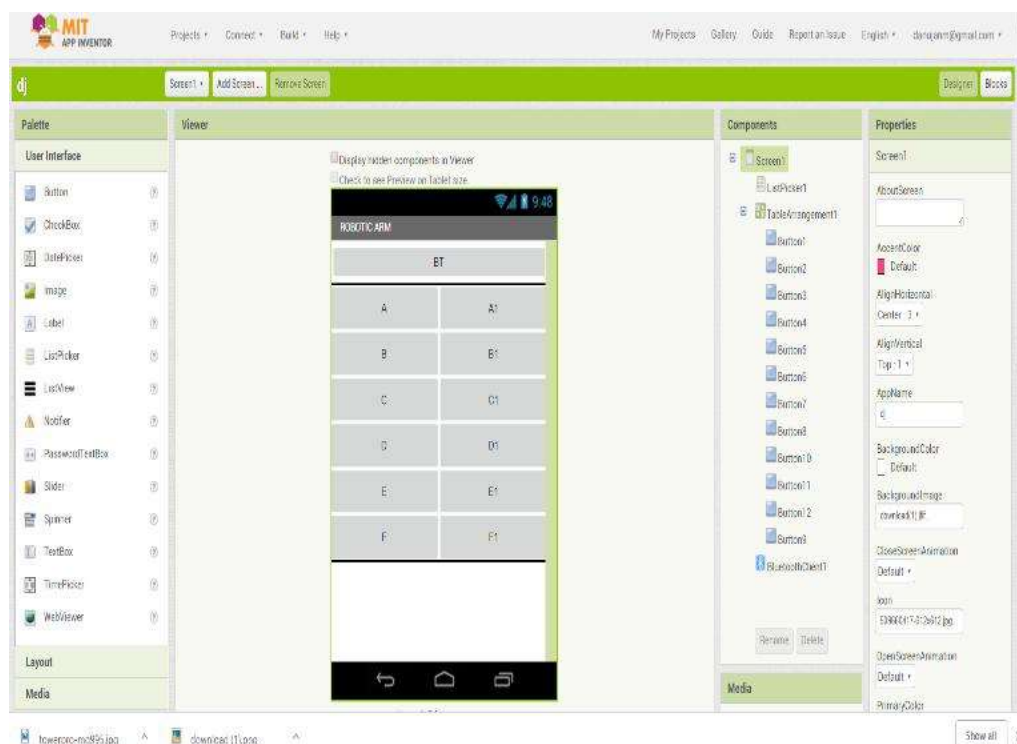


Figure 5,Android Application

The android application is made using MIT app inventor.It is an user friendly website where android application can be built effectively.The application is built by using blocks providedThe communication between Bluetooth module andmicrocontroller requires the submission of ASCIIorders through the software serial port (2,3 pins).Unfortunately on the event of using multiple softwareserial ports, only one port can receive data at a time.The servo control function in MCU generates thedifferent pwm signals to control 5 servos and gripper.The microcontroller interprets the commands issuedby the Bluetooth module, and produces the propersequence of timed pulses necessary to move the eightservos to the desired positions (increase or decrease the servo angles). The microcontroller produces a50Hz sequence of pulses, the duty cycle of which controls the commanded angle of each servo. Forexample, a 600us pulse could command the servo to move to itsfull counter-clockwise position; a 1320uspulse could command it to the centre, or neutral,position, and a 2040us pulse could command it tomove to the full-clockwise position. By varying thetime that each control line is driven high by themicrocontroller, the servo angles, and therefore the robot arm, can be controlled



Figure 6,Block Diagram of application

6.OBJECTIVES

Robots are indispensable in many manufacturing industries. The reason is that the price per hour to control an automaton may be a fraction of the price of the human labour required to perform a similar operation. More than this, once programmed, robots repeatedly perform functions with a high accuracy that surpasses that of the foremost practiced human operator. Human operators are, however, far more versatile. Humans can switch job tasks easily. Robots are unit engineered and programmed to be job specific. Today's most advanced industrial robots can before long become dinosaurs. Robots are a unit within the infancy stage of their evolution. As robots evolve, they're going to become a lot of versatile, emulating the human capability and skill to modify job tasks simply

7.Results

The projected methodology permits a non-skilful person to mechanically link with a variability of engineering robotic apparatus. Figures 7-8 show several images obtained during the practical development of the PBLE by the students. Further operational details can be viewed in a video available on YouTube. As a summary of the results, Figure 3 shows an image obtained during the development of the visual feedback loop to pick up the target object. Figure 3 shows the robotic arm going to the predefined Position 1 and, finally, Figure 2 shows the robotic arm trajectories of opening the gripper and releasing the object in the destination container.

8.CONCLUSION

Overall, the objectives of this project have been achieved which are developing the hardware and software for wireless mobile robotic arm, implementing the pick and place system operation and also testing the automaton that meets the standards of purpose project. From the analysis that has been made, it is clearly shown that its movement is precise, accurate, and easy to control and user friendly. The mobile robot has been developed successfully as the movement of the automaton as well as mobile and arm automaton will be controlled wirelessly. This robot is expected to overcome the problem such as placing or picking object that away from the user, pick and place hazardous object in the fastest and easiest way.

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