Design And Fabrication of Pick And Place Robot

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Abstract- *The project is meant to develop a Pick and Place Robot which can be controlled using an Android phone. The robot is capable of moving forward, backward, leftward, and rightward. The arm is capable of doing the picking and placing actions. An application called Blynk IOT is installed on the user's Android device and the commands are given to the robot to pick and place the objects from the source or required place to the destination place. WiFi has a simple and user-friendly interface and is easily available on any Android phone so that a disabled person can access Wi-Fi and use the robot for his needs.*

I. INTRODUCTION

Robotics acquired more importance in the modern era since its require less cost to operate than human labor to do the same task, also once programmed robots will perform better than experienced human labor. A soft-catching gripper is used to handle the object harmlessly. A smartphone has a control application to control the movements of the robot.

A robot is a mechanical device that performs automated tasks and movements, according to either a pre-defined program or a set of general guidelines and direct human supervision. These tasks either replace or enhance human work, such as in manufacturing, contraction, or manipulation of heavy or hazardous material. A robot is an integral part of automating the flexible manufacturing system that one greatly in demand these days. Robots are now more than a machine, as robots have become the solution of the future as cost labor wages and customer demand. Even though the cost of acquiring a robotic system is quite expensive but with today's rapid development and a very high demand for quality with IS0 standards, humans are no longer capable of such demands. Research and development of future robots are moving at a very rapid pace due to the constantly improving and upgrading of the quality standards of products.

II. LITERATURE SURVEY

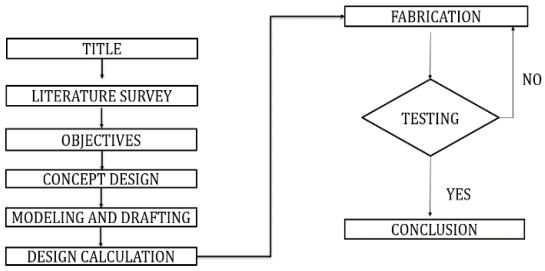
Adnan Rafi Al Tahtawi[1] The inverse kinematics method that is applied can make the robot perform a pick and place mission for several coordinate targets.

Ademola Abdulkareem, O. Ladenegan[2]This robot can take commands from a remote smartphone device and move objects to desired locations. This concept can be redesigned and specialized for various applications and industries.

Arka Sain, Janardan Datt[3] Wireless control of the robotic arm using an Android application and a suitable wireless standard such as Wi-Fi or Bluetooth enables us to successfully navigate with the nearby environment and perform 'pick and place operations.

Dhiraj Mahendra Pandey, Ganesh Dilip Jambhale[4]It can lift 350-gramobjects effectively and can be operated from a 1m distance. We can increase its weight capacity by changing the servo motor and part dimensions.

III. METHODOLOGY

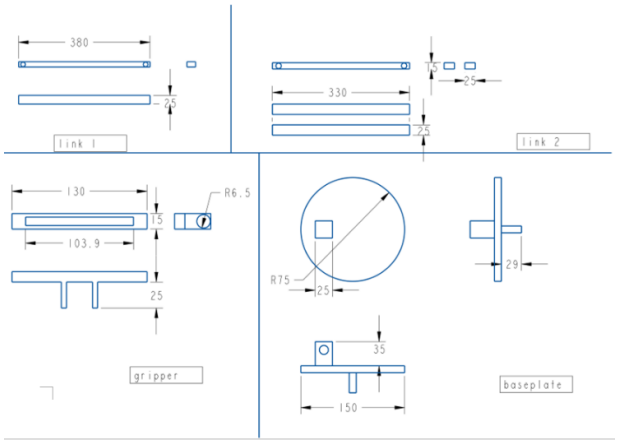


The methodology of a pick-and-place robot involves several steps, including designing, programming, testing, and operating the robot.

IV. OBJECTIVES

To fabricate a low-cost pick and place robot for industrial assembly line applications such as textile, and automobile sectors.A pick-and-place robot can perform repetitive tasks with consistent accuracy, which can lead to improved quality and reduced errors.

V. DETAILED DESIGN



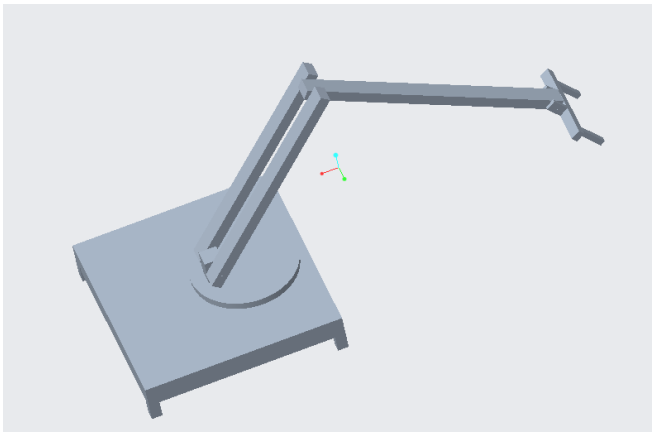
Robot Kinematics: The design of the robot's joints and linkages, including the type and number of degrees of freedom, must be carefully considered to ensure optimal movement and positioning capabilities.

End Effector: The design of the end effector or gripper tool is critical in a pick and place robot, as it must be able to securely grasp objects of different shapes, sizes, and weights. The gripper can be either mechanical, pneumatic or electric depending on the application.

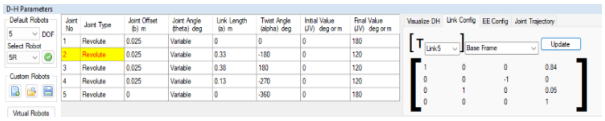
Actuators: The selection and design of the robot's actuators, such as electric motors, hydraulic actuators, or pneumatic cylinders, must be carefully considered to ensure optimal speed, torque, and accuracy.

Control System: The control system of the robot includes the software and hardware components that control the robot's movements, such as the motion controller, servo drives, and sensors. The design of the control system must be tailored to the specific requirements of the pick and place task.

Power Supply: The design of the robot's power supply is critical to ensure optimal performance, reliability, and safety. The power supply must be able to provide sufficient power to the robot's actuators and control system, and must also be able to handle any power fluctuations or surges.



VI. DENAVIT HARTENBERG PARAMETERS ANALYSIS



The Denavit-Hartenberg (DH) parameters are a widely used convention for kinematic modeling of robotic systems, particularly serial-link manipulators. The DH parameters provide a systematic way of defining the coordinate frames and the kinematic relationship between adjacent links of a robotic arm.

VII. FABRICATION

The fabrication of a pick and place robot involves a complex process of design, material selection, cutting and machining, assembly, wiring and programming, testing, and final touches. The process requires careful attention to detail, precision cutting and drilling, and programming expertise to ensure that the robot functions correctly and meets the required specifications.

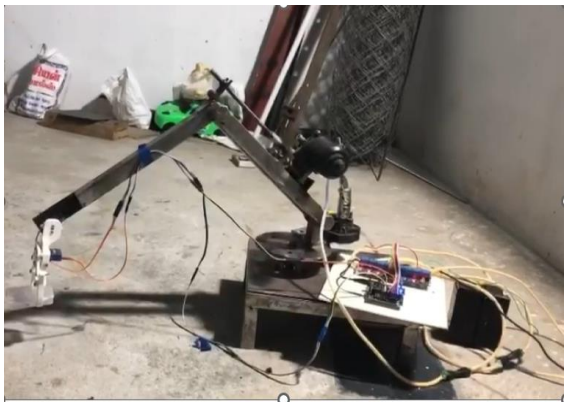
TECHNICAL SPECIFICATION

Kinematics	5 axis link arm robot
Drive system	DC,Servo Motor
Gripper	Servo electric Gripper
Payload	500g-1000g
Total weight	20kg

COMPONENTS

DC Motor	12V
Servomotor	5V
Material	Mild Steel
NODEMCU	ESP8256
Relay	8CH Relay
Gripper	3D Printed Gripper

VIII. TESTING AND RESULT



The testing of a pick and place robot typically involves several stages, including functional testing, performance testing, and safety testing. The results of the testing will depend on the specific design and capabilities of the robot, as well as the requirements and specifications of the application.

IX. CONCLUSION

Robotic Arm is using NODE MCU–ESP8266 to pick and place any object precisely without causing any damage moreover, the Robot can be controlled by using a software in mobile phone. The use of soft catching gripper and low power wireless communication like wi-fi makes our Robot more effectively compared to other systems.

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