

Arduino Based Robotic Arm

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Abstract: *With the advancement of technology and innovation at its peak, fabrication of systems and designs akin to human skills are increasingly integrated into working task to cater the rapid surge of human needs. Such innovations are made with the hopes of making peoples live easier. This paper concentrates on the development of a robotic arm which is functional to do a pick and place operation and controlled by using a mobile application via Android phone. Designed to work on predetermined commands, the robot arm has the ability to move in a four-axis direction; upward, downward, left and right direction at a specified angle with 6 servo motors and according to the mobile app specifications. Designed and realized, the robotic arm control is through the use of a mobile application, via Bluetooth module, that has been programmed through Arduino UNO microcontroller.*

Keywords: Robotic Arm, Arduino UNO, Bluetooth Module, etc.

I. INTRODUCTION

Now a Days, Robotic arms had been mostly used for industry automation and operation in the hazardous environment. Many robotic controls are very expensive due to high-precision actuators and custom machining of components. We recommend that robotic control research can advance more rapidly if robotic arms of valuable performance were highly reduced in price. Increased affordability can lead to wider acceptance, which in turn can lead to faster progress. However, drastic cost reduction will require design trade off and compromises. There are number of dimensions on which robotic arms can be evaluated, such as backlash, payload, speed, repeatability, compliance, human safety, and cost. In robotics research, some of these dimensions are more important than others: for grasping and object manipulation, high repeatability and low backlash are important. Human-safety is difficult if the manipulator is to be used in close to the people. Arduino UNO A000066 is used as the brain of the robotic arm, force sensors are placed at the gripper for finding the force applied on the object, and potentiometers are used at the joints for detecting the position of the motor shaft

II. LITERATURE SURVEY

1. Review on development of industrial robotic arm by Rahul Gautam This selective operation robotic control method is need to be overcome the problem such as placing or picking object that at distant from the worker. The robotic arm has been developed successfully as the movement of the robot can be controls precisely. It is expensive to change the cable and therefore the designing to reduce the friction on table, is crucial to increase time between maintenance.
2. Survey on Design and Development of competitive low-cost Robot Arm with Four Degrees of Freedom by Ashraf Elfahany. In this paper the representation of the design, development and implementation of robot arm is done, which has the ability to perform simple tasks, such as light material handling. The roboticarm is designed and made from acrylic material where servo motors are used to perform links between arms. The servo motors consist of encoder so that no need to use controller. However, the rotation range of the motoris less than 180° span, which greatly decreases the region reached by the arm and the possible positions. The design of the robot arm was for four degrees of freedom. The end effector is not considered while designing because a readily available gripper is used.

3. Abdullatif Baba:" Robotic arm control with Arduino " Turk Hava Kurumu University Computer Engineering Turkey. Research paper; June 2017. In the project, Arduino Nano microcontroller written in Java language is programmed and servo motor control is provided. Thus, it is possible to perform the desired operations by means of the elements located on the Arduino without any circuit construction other than the circuit where the servo motor inputs are located. For the mechanical part, the robot arm is drawn with the SolidWorks program and the dimensions of the robot arm are specified. A 5V power supply is also preferred for the robot to work.
4. Aimn Mohamed Ahmed Ghiet.R Year 2017 in this Arduino Nano microcontroller written in java is programmed and servo motor control is provided because it is possible to perform the desired operation by means of elements located on Arduino without any circuit construction. For mechanical parts the robotic arm is drawn with solid works programs. A 5v power supply is also preferred for the robot to work.
5. Virendra Patidar, Ritu Tiwari:" Survey of robotic arm and parameters" (ICCCI-2016) Coimbatore, India, Jan 2018. This is a survey paper on a robotic arm and their development. It gives a technical introduction to some of the recent research work in this field. This is a working field of research in which there are a number of outstanding open problems and an area of exploration. Nowadays, a different variety of robotic arms are commercially available. Some of them are excellent in accuracy and repeatability. In this paper, we understand the evolution of robotic arm in last 20 years and described different parameters of an arm. Type of robotic arm only depends on these parameters. Our survey may be used for knowledge and guidelines for future research work. The paper concludes with research gaps and proposed work. Robotic arm uses in the different fields like a house hold, workplace, and working station.

III. IMPLEMENTATION

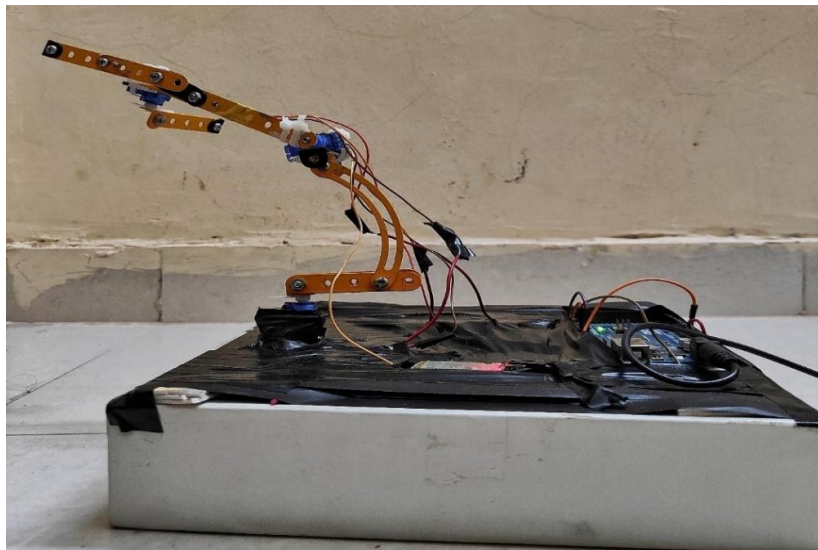
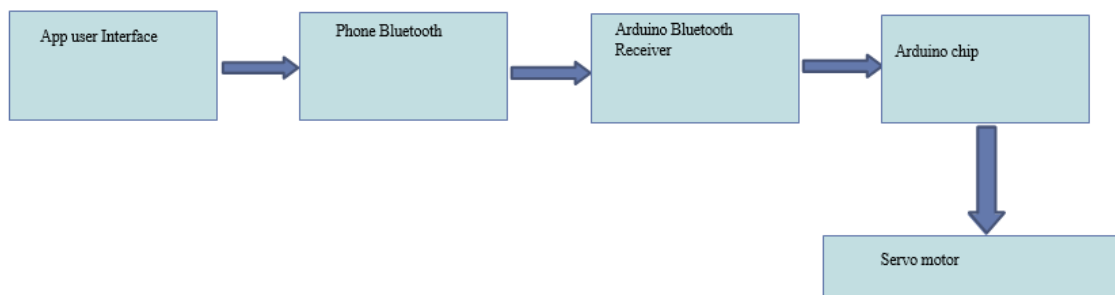


Figure 1: Constructed Project

The robotic arm works on the principle of electrical input energy to perform some mechanical works effectively with the help of some automation and program-based operations. The pick and place robotic arm consist of major hardware components such as strips & motors and arm gripper, switches, battery, piece of metal, and other discrete mechanical and electrical components. This project is designed for developing a pick and place robotic arm with a soft catching gripper.

This soft catching gripper is used for safely handling an object carefully while catching and placing. The robotic arm consists of servo motor which is used for angular rotations of the arm for catching items (to hold items, to release, to rotate, to place). This servomotor used is works on the principle of Fleming's left- hand rule and is controlled using Arduino circuit board.

IV. SYSTEM ARCHITECTURE



V. CONCLUSION

The Robotic arm is a convenient way to increase the efficiency of manufacturing processes. It will help in replacing the manpower required in the manufacturing processes and therefore provide solution to many issues such as decreasing of efficiency of work due to ageing and energy, injury, slow working speed etc.

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It is indeed a great pleasure and moment of immense satisfaction for we to present a project report on “Arduino based robotic arm for industrial purpose, cleaning and inspection of tanks on ship to avoid accidents and save time” amongst a wide panorama that provided us inspiring guidance and encouragement, we take the opportunity to thanks to thanks those who gave us their indebted assistance. We wish to extend our cordial gratitude with profound thanks to our internal guide Prof. Atul Ballal for his everlasting guidance. It was his inspiration and encouragement which helped us in completing our project.

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