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Arduino Based Robotic Arm

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I. 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 people's 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 4 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

II. 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 offs 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

III. Literature Review

Cost efficient solar power can be the solution to all our energy requirements. The Indian farmer's solution is solar powered intelligent irrigation systems. This device consists of solar-powered water pump and an automated monitoring of the water flow using a moisture sensor. It's the suggested solution for the Indian farmers to the ongoing energy crisis. This device saves electricity by reducing grid power use, and by reducing water losses, it conserves water [1]. Developing and implementing an automated SCADA managed system that uses PLC as controller is essential for purposes of agricultural, oil, and gas monitoring and control. The system is also

powered by an adaptive solar array, in which the solar panel absorbs the Sun's radiation. Rather than that, the solar system has high both the electricity and emission costs. The system features four input sensors; two sensors for soil moisture, two sensors for level detection. The soil moisture sensor tests the soil moisture, while the level detection sensors detect the water level in the tank. The output sides are composed of two solenoid valves, operated by two moisture sensors respectively [2]. A simple but effective, low-cost solar-powered water pumping system is developed in this paper which provides a drip irrigation system with the required pressurized water. The results of the theoretical and field studies of photovoltaic panels and other elements, the overall system mode ling techniques and their elements using the Systems Mode ling Vocabulary, are discussed. The demonstration site of the project covers an area of 1,000 square meters which includes over 100 trees [3]. The overview of feedback on a system of photovoltaic irrigation is provided in this paper. Photovoltaic water pumping system represents one of the best alternative irrigation methods. The variability in the spatial and temporal distribution of available irrigation water allows considerable demand for water conservation techniques. Thus solar powered Automated Irrigation System offers a sustainable solution to improve the efficiency of water usage in agricultural fields by using renewable energy system to remove the workmanship needed for flooding irrigation. Using this photo-irrigation system may contribute to the socioeconomic evolution [4]. This work centered on work on solar photovoltaic (PV) and solar thermal technologies to generally pump water for irrigation of remote rural farms especially considering the Sub-Saharan African region.

IV. Working

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.

V. Block diagram

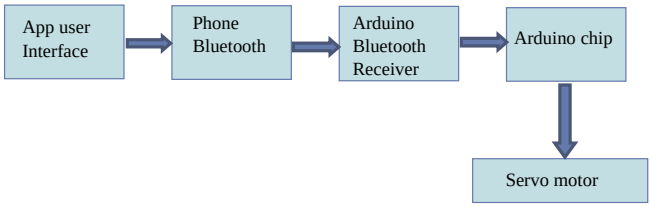
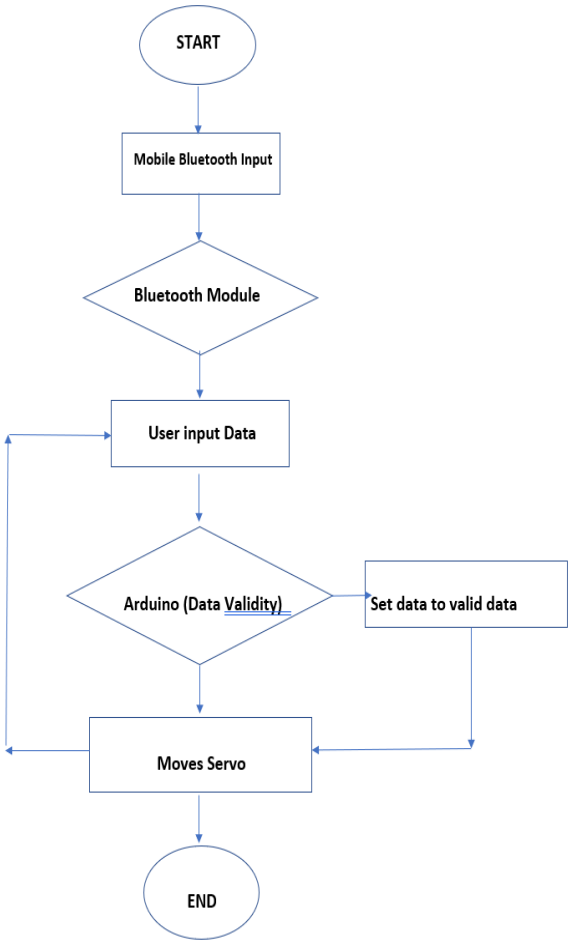


Fig. Block Diagram of Robotic Arm.

VI. Flowchart of Robotic Arm



VII. 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.

VIII. Acknowledgement

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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