Effect of Wireless Control of Robotic Arm

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Abstract:
In this day and age, there is an increasing need to create artificial arms for various inhuman situations where human communication is difficult or impossible. They could range from taking readings from a gushing lava spring to defusing a bomb. In this paper, we propose to build a mechanical arm that is constrained by typical human arm developments and whose information is obtained using accelerometers. Legitimate averaging calculation is used for smoothing the output of the accelerometer for appropriate control instrument and to lessen the amount of commotion rolling in from the sensors. This arm's advancement is dependent on Arduino ATmega328, which will all be interfaced with one another using sequential correspondence. This robot's development is based on the Arduino Mega platform, which will be interfaced with the wireless controller to the mobile robotic arm. The robot's performance has been evaluated using metrics such as speed, distance, and load capacity. Finally, this robot prototype is expected to solve problems such as placing or picking objects that are far away from the user, as well as picking and placing hazardous objects in the quickest and easiest way possible.

Keywords: Wireless Control, Robotic Arm, Robots,

Introduction:

Robots play an important role in computerising the adaptable assembling framework that is so highly sought after nowadays. Robots are now more than just machines, as they have become the arrangement without limits as far as cost work compensation and client interest. Regardless of the fact that the cost of obtaining an automated framework is extremely high, with today's rapid

advancement and popularity in quality with ISO standards, humans are no longer fit for such requests. Suture robots' innovative work is moving at a breakneck pace due to the constant improvement and updating of item quality standards.

Robots and automation are used to replace humans in tasks that are routine, dangerous, and monotonous, as well as in hazardous environments. In today's world of cutting-edge innovation, automation significantly increases production capacity, improves item quality, and lowers production costs. Nothing more than a couple of people are required to programme or monitor the computer and perform routine maintenance. [1]

A robotic arm is a programmable robot manipulator that performs functions similar to a human arm. The manipulator's links are joined by joints that allow either rotational motion (as in an articulated robot) or translational (linear) displacement. The manipulator's links can be thought of as a kinematic chain. The end effectors are the business end of the manipulator's kinematic chain and are analogous to the human hand. Depending on the application, the end effectors can be designed to perform any desired task such as welding, gripping, spinning, and so on. The robot arms can be controlled autonomously or manually and can be used to perform a variety of tasks with high accuracy. The robotic arm can be stationary or mobile (wheeled), and it can be designed for industrial or domestic use. Wireless mobile robots have also been evolving in previous years [2-3].

Figure 1 shows the basic robotic arm.

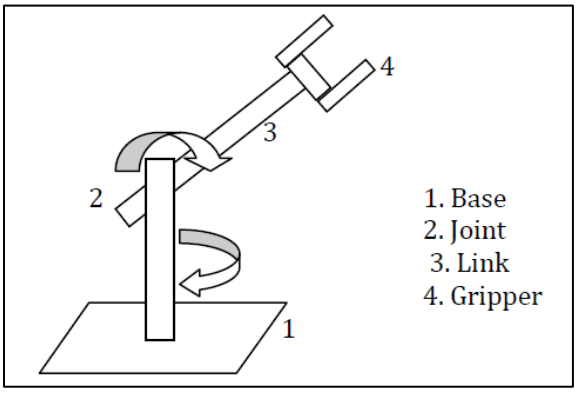

Figure 1: Basic robot arm

An automated arm is a programmable robot controller with capabilities comparable to a human arm. Such a controller's connections are linked by joints

that allow either rotational movement (as in an enunciated robot) or translational (direct) dislodging. The controller's connections can be thought of as forming a kinematic chain. The end effectors are the controller's business end of the kinematic chain, and they are practically equivalent to the human hand. Depending on the application, the end effectors can be designed to perform any ideal task, for example, welding, holding, turning, and so on. The robot arms can be self-governing or physically controlled, and they can be used to perform a variety of tasks with incredible precision. The automated arm can be fixed or mobile (for example, haggled), and it can be used for mechanical or domestic applications. This report manages an automated arm whose goal is to replicate the movements of a human arm by using accelerometers as sensors for the information security of common arm movements. In comparison to using a two controller, where each actuator is controlled independently, this control strategy allows for greater adaptability in controlling the automated arm. The handling unit processes each actuator's control signal based on accelerometer input to mimic the movements of the human arm. [4]

Review of Literature:

A serial servo controller circuit board controls the robot arm in this proposal. Microchip's PIC16F84A (flash programmable) microcontroller controls or operates the controller circuit board. The serial servo controller board will be connected to the serial port of a Windows-based PC. The programme for controlling the robot arm from a PC was written in Visual Basic 6. The PIC 16F84A is capable of running independent robot arm sequences. A voice recognition circuit was also integrated [5].

The paper discusses the planning and use of a Synchronized Robotic Arm, which is used to perform all basic tasks such as picking and placing materials. In this paper, a robotic arm is created, which is synchronised with a working arm and performs the same task as the working arm. The ATMEGA-8 Microcontroller is programmed using the Arduino IDE. Potentiometers are similarly used to detect the angle of rotation, and the signals are fed to the microcontroller. These types of arms have applications in fields other than robotics and automation [6].

The purpose of this project is to build and design a pick and place robotic arm using a PIC microcontroller. The main goal is to create a smaller and less expensive robotic arm for educational purposes. In this case, IR sensors serve as input devices, and the sensors send a signal that the PIC microcontroller analyses and responds to [7].

This paper shows the advancement of a wireless robot. A portable pick and place robot that is controlled by a remote PS2 controller. The robot controller is based on the Arduino Mega microcontroller, which is linked to the remote controller and then to the portable mechanical arm [4]. Different analyses, such as distance, speed, and load that the robot can pick, have been performed in order to determine its execution [8].

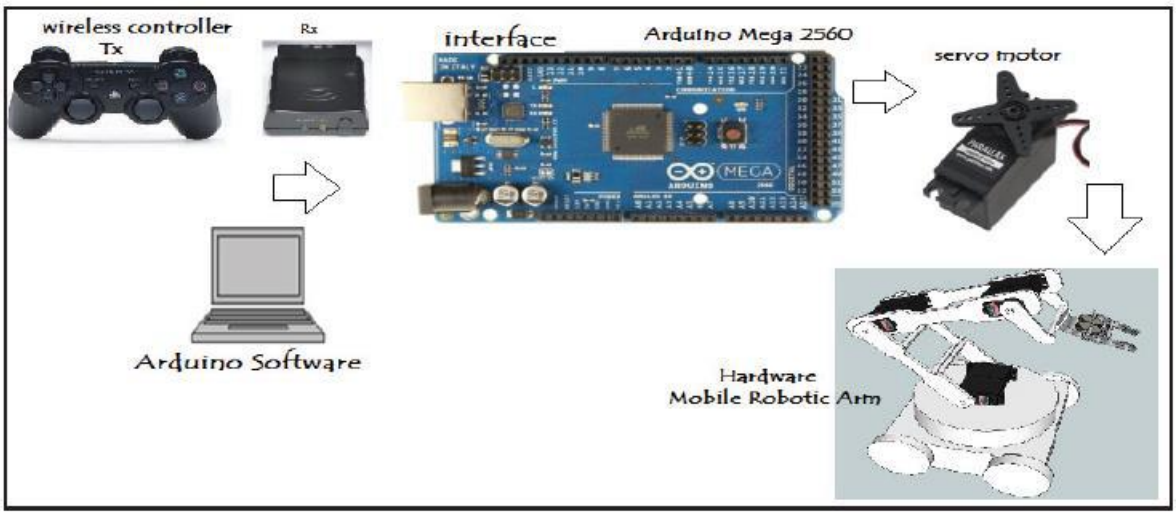

Figure 2: Project Overview of wireless controlled Robotic Arm [8].

Objectives:

- To define Fabrication Design and of Servo Controller
- Development of Robot Software\s
- Microcontroller and the Robot Arm interfacing\s
- To Complete wireless mobile robotic arm.

Research Methodology:

This paper is divided into two sections. The first step will be the design and implementation of the hardware and circuitry, followed by the development of the Arduino code for the pick and place operation.

Following flowchart of the research is shown in Figure 3

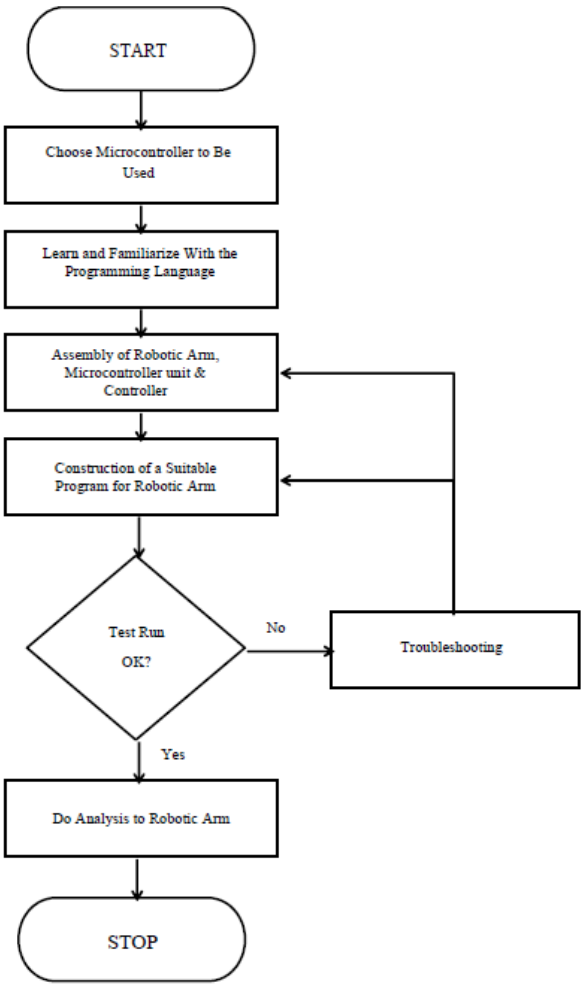

Figure 3: Flowchart of the Research Paper.

Result and Discussion:

The overall research findings will be presented and explained in this section. The outcomes include the actual structure, circuitry, and source code for programming. [9-12]

Developed Manual Controller Prototype

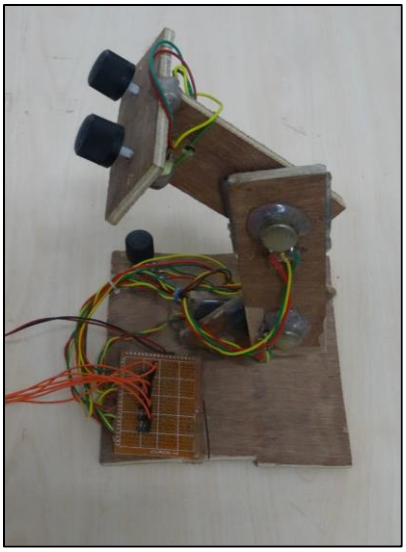

Figure 4: Manual Controller Prototype

Developed Circuitry

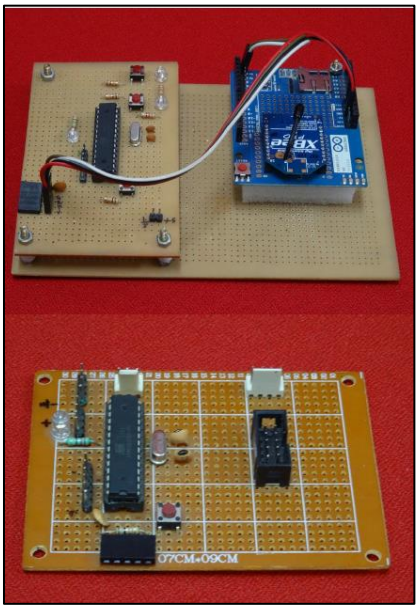

Figure 4: Developed Microcontroller Boards

Actual Robotic Arm Structure

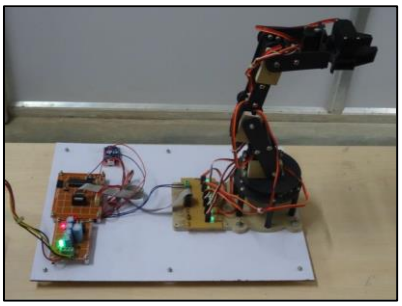

Figure 5: Actual Robotic Arm Structure

Complete designing robot

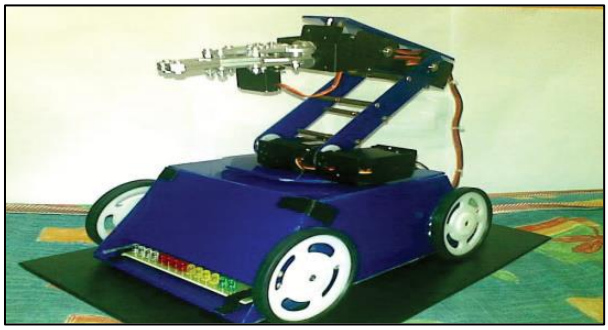

Figure 6: Completed wireless mobile robotic arm.

Figure 6 depicts the finished mechanical structure of a wireless mobile robotic arm. The robot's dimensions when not in use are (29 X 19 X 25.5) cm, and its weight is 1.55kg.

Conclusion:

Overall, the project's objectives of developing the hardware and software for a wireless mobile robotic arm, implementing the pick and place system operation, and testing the robot that meets the project's criteria have been met. Based on the analysis, it is clear that its movement is precise, accurate, easy to control, and user friendly. The mobile robot has been successfully developed because the movement of the robot, including the mobile and arm robot, can be controlled wirelessly. This robot is expected to solve problems such as placing or picking objects that are far away from the user, as well as picking and placing hazardous objects in the quickest and easiest way possible.

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