Mastering Precision: Design and Wireless Control of a 7-Axis Robotic Arm

2023-2024

Electrical & Telecom. Engineering

Hashem Alshami 11926161

Baraah abualreesh 11822790

Supervisor : Dr. Omar Tamimi

Project Abstract:

Abstract: This project employs a central Arduino-based controller and a specialized set of drivers to enable the development, assembly, and manipulation of a 7-axis robotic arm. The design of the arm include a claw hand gripper that is modified and powered by a high-performance servo motor. Although operating in an open-loop mode, the system is fitted with limit switches on each axis to guarantee both safety and accuracy. Additionally, each axis is equipped with a stepper motor that is linked to a gear system, so facilitating seamless movement. The main aim of this project is to conceptualize and construct a mechanically robust robotic arm capable of seamless control through the utilization of a wireless joystick. The purpose of this arm is to perform precise and fluid movements, facilitating effective manipulation and relocation of objects.

Methodology of the project:

In order to reach its goals, the project will follow an organized method that includes several important steps:

1. Mechanical Analysis: Do a thorough study of the mechanical structure of the robotic arms, paying special attention to how rigid the design is and where vibrations are most likely to happen.

2. Kinematic Analysis: Do a thorough analysis of the robot's motion's kinematics by using mathematical tools to learn more and improve its dynamics.

3. Control System Design: Make and test a control system that lets you move the robot around with a wireless joystick.

4. Software Development: The goal is to make software that effectively manages and lets robot arms and motors engage with each other, so that the robot works smoothly and without problems.

5. Integration of Arduino Microcontroller: Add an Arduino microcontroller to the system, along with the necessary changes to the wiring and software.

6. Testing and Validation: Carefully follow the testing steps to make sure the 5-axis robot moves and works the way it should.

7. Documentation: All parts of the project, such as results, changes, and software development, should be carefully written down. This paperwork will serve as a full report that explains the method used and the results that were reached.