Cover page

Project title: Programmable Robotic Arm Academic Year: 2024/2025

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كريم مازن يعقوب يعقوب

Project Type : Hardware

Supervisor Name: Dr. Luai Malhis

Format:

- Single space, Times New Roman.
- 12 pt,
- Maximum 1 page.

Abstract Body:

Items must be provided in the Abstract:

- Why do you think this project is important? Please explain the significance of this Project in brief.
- In your point of view what are the important aspects that should be covered in the project?
- Objective(s): In your view, please explain the main objectives of the project.
- Methodology: Give a brief outline of the application development process.
- Had this project been done before? Are there any similar applications available today?
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- **Note:** Please deliver this abstract early to ensure that your Project has been approved by the department's projects committee. **Registration will not be done without this approval.**

Project's Abstract:

Programmable Robotic Arm is a Smart ARM with 6 Degree of Freedom that can be programmed with two interfaces, special custom compiler with simple set of instruction providing sequential coding, control statements and variety of built-in functions. Also, it supports a mobile application that can control the robotic arm through simple interface and with capable of saving and repeating predefined sequences.

The Robotic Arm will provide prebuilt sensors and also sensors expansions by providing digital and analog external inputs that can be used while programming the arm which will provide high flexibility to the arm and allow variety of defined sequences to be used based on different sensors and inputs. There is also an add-on camera that can be used with the robotic arm for different purposes which is providing feed back of the robotic arm movement, allowing to use special instructions that will allow to auto picks items in the range of the camera, also can be used for quality checking and for providing live stream video to the robotic arm.

The main field of the programmable robotic arm is to be used in assembly lines as it can handle quality control and inspection of products by used appropriate sensors to detect any defects in assembly line, it can handle the multi-class assembly lines, very adaptive to change without needing to whole replacement or redesign neither for specialist to program it as it does in normal robotic arm, AI and ML can be used for decision making, also can be used for sorting things with the use of add-on camera, multi-angle grabbing and it provide feedback with the usage of rotary encoders and the add-on camera. There is more field that smart arm can be used in such as surgery operations in medical era, Agricultural Automation, Warehouse Automation with the help of RFID readers extensions and more others field.

The robotic arm will consist of 6 MG996R metal 360° motors for providing High precision and high torque, an ESP32 to control the motors and program the arm, Raspberry pi 5 to handle the image processing and provide the feedback to the esp32, Camera and multiple sensors: IR-Sensors for obstacles detection, Ultrasonic Sensor with DC motor for enabling the movement