

## Bachelor's Thesis, Term Project

# Mechanical Design for Industrial PUMA Robot and Control

**Supervisor (s):** (Assist. Prof. Dr. Eng. Amir Roushdy) and (Prof. Dr. Eng. Imam Morgan)

The Industrial PUMA robot is a robotic arm design from scratch and its structure is fully printed using additive manufacturing technologies and its electronics are controlled by the software Arduino. **There is a Lab Engineer from the ARATRONICS Laboratory, guiding and directing the student with Assist. Prof. Dr. Eng. Amir Roushdy and Prof. Dr. Eng. Imam Morgan.**



**Fig.:** Industrial PUMA Robot

### **Project description and objective:**

One of the most important challenges in the field of robotics is robot manipulators control with acceptable performance, because these systems are multi-input multi-output (MIMO), nonlinear and uncertainty. Presently, robot manipulators are used in different (unknown and/or unstructured) situation consequently caused to provide complicated systems, as a result strong mathematical theory are used in new control methodologies to design nonlinear robust controller with acceptable performance (e.g., minimum error, good trajectory, disturbance rejection). This project is focused on the Mechanical design, Fabrication and Control for the PUMA robot manipulator.

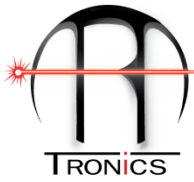
### **Research focus of this project:**

- Literature review on the project should be studied properly.
- Not only, creating a software control system for the project but also the hardware.

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For more details please contact:

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- Experiments using the gadget and control system should be built properly.
- The outcomes must be documented.

### **Requirements:**

- Passionate to learn more about Robotics, automation, and control.
- Prior mechatronic design expertise is desired like “SolidWork”.
- Enthusiasm for completing actual practical work with 3D printing staff (design fabrication and construction).
- A method of working that is both structured and self-contained.

### **General tasks of the project:**

- The complete design for the Robot is already exist in the ARATRONICS Lab and the ARATRONICS Lab Engineer will hand it to you from the first day.
- ARATRONICS will support you with the CAD robot design on Solidwork. You, will adjust some parts on the design to fit with the motors and actuators in the local market.
- Fabricate the Robot using 3D printer.
- Assembly all parts of the Robot.
- Motion control study for the Robot.

### **Other notes:**

- A weekly meeting with the advisors will be required for this project, as well as weekly progress updates (*The meeting could be more than once during the week based on your progress and based on your achievements*).
- You should to be in the Lab two days per week (*It could be more than two days based on your progress and based on your achievements*).
- All reports must be prepared in the style of a research paper.
- The outcome of this research will be published in one of the coming international Conferences and , or Journal