Mechatronics Lab – MCTR704

Course Objectives

The purpose of this interdisciplinary engineering field is the study of automation from an engineering perspective and serves the purposes of controlling basic and advanced Mechatronics systems.

The application-oriented experiments enable the students to develop a solid foundation in Mechatronics Engineering, through collaborating the mechatronic modules to perform the production goals and inherit flexible and agile manufacturing properties in the production scheme.

This course gives the students background on most of the components that are used in pneumatics applications with PLC.

By Studying this course the student will be able to broad knowledge of the main components in different automated manufacturing processes and how to design and implement an automated mechatronic process.

Course Topics

Part A
- ➢ Introduction to Pneumatics
- ➢ Advantages disadvantages of Compressed Air & air preparation
- ➢ Pneumatic symbols, types of compressors and air service units
- ➢ Pneumatic application with single acting cylinder
- ➢ Pneumatic application with double acting cylinder
- ➢ Electro Pneumatics applications
- ➢ Complicated pneumatic circuits with pneumatic process elements

Part B
- ➢ Introduction to PLC
- ➢ PLC language
- ➢ PLC timers and comparators
- ➢ Experimental PLC applications with pneumatics
- ➢ Industrial PLC and Pneumatics applications

Part C
Project Based Learning (PBL) is an appropriate method for use in the learning process of mechatronic. The use of PBL represents the development process to encourage the achievement of the main goal of learning in mechatronics lab.

Course Learning Outcomes

Knowledge & Understanding

- ➢ Recognize pneumatic and PLC components and how to operate them.
- ➢ List different function blocks of the PLC code.
- ➢ Describe the function of different function blocks.

Professional & Practical skills

- ➢ Use Festo Didactic software.
- ➢ Design an actual pneumatic circuit.
- ➢ Use Siemens PLC and software.
- ➢ Solve different problems using PLC code.
- ➢ Implement your own ideas in the applied project.

Intellectual skills

- ➢ Design and analyze a basic pneumatic circuit.
- ➢ Design your own pneumatic circuit.
- ➢ Debug errors in the pneumatic circuit.
- ➢ Experiment different mechatronic problems on PLC.
- ➢ Integrate Pneumatic circuit with PLC.
- ➢ Integrating electronics and pneumatics in your project to produce a complete system.
- ➢ Debug errors in the PLC code.
- ➢ Experiment your codes on workstations as well as simulate them in real time on the software.

Mechatronics Lab MCTR704 – Course Grades

Evaluation Method	Grade
Final Exam	40%
Mid- Term Exam	20%
Quizzes	10%
Project	15%
Lab Reports	15%