

AUTOMATION

Code: 322015

Main Scientific Area: Technologic innovation

Lecturer: João Pedro Borges Araújo Oliveira Silva

Language of Instruction: Portuguese

Regime: S2

Contact Hours: 60h Total Workload: 108h

ECTS: 6,0

Objectives

This course aims to provide students with fundamental knowledge of Programmable logic controllers using standard languages according to IEC 61121-3, as well as, make a general context of equipment involving automation techniques in current industrial reality.

Students are expected to obtain the ability to conceive solutions for automation problems considering the choices they have and the integration of existing equipment in the market.

Learning Outcomes

At the end of the course students should acquire the following skills:

Know the internal structure and mode of operation of programmable logic controllers;

Develop programs for PLCs using standardized languages according to IEC 61131-3 with Ladder diagrams, lists of instructions and GRAFCETs;

Learn to connect programmable automats to peripheral equipment such as industrial sensors and actuators;

Integrate programmable automats in industrial communication networks;

Know and develop controlling and monitoring systems for automation systems;

Course Contents

Introduction to Automation (objectives; types; levels; automatic systems, industrial automation);

Industrial Sensors (temperature, force and pressure, mechanical, inductive position;, capacitive, optical, encoders, bar code reader, RFID);

Actuators (pneumatic cylinders, pneumatic valves, relays, electric valve, induction, stepper and DC motors);

Functional diagram GRAFCET (types; elements – steps, transitions, targeted links, typical configurations, evolution rules; actions associated with steps);

Programmable logic controllers (PLC) (architecture, programming – modes, languages IEC 61131-3 – Ladder, instructions, programming software);

Industrial communication networks (field networks – fieldbus, devicenet, comonnet-, profibus, modbus, ASI bus, ethernet TCP/IP, PLC network connection);

Supervision of industrial processes (human-machine interface, SCADA tool).

Recommended Bibliography

João R. Caldas Pinto, técnicas de automação, 3ª ed. ETEP, 2010;

J. Norberto Pires, Automação Industrial, 4ª ed., ETEP, 2007;

António M. S. Francisco, Autómatos Programáveis, 4ª ed, ETEP;

Paulo Oliveira, Curso de Automação Industrial, 1ª ed, ETEP;

Learning and Teaching Methods

The syllabus of this course will enable the student to acquire a set of skills in the field of industrial automation.

This course will enable students to know and understand the different methods of analysis and design of discrete event systems and supervisory control and monitoring in the field of automation. After this theoretical foray, the student will be faced with a set of real problems of automation systems specific to different types of industries, and will be encouraged to search for solutions to solve them. Through the discussion of the same, elements (controllers, sensors and actuators), normally present in an industrial automation system, will be presented to the student, which will allow him to achieve a resolution. At the same time, the student will also be stimulated to be autonomous in the search for more advanced solutions

Assessment Methods

The approval in this CU is obtained with grade equal or greater than 10, on a scale from 10 to 20, the evaluation will be obtained from 4 components:

1 Theoretical/theoretical-practical test (30%);

3 Practical projects supported by a written report and oral defense (45%);

1 Project Based Learning - PBL (25%);

The minimum score for the test is 10 out of 20. The practical's works are required and has to have a minimum score of at least 8 out of 20.