

22861 Introduction to Mechatronic systems

Credit points: 3.0

Hours: 2 – lecture, 2 - laboratory

Prerequisites: electricity and electronic, signals and systems

Course description

This is the first course in the mechatronics specialization in the mechanical engineering department and as such, its aim is to give an overview of mechatronic systems. The students are getting to know microcontroller, digital and analog peripherals, sensors and actuators. In the laboratory students program a microcontroller and connect to it different sensors and actuators.

Course Contents

1. The structure of a microcontroller
2. Programing microcontroller
3. Digital I/O
4. Analog I/O
5. Theory of measuring systems
6. Sensors for measuring: force, displacement, temperature, acceleration, etc.
7. Actuators: DC brush and brushless motors, stepper motors
8. Modeling a position control system
9. Introduction to signal processing
10. Design and implementation of digital position controller

Bibliography

- Blum J., Exploring ARDUINO: tools and techniques for engineering wizardry, Wiley, 2014
- Bolton W., Mechatronics: Electronic control systems in mechanical and electrical engineering 6th ed. 2015, Pearson
- Alciatore D.G., Hisand M.B., Introduction to mechatronic and measurement systems 3rd ed. 2005, McGraw-Hill
- De Silva C.W., Mechatronic ssystems: Devices, Design, Control, Operation and Monitoring, 2007, CRC press

After studying Introduction to Mechatronic Systems, the student should be able to:

	Learning Objective
1	Describe the structure and principles of operation of a micro-controller
2	Program a micro-controller
3	Operate micro-controller digital and analog interfaces
4	Demonstrate a basic understanding of measurement principles and various types of sensors
5	Demonstrate familiarity with a DC motor model and other electromechanical actuators
6	Operate a robot using a micro-controller
7	Demonstrate knowledge of the principles of digital control

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