Name of the course: Artificial Intelligence in Processes and Automation	Total credits: 2+2+1=5

IPM-18AUTAIPAEG

Type: Obligatory

Total hours per semester

lecture: 26

practice: 26

consultation: 13

Other: projects in teamwork

Type of testing: exam

Other: projects, tests

Semester: 2nd

Subject requirement: Introduction to Vehicles and Sensors, Image and Signal Processing, Design & Analysis of Algorithms (IPM-18AUTIVSEG, IPM-18AUTISPE, IPM18AUTDAAEG)

Description

After this course, the student will (i) understand the connection between low level, i.e., network based AI and high level, i.e., rule based AI (ii) be able to develop stochastic and deterministic models from data (iii) understand control principles and (iv) understand the principles of designing optimal autonomous systems that can learn with state-of-the-art learning algorithms matching or overcoming human performance in industrial environments. Novel AI related software libraries will be introduced.

Literature

Compulsory

- Stuart J. Russell and Peter Norvig: **Artificial Intelligence: A Modern Approach**. Pearson, Inc. 2010. ISBN: 0-13-604259-7
- Richard S. Sutton and Andrew G. Barto. **Reinforcement Learning: An introduction**. Bradford Book, MIT Press. 2012. ISBN: 9780262193986

Recommended

- Alasdair Gilchrist **Industry 4.0: Smart** Factories Springer 2016. ISBN: 978-1-4842-2046-7
- Eric Tsui, Jay Lee, Norbert Gronau, Doug Vogel. **Industry 4.0: How to Revolutionize your Business** 2017. edX https://www.edx.org/course/industry-4-0-how-revolutionize-business-hkpolyux-i4-0x
- Edward Lee, Sanjit Seshia, and Jeff Jensen. **Cyber-Physical Systems** 2017. edX https://www.edx.org/course/cyber-physical-systems-uc-berkeleyx-eecs149-1x

Competencies

Knowledge

- Possession of complex and up-to-date knowledge in AI, process automation, control and optimal control, regarding the trends and the goals of developments in Smart Factories and Cyber-Physical Systems, including uncertainty, stochastic environments, and risks.
- Knowledge of the underlying mathematical principles including best practices, knowledge on network architectures, methods of architecture description and design.
- Detailed and expert-level knowledge of the technical terms and expressions of process automation and control in English.

Competencies

- Expertise and understanding of the concepts and methods control and process automation in different application areas. Ability to take part in the development of applications with real-time requirements.
- Ability to formalize complex technical problems, to analyze theoretical and practical background, and to provide adequate solutions.
- Skills for cooperation and team work, and ability to take leading role.
- Ability for written and oral communication in English, using the technical terms and expressions of computer science. Ability to argue, to prepare reports, to read, understand and exploit scientific and technical material (e.g. books and papers).
- Expertise in utilizing sources of technical information, their critical interpretation and evaluation, and the extraction of information relevant to the solution of a specific problem.
- Ability to perform supervised scientific research, and skills required for post-graduate studies.

Attitude

- Attends professional, technological development related to their qualification.
- Commitment to critical feedback and self-assessment.
- Commitment to lifelong learning and receptivity to new IT competencies.
- Adopts and coordinates the ethical principles of work, organizational culture and research.
- Shares professional knowledge, mediates professional results.
- Open to initiate collaboration with IT and other specialists.

Autonomy and responsibility

- Takes responsibility for his professional decisions taken during his professional activities.
- Takes responsibility for observing and enforcing deadlines.
- Takes responsibility for own and fellow workers' work.