Syllabus

Cognitive Robotics

Faculty of	**Field of study:**	Computer Science
	Specialisation:	All
	Level of study:	Undergraduate and graduate
	System of education:	Full-time and extra-mural

Course				**ECTS points**: 6			
Semester	No. of hours	Lect	Lab	P	C	Seminar	Completion/Exam
summer	60	30	30				Exam

Course content (Lecture)

The main aim of this course is to give you some understanding of cognitive science and how it helps to design artificial intelligence and robotic systems. More specifically, we will cover the following topics (among others):

1. Perception and action in humans and animals, and how it has led to behavior-based models of robot control.
2. Role of emotions in human intelligence and reasoning, and how to incorporate it in artificial intelligence systems.
3. Eliza effect and how to use it to design more natural and intuitive human-robot interfaces.
4. Biorobots: How can we use knowledge from perception and locomotion in animals to design robotic systems that move around in their environment more effectively.
5. Machine learning mechanisms motivated by developmental psychology (e.g. motivated reinforcement learning.)
6. How to use principles of perception and cognition (e.g. models of visual attention in humans) to design better websites, better human-computer interfaces, and so on.

Course content (Classes)

1. Robots: Beyond the computer metaphor in cognitive science
2. Varieties of embodiment
3. Evolution of robots
4. Developmental robotics
5. Learning intrinsic environment representations from sensory-motor interactions
6. Designing sociable robots
7. Eliza effect and its role in cognitive robotics: Robots and Autistic children
8. Theory of mind for robots
9. Internal value system in cognitive robotics architectures
10. Interaction theory in cognitive robotics

References (Basic):

Cynthia Breaezeal (2002). Designing Sociable Robots. Cambridge (Mass.): MIT Press

Ronald Arkin (1998), Behavior-based robotics, Cambridge (Mass.): MIT Press.

References (Additional):
Cynthia Breazeal, Daphna Buchsbaum, Jesse Gray, David Gatenby, and Bruce Blumberg (2004). Learning From and About Others: Towards Using Imitation to Bootstrap the Social Understanding of Others by Robots. Artificial Life. A. Billard, B. Robins, K. Dautenhahn, J. Nadel (2006). Building a Mini-Humanoid Robot for the Rehabilitation of Children with Autism. RESNA Assistive Technology Journal.

Expected learning outcome:	Students will understand some principles of cognitive science, and how they can be used to design more effective AI and robotic systems.
Language of instruction:	English
ERASMUS subject code:	
Prerequisites:	
Assessment method:	You will be required to do a project, which could be a software or a hardware project, to demonstrate that you are able to apply some of the principles discussed in the course in an actual working system.
Unit:	
Lecturer:	Bipin Indurkhya
Lecturer (Project / Laboratory):	
Modified:	