

Robot Motion Planning and Control

Course Workload		Assessment form (examination/ graded test/ ungraded test)
ECTS	Hours	
6	216	Exam

The course is aimed at studying approaches to trajectory planning and robot control. The course content covers the basic concepts, definitions and approaches to path and trajectory planning, robot motion control and robot interaction force control. Attention is paid to the problems of robust and adaptive motion control and impedance control. The course contains laboratory work on solving trajectory planning, motion control and interaction force control problems.

Course structure:

1. Trajectory planning

- 1.1. Trajectory Planning: Designing Trajectory Generators
- 1.2. Path Planning: Graph Based Methods
- 1.3. Path Planning: Cell Decomposition Based Method
- 1.4. Path Planning: Potential Field Based Methods
- 1.5. Path planning: optimization methods
- 1.6. Path Planning: Bio-Inspired Methods
- 1.7. Trajectory Planning: Single-Segment Trajectory
- 1.8. Trajectory Planning: Multi-Segment Path

2. Robot motion control

- 2.1. Adaptive motion control of robots
- 2.2. Scalar motion control of robots
- 2.3. Multivariable motion control of robots
- 2.4. Robust motion control of robots

3. Robot interaction force control

- 3.1. Hybrid motion and interaction force control
- 3.2. Impedance control
- 3.3. Low-level force-torque control of joints
- 3.4. Admittance Control