Seminar on Foundations of Mobile Robotics

In continuation of our Ms-course on 'Mobile Robotics,' in WS23/24 this seminar dives deeper into crucial topics related to autonomous mobile systems that were not fully explored in the main course. Participants will acquire knowledge of advanced algorithms and techniques essential for a variety of mobile robots, including domestic robots, service robots, and self-driving cars.

Students will collaboratively explore chosen topics in small groups of 2-3 members. Each group will be given 2-3 related scientific papers and is expected to deliver the following:

- A short tutorial presentation on the theoretical aspects of the chosen topic
- A Matlab implementation featuring at least three different methods or variations thereof, accompanied by code for testing
- A comprehensive comparative experimental evaluation on relevant data
- A final presentation

There is no obligation for a written report.

Example Topics

- Laser odometry
- Visual odometry
- Multi-Hypothesis EKF Localization
- 3D Graph SLAM
- Place recognition
- Basic semantic SLAM
- Mobile robot modeling and trajectory control
- Search for motion planning
- Reactive planning and obstacle avoidance
- Multi-robot planning and coordination
- Coverage planning

Past participation in the "Mobile Robotics" course is formally not required but strongly recommended.

Teaching goals

Students acquire knowledge about the foundations of robotics, and the important faculty of designing and executing conclusive experiments. Additionally, they sharpen their programming, presentation, self-organization, and team working skills.

Max. number of students: 30