

Introduction to Mobile Robotics

Welcome

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Today

- This course
- Robotics in the past and today

Organization

- Wed 16:00 – 18:00
Fr 14:00 – 15:00
lectures, discussions
- Fr 15:00 – 16:00
homework, practical exercises
(Python)
- Web page:
www.informatik.uni-freiburg.de/~ais/
- Exam: Oral or written

Goal of this course

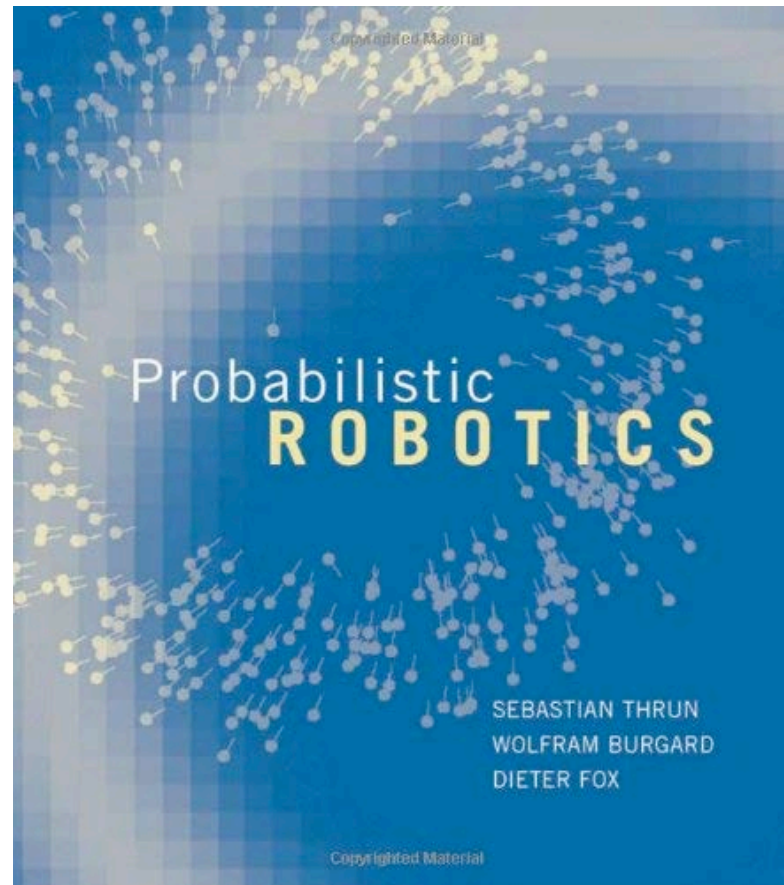
- Provide an overview of problems and approaches in mobile robotics
- Probabilistic reasoning: Dealing with noisy data
- Hands-on experience

Content of this Course

1. Linear Algebra
2. Wheeled Locomotion
3. Sensors
4. Probabilities and Bayes
5. Probabilistic Motion Models
6. Probabilistic Sensor Models
7. Mapping with Known Poses
8. The Kalman Filter
9. The Extended Kalman Filter
10. Discrete Filters
11. The Particle Filter, MCL
12. SLAM: Simultaneous Localization and Mapping
13. SLAM: Landmark-based FastSLAM
14. SLAM: Grid-based FastSLAM
15. SLAM: Graph-based SLAM
16. Techniques for 3D Mapping
17. Iterative Closest Points Algorithm
18. Path Planning and Collision Avoidance
19. Multi-Robot Exploration
20. Information-Driven Exploration
21. Summary

Reference Book

Thrun, Burgard, and Fox:
"Probabilistic Robotics"



Relevant other Courses

- Foundations of Artificial Intelligence
- Computer Vision
- Machine Learning

- and many others from the area of cognitive technical systems.

Opportunities

- Projects
- Practicals
- Seminars
- Thesis

- ... your future!