Seminar Robotics and Navigation

Bachelor Seminar
(CS3702/CS3703/ME3702)

11.02.2020
Who?

Svenja Ipsen
Institute for Robotics and Cognitive Systems
Building 64, ground floor, room 87

+49 451 3101 5217
ipsen@rob.uni-luebeck.de

Courses, languages, ECTS points

Bachelor:
- CS3702: Bachelor seminar Informatics
- CS3703: Bachelor seminar Medical Informatics
- ME3702: Bachelor seminar Medical Engineering Sciences

All courses: 4 ECTS points, ungraded certificate
What? Requirements

- Choose a topic from the list
- **By 15\textsuperscript{th} April**, send me an email with the following data:
  name, date of birth, student ID, degree programme (module no.), topic.
  
  *First come, first served. No e-mail, no registration!*
- Contact your tutor via email to get information on the topic
- Get the newest, most reliable information on it (comprehensive literature review)
- **Write a conference paper** of at least 4 pages about your topic. Use (and do not change) the IEEE Template from [www.ieee.org/conferences_events/conferences/publishing/templates.html](http://www.ieee.org/conferences_events/conferences/publishing/templates.html)
- **By May 18\textsuperscript{th}** you can cancel your registration.
- Submit your conference paper until **15\textsuperscript{th} June** to me and / or your tutor
  *Otherwise, you will officially fail this seminar!*
- Prepare possible rework of your report or add information in the presentation
- **Prepare a presentation** of 20-25 min, hand in your slides until **22\textsuperscript{nd} June**
- Presentations will be given at 1-2 dates at the end of June (likely in this room). Time slots are 35-40 min per student (incl. 15 min for discussion)
- **Attend** all presentations and actively participate in the discussions!
When? Schedule

February, 11  1<sup>st</sup> kickoff meeting
April, 8      2<sup>nd</sup> kickoff meeting
April, 15     Deadline: Email registration
April, 15     Presentation: Best practices
May, 18      Deadline: Unregister (drop out) via Email
June, 15     Deadline: Submission of your proceedings paper
June, 22     Deadline: Submission of your presentation
June, 24     Presentations (~2 - 5 p.m.)
July, 1       Presentations (~2 - 5 p.m., optional)
July, 17     Lectures end, exams begin

Presentation dates are still tentative, deadlines are fixed!
Topics – Medical imaging & navigation

Felix von Haxthausen – vonHaxthausen@rob.uni-luebeck.de
1. Comparison and evaluation of low-cost depth cameras
2. Calibration approaches of spatially tracked 3D ultrasound probes
3. Tracking and robotic navigation systems for endovascular interventions

Dr. Veronica Garcia Vazquez – garciavazquez@rob.uni-luebeck.de
4. Comparison of augmented/virtual reality devices
5. Vessel reconstruction based on ultrasound (standard / intravascular ultrasound)
6. Tracking of endovascular tools in X-ray images

Daniel Wulff – wulff@rob.uni-luebeck.de
7. Learning techniques in medical ultrasound analysis
8. Image registration techniques for real-time tracking in medical images
9. Ultrasound guidance for surgical procedures
Topics – Medical robotics

Svenja Ipsen – ipsen@rob.uni-luebeck.de
10. Visual servoing for robot control
11. Hand-eye calibration approaches for robot-camera systems
12. Collaborative robots in the medical field – overview and comparison

Sven Böttger – boettger@rob.uni-luebeck.de
13. Robotic teleoperating systems – A survey
14. Robotic force-feedback control
Topics – Machine Learning / Deep Learning

Daniel Wulff – wulff@rob.uni-luebeck.de
7. Learning techniques in medical ultrasound analysis

Jannis Hagenah – hagenah@rob.uni-luebeck.de
15. Deep Learning for Depth Estimation
16. Object Detection with Deep Learning

Honghu Xue – xue@rob.uni-luebeck.de
17. Deep Reinforcement Learning in navigation
18. Efficient Deep Reinforcement Learning algorithms for control (model-based RL)
Topics – Mobile robotics

Ralf Bruder – bruder@rob.uni-luebeck.de
19. Differential flatness for quadrocopter control
20. FMCW Radar for use in mobile robotics - theory and application
21. Safety systems for mobile robotics - overview and comparison

Nils Rottmann – rottmann@rob.uni-luebeck.de
22. Optimal Field Exploration with Gaussian Processes
23. Sensor Fusion using Kalman and Particle Filter
24. Dynamics and Control of Quadrocopter
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<thead>
<tr>
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Next steps

- Choose a topic (as soon as possible!)
- By 15th April send me an e-mail with your personal details and your topic selection

Further information

Today’s slides will be uploaded on Moodle: moodle.uni-luebeck.de/course/view.php?id=4906

→ Bachelor Seminar /CS3702/CS3703/ME3702/CS3290 "Robotics and Navigation"

And on the Institute’s website: www.rob.uni-luebeck.de/index.php?id=418