

Photogrammetry & Robotics Lab

Course Introduction

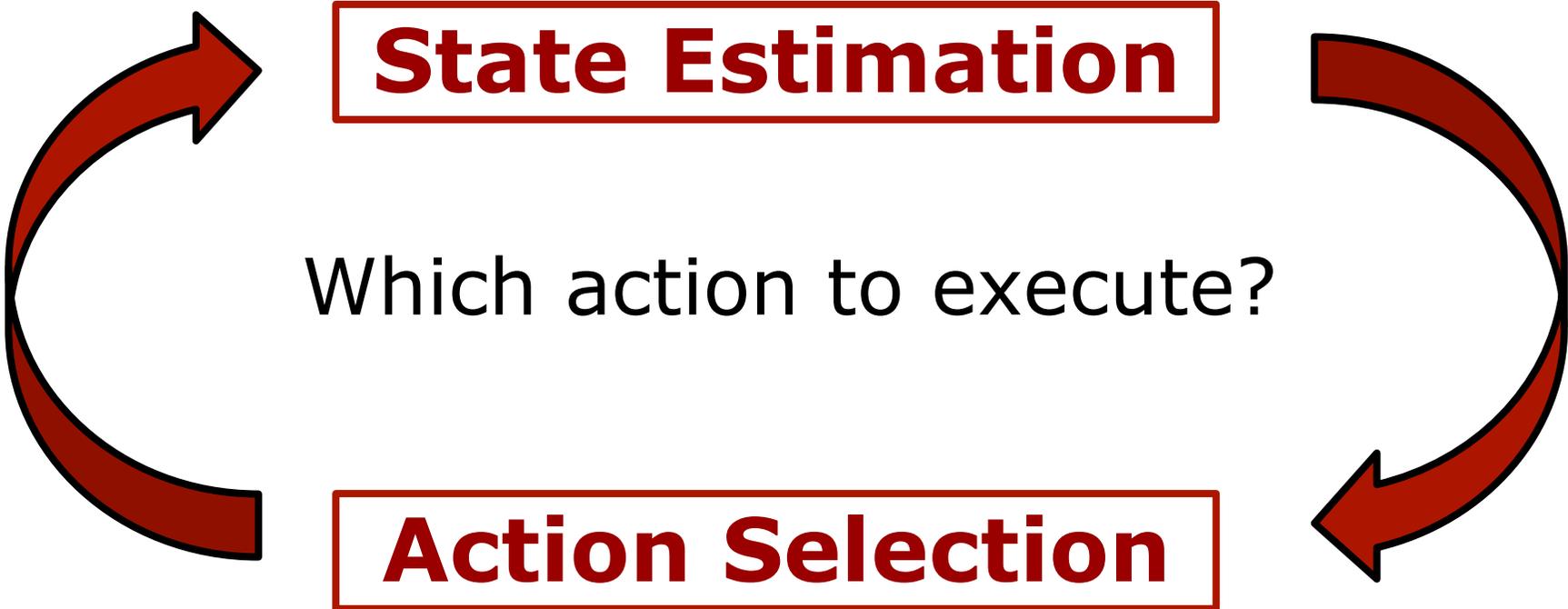
Cyrill Stachniss

Autonomous Mobile Systems



Two Fundamental Questions in Mobile Robotics

What is the state of the world?



State Estimation

Which action to execute?

Action Selection

Focus of this Course

What is the state of the world?

State Estimation

Focus on Geometric Estimation

What does the world look like
and where is the robot?

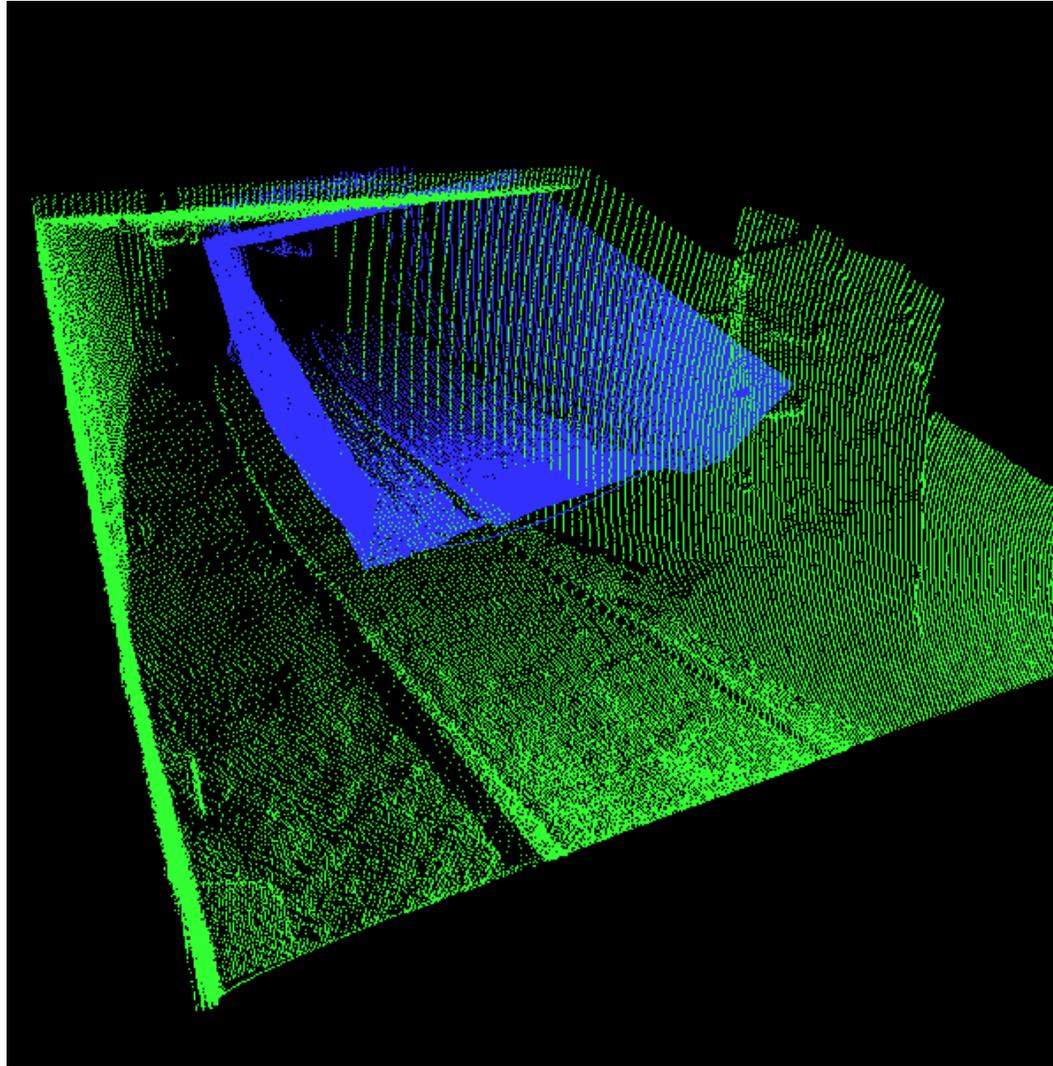
Topics & Planned Schedule

- Robotics part: Stachniss
- Mobile sensing part: Klingbeil & Kuhlmann

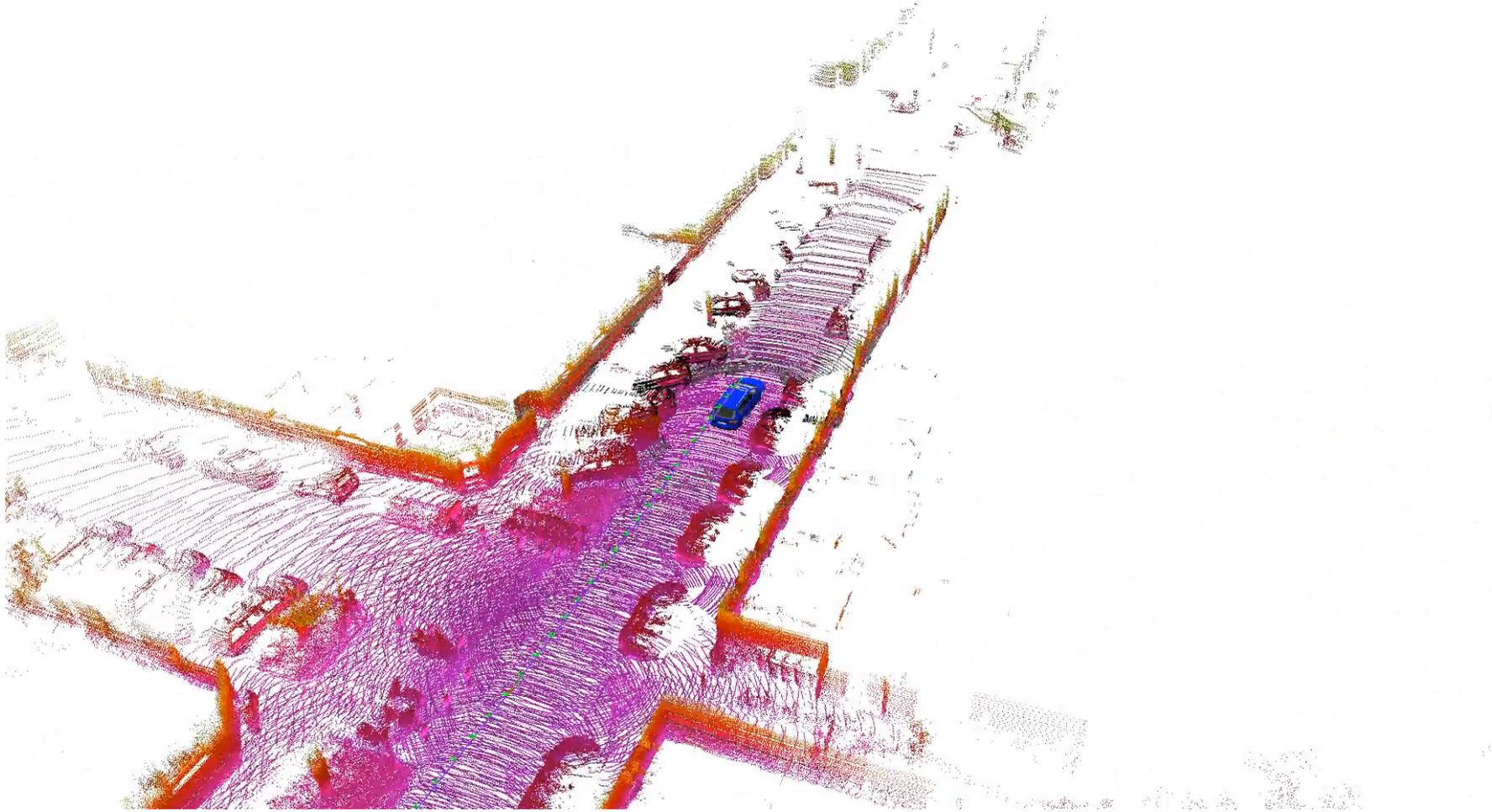
Robotics Part – Stachniss

- Least squares
- Point cloud registration
- Graph-based SLAM
- Pose-graphs and landmarks
- Robust optimization for SLAM
- Camera models
- Relative orientation of the image pair
- Fundamental and essential matrix: F & E

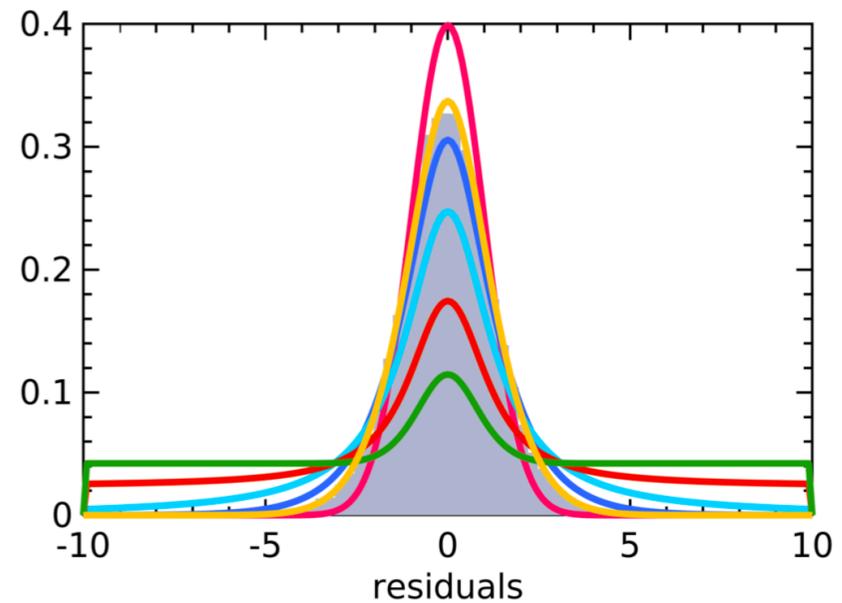
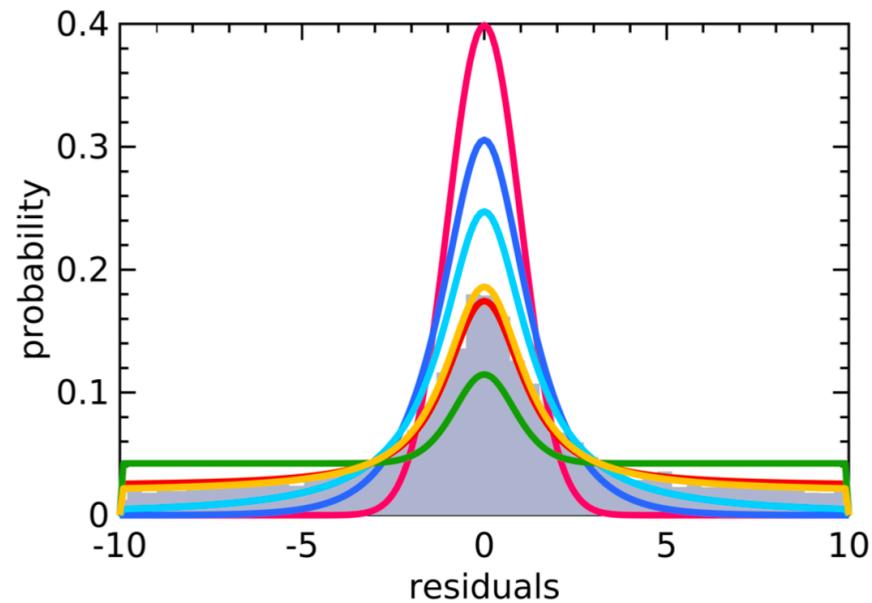
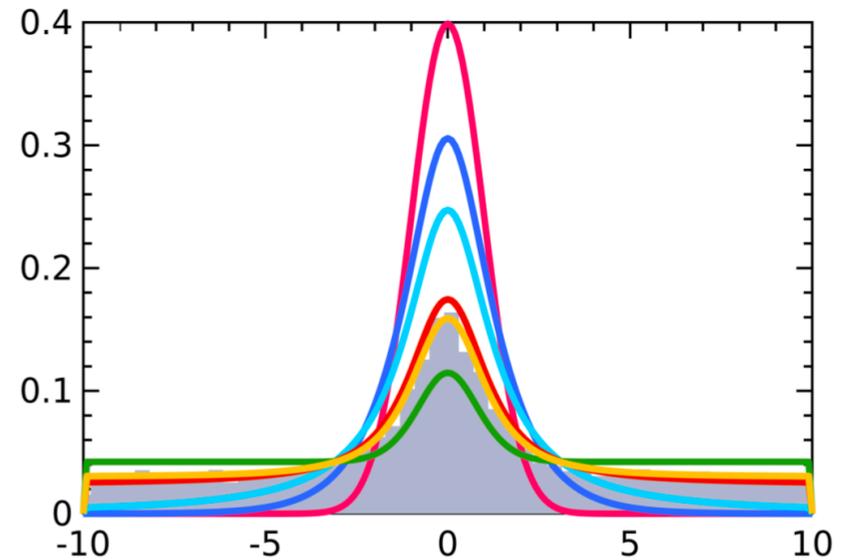
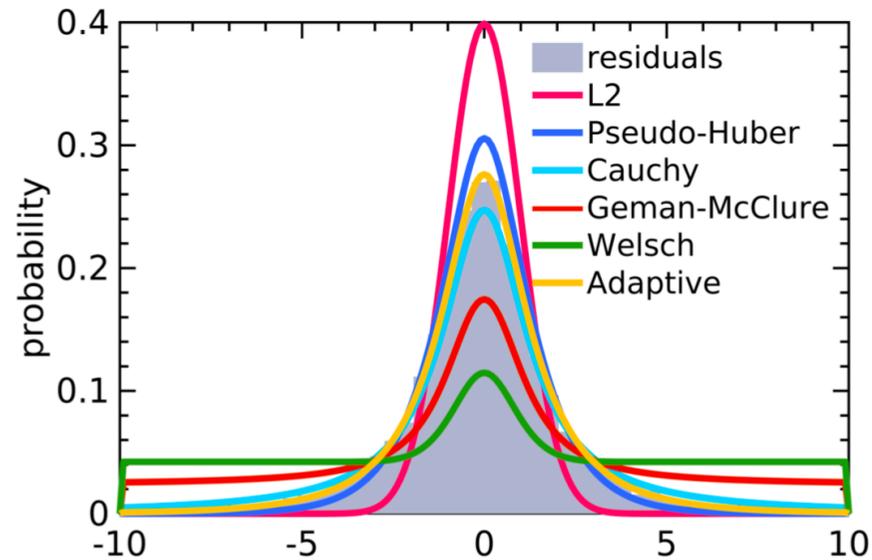
Point Cloud Registration



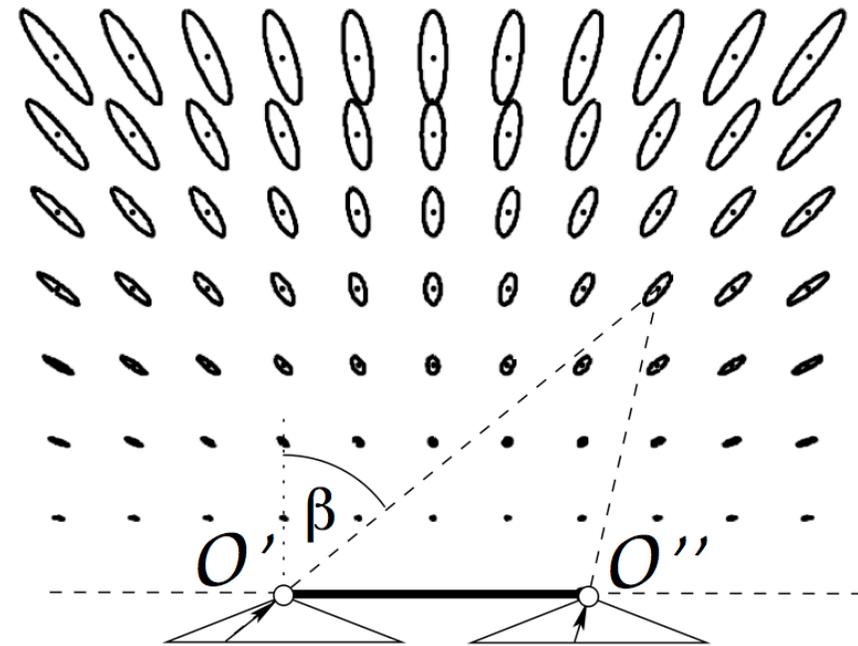
Localization and Mapping



Dealing with Errors & Outliers



Geometry of the Stereo Pair



Multiple-View Geometry



Homework Assignments

- Deadline given on the assignments
- **Exam admission: 50%** of the points of the homework assignments
- **Coding** is an essential part of the homework assignments
- Submission in groups of **2 students**
- Assignment/submission via eCampus
- Limit collaboration among groups
(zero tolerance on plagiarism)

Lectures, Exercises, and Exam

- **Lectures** as video recording
- **Tutorials** & questions via Zoom
- **Homework** assignments
- Deadlines: see assignment sheet
- **Oral exam**

**Problems or Questions?
Contact Us!**