Practical Course: Vision-based Navigation
Summer term 2015

Premeeting

Dr. Jörg Stückler, Vladyslav Usenko, Jakob Engel, Prof. Dr. Daniel Cremers
Real-Time Camera Tracking and 3D Reconstruction Using Signed Distance Functions

Erik Bylow, Jürgen Sturm, Christian Kerl, Fredrik Kahl, Daniel Cremers

Robotics: Science and Systems (RSS)
June 2013

Computer Vision Group
Department of Computer Science
Technical University of Munich
LSD-SLAM: Large-Scale Direct Monocular SLAM
Jakob Engel, Thomas Schöps, Daniel Cremers
ECCV 2014, Zurich

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Technical University of Munich
Content of this Course

- You can gain practical experience with
  - Visual odometry and localization/state estimation
  - Vision-based Simultaneous Localization and Mapping (SLAM)
  - Vision-based control of quadrocopters or wheeled robots

- Implementation of algorithms

- Benefits/drawbacks of specific methods when applied to concrete, relevant problems

- Learn how to work in teams/on projects

- Improve your presentation skills

Dr. Jörg Stückler, Computer Vision Group, TUM
Course Organisation

- Course takes place during the lecture period

- Initial phase (first 4-5 weeks): Lectures & Exercises
  - Mondays 1pm to 3pm in seminar room 02.09.023
  - Programming assignments will be handed out every week and checked/graded by the tutors
  - Small groups, each participant should be able to explain their solution
  - Attendance to lecture & exercise sessions mandatory

- Second phase (remainder): Project
  - Work in small groups (2-3 people) on a project
  - Lab 02.05.014 available; tutors available Mondays 1pm-5pm
  - Implement a specific algorithm, which one tbd.
  - Present project outcome in talk&demo session (15min per group)
  - Written report on project outcome (10-12 pages, single column, single-spaced lines, 11 pt)
Course Requirements

- Good knowledge of the C/C++ language and basic mathematics such as linear algebra, analysis, stochastics, and numerics is required

- Prior practical knowledge in CUDA programming, robotics, and computer vision topics is a plus

- Participation in at least one of the following lectures of the TUM Computer Vision Group: Variational Methods for Computer Vision, Multiple View Geometry, Autonomous Navigation for Flying Robots. Similar lectures can also be accepted
Course Registration

- You apply for courses through the matching system in TUMOnline: **30. January - 3. February 2015**
  - List your preference on courses
  - Please specify how you meet the course requirements / if you have attended any related computer vision courses before!

- Matching Results: **10. February 2015**
- Enrollment: **14. February 2015**

- We can only guarantee places to students assigned through the matching process (and fitting the course requirements)!!
Questions ?