# 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

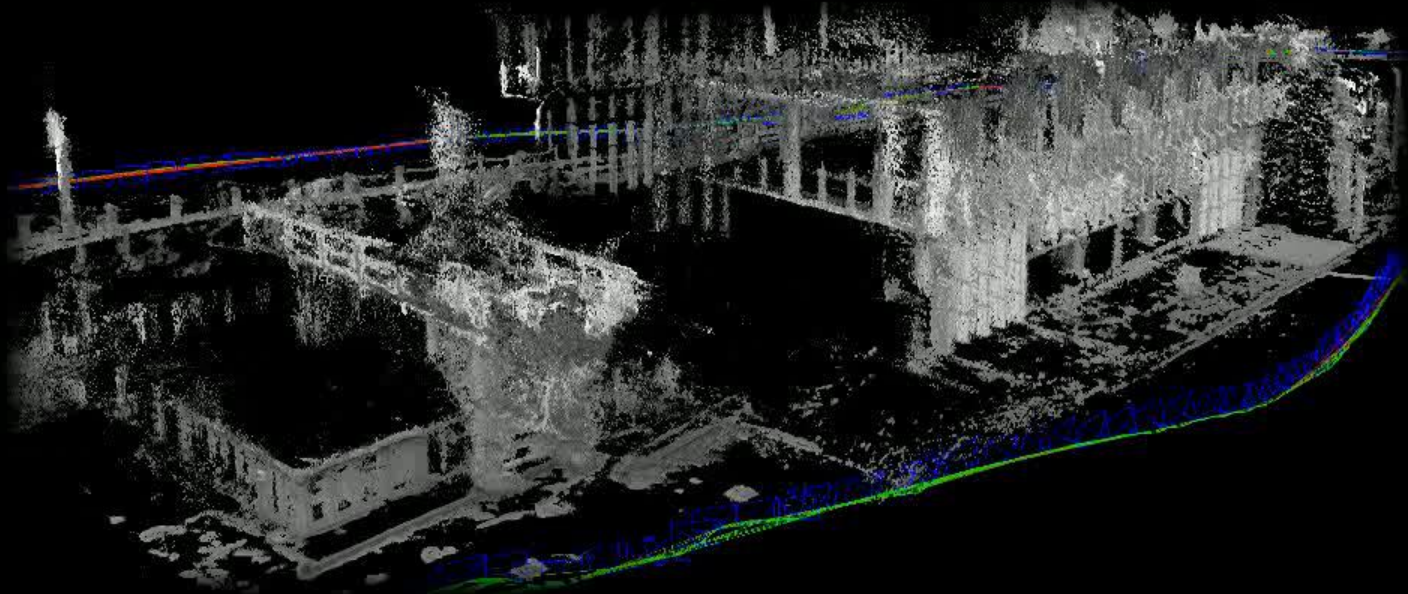**Robotics: Science and Systems (RSS)**
**June 2013**

Computer Vision Group
Department of Computer Science
Technical University of Munich

# LSD-SLAM: <u>L</u>arge-<u>S</u>cale <u>D</u>irect Monocular <u>SLAM</u>

Jakob Engel, Thomas Schöps, Daniel Cremers
**ECCV 2014, Zurich**

Computer Vision Group
Department of Computer Science
Technical University of Munich

Dr. Jörg Stückler, Computer Vision Group, TUM

# 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

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# 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)

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# 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

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# 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
- Post-application: 11. February – 13. February 2015
- Enrollment: 14. February 2015

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

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Questions ?

Dr. Jörg Stückler, Computer Vision Group, TUM