# Final Projects

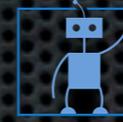## Applied Computer Vision for Robotics

19.06.2013

# Basic Info
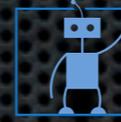
Robotics and Embedded Systems

- 4 Weeks

- next week: Presentation of Project Roadmap

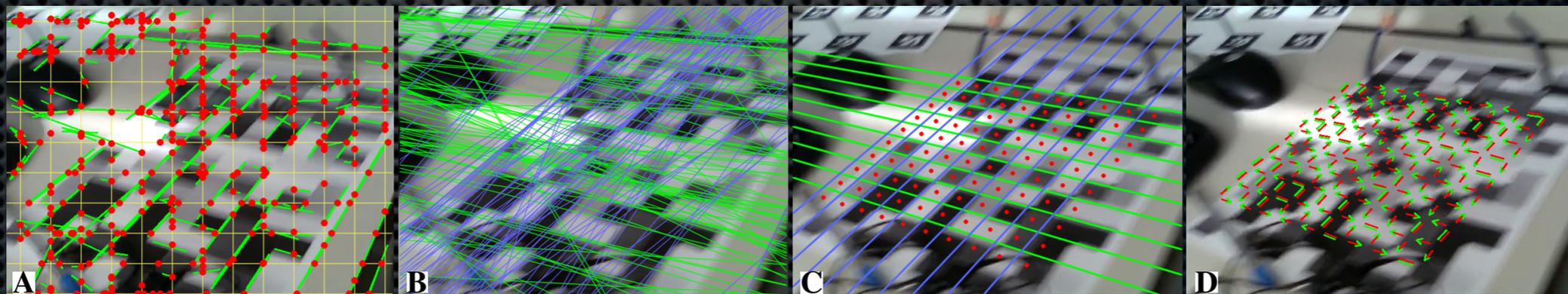- 2 Status meetings (03. & 10.07.)
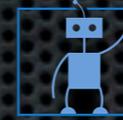
- Final Presentation (17.07.2013)

# Five Shades of Gray

* Detect marker in image

* Useful for camera pose estimation

* Very recent paper:
http://www.fit.vutbr.cz/~izacharias/papers/2013-CVPR-UMF.pdf

# Evaluation of various binary descriptors using a systematic approach
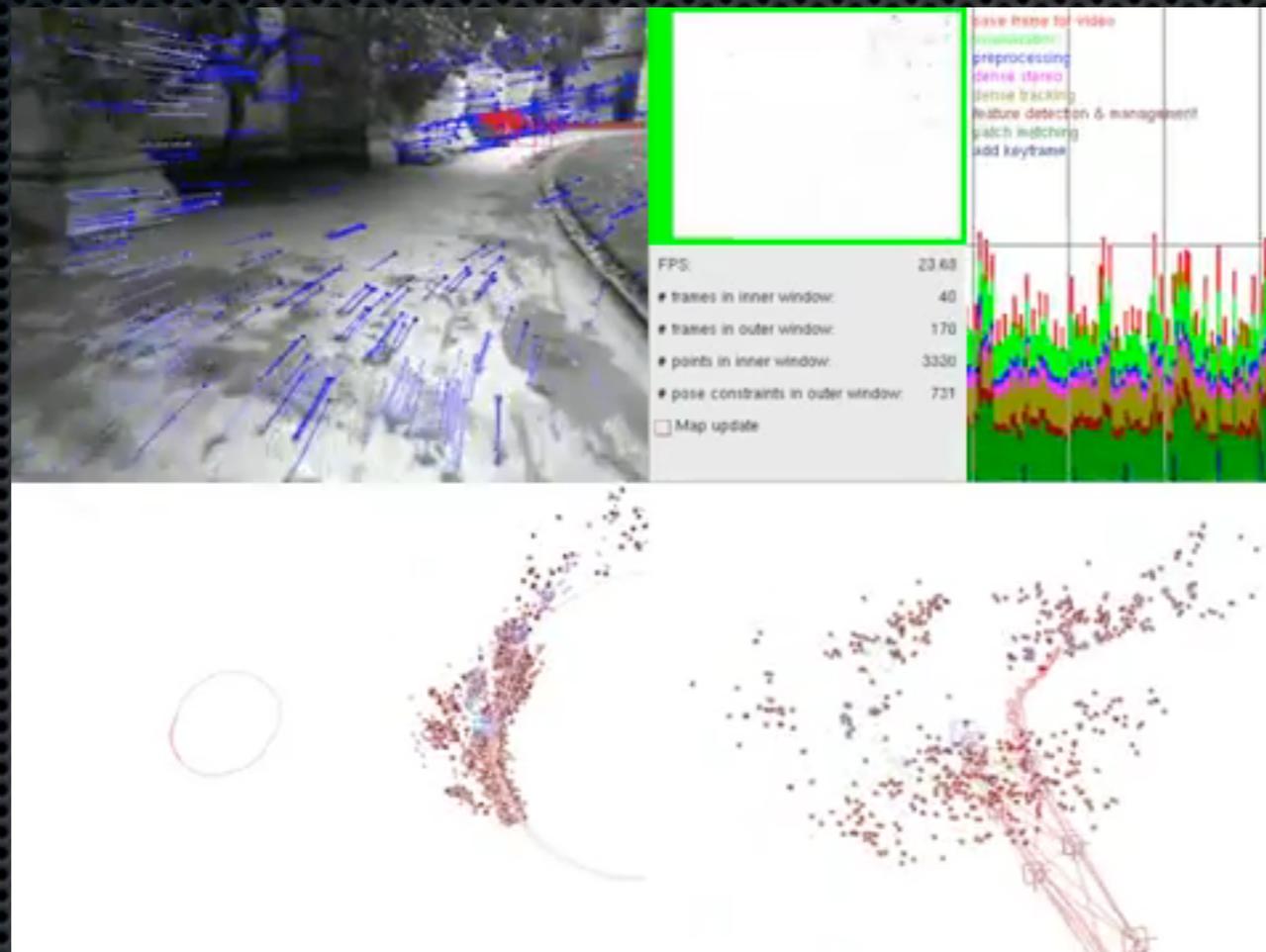
Robotics and Embedded Systems

TUM

- Instead of just using the difference of two regions the idea is to "try" the combination of more regions, different sizes, filters etc.

- Systematic evaluation of many possible combinations using a big dataset

- Find a better descriptor!

# Monocular (Stereo) Visual Odometry SLAM
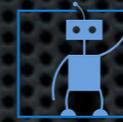


- Use only a single camera for motion estimation and mapping (up to scale)

- create a feature map of the environment

# SeqSLAM

Nurburgring – Frame Matches
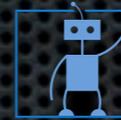
Science and Engineering Faculty

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CRICOS No. 00213J

- ✖ Appearance Based Localization / Place Recognition

- ✖ https://wiki.qut.edu.au/download/attachments/104094381/
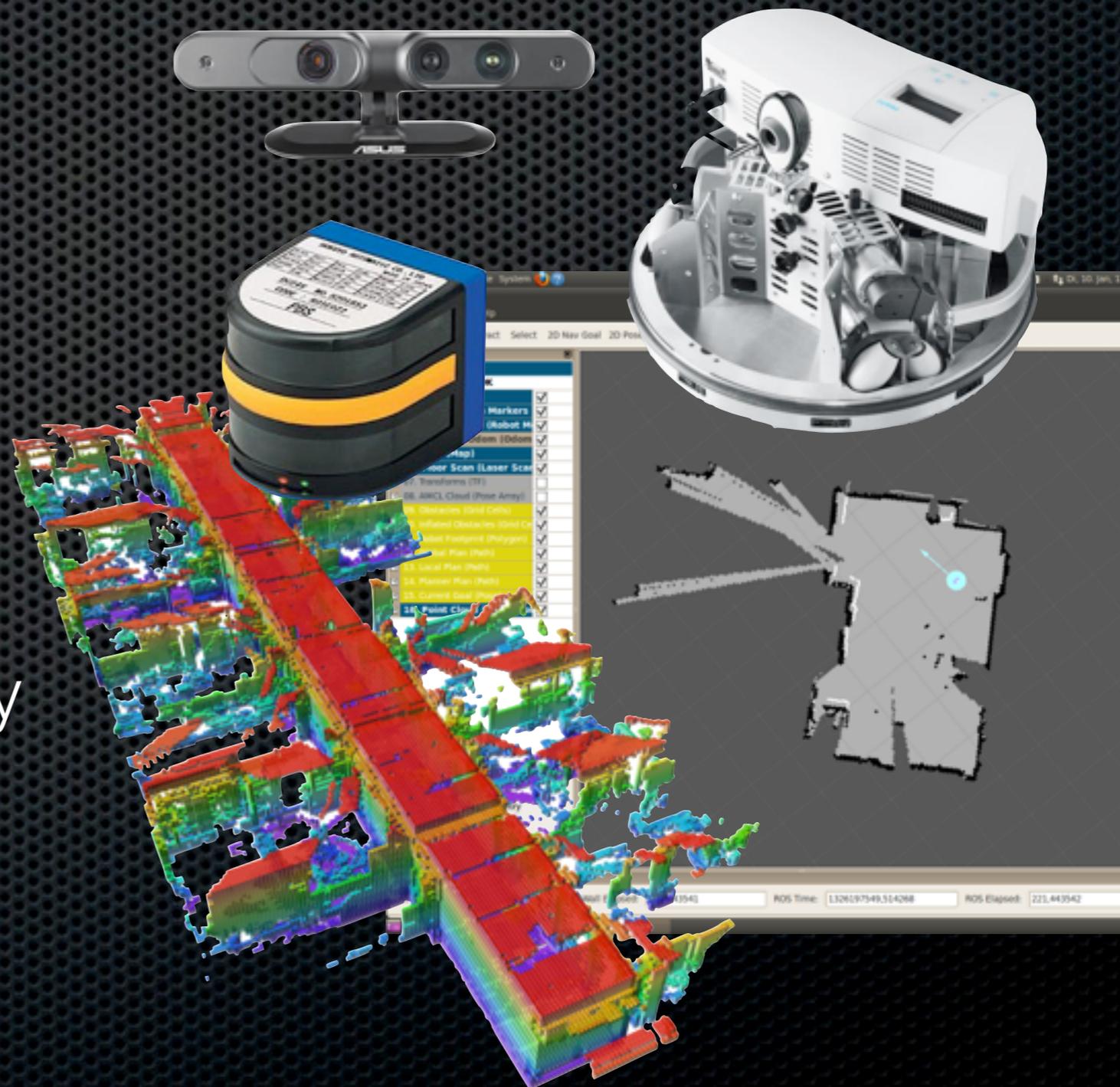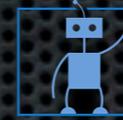  icra2012_milford_camera_ready.pdf?version=1&modificationDate=1331426338663

# Octotino

- Robotino

- Octomap

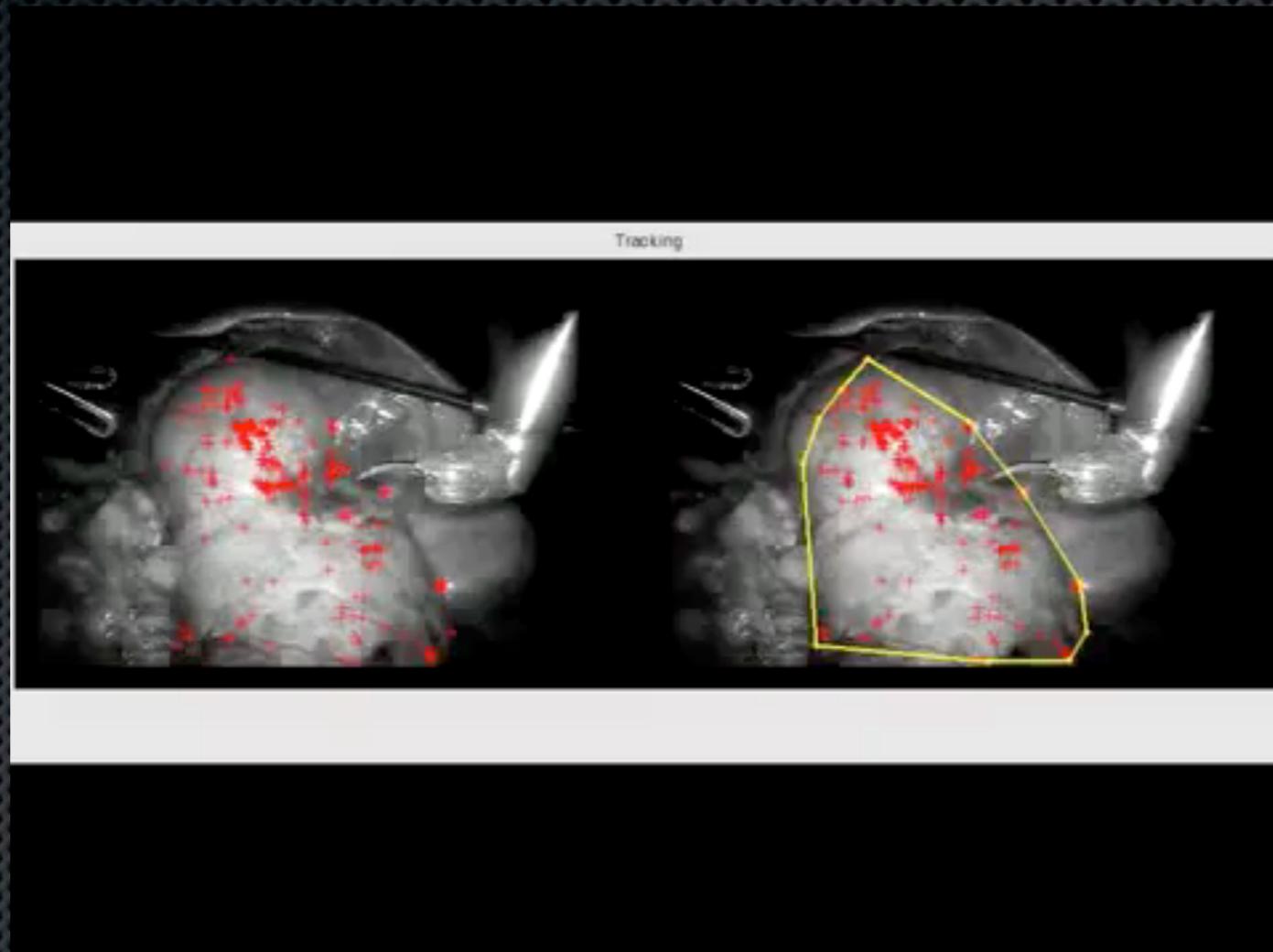- Laserscanner

- Autonomy

- RGB-D Visual Odometry

# Adaptive Multi-Affine Feature Matching
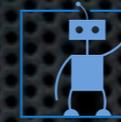


- http://ranger.uta.edu/~gianluca/papers/PuAdCaMa_IROS11.pdf

- Special Feature Matching strategy using geometric constraints

# Overview

Robotics and Embedded Systems

| Topic | Short Description | Assigned Team |
|---|---|---|
| Five Shades of Gray | Template Detection & Tracking | |
| Systematic evaluation of binary descriptors | Feature Descriptor Development | global maximum |
| Mono/Stereo SLAM | Simultaneous Localization and Mapping | a_team |
| SeqSLAM | Appearance-based Place Recognition | grotteneumel |
| Octotino | Mapping with Robotino | wurzel |
| Adaptive Multi-Affine Feature Matching | Feature Matching Strategy with geometric constraints | |
| Sensor Fusion (BMW) | Labcar Data; RGBD, Odometry, IMU Fusion | |
| Boundingbox Filtering of Multi-Object-Tracking (BMW) | Stereo Input, Labcar Input, Object Pose Filtering (EKF, ROS, PCL) | |