

Practical Course: GPU Programming in Computer Vision

Preliminary Meeting

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What you will learn in the practical course

- Introduction to parallel computing on GPUs
- Introduction to NVIDIA CUDA Framework
- How to parallelize basic computer vision algorithms in CUDA/C++
- Practical project experience
- Team work & presentation skills

Important Dates

- Preliminary Meeting: **7. February 2018 (today)**
- Registration in the matching system from 9th to 14th of February 2018
 - List your preferred practical courses
 - Send an email to `cuda-ss18@vision.in.tum.de` with your (tabular) CV which shows that you meet the prerequisites.
Deadline **13. February 2018**
- Matching Results: **21. February 2018**
- **Only assigned students are allowed to attend !!!**
- See `docmatching.in.tum.de/index.php/schedule`



Course Organization

- 4–5 weeks block course in the semester break (beginning of September - mid of October)
- 1 week lecture and exercise session
- 3–4 weeks project phase
- Our computer lab will be open for students
- Computers are equipped with proper GPUs (GTX 750), one for each student.
- Students will work in groups: 24 students; 8 groups, each has 3 students.
- Every group will be assigned to one advisor.

Course Structure

- Prerequisites:
 - Good Knowledge in C/C++
 - Knowledge in Basic Mathematics (Calculus/Analysis and Linear Algebra)
- First week
 - Lecture (CUDA + Math) in the morning
 - Hands-on programming exercises in the afternoon
- Following 3-4 weeks
 - Project phase, one project per group
 - Your own ideas
 - Project Proposals, any related topic to Computer Vision, Image Processing, Machine Learning, etc.
- Demo Day
 - Final presentation of the projects

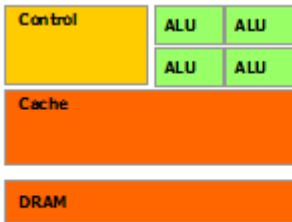
Evaluation Criteria

- Successful completion of the exercises (0,3 bonus)
- Gained expertise in CUDA/parallel programming
- Quality of your final project
 - Successful completion of the project
 - Projects will be evaluated by the project advisors
 - Your talk

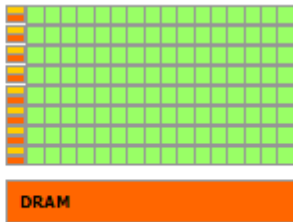
Regular Attendance is Required

- Attendance at classes/exercises is mandatory
- In case of absence: Medical attest
- The practical course is intended as a **4-5 week full-time** project

Motivation on GPU programming

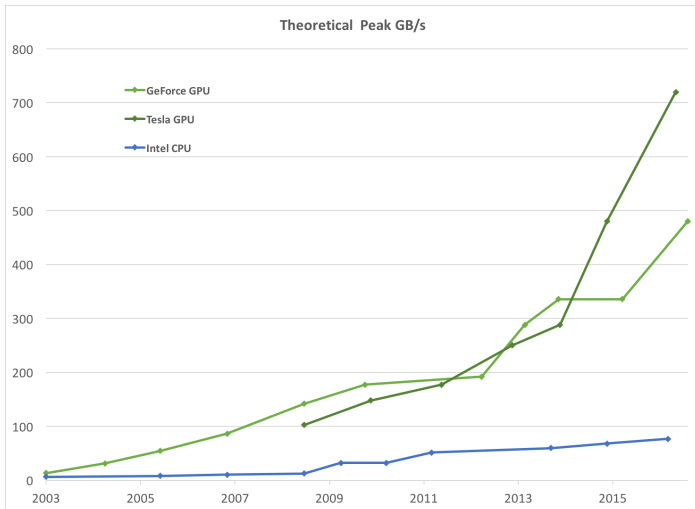
**CPU**

4-32 cores

**GPU**

3072 cores

CPU vs GPU

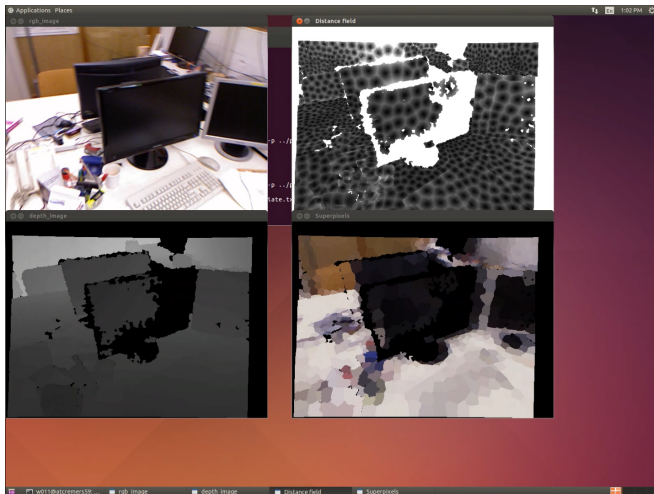


Student projects from the previous years

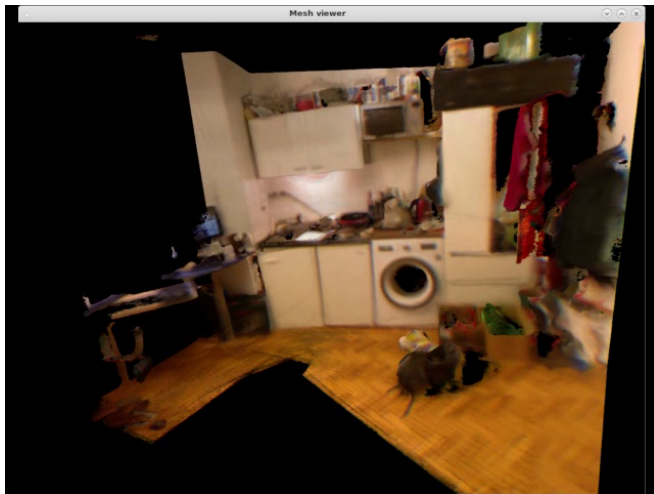
Image Stitching of Aerial Images



Depth-Adaptive Superpixels



Kinect Fusion



Dense Visual Odometry

