



Master Thesis am Institut für Maschinelles Sehen und Darstellen (ICG)



Topic:

Hardware Accelerated Naïve Key-point Descriptors and Matching

Description:

Natural Feature Tracking (NFT) is an important technique for Augmented Reality applications. NFT can roughly be divided into feature detection and tracking. The most costly part hereby being the detection and classification of key points. Though, the actual extraction is mostly computationally inexpensive, key point descriptors still need large amounts of cycles and mostly are using implementations that are heavy in conditional dependencies. However, key-point descriptors can also be seen as a specialized implementation of signal processing and therefore could be offloaded into an FPGA, DSP or the GPU common in most hardware including mobile devices. In a first step this project investigates naïve descriptors such as, but not restricted to OSID [1] in order to evaluate the feasibility of this approach. Secondly, an approach of key point matching is needed to avoid the read-back of candidates. The objective is to understand and evaluate run-time behavior and robustness of the key-point descriptors and matching with the focus on a target implementation on a mobile or embedded platform.



Workflow of OSID descriptor proposed in [2]

The goal is to demonstrate the usage of specialized hardware for the extraction and matching of key-point descriptors.

Project Duration:

Usually 6 to 12 month

Preconditions/Possibilities:

Knowledge in one of the fields of GPGPU, DSP or FPGA programming

Knowledge in C++ programming

Knowledge in computer vision and algorithmic optimization

Working with modern Smartphones and Embedded Hardware (Beagleboard, Pandaboard, etc.)

Partial financial compensation after successful completion

Contact:

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Further Information / Literature:

[1] HandheldAR homepage: http://www.studierstube.at/handheld_ar

[2] Feng Tang, Suk Hwan Lim, Chang N.L., Hai Tao, "A novel feature descriptor invariant to complex brightness changes". In CVPR, pp 2631-2638, 2009