Karlsruhe Institute of Technology

Institute for Data Processing and Electronics
Prof. Dr. Marc Weber

Optimizing imaging algorithms for the latest CPU and GPU architectures

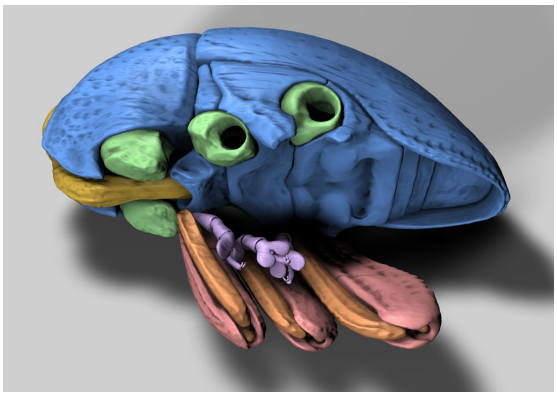
Internship

Parallel computing has become increasingly important in the last several years. Standard servers include nowadays up to 64 cores. Modern GPUs are able to execute thousands of floating point operations in parallel and have become a valuable tool in multiple scientific fields that require high computational throughput. It becomes more and more important to parallelize existing algorithms and tune the implementations to the recent hardware architectures. For the optimal performance, it is crucial to also take the details of hardware architectures into account.

Imaging station equipped with 2 Xeon CPUs with in total 16 cores and 4 GPUs.

The student will join an ongoing projects and will perform optimization of selected image-processing algorithms for recent parallel architectures. Available projects include

- advanced image reconstruction and segmentation algorithms done in cooperation with the ANKA synchrotron,
- digital image tracking algorithms done in cooperation with Institute for Thermal Process Engineering,
- simulation codes for the international KATRIN and Edelweiss collaborations.



Example of 3D X-ray imaging. The functional groups of a flightless weevil are colored.

Required Skills

Good knowledge of C programming language, knowledge of OpenCL or/and CUDA is a plus.

Experience Gained

Image processing in scientific applications, High Performance Computing, Hardware-aware software development, Parallel and GPU programming, Benchmarking and Profiling.

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