Karlsruhe Institute of Technology

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Managing high-throughput scientific electronics with Linux

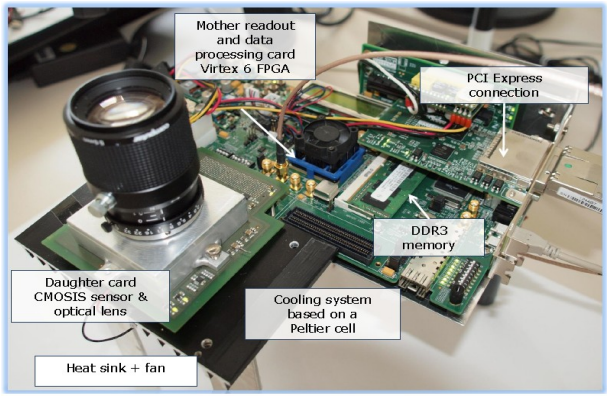
Internship

Nowadays scientific instrumentation is characterized by increasing data rates and the need for efficient online analysis and monitoring. To address this demands, sophisticated hardware and software capable to stream tens of gigabytes per seconds is required. Additional complexity is added by necessity to synchronize the development of hardware and software components.

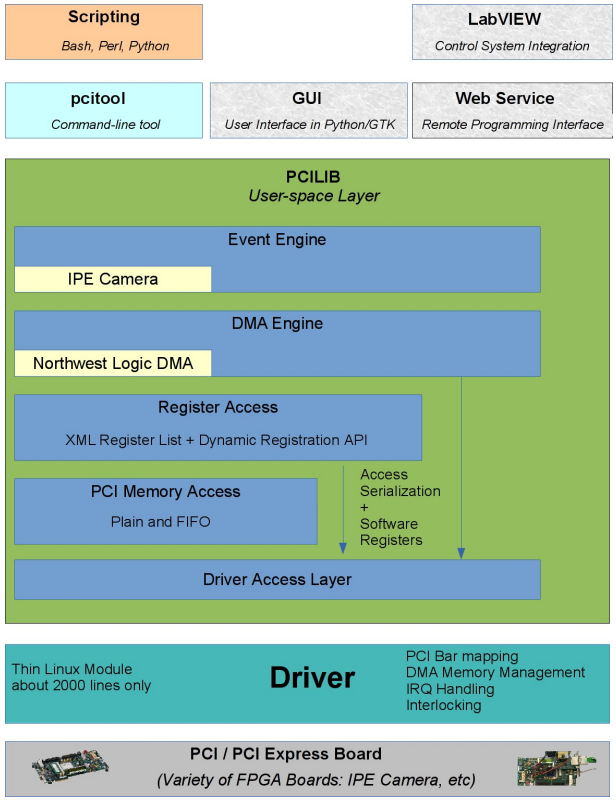
To support the development of DAQ electronics, we have designed the “Advanced Linux PCI Services” ALPS. The framework provides standard components like register access and DMA protocols across multiple devices, ALPS allows one to rapidly implement software support for newly developed PCI-based electronics and provides extensive support for hardware debugging.

The student will join the ALPS project and will contribute with

- the implementation of additional DMA protocols,
- support for new hardware and
- the implementation of new subsystems that help to control and debug hardware.



Prototype of a high-speed streaming camera with PCIe link. The camera is developed at IPE.



The ALPS Architecture: The software consists of the tiny kernel module, SDK library, and command-line tool. The GTK GUI and Web Service interface are planned. The SDK consists of 4 layers: raw access to the PCI I/O memory, register model, DMA engine, and device specific code.

Required Skills

Very good knowledge of the C/C++ programming language, acquaintance with POSIX standards, understanding of process synchronization. Prior experience in developing Linux kernel modules is a plus.

Experience Gained

Linux kernel development, PCIe-based scientific electronics, DMA protocols

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