Bern University
of Applied Sciences

Research Group
HuCE – microLab

Competences

The research group HuCE – microLab develops hardware-algorithms in microelectronics, signal-processing and control. The group concentrates on application-specific implementations of algorithms in hardware solutions using ASIC or FPGA. When implementing algorithms using the method of hardware/software co-design, we profit from combinations of both, the flexible microprocessor technology and the high-speed application-specific ASIC/FPGA technology. In our research and development activities, we focus on energy efficiency, processing performance, and miniaturization. Current R&D projects cover the application fields of mass-spectrometry, optical coherence tomography, esophagus ECG recording-systems in biomedical engineering, smart-cards and sensor networks in sports, and healthcare.

Key Projects

The following research (Commission for Technology and Innovation CTI) and industrial projects give an overview of the research activities of the group:

- High-speed data acquisition and signal processing for mass-spectrometry
- Esophageal ECG recorder: electronic implant for long-term ECG recording
- Miniaturized swept-source optical coherence tomography engine
- Motion analysis and signal processing in high performance road racing bicycles
- Body sensor network for physical activity recording
- Modeling of circuit blocs for integrated sigma-delta modulators to be used in highresolution analog-to-digital converters
- Algorithms for resource-limited fingerprint recognition Infrastructure

Infrastructure

The modern infrastructure of the HuCE – microLab includes equipment for fast prototyping like a low volume, highly flexible SMD/BGA pick, place and soldering system, die bonder, an automatic wire bonder, a wafer prober for ASIC measuring and testing, CAD tools for ASIC/FPGA design (Xilinx, Cadence, Synopsys, Matlab/Simulink), and high-end measurement devices like LeCroy 20 GS/s oscilloscopes and HP pattern generator/logic analyzers.

Our flexible collaboration model for services and R&D projects allows us to start industrial projects within a week.

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