

School of Business and Engineering Vaud (HEIG-VD)

“RECONFIGURABLE AND EMBEDDED DIGITAL SYSTEMS” INSTITUTE

“REDS: The colour of innovation”

Types of service

Besides offering Bachelor- and Master-level courses, the missions of the REDS Institute include research and development (R&D) projects, technology transfer, industrial contracts, CTI contracts and European projects.

The REDS offers and performs:

- Applied research;
- Technology transfer;
- Industrial contracts;
- Projects supported by the Commission for Technology and Innovation (CTI);
- National projects;
- European projects;
- Continuing education.

The REDS is a member of several organisms and association, such as:

- RCSO-ISYS – Competence network of Western Switzerland in Integration and Systems;
- swissT.net – Swiss Technology Network;
- OSADL – Open Source Automation Development Lab [Academic Member].

The Institute in 2011

- 4 Professors;
- 18 R&D Engineers and Technical Collaborators;
- 25 projects;
- Turnover of 1.5 M CHF;
- 12 Bachelor and internships;
- 5 Master investigation projects;
- 2 Master theses.

Contact us

REDS Institute

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Twelve research institutes at HEIG-VD as drivers of innovation

- More than 200 contracts with the economics world;
- 300 engineers and economists participating in research projects;
- 9 start-up, 1 of which created in 2011.

CETT Center for Engineering and Technology Transfer of the HEIG-VD

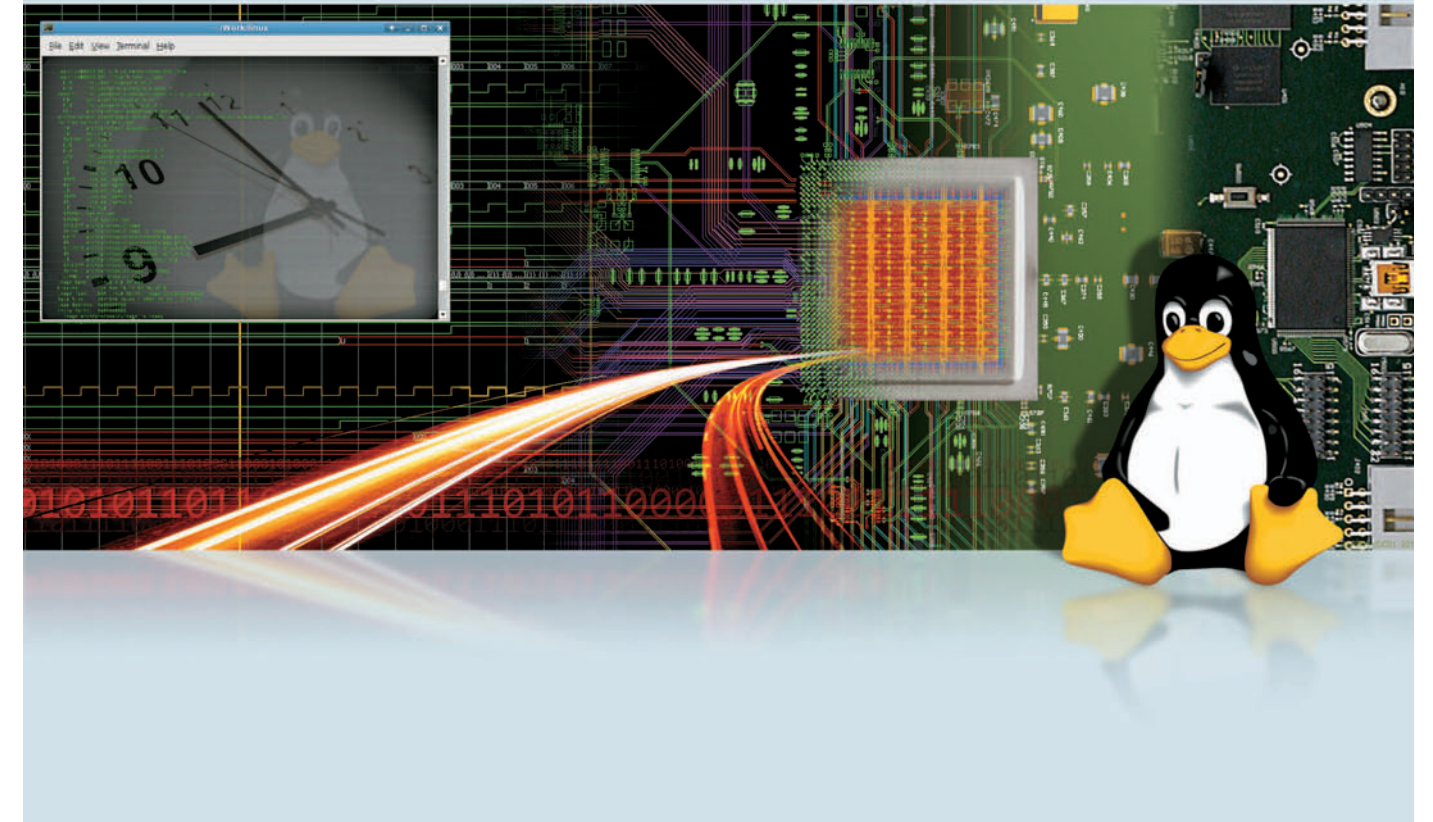
- Management and dissemination of applied research and development projects
- Creation of partnerships between institutes of HEIG-VD, companies and associations

mine de rien sarl [agence conseil en communication]

heig-vd

Haute Ecole d'Ingénierie et de Gestion
du Canton de Vaud

REDS
Reconfigurable & Embedded
Digital Systems



School of Business and Engineering Vaud (HEIG-VD)

“RECONFIGURABLE AND EMBEDDED DIGITAL SYSTEMS” INSTITUTE

Reconfigurable & Embedded Digital Systems (REDS) Institute is attached to the Department of Information and Communications Technology (ICT) of the HEIG-VD. The Institute has strong expertise in the following fields:

- Hardware-oriented Efficient Information Processing
- Software-oriented Heterogeneous Device Support
- Integrated Design of Embedded Systems

<http://www.reds.ch>

Hes-so
Haute Ecole Spécialisée
de Suisse occidentale
Fachhochschule Westschweiz
University of Applied Sciences
Western Switzerland

REDS: Applied Research and Development

The Reconfigurable & Embedded Digital Systems (REDS) Institute, which is attached to the Department of Information and Communications Technology (ICT) of the HEIG-VD, has strong R&D expertise in high-performance embedded systems.

The activities of the Institute rely on three strategical axes:

- Hardware-oriented Efficient Information Processing
- Software-oriented Heterogeneous Device Support
- Integrated Design of Embedded Systems

In these domains, the Institute has achieved numerous marking realizations based on industrial contracts, CTI contracts, and national or European projects.

The following examples can be quoted for 2011:

- The development of a 24-layers board including 32 high-speed 10 Gigabits/s serial lines connected to optical transceivers;
- A multi-OS virtualization platform;
- A reconfigurable radio communication system;
- A multi-sensor platform for geological monitoring;
- Etc.

Efficient Information Processing

Our skills in the field of programmable circuits (FPGA/CPLD) and interconnection technologies (high-speed interfaces and buses) lead to innovative solutions in the domain of applications requiring high-speed data processing (hardware acceleration, signal processing, cryptography, etc.).

Our realizations rely on a solid experience of digital systems development and verification methodologies (VHDL, SystemVerilog, EDA tools, Matlab Simulink).

- Computing accelerator;
- Hardware implementation tailored to dedicated algorithms (cryptography, signal processing, etc.);
- High-speed data communication;
- Co-design and data flow optimization;
- Software for hardware design.



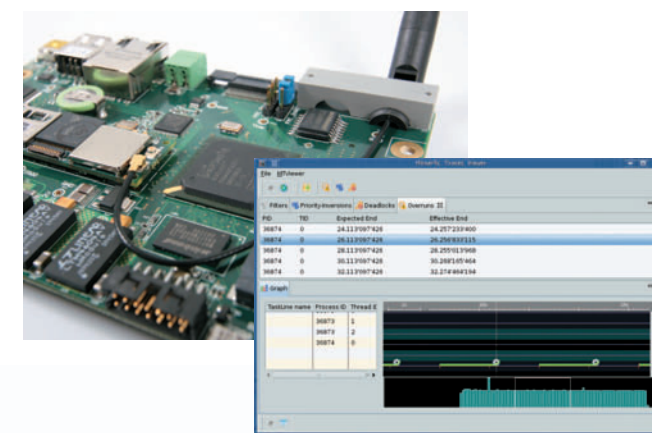
QCrypt: Secure High-Speed Communication based on Quantum Key Distribution

Heterogeneous Device Support

High performance embedded systems are based on heterogeneous hardware: processing units (32/64-bit processors / microcontrollers, DSPs, FPGAs, GPUs, etc.) and peripherals (multimedia, communication, sensors, motor control, etc.).

Reaching a high level of parallelism involves dealing efficiently with software heterogeneity. Our approach consists in partitioning the application on several processing units and using virtualization to run several operating systems on the same hardware.

- Software development for heterogeneous hardware;
- Software partitioning on heterogeneous target platforms;
- Development of processor clusters and calculation units (DSP, FPGA, etc.);
- Optimal use of hardware resources according to application needs.



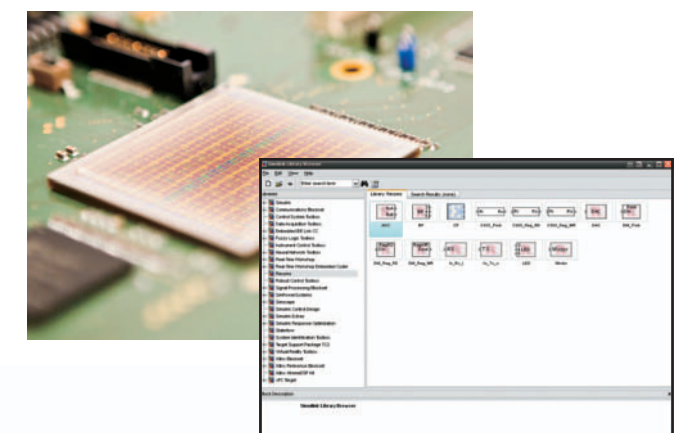
EXM (left figure): Real-time embedded platform running Linux
Monartis (right figure): Monitoring and analyses of traces from real-time systems

Integrated Design of Embedded Systems

We are able to design and realize entirely a high performance embedded platform.

Our experience of hardware design (schematic, routing, tests) of high-density and high-speed boards, embedded runtime environments (monitors, OSs, RTOSs) and software engineering (from low-level programming to GUIs), allows us to design and implement embedded platforms from scratch.

- Complex design of embedded platforms;
- Various design integration (communication, memory, sensors, etc.);
- Specific software environments development;
- Deployment of embedded hardware and software platforms.



RECOMS: Reconfigurable Embedded Communication System