

ETH Zürich, Computer Science Department, Computer Systems Institute, Native Systems Laboratory

www.inf.ethz.ch

History and Profile

The Computer Science Department at ETHZ is the proud heir to a tradition going back to some of the first computers ever devised (For example Konrad Zuse's Z4, which he brought to ETH in 1950 and ERMETH), pioneering work in numerical computing and logic, as well as the design of programming languages Algol, Pascal, Modula-2 and Oberon and associated hardware Lilith and Ceres, user interfaces and operating systems by Niklaus Wirth and his collaborators. Today the department pursues thriving research in many areas extending from computation theory and information systems to computational sciences, bioinformatics, computational intelligence, algorithm analysis, software engineering, programming languages, pervasive computing, computer graphics, game design, human-computer-interaction, information security, model checking, web algorithms, large-scale databases, distributed systems, and many other areas at the forefront of computer science and information technology.

The core competence of the “Native Systems” research lab is the design and implementation of domain programming languages, small-scale operating systems and field programmable gate arrays (FPGA). “Open source” for the purpose of teaching and with the goal of a deepened understanding of “how it really works behind the scenes” has been a long-term strategy pursued by the lab for twenty plus years. Specific challenges include new generation human-computer-interaction, wearable computing and motion tracking systems. Current application domains comprise industrial control systems, aviation, ehealth, motion tracking, multimedia, and the digital arts. In the context of an international collaboration, a speech indexer software tool has been developed with the aim of preserving text and speech of endangered languages.

History with the Arts

The lab has a great track record in digital arts projects, including long-term collaboration with a typographer (Hans Meier), a concrete painter (Peter Scherri), a dancer (Irena Kulka), and artist (Art Clay), with several substantial results including exhibitions (Flying over Malevich), performances (Zappy Birthday), and award-winning research (Emotion tracking of a Buto dancer). In a recent artist-in-labs project a fully programmable electronic music synthesizer was developed.

The lab was instrumental in launching the “Digital Art Weeks” (DAW), a major festival for performance and state of the art media applications. Over the years of its existence, many artists and scientist have been brought together with the common goal of providing custom tools and a platform to artists who are interest in technology. Each year, the organizers of the Digital Art Weeks seek out relevant themes that



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coexist between art and science and which express themselves as part of a global movement of digital communications culture. Several artists have already explored this laboratory. Art Clay, Irena Kulka, Pablo Ventura, Corebounce, Heinrich Lüber, Peter Schweri and several others. In order to give the artist-in-labs applicant an idea of some of exciting projects that have already taken place, please find further information on the research website of the department as well as the website of the Digital Art Week:

www.inf.ethz.ch

www.digitalartweeks.ethz.ch

Specific Themes for the Resident Artist

We envisage that a resident artist would find the following research themes interesting:

- Sensor-based motion tracking, possibly in combination with audio/visual feedback and/or virtual reality. Mathematical models used are Hidden Markov and Support Vector Machines. Reference projects are Buto dance (Irena Kulka) and TAICHI (Dennis Majoe).
- Nonlinear story telling, based on a central controller, a network of video projectors, and a sophisticated audio/video/ text data base. Reference project “Es geschah am 6. Tag” by Tom Lang.
- Computational linguistics. Language corpora based speech indexing software for the support of teaching exotic and endangered languages.
- New (graphical) user interfaces and skin design frameworks. Reference project by Stijn Ossevort on top of the Bluebottle custom operating system.
- Novel programming concepts, models and languages for the support of multimedia production along the lines of Director, Max/ MSP, SuperCollider etc.
- New generation of brain machines based on audio/video effects, in collaboration with psychologists. Reference project “Virtual Kaleidoscope” using the QBIC wearable computer.
- Generative graphics for Visual Jockeys, electronic jewelry, “Kunst am Bau”, stage design, etc., possibly in combination with an interactive event heap controlled by mobile phones etc.
- Visualization concepts for data structures and algorithms, possibly in 3D, with the goal of an installation at the occasion of the “i-days 2010” in Luzern.
- Game concept for interactive “first aid education”, in particular concerning heart diseases. In collaboration with the University Hospital in Basel (Dr. P. Hunziker).