

PIONEERING CLOUD TECHNOLOGIES THAT ARE ROBUST, ECONOMICAL AND ENVIRONMENTALLY FRIENDLY



INDUSTRY
AFFILIATES
PROGRAM

EPFL

MESSAGE FROM THE DIRECTOR

INDUSTRY AFFILIATES PROGRAM



Pioneering robust, economical and environmentally friendly IT

Welcome to Ecocloud. EcoCloud is the one and only academic center of its kind enabling eco-friendly smart data through resilient, efficient, secure and trustworthy data platforms.

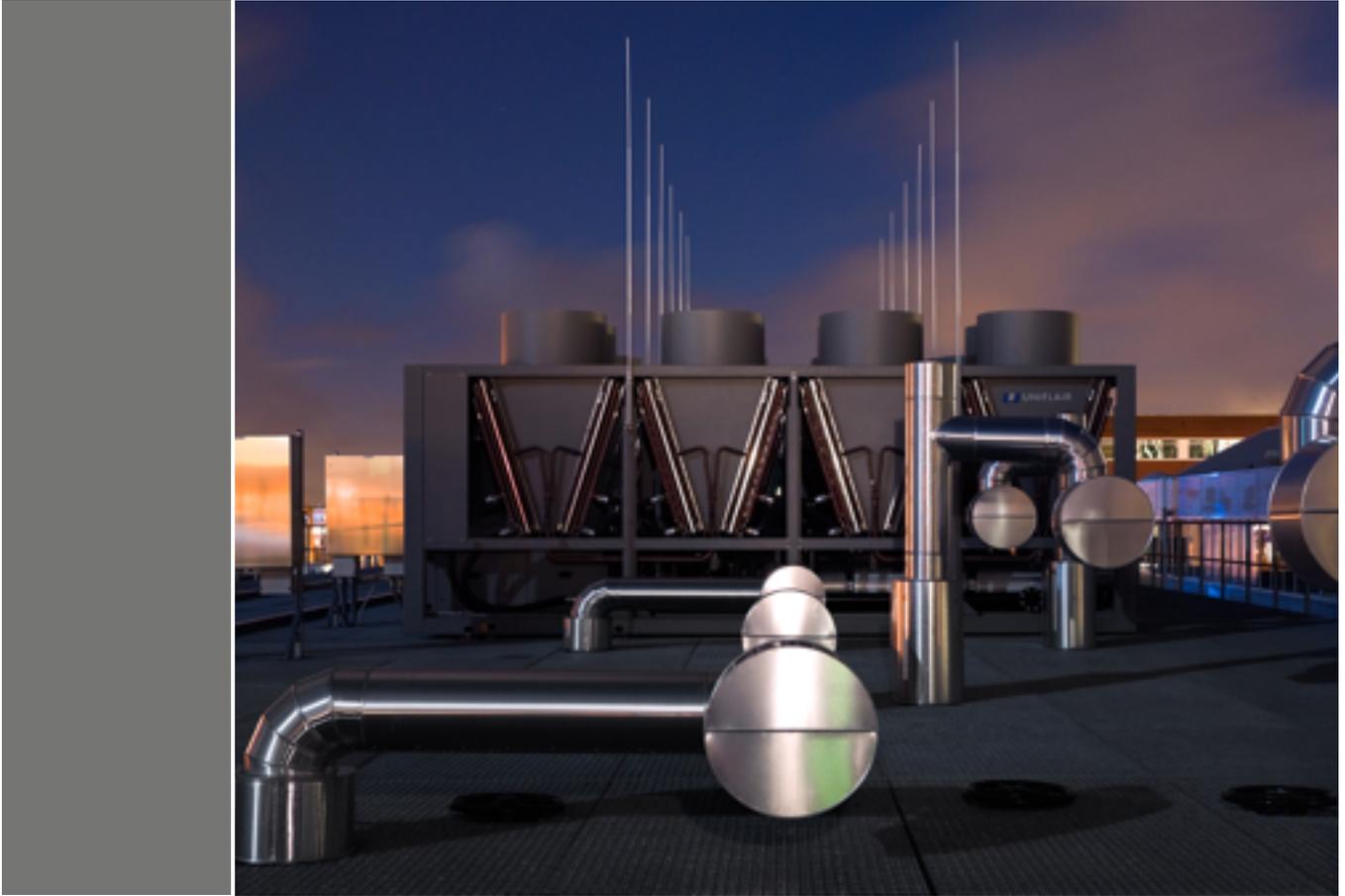
Our mission is to provide world-class leadership for, and to drive innovation in, resilient, efficient, secure and trustworthy data platforms and technologies. In so doing, we aim to address the major national and global IT challenges that affect us all.

We aim to deliver the innovation and timely outputs that are crucial to ICT sector companies. Indeed, our success synergistically builds on strong support for, and a growing appreciation by, private industry.

With our strong emphasis on industry collaboration and technology transfer, the Industry Affiliates Program (IAP) aims to build long-term partnerships founded on research collaborations, PhD programs, University-Industry partnered research grants, internships, visiting scholar programs, fellowships, executive education and more.

David Atienza,
Scientific Director, EcoCloud

ECO CLOUD CENTER



Making cloud computing scalable, cost-effective and sustainable

EcoCloud is an inter-disciplinary consortium of internationally-recognized experts in data analytics and machine learning, scalable and parallel programming, software development paradigms, data and storage management technologies, computer systems and circuits engineering, and novel cooling technologies. We collaborate on innovating core technologies to bridge the gap between applications of massive data and their demand on IT resources, and the diminishing energy efficiency from conventional semiconductor fabrication technologies.

Founded on the predication that future cloud/IT technologies must address the following two essential goals in the years to come:

1. We must reach environmental sustainability for the digital world, which relates to using IT infrastructures and datacenters to preserve biodiversity, natural resources, and climate in the years to come for different core applications (e.g., smart cities, AI for sustainability, scientific computing, etc.).
2. We must ensure a circular economy of IT infrastructure facilities or datacenters by minimizing energy consumption and providing solutions for sustainable computing. The target is to prevent possible damages to the natural environment, which would manifest in the medium- to long-term effect, as IT technologies are further deployed at the expected fast pace.

We intend to address these issues with three pillars of activity:

1. ICT infrastructure as enabler for a sustainable society: EcoCloud will target to address application-driven ICT and cloud computing research to provide the computational and communication foundations for sustainable development in core environmental, economic, and social sustainability areas. In particular, EcoCloud targets to provide sustainability for the following four topics: (a) energy-constrained and sustainable deep learning, (b) sustainable smart cities and transportation systems, (c) computational and data storage sustainability for scientific computing, and (d) energy-constrained trustworthy systems.

2. Sustainable ICT infrastructure: Future cloud platforms must be developed holistically and ground-up (and together with key industrial players) with sustainability as a core requirement. Moreover, the next-generation datacenters require innovation in integrated and co-designed technologies for cooling, electricity generation, storage, and management to maximize the use of renewables and sustainable energy utilization. In particular, EcoCloud covers the following two topics: (a) minimal-energy computing and storage cloud platforms, and (b) sustainable use of renewable energy in IT infrastructures.

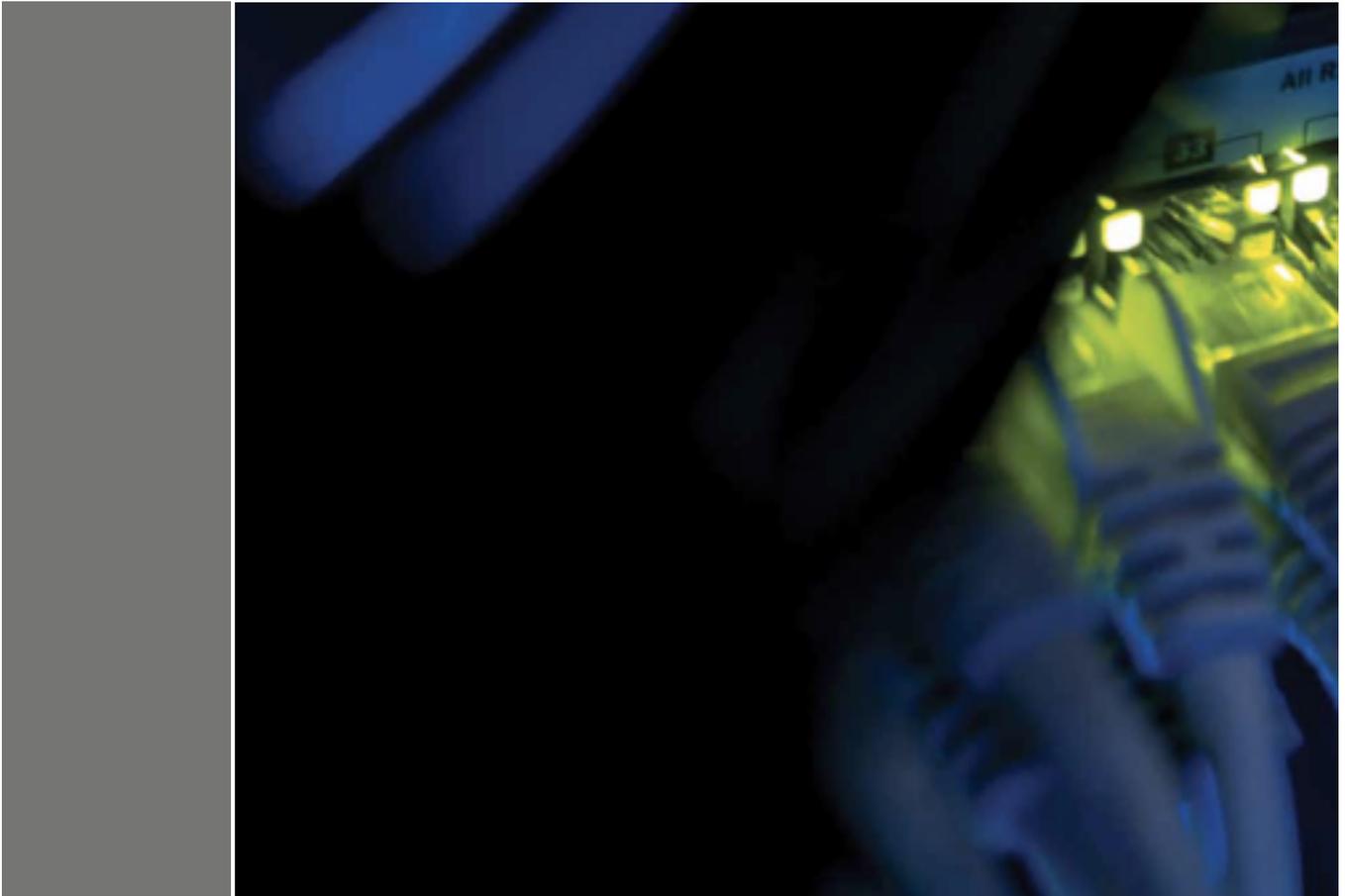
3. Dissemination of best practices for IT infrastructure in a sustainable society: Besides the aforementioned technical goals, a critical area that requires attention is best practices for datacenters owners and operators. Today, there is little awareness of best practices in energy efficiency, emissions or sustainability of cloud services. EcoCloud develops outreach activities to promote best practices with the government (OFEN) and Swiss non-profits serving the DC market (SDEA, asut, SDCA, Green IT, INR, DigitalSwitzerland) as well as academic hubs with strong outreach portfolios (thanks to our partnerships with IMD).

Our targeted research enables laboratories to work together towards a common goal, thereby propelling collaboration and the potential for trans-disciplinary innovation. In so doing, EcoCloud reinforces the core missions of EPFL in the area of digital sustainability..

One of Europe's leading institutes of technology, EPFL also has an extremely start-up friendly culture that supports the development of ambitious projects by facilitating trans-disciplinary research, together with industrial partners beyond the traditional frontiers of laboratories and disciplines. The campus' dynamic innovation ecosystem includes its Science Park (PSE) and the Foundation for Innovation and Technology (FIT). As a result, EcoCloud is perfectly positioned to drive innovation in cloud technologies.



INDUSTRY AFFILIATES PROGRAM



Industry Affiliates Program Mission

The EcoCloud Industry Affiliate Program (IAP) offers companies a unique opportunity to collaborate with EPFL faculty, students and researchers. Affiliated are given unparalleled access to new technologies and ideas as they move from laboratory to marketplace. The ideal platform for communication and discovery between the research and corporate communities, the program catalyses collaborative research, customises educational programs and facilitates graduate recruiting.

The EcoCloud IAP was created to enable connections and strengthen collaborations between EcoCloud and industry. While there are numerous benefits to joining the IAP and becoming an Affiliate, the advantages boil down to three key reasons:

- To gain early awareness of the latest research - Through meetings, visits and a members-only website, EcoCloud Industry Affiliates get to preview the latest research findings from across our labs before they are published.
- To explore potential research collaborations and sponsorships - Companies can get much more by sponsoring EcoCloud research directly. Becoming an Affiliate allows you to see how we work and what we do, giving you the insights you need to identify research partnerships.
- To recruit EcoCloud students - Our students are one of our most valuable assets. They can add substantial value to your company as interns or employees. We post student profiles on the members-only website, and you can meet them at our Annual Event. EcoCloud can also host talks geared towards students, and distribute job and internship announcements.

INDUSTRY AFFILIATES PROGRAM



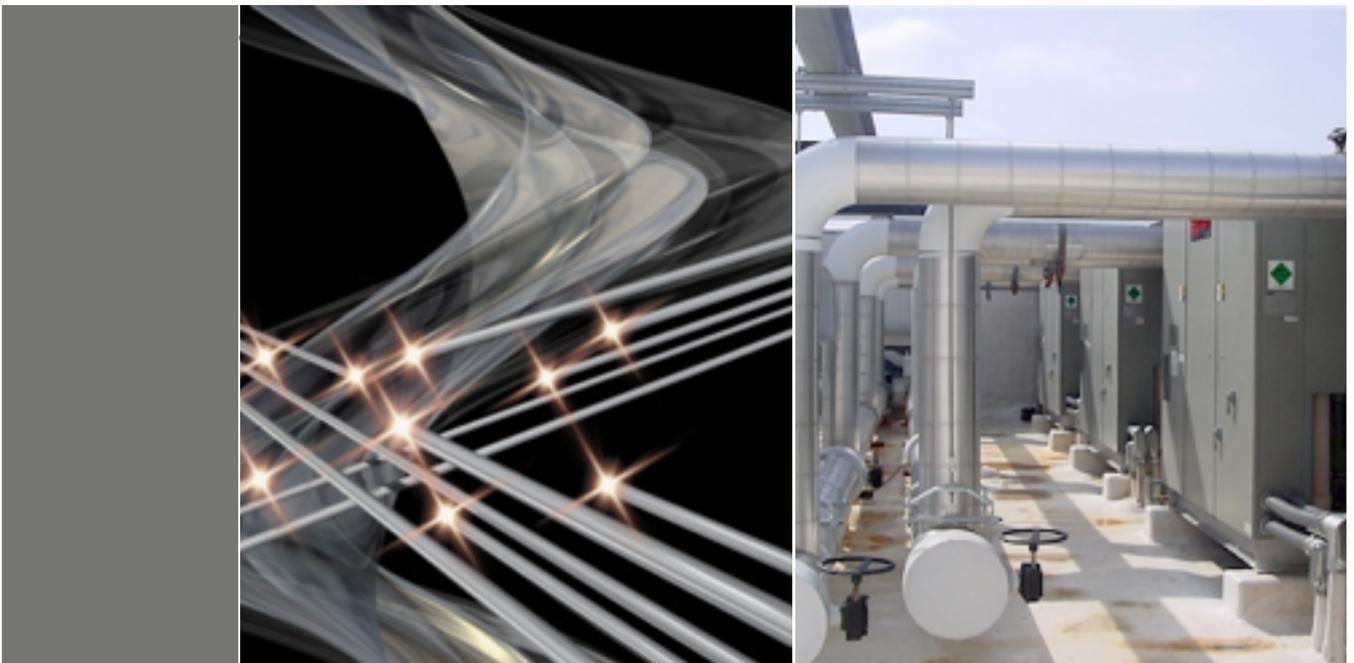
Industry Affiliates Program Member Benefits

The EcoCloud IAP is a corporate membership program whereby companies pay an annual membership fee in return for facilitated access to the research programs, the researchers and the graduate students, offering the ability to capitalize on the unique, dynamic trans-disciplinary innovation culture at EPFL. Spanning entrepreneurial startups emerging from our research, to delivering customizable executive education, industry collaboration and technology transfer lie at the heart of the EcoCloud's IAP.

Benefits of becoming an Affiliate include:

- **Annual Event** - An annual conference exclusively designed for our existing and prospective Industry Affiliates and research colleagues to showcase the activities of the center. The event's program includes activities such as presentations by EcoCloud faculty and researchers on the latest research results organized around chosen research themes; student poster sessions; lab tours; demonstrations; discussions on grand challenges, applications and technology roadmaps; and opportunities to meet and network with EcoCloud researchers, students and colleagues.
- **Research Monitoring** - Throughout the year, EcoCloud will enable Affiliates to remain engaged by means of newsletters, seminars, talks and virtual meetings. When feasible, these events will be broadcast live for our IAP member companies, so participants can join in remotely to hear from different thought leaders at EcoCloud and keep informed about the latest research. Affiliates also have preferential access to the comprehensive members-only IAP website, which contains information about research outcomes, EcoCloud events, video and publication archives, and other research outputs.

- **Graduate Student Recruiting** - EcoCloud will organize events (including the Annual Event), during which Affiliates have access to soon-to-be graduating students to facilitate recruiting. We work with our Affiliates to facilitate recruiting activities throughout the year, including advertising job and internship announcements, hosting talks and seminars, and other student-targeted networking events.
- **Occasional Visits** - Affiliates may arrange visits to EcoCloud. Visits enable previews of EcoCloud's research programs and results and demonstrations of emerging technologies. We work with our Affiliates to identify appropriate EcoCloud researchers, ongoing projects and potential opportunities for collaboration.
- **Joint Research Projects** - Member companies have opportunities to engage with EcoCloud in research projects and collaborations into deployable technology. These include, but are not limited to: the opportunity to contribute and formally participate in EcoCloud research projects, customization of educational programs and the opportunity to develop and sponsor structured research programs.
- **Advertising** - Our Affiliates have the opportunity to promote their company's brand on EcoCloud's website and reports.
- **Outreach and Executive/Continuing Education** - EcoCloud develops and hosts at least two outreach programs per year. Past events included a summer workshop on cooling technologies, a winter school on data-centric systems, and co-hosting the 3D silicon integration conference. Moreover, EcoCloud is eager to develop special executive/continuing education courses to address the specific needs of our affiliates.
- **Technical Advisory Board** - EcoCloud Affiliates designate a technical staff to EcoCloud Technical Advisory Board which meets once a year to discuss grand challenges, research and industrial trends, and discuss EcoCloud research direction. This annual meeting can vary from a one hour meeting to a full blown two-day retreat to present research and solicit feedback.
- **Visiting Scholars and Fellows Program** - The EcoCloud Visiting Scholar and Fellows Program stimulates and supports our research by engaging promising scholars and practitioners in order to foster exchange. Each year, a number of distinguished academics (Visiting Scholars) and junior faculty and students (Fellows) will be selected on the basis of their qualifications, the quality of their research plans, and the relevance to both EcoCloud's mission and targeted research objectives. EcoCloud's Visiting Scholars and Fellows will work on projects that offer joint collaborative opportunities.



CURRENT INDUSTRY AFFILIATES

INDUSTRY AFFILIATES PROGRAM



IBM **Research** Europe



DeepSquare



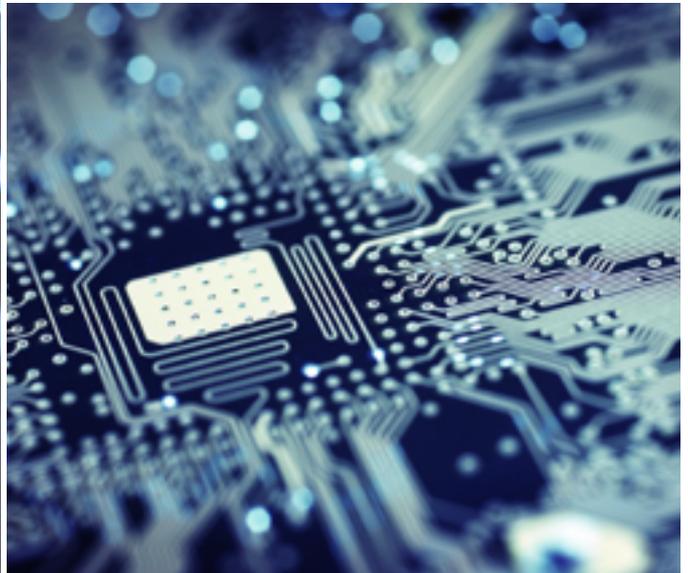
CONTACT

EcoCloud works with companies both on a one-to-one basis and as part of larger lab-wide initiatives, where our researchers work closely with corporate sponsors to define and execute research themes. We are currently broadening our partnerships, and welcome meeting with visionary companies across a range of disciplines.

For information about EcoCloud, please contact:

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IAP Manager, EcoCloud
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FACULTY

Alexandre Alahi

Visual Intelligence for Transportation

Computer Vision, Machine Learning, and Robotics applied to transportation & mobility. Artificial Intelligence (AI) driven systems such as safe autonomous vehicles.

David Atienza

Embedded Systems Laboratory

Internet of Things (IoT) and edge computing design, embedded systems design, 2D/3D thermal modeling and management for MPSoc, electronic design automation, wireless body sensor networks, memory optimization, low-power hardware and software co-design, embedded machine learning.

Edouard Bugnion

Data Center Systems Laboratory

Datacenter efficiency, with a focus on infrastructure support in network and data planes for OLDI applications. System security, with a focus on building solutions from Trusted Execution Environments offered in hardware.

Babak Falsafi

Parallel Systems Architecture Laboratory

Computer architecture, technology-scalable datacenters, design for dark silicon, robust computer systems and performance evaluation. Prof. Falsafi is one of the inventors of Midgard.

Olga Fink

Intelligent Maintenance and Operations Systems Laboratory

The development of intelligent algorithms in complex infrastructures and industrial systems. Deep learning and hybrid algorithms for intelligent maintenance systems.

Pascal Frossard

Signal Processing Laboratory

Image processing, graph signal processing and machine learning, as well as closely related fields such as network data analysis, distributed signal processing, image and video coding and immersive communications.

Rachid Guerraoui

Distributed Computing Lab

Distributed algorithms, secure distributed storage, transactional shared memory and distributed programming languages, including work on (e-)Transactions, epidemic information dissemination and indulgent algorithms.

Paolo Ienne

Processor Architecture Laboratory

Computer and processor architecture, FPGAs and reconfigurable computing, electronic design automation, computer arithmetic, embedded systems, compilers and asynchronous design.

FACULTY

Martin Jaggi

Machine Learning and Optimization Laboratory

Machine learning, distributed and large scale optimization, sparse methods, structured prediction and matrix factorizations.

Colin Jones

Automatic Control Laboratory

Development of the theory and practice of optimization-based, or model predictive control with a particular emphasis on problems arising from renewable energy challenges.

Sanidhya Kashyap

Robust Scalable Systems Software Lab

Building scalable systems with performance, efficiency, and robustness.

Anne-Marie Kermarrec

Scalable Computing Systems Laboratory

Large-scale distributed systems, epidemic algorithms, peer to peer networks and system support for machine learning.

Jean-Paul Kneib

Laboratory of Astrophysics

Research at the crossroad of astrophysics, cosmology and fundamental physics: wide field imaging and spectroscopy galaxy surveys; deep multi-wavelength survey of massive galaxy clusters.

Christoph Koch

Data Analysis Theory and Applications Laboratory

The optimization, compilation, and synthesis of query and analytics code and the automatic incrementalization of workloads; the complexity and expressive power of declarative and domain-specific languages, the foundations of incremental and online data processing.

Viktor Kuncak

Lab for Automated Reasoning and Analysis

Languages, algorithms and systems for verification and automated reasoning.

James Larus

Very Large Scale Computing Lab

New and efficient techniques for measuring and recording executing programs' behavior, tools for analyzing and manipulating compiled and linked programs, programming languages for parallel computing, tools for verifying program correctness, and techniques for compiler analysis and optimization.

FACULTY

Elison Matioli

POWERlab

Innovate in semiconductor devices with nanoscale design of high-performance materials, to exploit their unique properties and conceive new, drastically more efficient devices that outperform the state-of-the-art.

Giovanni de Micheli

Laboratory of Integrated Systems

The interplay of hardware and software design for traditional (computation on silicon) and non-traditional (nanotechnology and biosensors) systems. Design technologies for nanosystems, design and fabrication of biosensors and bio-interfaces.

Christophe Moser

Laboratory of Applied Photonics Devices

Manufacturing 3D structures in transparent and diffuse materials from soft to hard via additive manufacturing, shaping light and using linear and non-linear optics in multimode fibers to perform endoscopic imaging, light delivery and optical computing neuromorphic machines.

Martin Odersky

Programming Methods Laboratory

The design and implementation of the programming language Scala which tries to achieve a fusion of object-oriented and functional programming, while remaining compatible with mainstream platforms such as Java and .NET

Mario Paolone

Distributed Electrical Systems Laboratory

The development of smart grid concept solutions to efficiently deliver sustainable, economic and secure electricity supply.

Matthias Payer

HexHive Laboratory

Software security, system security, binary exploitation, effective mitigations, fault isolation/privilege separation, strong sanitization, and software testing (fuzzing) using a combination of binary analysis and compiler-based techniques.

Demetri Psaltis

Optics Laboratory

Linear and non-linear multimode fibers, imaging through complex scattering media, laser tissue ablation, cochlear imaging, optical diffusion tomography, holography, opto-fluidics, electrochemistry and hydrogen production, and deep learning for optical imaging.

Mirjana Stojilovic

Parallel Systems Architecture Laboratory

Designing domain-specific reconfigurable arrays, hardware and software acceleration of VLSI and FPGA placement and routing, machine-learning approaches for reducing the leakage power of FPGAs and the analysis and design of FPGA routing architectures.



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