While Information Technology (IT) is emerging as a key pillar in a modern day society, the demand on data processing, communication and storage is growing faster than conventional technologies can sustain. EcoCloud is an inter-disciplinary consortium of researchers to innovate core technologies and bridge the gap between applications of massive data and their explosive demand on IT resources, on the one hand, with the diminishing energy efficiency from conventional semiconductor fabrication technologies, on the other. EcoCloud is based on the observation that in the future, the only path forward to enable growth in economical data-centric IT is through judicious and tight integration of core technologies in the IT ecosystem. To realize this vision, EcoCloud brings together a multi-disciplinary team of researchers and industrial affiliates from areas that include learning theory, statistics, programming languages, computer systems, circuits, all the way to mechanical engineering.

Further information:
Can you trust the result of your numerical computation?

My research focuses on techniques that help scientists and programmers gain confidence in the correctness and accuracy of numerical computations. These computations arise in a number of important areas, from cyber-physical systems such as train car controllers to scientific computing applications like simulations. Developing accurate numerical software is difficult because of finite representation of numbers, approximate numerical algorithms, and noisy data. The goal of my research is to facilitate the writing of numerical software by enabling the scientist to write programs using real arithmetic and a specification of uncertainties and let the compiler automatically choose the appropriate data type and algorithmic approximation. For example, my tools can verify that ranges of variables and roundoff errors in floating-point or fixed-point computations stay bounded below a certain threshold. My work builds on state-of-the-art theorem-proving technology, which is quickly evolving. This requires me to stay continuously up-to-date and follow up on changes, but also makes my work exciting.

I appreciate very much that I was able to choose my PhD topic myself, allowing me to combine my interest in computer science, mathematics and physics. During my four years at EPFL and while presenting my work at conferences and seminars around the world, I met many interesting people and had many conversations that resulted in new ideas for my work. It feels great to be part of the international research community!

Can one hear the shape of a room?

I came to EPFL to do signal processing, and Martin Vetterli had this fantastic problem for me. It was about acoustics, and the problem’s pet name was “Can one hear the shape of a room?”. Imagine you’re blindfolded in a room and you snap your fingers… what can you say about the shape of the room from the echoes?

Quickly I realized how pleasurable it is to work on this problem at EPFL. When we set out to do experiments, whatever we needed, we’ve got it right away. Equipment, support, enthusiasm. We were even granted evening access to the monumental Lausanne cathedral to experiment with the acoustics! That’s what I love about research in Martin’s lab. We’re curious about something, and we ask a question. Interacting with other researchers (there’s a strong conference-going culture in the lab), we learn that they’re curious about something similar, but they call it something else. We can’t make our ideas work, we get frustrated, so we move to work on new problems spawned by the original one. Suddenly, we get this simplest idea that solves the original problem, and the next thing you know, we’re popping balloons in the Lausanne cathedral!

Our solution is a combination of room acoustics, inverse problems, and Euclidean geometry—for any of these topics there’s someone in the school that you can talk to. What’s more, you get to attend courses about various topics from computer science, signal processing and information theory, given by the very people who invented these topics.

Our results seem startup-worthy. The support we get around here is terrific: Access to funding, training, contacts, a number of already successful companies, working space, connections in the Silicon Valley, and the inspiration to go for it.
Program requirements

Admission to our program is centralized and highly competitive. The program is entirely in English with a duration of 4-6 years. Most admitted students enter the program in the Fall semester; in exceptional cases students can also start in the Spring semester. During their first year, students should take at least one advanced course in an area related to their research interest, participate in research projects, and pass a candidacy exam. PhD students also participate in the teaching activities of the school as teaching assistants and therefore acquire teaching skills. The program supports all admitted students financially at competitive salaries. The majority of the students (based on ranking at the time of admission) receive a one-year fellowship from the school and are free to choose a thesis advisor and area of research in the first year. The school also provides generous resources for traveling to conferences and attending summer schools.

Application

At the time of enrollment, a student must have a 4 or 5-year Bachelor’s degree, or a Master’s degree, with a strong background in computer science, communication systems, electrical engineering, mathematics, physics, or a related field. Candidates are invited to submit their applications prior to December 15th deadline for early admission, and at the latest by April 15th. The application process is fully electronic, including the submission of reference letters (no hardcopies). Referees will be automatically contacted by e-mail upon submission of the application. Applicants are encouraged to submit their application material early to allow sufficient time for the referees to respond prior the chosen deadline. Submitting an application is free of charge.

Discover what former PhD students say about us: http://phd.epfl.ch/edic/testimonials

Research Areas

- Algorithms & Theoretical Computer Science
- Artificial Intelligence & Machine Learning
- Computational Biology
- Computer Architecture & Integrated Systems
- Data Management & Information Retrieval
- Graphics & Vision
- Human-Computer Interaction
- Information & Communication Theory
- Networking
- Programming Languages & Formal Methods
- Security & Cryptography
- Signal & Image Processing
- Systems

Further information on our research areas: http://ic.epfl.ch/research

Additional information

Contact

EPFL EDIC
Station 14
CH-1015 Lausanne
Switzerland
edic@epfl.ch
http://phd.epfl.ch/edic