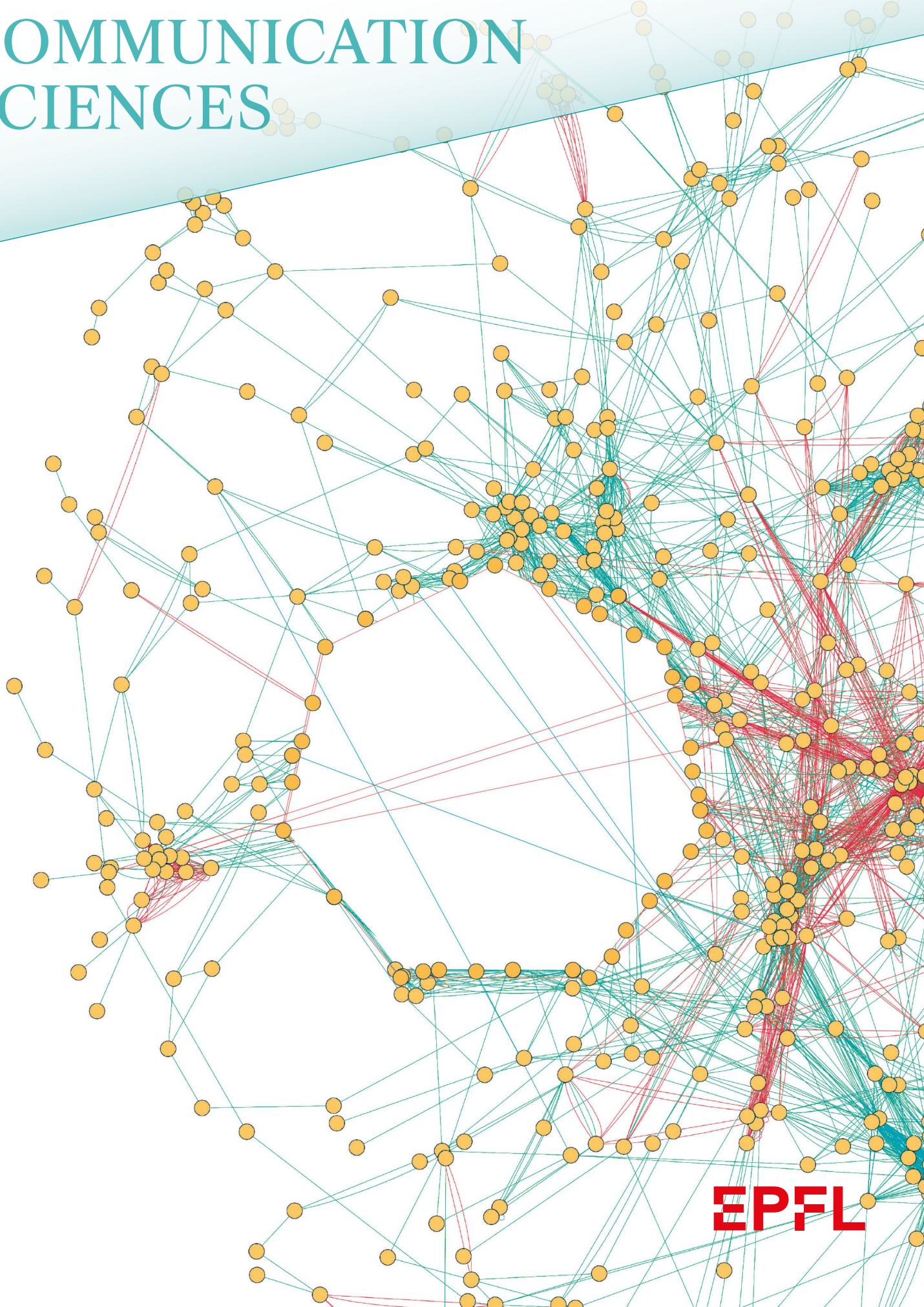# COMPUTER AND COMMUNICATION SCIENCES

EPFL

Our program seeks ambitious and talented individuals who aspire to be at the center of the technological revolution where information is at the core of innovation. We have an award-winning and internationally recognized faculty targeting broad research areas and working closely with top international research organizations. With a rich intellectual environment, a working culture and resources matched by the highest-rated academic institutions, our program targets training bright minds to be the research and industrial leaders of the information technology revolution.

CIS
Center for Intelligent Systems

The Center for Intelligent Systems (CIS) is a joint initiative of the schools of Architecture, Civil and Environmental Engineering (ENAC), Computer and Communication Sciences (IC), Basic Sciences (SB) and Engineering (STI), that seeks to advance research and practice in the strategic field of intelligent systems. Such systems are embedded with elements of artificial intelligence and are emerging in response to the convergence of the virtual and physical worlds.

go.epfl.ch/cis

Related Centers

Housed at EPFL, the Center for Digital Trust (C4DT) is a competence center that brings together 12 founding partners, 35 laboratories, civil society, and policy actors to collaborate, share insight, and to gain early access to trust-building technologies, building on state-of-the-art research at EPFL and beyond.

c4dt.org

The Swiss Data Science Center is a joint venture between EPFL and ETH Zurich. Its mission is to accelerate the adoption of data science and machine learning techniques within academic disciplines of the ETH Domain, the Swiss academic community at large, and the industrial sector. The center is composed of a large multi-disciplinary team of scientists.

datascience.ch/

scalacenter
For open source. For education.

The Scala Center acts as an open source foundation for Scala. It engages with developers in the open-source community in the effort to improve the language, its tools and its documentation. It also helps developers learn the language through MOOCs, seminars and other activities. The Scala Center is funded for the most part by donations from industrial partners.

scala.epfl.ch

The mission of EcoCloud is to provide world-class leadership for, and to drive innovation in, resilient, efficient, secure and trustworthy data platforms and technologies. It aims to address the major IT challenges that affect us all. Indeed, our success synergistically builds on strong support for private industry.

ecocloud.ch

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 round-off 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 continuously stay up to date and follow up on changes, but also makes my work exciting. I strongly appreciated 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!

Dr. Eva Darulova,
PhD thesis at the Laboratory for Automated Reasoning and Analysis, now tenure-track at the Max-Planck Institute for Software Systems
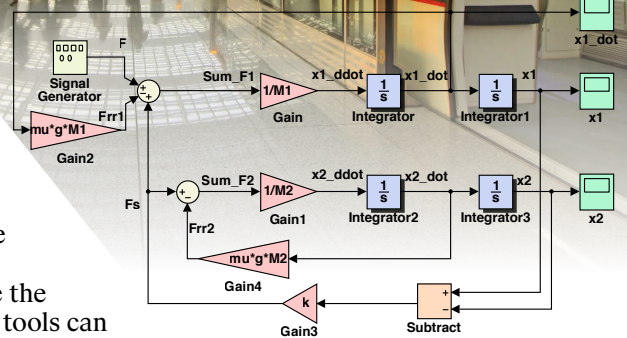
Can one hear the shape of a room?

I came to EPFL to do signal processing and Prof. Martin Vetterli gave me this fantastic problem to solve. "Can one hear the shape of a room?" was the question regarding the acoustics problem. Imagine you are 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.

The support we got around here was terrific: We were provided with access to funding, working space, equipment for experiments, training, contacts to a number of already successful companies, connections to the Silicon Valley and the inspiration to go for it.

What I love about the research in Prof. Vetterli's lab? That you are always curious about something and ask a question. Sometimes, you cannot make your ideas work, you get frustrated, so you move to work on new problems spawned by the original one. Suddenly, you get the simplest idea that solves the original problem, and the next thing you know, you are popping balloons in the cathedral of Lausanne to experiment with the acoustics! For us that meant: Our solution is a combination of room acoustics, inverse problems, and Euclidean geometry – for any of these topics there is someone in the school that you can talk to.

At the lab, there is a strong culture of going to conferences, which allows interacting with other researchers and seeing that they are curious about similar topics, but that they call it something else. You learn that they are curious about something similar, but they call it something else. In addition, 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. The results coming out of the lab are start-up-worthy.

Dr. Ivan Dokmanić,
PhD thesis at the Audiovisual Communications Laboratory, now assistant professor in Electrical and Computer Engineering at the University of Illinois at Urbana-Champaign
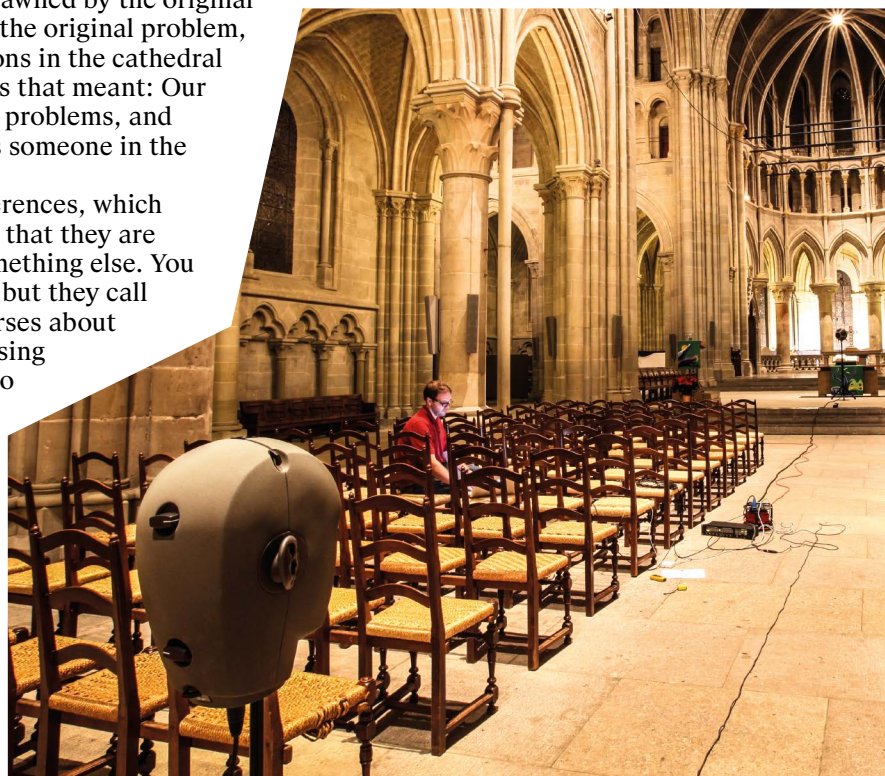
Program requirements

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 a Spring semester admission may be possible). 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, candidates must have obtained a Bachelor's degree (4 or 5 years) 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 to the chosen deadline. Submitting an application is free of charge.

Changes to the application deadlines may apply. For the most recent information, please refer to the program's webpage.

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

Research Areas

Algorithms & Theoretical Computer Science

Artificial Intelligence & Machine Learning

Computer Architecture & Integrated Systems

Data Management & Information Retrieval

Data Science

Digital Education

Human-Computer Interaction

Information & Communication Theory

Programming Languages & Formal Methods

Security & Privacy

Signal & Image Processing

Systems & Networking

Visual Computing

Further information on our research areas:
https://www.epfl.ch/schools/ic/research/

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