EDIC: PhD Program @ IC

Prof. Matthias Grossglauser
EDIC Program Director
School of Computer and Communication Sciences - IC

- Internationally highly ranked
- From peer schools (e.g., Berkeley, CMU, Cornell, MIT, Stanford, …)
- Internationally recognized (e.g., Turing Award, US National Academies, ACM/IEEE Fellows)
- Strong industrial liaison
- Information theory to datacenters
IC Faculty

25 computer researchers have an h-index >40

Nr. 1 in Systems & Communication Engineering Panel (the ranking of ERC grants)

Nr. 2 in Computer Science & Informatics Panel (the ranking of ERC grants)

QS World University Ranking 2019 Computer Science & Information Systems

1. Massachusetts Institute of Technology (MIT)
2. Stanford University
3. Carnegie Mellon University
4. University of California, Berkeley (UCB)
5. University of Cambridge
6. University of Oxford
7. Harvard University
8. EPFL - Ecole Polytechnique Federale de Lausanne
9. ETH Zurich - Swiss Federal Institute of Technology
10. National University of Singapore (NUS)

Source: www.topuniversities.com
IC at a glance

theory, foundations, fundamental limits...

interfacing with humans and nature...

building real systems, all layers...

learning from data, extracting knowledge, transforming data...
IC ERCs in Perspective

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Institutions that received 10 or more grants (Starting, Consolidator and Advanced) 2007-16 in “Computer Science and Informatics” + 2 PE7 + 1 SNSF ERC
Broad impact on computer science

ICML 2018

17 Number of paper presented by EPFL

13th position with the most papers

7th position among universities

NIPS 2018

14 Number of paper presented by EPFL

17th position with the most papers

11th position among universities
Bike designed with AI breaks world speed records

Jewelry uses EPFL technology to turn light into words

EPFL software mines rich medical data while keeping it secure

EPFL computer scientists flag global hardware security vulnerability

EPFL researchers invent low-cost alternative to bitcoin

An algorithm to detect outside influences on the media
Swiss Data Science Center (SDSC)

- Academic and industry research collaborations
- Partnerships with Bühler and Peugeot-Citroën
- RENKU, the SDSC analytics platform (Open Source)
- 1st SDSC Industry Day (November 2017)
- 1st IEEE Data Science Workshop (June 2018)

www.datascience.ch
EPFL as a Centre for Digital Trust

- Critical Infrastructures
- Privacy Protection Cryptography
- Finance & Economy
- Health
- Democracy & Humanitarian
- Cryptography
- Digital Information
- Smart Contracts Blockchain
- Software Verification
- System Security
- Machine Learning

www.c4dt.org
Joint venture by IC, STI, & SB

Build upon existing strengths
- Intelligent Systems
- Foundational theory
- Modelling
- Machine learning
Key Challenges: Intelligent Systems

- Next technological revolution will be systems built on artificial intelligence, data science, machine learning
  - Bridge physical and cyber worlds
  - Perform actions previously left to humans
  - Continuously adaptive and improving

- Need to grow competencies in multiple areas
  - Machine learning, artificial intelligence
  - Vision, audio/visual processing
  - Speech, natural language processing
  - Human-AI collaboration, agents
  - Planning
  - Complex systems
  - Programming models and tools, software verification
  - Security, trustworthiness, and privacy
Key Challenges: Foundation of Technology

- Moore’s Law is coming to its end
  - Still many opportunities to improve silicon-based devices

- Need new computational materials and models

- Quantum computing
  - Radically different computational paradigm
  - Needs new algorithms, programming languages and tools, verification techniques

- Biologically-inspired computing
  - New mechanisms to build power-efficient, robust, failure-tolerant computations
  - New models for computational intelligence
Key Challenges: Reliable and Trustworthy Computation

- Integration of computing into society has created severe problems
  - Loss of personal privacy
  - Impaired trust in institutions
  - Safety of critical infrastructure
  - Educational mismatch and job displacement

- CS created technologies underlying these problems
  - Some have technical solutions
  - Others would benefit from CS involvement in formulating legal or political remediations
In a nutshell

- 4-6 years duration in English
- Competitive salary (~$51k)
- Award winning faculty and students
- Strong industrial liaison

In numbers

- 230+ PhDs, among campus largest
- 90% international students
- 45-50 join per year
- ~5 PhD students per faculty
Why a PhD?

- PhD is about where the IT revolution is going, and how you can be at the center of it all
- You should consider a PhD if you want
  - Be an academic
  - Take leadership positions in industry R&D
  - Preparation for a startup

Who should do a PhD?

- Fascinated by IT and have an aptitude for science and engineering
- Passionate about understanding how and why things work, the underlying fundamentals
- Want the breadth and depth for a vision to have an impact and make a difference

Profile

- 4- or 5-year Bachelor or Master degree
- Rigorous background in computer science, communication systems, electrical engineering, mathematics, physics and/or related fields
- Highly motivated, exceptional students who are passionate about scientific research
EDIC Admission Cycles
go.epfl.ch/phd-edic

- **1\(^{st}\) admission cycle**
  - deadline December 15
  - Main admission cycle
  - Synchronized with US/Canada
  - Visit the Open House
  - **Apply NOW!**

- **Smaller 2\(^{nd}\) admission cycle**
  - deadline April 15
  - Fewer applications, fewer admissions
  - Synchronized with Europe
  - Will not get a chance to visit the Open House
EDIC Application Timeline

- Application deadline: 1st cycle
- Mid Jan., Admission decisions sent out
- End Mar., EDIC Open House
- Mid Apr., Acceptance deadline
- Apr. 15, Application deadline 2nd cycle
- Mid May, Admission decisions sent out
- Beg. Jun., Acceptance deadline
- Enrollment in Sept.

1st Admission Cycle

- Over 700 applications over both rounds
- Enroll roughly 50-55 (of which 20% from EPFL MS)
- Accept the top ~45 ranked as fellowship (of which 15% from EPFL MS)
EDIC Application Process

go.epfl.ch/phd-edic

- See the EDIC webpage for specific requirements
- Go through IC faculty webpages to identify the research areas and the professors that are of most interest to you. You will need to include this information in the application form ...
- Write a *Statement of Purpose* (SoP). Document clearly your reasons for wishing to do a doctoral thesis with EDIC, whom you would like to work with and explain longer-term professional goals
- Find 3 referees. Ask someone who can comment on your academic performance and your potential to do solid research with specific examples. Make sure that the letters are submitted by the application deadline
EDIC Application: Writing your SoP …

▪ First paragraph
  • Describe the general areas of research that interest you and why

▪ Second to fourth paragraph
  • Describe some research projects that you worked on. What was the problem you were trying to solve? Why was it important? What approaches did you try? What did you learn? It’s fine to say that you were unable to fully solve your problem

▪ Fifth and sixth paragraph
  • Tell us a little bit about yourself and your life experiences. Why do you feel you need a PhD? Why is EDIC the right place for you? Whom would you like to work with?
Your path to a PhD with EDIC

During your PhD with EDIC

- You have an advisor(s)
  - With you until defense
  - Courses, research, career planning
  - Annual feedback (evaluations)

- You have a mentor
  - Program committee contact person + a “buddy” (older PhD) for first year
  - Faculty member beyond (from outside area)
  - Someone to talk to in general
Your first year with EDIC ...

**PhD Orientation (2 weeks)**

- September
  - French classes
  - Administrative tasks
  - Research seminars
  - Social events
  - Matching process *

- Mid-September
  - Semester start

* fellowship students

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**First Year (Fellowship & Direct Hires)**

- Fall Semester
  - First project
  - Depth course
  - Potential matching *

- Spring Semester
  - Second project
  - Candidacy exam
  - Definitive matching *

* fellowship students
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Sample of EDIC alumni in academia

Nada Amin
Assistant Professor, Harvard

Alexandros Daglis
Assistant Professor, Georgia Tech

Ivan Dokmanic
Assistant Professor, UIUC

Hamed Hassani
Assistant Professor, UPenn

Amin Karbasi
Assistant Professor, Yale

Baris Kasikci
Assistant Professor, Michigan

Heather Miller
Assistant Professor, Carnegie Mellon

Ayfer Ozgur
Assistant Professor, Stanford

Ruzica Piskac
Assistant Professor, Yale

Tiarck Rompf
Assistant Professor, Purdue

Immanuel Trummer
Assistant Professor, Cornell

Manos Athanassoulis
Assistant Professor, Boston
EDIC Graduates: From where to where? 550 graduates since 2006

Where do our students come from:
- Americas: 4%
- Africa: 1%
- Switzerland: 20%
- EU: 43%
- Asia: 32%

Where our PhD alumni Go:
- Switzerland: 52%
- EU: 17%
- US: 21%
- Asia: 10%

Careers of our PhD alumni:
- Industry: 74%
- Academia: 26%
In conclusion ...

- Rich intellectual environment w/ international focus
- Graduate students collaborate w/ world-renowned faculty
- Benefit from generous resources & rich network of academic and industrial partners
- Value close interaction between students & faculty within a flat organization structure
- EDIC alumni pursue stellar international careers as academics, scientists, and entrepreneurs
Need more information ...

go.epfl.ch/phd-edic
edic@epfl.ch