Pengcheng **Xu**

c/o Systems Group, Stampfenbachstrasse 114, 8092 Zürich, Switzerland

☎ +41 79 323 95 87 | ✉ pengcheng.xu@inf.ethz.ch | ⌂ jsteward.moe

Aut inveniam viam aut faciam.
"I'll either find a way or make one."—Hannibal

Education

Systems Group, D-INFK, ETH Zürich
Zürich, Switzerland

DOCTORATE COMPUTER SCIENCE
Since Dec. 2023

- Part of the *Direct Doctorate in Computer Science* degree program
- Thesis supervisor: Prof. Dr. Timothy Roscoe

D-INFK, ETH Zürich
Zürich, Switzerland

COMPUTER SCIENCE MSc
Sept. 2021 - Sept. 2023

- Part of the *Direct Doctorate in Computer Science* degree program
- Thesis supervisor: Prof. Dr. Torsten Hoefler

School of EECS, Peking University
Beijing, China

B.Sc. COMPUTER SCIENCE AND TECHNOLOGY
Sept. 2017 - Jul. 2021

- "*Summa cum laude*"; member of the *Turing Class* honors program
- Thesis supervisor: Prof. Yun Liang

Projects

NetOS, Systems Group @ ETH Zürich
Zürich, Switzerland

DOCTORATE (WITH PROF. DR. TIMOTHY ROSCOE)
Since Dec. 2023

- Developing LAUBERHORN, a cache-coherent RPC NIC that is part of the OS
- Developing TXNLANG, a transaction-based intermediate language for HW formal verification
- Research focus: OS, networking, architecture, formal verification

Scalable Parallel Computing Lab (SPCL) @ ETH Zürich
Zürich, Switzerland

MASTER THESIS (WITH PROF. DR. TORSTEN HOEFLER)
Mar. 2023 - Sept. 2023

- Developed FPsPIN, an FPGA prototype of the sPIN in-network-compute paradigm
- Skills involved: Verilog, FPGA, systems programming in C

NetOS, Systems Group @ ETH Zürich
Zürich, Switzerland

SEMESTER PROJECT (WITH PROF. DR. TIMOTHY ROSCOE)
Oct. 2022 - Feb. 2023

- Developed EFRI, an OS-firmware interface for the *Enzian* research computer
- Skills involved: systems programming in C, interface design

Center for Energy-efficient Computing and Applications (CECA) @ PKU
Beijing, China

UNDERGRADUATE RESEARCH (WITH PROF. YUN LIANG)
Dec. 2017 - Jul. 2021

- Developed a prototype RISC-V-based accelerator platform on FPGAs
- Explored automatic compute intrinsic synthesis through MLIR and accelerator templates
- Skills involved: Chisel, systems programming in C, compiler design, C++, FPGA

Parallel Systems Architecture Lab (PARSA) @ EPFL
Lausanne, Switzerland (remote)

RESEARCH INTERN (WITH PROF. BABAK FALSAFI)
Jul. 2020 - Jan. 2021

- Worked on a seL4 port for MIDGARD, a new virtual memory scheme for terabyte-scale memory servers
- Skills involved: seL4, systems programming in C

XG Lab @ Alibaba DAMO Academy
Beijing, China

ACADEMIC COLLABORATION (WITH PROF. CHENREN XU & DR. PENGYU ZHANG)
Sept. 2020 - Jan. 2021

- Developed the FPGA data capture and signal processing pipeline for a custom RFID localization system
- Skills involved: Verilog, FPGA, systems programming in C

PKU Student Supercomputing Competition Team (PKUSC)
Beijing, China

TEAM LEADER
Nov. 2017 - Nov. 2020

- Built small clusters under tight power budget to solve super-computing challenges
- Skills involved: SysAdmin, C, C++, CUDA, Fortran

Work

SenseTime *Beijing, China*
RESEARCH INTERN *Jun. 2019 - Dec. 2019*

- Built the prototype of an in-house tensor compiler for deep-learning applications
- Skills involved: compiler design, C++

Teaching

Advanced Operating Systems, ETH Zürich *Zürich, Switzerland*
ASSISTENTZ (HEAD TA), HILFSASSISTENZ (HA) *2022 - 2025*

System Programming and Computer Architecture, ETH Zürich *Zürich, Switzerland*
ASSISTENZ (HEAD TA) *2024*

Computer Systems, ETH Zürich *Zürich, Switzerland*
HILFSASSISTENZ (HA) *2022*

Computer Networks (Honor Track), Peking University *Beijing, China*
TEACHING ASSISTANT (TA) *Sept. 2020 - Feb. 2021*

- Developed a lab assignment for students to implement their own NIC on FPGAs

Publications

Zikai Liu, Jasmin Schult, **Pengcheng Xu**, Timothy Roscoe. "Mainframe-style channel controllers for modern disaggregated memory systems" *Seoul, Republic of Korea*
ASIA-PACIFIC WORKSHOP ON SYSTEMS (APSYS), CO-LOCATED WITH SOSP 2025 *October 2025*

Timo Schneider, **Pengcheng Xu**, Torsten Hoefler. "FPsPIN: An FPGA-based Open-Hardware Research Platform for Processing in the Network" *Online*
IEEE HOT INTERCONNECTS SYMPOSIUM (HOTI) *Aug. 2025*

Pengcheng Xu, Timothy Roscoe. "The NIC should be part of the OS." *Banff, Alberta, Canada*
THE ACM SIGOPS WORKSHOP ON HOT TOPICS IN OPERATING SYSTEMS (HOTOS) *May 2025*

Anastasiia Ruzhanskaia, **Pengcheng Xu**, David Cock, Timothy Roscoe. "Rethinking Programmed I/O for Fast Devices, Cheap Cores, and Coherent Interconnects" *Online*
ARXIV *Oct. 2024*

Pengcheng Xu. "Full-System Evaluation of the sPIN In-Network-Compute Architecture" *ETH Zurich*
ETH LIBRARY *Sept. 2023*

Pengcheng Xu. "Enzian Firmware Resource Interface" *ETH Zurich*
ETH LIBRARY *Feb. 2023*

Zejia Fan, Yuchen Gu, Zhewen Hao, Yueyang Pan, **Pengcheng Xu**, Yuxuan Yan, Fangyuan Yang, Zhenxin Fu, Yun Liang. "Critique of 'MemXCT: Memory-Centric X-Ray CT Reconstruction With Massive Parallelization' by SCC Team From Peking University" *Journal*
IEEE TRANSACTIONS ON PARALLEL AND DISTRIBUTED SYSTEMS (TPDS) *Jan. 2022*

Qingcheng Xiao, Size Zheng, Bingzhe Wu, **Pengcheng Xu**, Xuehai Qian, Yun Liang. "HASCO: Towards Agile HArdware and Software CO-design for Tensor Computation" *Worldwide*
INTERNATIONAL SYMPOSIUM ON COMPUTER ARCHITECTURE (ISCA) *June 2021*

Yihua Cheng, Zejia Fan, Jing Mai, Yifan Wu, **Pengcheng Xu**, Yuxuan Yan, Zhenxin Fu, Yun Liang. "Critique of 'Planetary Normal Mode Computation: Parallel Algorithms, Performance, and Reproducibility' by SCC Team From Peking University"
Journal
IEEE TRANSACTIONS ON PARALLEL AND DISTRIBUTED SYSTEMS (TPDS)
Jan. 2021

Pengcheng Xu, Yun Liang. "Automatic Code Generation for Rocket Chip RoCC Accelerators"
Virtual Workshop
WORKSHOP ON COMPUTER ARCHITECTURE RESEARCH WITH RISC-V (CARRV), CO-LOCATED WITH ISCA
May 2020

Posters

Pengcheng Xu, Jasmin Schult, Zikai Liu, Roman Meier, Timothy Roscoe. "Lauberhorn: a Smart NIC that is part of the OS"
Rotterdam, the Netherlands
EUROPEAN CONFERENCE ON COMPUTER SYSTEMS (EUROSYS)
Apr. 2025

Pengcheng Xu, Jasmin Schult, Anastasiia Ruzhanskaia, David Cock, Timothy Roscoe. "Enzian fast RPC: merging OS and NIC on coherent interconnects"
Santa Clara, CA, USA
USENIX SYMPOSIUM ON OPERATING SYSTEMS DESIGN AND IMPLEMENTATION (OSDI)
Aug. 2024

Honors & Awards

2020   **Second Place**, Virtual Student Cluster Competition at SC'20   *Global Event*
- Worked as leader in charge of cloud cluster management and the mystery task
- Team ranked top on the CESM (Community Earth System Model) application

2019   **First Prize**, ASC Student Supercomputing Challenge 2019   *Dalian, China*
- Worked as leader in charge of system install and administration, benchmarks, logistics, and the mystery task

2019   **SenseTime Scholarship 2019**   *Beijing, China*

2018   **Award for Scientific Research**, Peking University   *Beijing, China*

2018   **Prize of Excellence**, IBM OpenPOWER/CAPI and OpenCAPI Heterogeneous Computing Design Contest   *Beijing, China*
- Worked to build an FPGA accelerator for *BCrypt* on the OpenCAPI FPGA-host platform

2018   **Second Prize**, Peking University Collegiate Programming Contest   *Beijing, China*

2018   **Accepted & Passed**, Google Summer of Code 2018 with Gentoo Foundation   *Global Event*
- Worked to modularize Android system upgrades with Portage and LXC