

Pengcheng Xu

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Aut inveniam viam aut faciam.
“I’ll either find a way or make one.”—Hannibal

Education

Systems Group, D-INFK, ETH Zürich

DOCTORATE COMPUTER SCIENCE

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

Zürich, Switzerland

Since Dec. 2023

D-INFK, ETH Zürich

COMPUTER SCIENCE MSc

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

Zürich, Switzerland

Sept. 2021 - Sept. 2023

School of EECS, Peking University

B.Sc. COMPUTER SCIENCE AND TECHNOLOGY

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

Beijing, China

Sept. 2017 - Jul. 2021

Projects

NetOS, Systems Group @ ETH Zürich

DOCTORATE (WITH PROF. DR. TIMOTHY ROSCOE)

- 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

Zürich, Switzerland

Since Dec. 2023

Scalable Parallel Computing Lab (SPCL) @ ETH Zürich

MASTER THESIS (WITH PROF. DR. TORSTEN HOEFER)

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

Zürich, Switzerland

Mar. 2023 - Sept. 2023

NetOS, Systems Group @ ETH Zürich

SEMESTER PROJECT (WITH PROF. DR. TIMOTHY ROSCOE)

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

Zürich, Switzerland

Oct. 2022 - Feb. 2023

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

UNDERGRADUATE RESEARCH (WITH PROF. YUN LIANG)

- 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

Beijing, China

Dec. 2017 - Jul. 2021

Parallel Systems Architecture Lab (PARSA) @ EPFL

RESEARCH INTERN (WITH PROF. BABAK FALSAFI)

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

Lausanne, Switzerland (remote)

Jul. 2020 - Jan. 2021

XG Lab @ Alibaba DAMO Academy

ACADEMIC COLLABORATION (WITH PROF. CHENREN XU & DR. PENGYU ZHANG)

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

Beijing, China

Sept. 2020 - Jan. 2021

Google Summer of Code @ Gentoo Foundation

STUDENT CONTRIBUTOR (WITH BENDA XU <HEROXB>)

- Developed *SharkBait*, sandboxing Android with LXC inside native Gentoo on consumer hardware
- Skills involved: C, Android, Bash, build systems

Remote

Apr. 2018 - Aug. 2018

PKU Student Supercomputing Competition Team (PKUSC)

TEAM LEADER

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

Beijing, China

Nov. 2017 - Nov. 2020

Work

SenseTime

RESEARCH INTERN

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

Beijing, China

Jun. 2019 - Dec. 2019

Teaching

Advanced Operating Systems, ETH Zürich

ASSISTENTZ (HEAD TA), HILFSASSISTENZ (HA)

Zürich, Switzerland

2022 - 2025

System Programming and Computer Architecture, ETH Zürich

ASSISTENZ (HEAD TA)

Zürich, Switzerland

2024

Computer Systems, ETH Zürich

HILFSASSISTENZ (HA)

Zürich, Switzerland

2022

Computer Networks (Honor Track), Peking University

TEACHING ASSISTANT (TA)

Beijing, China

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 SOSPP 2025

October 2025

Timo Schneider, **Pengcheng Xu**, Torsten Hoeffler. “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

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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”

EUROPEAN CONFERENCE ON COMPUTER SYSTEMS (EUROSYS)

Rotterdam, the Netherlands

Apr. 2025

Pengcheng Xu, Jasmin Schult, Anastasiia Ruzhanskaia, David Cock, Timothy Roscoe. “Enzian fast RPC: merging OS and NIC on coherent interconnects”

USENIX SYMPOSIUM ON OPERATING SYSTEMS DESIGN AND IMPLEMENTATION (OSDI)

Santa Clara, CA, USA

Aug. 2024

Honors & Awards

2020 **Second Place**, Virtual Student Cluster Competition at SC'20

- Worked as leader in charge of cloud cluster management and the mystery task
- Team ranked top on the CESM (Community Earth System Model) application

Global Event

2019 **First Prize**, ASC Student Supercomputing Challenge 2019

- Worked as leader in charge of system install and administration, benchmarks, logistics, and the mystery task

Dalian, China

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