

# Pengcheng Xu

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

## Education

### School of EECS, Peking University

B.SC. COMPUTER SCIENCE AND TECHNOLOGY (EXPECTED)

- Member of the *Turing Class* Honor Program
- Advisor: Professor Yun Liang at Peking University

Beijing, China

Sept. 2017 - Jul. 2021

## Academic Experiences

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

UNDERGRADUATE RESEARCH

- With Prof. Yun Liang
- Build heterogeneous RISC-V SoCs that foster state-of-the-art accelerator designs
- Develop system and application software for embedded platforms
- Explore the fringes of performance and efficiency of emerging platforms with HW/SW Co-design

Beijing, China

Dec. 2017 - Current

### Parallel Systems Architecture Lab (PARSA) @ EPFL

RESEARCH INTERN

- With Prof. Babak Falsafi
- Design next-generation memory subsystems targeting terabyte-scale situations
- Build RISC-V-based hardware and software solutions for validation

Lausanne, Switzerland

(remote from Beijing)

Jul. 2020 - Current

### XG Lab @ Alibaba DAMO Academy

ACADEMIC COLLABORATION

- With Prof. Chenren Xu & Dr. Pengyu Zhang
- Build high-speed FPGA receiver for high-accuracy UHF RFID localization system
- Interface with RF frontends with RISC-V MCU and host over PCIe

Beijing, China

Sept. 2020 - Current

### PKU Student Supercomputing Competition Team (PKUSC)

TEAM LEADER

- Optimize real-world HPC benchmarks and applications for performance and efficiency
- Gained profound experience in cluster building, management, and maintenance
- Participated in Student Cluster Competition @ SC19 & SC20 (2nd place, historic best) and ASC19
- Team invited to publish reports on *IEEE TPDS* and *Parallel Computing*

Beijing, China

Nov. 2017 - Nov. 2020

## Work Experiences

### SenseTime

RESEARCH INTERN

- Design and develop in-house deep learning compiler for GPU
- Foundation work for code generation of in-house deep learning framework
- Awarded *Outstanding Intern* title

Beijing, China

Jun. 2019 - Dec. 2019

## Teaching Experiences

### Computer Networks (Honor Track), Peking University

TEACHING ASSISTANT (TA)

- Volunteered to design hardware IP router lab assignment
- Delivered RISC-V research tutorial to all students

Beijing, China

Sept. 2020 - Nov. 2021

## Publications

Yihua Cheng\*, Zejia Fan\*, Jing Mai\*, Yifan Wu\*, **Pengcheng Xu\***, Yuxuan Yan\*, Zhenxin Fu, Yun Liang. "Critique of 'Computing Planetary Interior Normal Modes with a Highly Parallel Polynomial Filtering Eigensolver' by SCC Team from Peking University"

IEEE TRANSACTIONS ON PARALLEL AND DISTRIBUTED SYSTEMS (TPDS)

Journal

to appear

- \*: these authors contributed equally to this work.
- Invited publication for the submitted report of reproducibility challenge at the SC19 Student Cluster Challenge

**Pengcheng Xu, Yun Liang.** "Automatic Code Generation for Rocket Chip RoCC Accelerators"

Virtual Workshop

FOURTH WORKSHOP ON COMPUTER ARCHITECTURE RESEARCH WITH RISC-V (CARRV 2020), CO-LOCATED WITH ISCA 2020

May, 2020

- Introduced a flow for convenient, efficient automatic code generation for Rocket Chip RoCC accelerators
- Verified proposed flow for the Gemmini matrix multiplication accelerator with TVM

## Honors & Awards

### INTERNATIONAL

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

- Team of five from PKUSC, *first participation*
- Worked as leader in charge of system install and administration, benchmarks, logistics, and the mystery task
- Competition featured real-world HPC applications: global climate simulation, genome sequencing, lattice heat transport simulation, fluid dynamics, and deep learning super-resolution

2018 **Accepted & Passed**, Google Summer of Code 2018 with Gentoo Foundation

Global Event

- Worked to develop solution to *modularize the Android system upgrade with Portage*
- Enabled utilization of mature Unix technologies in mobile computing

### DOMESTIC

2019 **SenseTime Scholarship 2019**

Beijing, China

- Awarded to 31 students in Computer Science across Mainland China for academic excellence
- Winners receive 20,000 CNY and a trip to SenseTime headquarters in Shanghai

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* (widely-used hashing algorithm) on Xilinx UltraScale+ FPGAs
- Developed on the OpenCAPI FPGA-host platform for high-performance, cloud-oriented acceleration

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

Beijing, China

## Selected Individual Projects

### KHEmu: User-space binary translation

Jun, 2020

- Designed for high-performance translation with emerging ISAs
- Written in Rust for unmatched performance, flexibility, and safety
- SIMD-capable IR and native floating point, LLVM JIT compilation, dynamic linking support, and more

### KHTcp: User-space network stack

Oct, 2019

- Ethernet, IP, TCP & UDP implemented from scratch with libpcap
- Built for high-performance with event-driven asynchronous programming model
- Client-server model for concurrent use from multiple userspace applications

## Skills

<b>Programming Language</b>	C, Modern C++, Rust, Scala, Java, Bash, OCaml, Go, Scheme
<b>High Performance Computing</b>	Performance profiling & optimizations, MPI, OpenMP, OpenACC
<b>System &amp; Cluster Management</b>	Linux & OpenBSD management, Conventional & RDMA networking, Distributed filesystems
<b>Embedded &amp; FPGA</b>	Linux kernel development, Baremetal (MCU & SoC) development, Chisel, Verilog
<b>Multimedia</b>	GStreamer, FFmpeg (LibAV), OpenCV
<b>Foreign (Natural) Languages</b>	English (Proficient: TOEFL 112, GRE 331/4.0), Japanese (Proficient: JLPT N1)