

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 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”

Journal

IEEE TRANSACTIONS ON PARALLEL AND DISTRIBUTED SYSTEMS (TPDS)

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

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