Tianyi **Cui**

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Education

University of Washington *Seattle, US*

PH.D. IN COMPUTER SCIENCE *Sep. 2018 - Present*

- Research focus on Datacenter Networking and Systems
- Advisor: Arvind Krishnamurthy
- GPA: 3.95

University of Science and Technology of China, Special Class for the Gifted Young[1] *Hefei, China*

B.S.E. IN COMPUTER SCIENCE *Sep. 2014 - July 2018*

- **Overall GPA: 3.96/4.3   Rank: 2/147**
- Honor Class Student

Publications

[1] B. Li, **T. Cui**, Z. Wang, W. Bai, L. Zhang, "SocksDirect: Datacenter Sockets can be Fast and Compatible." Proceedings of the 2019 ACM SIGCOMM Conference(**SIGCOMM '19**) (**Co-First author)**

[2] M. Liu, **T. Cui**, H. Schuh, A. Krishnamurthy, S. Peter, K. Gupta "iPipe: A Framework for Building Distributed Applications on Multicore SoC SmartNICs." Proceedings of the 2019 ACM SIGCOMM Conference(**SIGCOMM '19**)

[3] **T. Cui**, W. Zhang, K. Zhang, A. Krishnamurthy "Offloading load balancers onto SmartNICs." Proceedings of the 12th ACM SIGOPS Asia-Pacific Workshop on Systems(**APSys '21**)

Research Experience

Intelligent Buffer Tuning for SONiC *Microsoft Research, Redmond*

RESEARCH INTERN, ADVISOR: WEI BAI *July. 2020 - Dec. 2020*

- Identified a performance bottleneck in the Datacenter
- Designed an optimization algorithm for switch buffer management
- Achieved zero packet lose and eliminated Pause Frames for testbed

SocksDirect: Datacenter sockets can be Fast and Compatible *Microsoft Research Asia*

RESEARCH INTERN, ADVISOR: PROF. LINTAO ZHANG *Oct. 2017 - July. 2018*

- Designed and implemented a Linux socket API compatitable communication Framework
- Leverage RDMA for inter-host communication and shared memory for intra-host communication
- Designed sophisticated techniques to bridge the gap of socket semantics and RDMA
- Achieved 17x latency improvement and 7x message throughput improvement

Go-to-FPGA Compilation Framework: Let Software Programmer Play Hardware *UCLA*

RESEARCH INTERN, ADVISOR: PROF. JASON CONG *June 2017 - Sep. 2017*

- Aim to reduce the programming difficulty for software developers to develop FPGA
- Developed a Golang to FPGA compiler to leverage Go routine and channel features in Golang
- Discovered several backend optimizations (fine-grained parallelism and task-level pipeline) for my compiler to improve the performance of generated code

Wireless Backscatter with Commodity WiFi Device *USTC*

RESEARCH ASSISTANT, ADVISOR: PROF. XIANGYANG LI, PROF. PANLONG YANG *Oct. 2016 - June. 2017*

- Designed a wireless backscatter system which could transmit signal with off-the-shelf WiFi routers
- Implemented the system with FPGA and Labview

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[1] I entered the university one year earlier than my peers.

HTTPS Gateway using FPGA   *Microsoft Research Asia*

Rᴇsᴇᴀʀᴄʜ Iɴᴛᴇʀɴ, Aᴅᴠɪsᴏʀ: Pʀᴏғ. **Kᴜɴ Tᴀɴ**   *July. 2016 - Aug. 2016*

- Offloaded RSA decryption in HTTPS handshakes to FPGA
- Designed an efficient and scalable RSA algorithm on FPGA with high level C-like language
- Our accelerator saved up to 13 CPU cores previously used for RSA decryption to maintain 16K HTTPS connections per second
- Won the **global 2nd place** of the "Quality for cloud customers" challenge out of 200+ projects worldwide in Microsoft Hackathon

Courses

Au 2018	**CSE 550**,	Systems for all	*4.0*
Wi 2019	**CSE 551**,	Operating Systems	*4.0*
Sp 2019	**CSE 552**,	Distributed Systems	*4.0*
Sp 2020	**CSE 547**,	Machine Learning for Big Data	*3.9*

Awards

Oct. 2017	**Guo Moruo Scholarship**,	Highest honor in USTC, awarded top 1.7% of our university	*USTC*
Oct. 2016	**National Scholarship**,	Top 0.2% of the nation	*USTC*
Aug. 2016	**Global 2nd prize of "Quality for cloud customers" challenge**,	Microsoft Hackathon	*Microsoft*
Jan. 2016	**Outstanding Project**,	Topic of An analysis of the privacy and security of MI Phone	*USTC*
Dec. 2015	**Outstanding Scholarship Award**,		*USTC*
Oct. 2015	**Gold Medal**,	International Genetically Engineered Machine Competition (iGEM)	*Boston, US*
Aug. 2014	**Bronze Medal**,	National Olympiad in Informatics (NOI) (nationwide)	*Shenzhen, China*

Activities

Technical Group of the College of the Gifted Young   *USTC*

Pʀᴇsɪᴅᴇɴᴛ   *May 2015-May 2016*

- Maintained the web servers and network gateways of our college
- Built the website of our college
- Organized the Capture the Flag competition in USTC

Linux User Group   *USTC*

Pʀᴇsɪᴅᴇɴᴛ   *May 2016 - June 2017*

- One of the largest Linux User Groups in China
- Maintained a VPN server for hundreds of users
- Organized Linux Install Party, Software Freedom Day, several talks etc. Each time hundreds of students attend them

Skills

Programming Language	C/C++, Python, CUDA, LaTeX
Hardware	Verilog, OpenCL, Vivado, Quartus
Tools	Linux, Git, LLVM
Networking	DPDK, RDMA, NP based SmartNIC