Curriculum Vitae – Mohammad Alian

Assistant Professor, Electrical and Computer Engineering, Cornell University
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Overview

- Area of interest: Computer Architecture and Systems
- Vision: My research sees compute as a revolving paradigm around data delivery hierarchy (i.e., memory, storage, and network) and not the other way around, which is the conventional view. From this perspective, my vision is to depart from the conventional separation of the tasks between data delivery hierarchy and compute to build next-generation datacenter.

Education

- Ph.D. in Computer Engineering, ECE Department, University of Illinois Urbana Champaign — July 2020
  Advisor: Nam Sung Kim
  Dissertation title: A Cross-stack, Network-centric Architectural Design for Next-generation Datacenters
- M.S. in Computer Engineering, ECE Department, University of Wisconsin-Madison — August 2015
- B.S. in Computer Engineering, ECE Department, University of Tehran, Iran — May 2013

Honors

- NSF CAREER Award, 2023
- Miller Faculty Scholar Award from University of Kansas School of Engineering, 2023
- Samsung Open Innovation Contest runner up award ($30K gift), 2022
- Selected as a rising star in Computer Architecture, 2019
- Best paper finalist for paper “Simulating PCI-Express Interconnect for Future System Exploration,” IEEE International Symposium on Workload Characterization (IISWC), 2018
- Best paper finalist for paper “Application-Transparent Near-Memory Processing Architecture with Memory Channel Network,” IEEE/ACM International Symposium on Microarchitecture (MICRO), 2018
- Best paper finalist for paper “dist-gem5: Distributed Simulation of Computer Clusters,” IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), 2017
- IEEE MICRO Honorable mention for paper “NCAP: Network Driven, Packet Context-Aware Power Management for Client-Server Architecture,” IEEE International Symposium on High-Performance Computer Architecture (HPCA), 2017
- Best paper finalist for paper “NCAP: Network Driven, Packet Context-Aware Power Management for Client-Server Architecture,” IEEE International Symposium on High-Performance Computer Architecture (HPCA), 2017

Experience

- Assistant Professor, ECE, Cornell University — July 2024 – present
- Adjunct Assistant Professor, EECS, University of Kansas — July 2024 – present
- Assistant Professor, EECS, University of Kansas — August 2020 – July 2024
- Visiting Professor, School of Computer and Communication Science, EPFL — February 2023 – August 2023
  Host: Prof. Babak Falsafi
- Research Assistant, ECE Department, University of Illinois Urbana Champaign — August 2015 – July 2020

- Research Assistant, ECE Department, University of Wisconsin-Madison January 2014 – July 2015

Teaching

- EECE 800: Special topics on Computer Architecture Research Spring 2024
- EECE 645: Computer Architecture Spring 2024
- EECS388: Embedded Systems Fall 2023
- EECS752: Modern Computer Organization Fall 2023
- EECS752: Modern Computer Organization Fall 2022
- EECS388: Embedded Systems Fall 2022
- EECS645: Computer Architecture Spring 2022
- EECS388: Embedded Systems Fall 2021
- EECS752: Modern Computer Organization Spring 2021
- EECS388: Embedded Systems Fall 2020

Professional Activities

- Technical Program Committee:
  International Symposium on Microarchitecture (MICRO), 2023
  International Symposium on High-Performance Computer Architecture (HPCA), 2024, 2025
  International Parallel & Distributed Processing Symposium (IPDPS), 2022, 2023
  International Symposium on Performance Analysis of Systems and Software (ISPASS), 2022
  Young Architect Workshop (YArch) 2021, 2022, 2023
- External Review Committee:
  International Symposium on Computer Architecture (ISCA), 2023, 2024
  International Symposium on Microarchitecture (MICRO), 2024
- Travel grant chair, International Symposium on Performance Analysis of Systems and Software (ISPASS), 2023
- ACE Center Broadening Participation Champion, 2023 to present
- University of Kansas School of Engineering Diversity, Equity, Inclusion, and Belonging committee member, 2020 - present

Publications

24: Ali Ansari, Shanqing Lin, Ayan Chakraborty, Bugra Eryilmaz, Mohammad Alian, Babak Falsafi, Michael Ferdman, “Silicon Efficiency in Post-Moore Servers,” Workshop on Hot Topics in Ethical Computer Systems in conjunction with ASPLOS, 2024

23: Rohan Mahapatra, Soroush Ghodrati, Byung Hoon Ahn, Sean Kinzer, Shu-Ting Wang, Hanyang Xu, Lavanya Karthikeyan, Hardik Sharma, Amir Yazdanbakhsh, Mohammad Alian, and Hadi Esmaeilzadeh, “*In-Storage Domain-Specific Acceleration for Serverless Computing*,” International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2024

22: Neel Patel, Amin Mamandipoor, Mohammad Nouri, Mohammad Alian, “*SmartDIMM: In-Memory Acceleration of Upper Layer I/O Protocols*,” International Symposium on High-Performance Computer Architecture (HPCA), 2024 [FPGA Prototype][Artifacts available, functional, and reproduced]

21: Shu-Ting Wang, Hanyang Xu, Amin Mamandipoor, Rohan Mahapatra, Byung Hoon Ahn, Soroush Ghodrati, Krishnan Kailas, Mohammad Alian, Hadi Esmaeilzadeh, “*Data Motion Acceleration for Heterogeneous Cross Domain Accelerator Chaining*,” International Symposium on High-Performance Computer Architecture (HPCA), 2024

20: Neel Patel, Amin Mamandipoor, Derrick Quinn, Mohammad Alian, "*XFM: Accelerated Software-Defined Far Memory*," IEEE/ACM International Symposium on Microarchitecture (MICRO), 2023 [Artifacts available, functional, and reproduced]

19: Johnson Umeike, Neel Patel, Alex Manley, Amin Mamandipoor, Heechul Yun, Mohammad Alian, "*Profiling gem5 Simulator*," IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), 2023

18: Mohammad Alian, Siddharth Agarwal, Jongmin Shin,Neel Patel, Yifan Yuan, Daehoon Kim, Ren Wang, Nam Sung Kim, "*IDIO: Network-driven, Inbound Network Data Orchestration on Server Processors*," IEEE/ACM International Symposium on Microarchitecture (MICRO), 2022

17: Ki-Dong Kang, Gyeongseo Park, Hyosang Kim, Mohammad Alian, Nam Sung Kim, Daehoon Kim, "*NMAP: Power Management Based on Network Packet Processing Mode Transition for Latency-Critical Workloads*," IEEE/ACM International Symposium on Microarchitecture (MICRO), 2021

16: Yifan Yuan, Mohammad Alian, Yipeng Wang, Ilia Kurakin, Ren Wang, Charlie Tai, Nam Sung Kim, "*Do Not Forget the I/O When Allocating Your LLC*," ACM International Symposium on Computer Architecture (ISCA), 2021 [Technology Adapted by Intel]

15: Mohammad Alian, Jongmin Shin, Ki-Dong Kang, Ren Wang, Alexandros Daglis, Daehoon Kim, Nam Sung Kim, "*IDIO: Orchestrating Inbound Network Data on Server Processors*," IEEE Computer Architecture Letters (CAL), 2021

14: Soroush Ghodrati, Byung Hoon Ahn, Joon Kyung Kim, Sean Kinzer, Brahmendra Yatham, Navateja Alla, Hardik Sharma, Mohammad Alian, Eiman Ebrahimi, Nam Sung Kim, Cliff Young, Hadi Esmaeilzadeh, "*Planaria: Dynamic architecture Fission for Spatial Multi-Tenant Acceleration of Deep Neural Networks*," IEEE/ACM International Symposium on Microarchitecture (MICRO), 2020

13: Mohammad Alian, Yifan Yuan, Jie Zhang, Ren Wang, Myoungsoo Jung, Nam Sung Kim, "*Data Direct I/O Characterization for Future I/O System Exploration*," IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), 2020

12: Jason Lowe-Power, Abdul Mutaal Ahmad, Ayaz Akram, Mohammad Alian, et al., "*The gem5 Simulator: Version 20.0+: A New Era for the Open-Source Computer Architecture Simulator*," ArXivorg, 2020

11: Mohammad Alian, Nam Sung Kim, "*NetDIMM: Low-Latency, Near-Memory Network Interface Architecture*," IEEE/ACM International Symposium on Microarchitecture (MICRO), 2020

10: Ki-dong Kang, Mohammad Alian, Daehoon Kim, Jaehyuk Huh, Nam Sung Kim, "*VIP: Virtual performance-state for efficient power management of virtual machines*," ACM Symposium on Cloud Computing (SoCC), 2018

9: Mohammad Alian, Krishna Parasuram Srinivasan, Nam Sung Kim, "*Simulating PCI-Express Interconnect for Future System Exploration*," IEEE International Symposium on Workload Characterization (IISWC), 2018, [Best Paper Finalist]

8: Jie Zhang, Miryeong, Kwon, Donghyun Gouk, Changlim Lee, Mohammad Alian, Myoungjun Chun, Mahmut Kandemir, Nam Sung Kim, Jihong Kim, Myoungsoo Jung, "*FlashShare: Punching Through Server Storage Stack from Kernel to Firmware for Ultra-Low Latency SSDs*," USENIX Symposium on Operating Systems Design and Implementation (OSDI), 2018

7: Mohammad Alian, Seung Won Min, Hadi Asgharimoghaddam, Ashutosh Dhar, Dong Kai Wang, Thomas Roewer, Adam McPadden, Oliver OHalloran, Deming Chen, Jinjun Xiong, Daehoon Kim, Wen-mei Hwu, Nam Sung Kim, "*Application-Transparent Near-Memory Processing Architecture with Memory Channel Network*," IEEE/ACM International Symposium on Microarchitecture (MICRO), 2018, [Best Paper Finalist][Industry Product]

6: Youjie Li, Jongsea Park, Mohammad Alian, Yifan Yuan, Hardik Sharma, Qu Zheng, Petian Pan, Alexander Gerhard Schwing, Hadi Esmaeilzadeh, Nam Sung Kim, "INCEPTIONN: A Network-Centric Algorithm/Hardware Co-Design to Accelerate Distributed Training of DNNs," IEEE/ACM International Symposium on Microarchitecture (MICRO), 2018 [FPGA Prototype]

5: Seung Won Min, Mohammad Alian, Wen-Mei Hwu, Nam Sung Kim, "*Semi-Coherent DMA: An Alternative I/O Coherency Management for Embedded Systems*," IEEE Computer Architecture Letters (CAL), 2018

4: Seokhan Lee, Kiwon Lee, Minchul Sung, Mohammad Alian, Chankyung Kim, Wooyeong Cho, Reum Oh, Seongil O, Jung Ho Ahn, Nam Sung Kim, "*3D-XPath: High-Density Managed DRAM Architecture with Cost-effective Alternative Paths for Memory Transactions*," Parallel Architectures and Compilation Techniques (PACT), 2018

3: Mohammad Alian, Umur Darbaz, Gabor Dozsa, Stephan Diestelhorst, Daehoon Kim, Nam Sung Kim, "*dist-gem5: Distributed Simulation of Computer Clusters*," IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), 2017, [Best Paper Finalist] [Open Source Release]

2: Mohammad Alian, Ahmed Abulila, Lokesh Jindal, Daehoon Kim, Nam Sung Kim, "*NCAP: Network Driven, Packet Context-Aware Power Management for Client-Server Architecture*," IEEE International Symposium on High-Performance Computer Architecture(HPCA), 2017, [Best Paper Finalist] [IEEE Micro Honorable Mention]

1: Mohammad Alian, Daehoon Kim, Nam Sung Kim, "*pd-gem5: Simulation Infrastructure for Parallel/Distributed Computer Systems*," IEEE Computer Architecture Letters (CAL), 2016

Patents

3: Mohammad Alian, Nam Sung Kim, Siddharth Agarwal "IDIO: Network-driven, Inbound Network Data Orchestration on Server Processors," Provisional

2: Nam Sung Kim, Mohammad Alian, "Application-Transparent Near-Memory Processing Architecture with Memory Channel Network," US20210209047A1

1: Nam Sung Kim, Mohammad Alian,"NCAP: Network Driven, Packet Context-Aware Power Management for Client-Server Architecture," US20190004594A1

Current Students

- Neel Maulik Pattel, Ph.D., Expected 2027
- Derrick Quinn, Ph.D., Expected 2028
- Mohammad Nouri, Ph.D., Expected 2029
- Amin Mamandipoor, Ph.D., Expected 2027 (University of Kansas)
- Huy Tran, Ph.D., Expected 2029 (University of Kansas)
- John Salihu, MS., Expected 2025 (University of Kanas)
- Alex Manely, MS., Expected 2025 (University of Kanas)

Past Students

- Johnson Chinedu, MS., First Employment: Ph.D. Student at University of Maryland

Open Source Tools

- dist-gem5: full-system, cycle level tool for distributed simulation of computer clusters
  Part of the gem5's official release: https://github.com/gem5/gem5

- DPDK gem5: gem5 extention to run DPDK user-space networking stack
  Github: https://github.com/agsiddharth/CAL-DPDK-GEM5

- Dynamic management of Data Direct I/O (DDIO) ways in the last-level cache in Intel CPUs
  Part of Intel RDT software package: https://github.com/intel/intel-cmt-cat/releases/tag/v4.4.0

- Intel Data Direct I/O (DDIO) technology modeling in gem5
  Github: https://github.com/agsiddharth/CAL-DPDK-GEM5