Ali Hajiabadi

Computer Science PhD Student
National University of Singapore (NUS)

Contact Information

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Research Interests

Systems Security, Hardware/Software Co-design, Computer Architecture, Optimizing Compilers, ML Security and Privacy

Education

August 2019 - September 2023 (expected)
Doctor of Philosophy in Computer Science
National University of Singapore (NUS), Singapore
Advisor: Dr. Trevor E. Carlson

2014 - 2019
Bachelor of Science in Computer Engineering
Sharif University of Technology, Tehran, Iran
Thesis: "High Concurrency Latency Tolerant Register Files for GPUs"
Advisor: Prof. Hamid Sarbazi-Azad

2009 - 2013
Diploma in Physics and Mathematics Discipline
Shahid Beheshti High School, Birjand, Iran
Affiliated with the National Organization for the Development of Exceptional Talents (NODET)

Research Experience

August 2019 - Present
Graduate Research Assistant at National University of Singapore, Singapore
NUS Computer Architecture Group
Advisor: Prof. Trevor E. Carlson
My current research spans around HW/SW co-design to build secure and efficient general-purpose processors. My focus is on microarchitectural attacks, including speculation-based attacks and power analysis attacks.

July 2016 - June 2019
Research Assistant at Sharif University of Technology, Tehran
High Performance Computer Architectures and Networks (HPCAN) Lab
Advisor: Prof. Hamid Sarbazi-Azad
Focus of my research has been on latency tolerant register files for GPUs through HW/SW cooperative register prefetching. I contributed to an ASPLOS paper (acknowledged) and an ACM TOCS paper. In collaboration with *Institute for Research in Fundamental Sciences*, *EPFL*, and *ETH Zürich*.

Summer 2018
Research Intern at National University of Singapore (NUS)
Advisor: Prof. Trevor E. Carlson
As a visiting research assistant, I investigated the potentials of out-of-order commit and how to implement an efficient system to enable out-of-order commit.

Teaching Experience

Spring 2020 & Spring 2021
Teaching Assistant, National University of Singapore, Singapore
Course: CS2106 Introduction to Operating Systems
Instructor: Prof. Djordje Jevdjic

Publications

[1] Arash Pashrashid, **Ali Hajiabadi**, Trevor E. Carlson
Fast, Robust and Accurate Detection of Cache-based Spectre Attack Phases.
Proceedings of 41^{st} IEEE/ACM International Conference on Computer-Aided Design (**ICCAD 2022**), November 2022. Acceptance rate: 132/586 = 22.5%
[Paper][Github Project]

[2] **Ali Hajiabadi**, Andreas Diavastos, Trevor E. Carlson
Noreba*: A Compiler-Informed Non-speculative Out-of-Order Commit Processor.*
Proceedings of 26^{th} ACM International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS 2021**). April 2021. Acceptance rate: 75/398 = 18.8%
[Paper][Extended Abstract][Short Slides][Short Talk][Slides][Full Talk]

[3] Mohammad Sadrosadati, Amirhossein Mirhosseini, **Ali Hajiabadi**, Seyed Borna Ehsani, Hajar Falahati, Hamid Sarbazi-Azad, Mario Drumond, Babak Falsafi, Rachata Ausavarungnirun, Onur Mutlu
Highly Concurrent Latency-tolerant Register Files for GPUs.
In ACM Transactions on Computer Systems (**TOCS**), 2021.
[arXiv Paper]

[4] Harish Patil, Alexander Isaev, Wim Heirman, Alen Sabu, **Ali Hajiabadi**, Trevor E. Carlson
ELFies: Executable Region Checkpoints for Performance Analysis and Simulation.
Proceedings of 19^{th} IEEE International Symposium on Code Generation and Optimization (**CGO 2021**), March 2021. Acceptance rate: 31/89 = 34.8%
[Paper]

[5] **Ali Hajiabadi**, Archit Agarwal, Andreas Diavastos, Trevor E. Carlson
Mitigating Speculation-based Attacks through Configurable Hardware/Software Co-design.
arXiv (unpublished), 2023.
[arXiv Paper]

[6] Yun Chen, **Ali Hajiabadi**, Lingfeng Pei, Trevor E. Carlson
New Cross-Core Cache-Agnostic and Prefetcher-based Side-Channels and Covert-Channels.
arXiv (unpublished), 2023.
[arXiv Paper]

[7] Yun Chen*, **Ali Hajiabadi***, Romain Poussier, Andreas Diavastos, Shivam Bhasin, Trevor E. Carlson
Mitigating Power Attacks through Fine-Grained Instruction Reordering.
arXiv (unpublished), 2021.
* Authors with equal contribution.
[arXiv Paper]

Honors & Awards

January 2022	Recipient of Student Travel Award from ASPLOS'22 conference.
August 2021	Recipient of Research Achievement Award from School of Computing, NUS.
March 2020	Invited talk and travel grant for the 2^{nd} Young Architect Workshop at ASPLOS'20, Switzerland.
February 2019	Recipient of President's Graduate Fellowship, the most prestigious doctoral fellowship at National University of Singapore (NUS).
September 2014	Ranked **164**th in Iranian National University Entrance Exam among more than 250,000 students.
2006 & 2009	Recognized as talented student in entry exam of NODET among Birjand students for middle school and high school.

Services

October 2022	**Shadow PC member** at 18^{th} European Conference on Computer Systems (EuroSys 2023), Rome.
March 2022	**Mentor in the Meet-a-Senior-Student program** at 27^{th} International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2022), Lausanne.
June 2021	**Student Volunteer** at 42^{nd} International Conference on Programming Language Design and Implementation (PLDI 2021), Virtual.

Talks

August 2021	Noreba: **A Compiler-Informed Non-speculative Out-of-Order Commit Processor** *Computing Research Week, School of Computing (NUS)*, Virtual.
April 2021	Noreba: **A Compiler-Informed Non-speculative Out-of-Order Commit Processor** *International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2021)*, Virtual.
February 2021	**Accelerating HPC applications with Out-of-Order Commit Processors** *Free and Open source Software Developers' European Meeting (FOSDEM 2021), HPC, Big Data, and Data Science track*, Virtual.
March 2020	**Speculation-Free Out-of-Order Commit** *2^{nd} Young Architect Workshop at the 25^{th} International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS 2020)*, Virtual.

Skills

Programming Languages:	C/C++, Python, and familiar with Java, Scala, Matlab
Scientific Tools:	LLVM Compiler Infrastructure, gem5 Simulator, Sniper Simulator, GPGPU-Sim, BookSim, GPU-Ocelot, Pin
Operating Systems:	Linux, Mac OS, Windows
Typesetting:	LaTeX, Microsoft Word