Ryan Wong

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Research Interests

Computer architecture; memory & storage systems; emerging memory technologies; hardware accelerators for machine learning and databases; scientific computing

Education

University of Illinois Urbana-Champaign — **Urbana, Illinois**
Ph.D. in Computer Science — *2021-Present*
Advisor: Saugata Ghose

University of Rochester — **Rochester, New York**
M.S. in Electrical Engineering — *2019-2021*
Advisor: Engin Ipek

University of Rochester — **Rochester, New York**
B.S. in Computer Science/B.A. in Chemistry — *2014-2018*
Distinction in Chemistry

Professional Experience

Radiation Hardened CMOS — **Sandia National Laboratories**
Graduate R&D Intern — *2019-2021*
Co-advisors: Ben Feinberg, Sapan Agarwal

Computer Systems Architecture Laboratory — **University of Rochester**
(Graduate) Research Assistant — *2017-2021*
Advisor: Engin Ipek

NSF-Research Experience for Undergraduates — **Salisbury University**
Research Assistant — *Summer 2018*
Advisor: Lei Zhang

ICODES Test Group — **Tapestry Solutions**
Software Tester — *Summer 2016, 2017*

Publications

B. Feinberg, **R. Wong**, T. P. Xiao, C. H. Bennett, J. N. Rohan, E. G. Boman, M. J. Marinella, S. Agarwal, and E. Ipek, "An Analog Preconditioner for Solving Linear Systems", 27^{th} *International Symposium on High-Performance Computer Architecture* **(HPCA)**, 2021.

B. Feinberg, B. Heyman, D. Mikhailenko, **R. Wong**, A. Ho, and E. Ipek, "Commutative Data Reordering: A New Technique to Reduce Data Movement Energy on Sparse Linear Algebra Workloads", 47^{th} *International Symposium on Computer Architecture* **(ISCA)**, 2020.

B. Feinberg, B. Heyman, D. Mikhailenko, **R. Wong**, and E. Ipek, "Reducing Data Movement Energy via Commutative Data Reordering", *Government Microcircuit Applications & Critical Technology Conference* **(GOMACTech)**, 2019.

Awards

Outstanding Teaching Assistant* — **University of Illinois**
Department of Computer Science — *2022*

Hopeman Fellowship — **University of Rochester**
School of Engineering and Applied Sciences — *2019-2020*

Research Projects

Commutative Data Reordering — **University of Rochester**
2018-2020

Data movement is a significant contributor to on- and off-chip energy. In this project, we develop a novel data movement technique that minimizes energy by strategically selecting the lowest energy order in which data can be transmitted, without reduction in system performance.

Reconfigurable Optical Networks-On-Chip (NSF-REU) — **Salisbury University**
2018

A reconfigurable optical network-on-chip allows for any node to be connected to any other node at any time. Our approach is to use statistical methods and machine learning to analyze how dynamic and static configurations affect performance for a given application. The long term goal is to predict which configurations will have optimal, or close to optimal performance.

Technical Skills

- **Programming languages:** C, Java, Python
- **Hardware description languages:** Verilog
- **Architectural simulation:** zsim, GPGPU-SIM, McPAT, SimpleSSD, gem5
- **Formal testing techniques:** Regression, validation, performance, functional

Teaching

CS 233(H): Computer Architecture* — **University of Illinois**
Instructors: Profs. Geoffrey Herman & Saugata Ghose — *Fall 2022*
Instructors: Profs. Geoffrey Herman & Saugata Ghose — *Fall 2021*

ECE 201/401: Advanced Computer Architecture — **University of Rochester**
Instructor: Prof. Engin Ipek — *Fall 2019*

ECE 200/400: Computer Organization — **University of Rochester**
Instructor: Prof. Engin Ipek — *Spring 2019*

CSC 172: Data Structures and Algorithms — **University of Rochester**
Instructor: Prof. Tamal Biswas — *(Head Workshop Leader) Spring 2018*
Instructor: Prof. Ted Pawlicki — *Spring 2017*

CSC 242: Artificial Intelligence — **University of Rochester**
Instructor: Prof. George Ferguson — *Fall 2017*

CSC 171: Introduction to Computer Science — **University of Rochester**
Instructor: Prof. Ted Pawlicki — *(Head Workshop Leader) Fall 2017*
Instructor: Prof. George Ferguson — *Fall 2016*

Mentoring

Julie Lee — **University of Illinois**
Senior Thesis: Adaptive Cache Hierarchies — *2022-2023*

Kevin Higgs — **University of Illinois**
ISUR: In-Storage Computing — *2022-Present*