

JOHN “JACK” P. WADDEN

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EDUCATION

University of Virginia, Charlottesville, VA

Department of Computer Science

Dissertation Title: “Accelerated Pattern Recognition Processing Using Hybrid Spatial/Von Neumann Architectures”

Committee: Kevin Skadron (advisor), Mircea Stan, Samira Khan, Gabe Robins, Andrew Grimshaw

PhD Candidate, 2017 – May 2018

PhD in Computer Science, Expected May 2018

University of Virginia, Charlottesville, VA

Department of Computer Science

Graduate Student, 2011 – 2017

Master of Computer Science, December 2014

Williams College, Williamstown, MA

Major: Computer Science

Bachelor of Arts, June 2011

RESEARCH INTERESTS

Computer Architecture, Bioinformatics, Hybrid Spatial/von Neumann Architectures, Domain-specific Accelerator Design, Reconfigurable Computing, Processing in Memory, Bioinformatics, Automata Processing, Automatic Parallelization, Architectural Reliability, Edge Computing, Oxford Nanopore Technologies Sequencing

RESEARCH EXPERIENCE

University of Michigan/Sequal Inc., Ann Arbor, MI

Post-doctoral Research Fellow

Currently researching practical acceleration of widely used bioinformatics algorithms for whole genome sequencing and metagenomics. This effort aims to enable targeted, ultra-rapid diagnosis of genetic disorders (e.g. cancer) and infections.

July 2018 — Present

University of Virginia, Charlottesville, VA

Graduate Research Assistant

Researched acceleration of automata processing, a spatial computing paradigm used for acceleration of deep packet inspection, bioinformatics, and machine learning workloads. Past research: investigated performance portability of OpenCL code across GPUs, CPUs, and FPGAs, and feasibility of automatic dynamic binary parallelization in many-core and heterogeneous systems. Assisted biomedical engineers in accelerating simulations of mouse heart cells.

January 2012 — May 2018

Advanced Micro Devices Research, Boxborough, MA

Research Co-Op/Consultant

In support of AMD’s exascale computing effort, conducted research with Prof. Sudhanva Gurumurthi and Dr. Vilas Sridharan on advanced GPU software reliability solutions.

January 2013 -- November 2013

PUBLICATIONS (PRESENTING AUTHOR UNDERLINED)

Harisankar Sadasivan, Jack Wadden, Robert Dickson, David Blaauw, Reetuparna Das, Satish Narayanasamy “Rapid Real time Squiggle-level Classification for Read Until Using RawMap.” In preparation. 2020.

Arun Subramaniyan, Jack Wadden, Kush Goliya, Nathan Ozog, Xiao Wu, Satish Narayanasamy, David Blaauw, and Reetuparna Das. “Accelerating Maximal-Exact-Match Seeding with Enumerated Radix Trees.” Under submission. Bioarxiv: <https://www.biorxiv.org/content/10.1101/2020.03.23.003897v1>. 2020.

Jack Wadden, et al. “AutomataZoo: A Modern Automata Processing Benchmark Suite.” IEEE International Symposium on Workload Characterization (IISWC’18). September 2018.

Kevin Angstadt, Jack Wadden, Westley Weimer, and Kevin Skadron. Portable Programming with RAPID. In *IEEE Transactions on Parallel and Distributed Systems*, to appear. IEEE.

Jack Wadden, Kevin Angstadt, Kevin Skadron. “Characterizing and Mitigating Output Reporting Bottlenecks in Spatial Automata Processing Architectures.” IEEE International Symposium on High-Performance Computer Architecture (HPCA’18). February, 2018.

Kevin Angstadt, Jack Wadden, Westley Weimer, Kevin Skadron. “MNRL and MNCaRT: An Open-Source, Multi-Architecture State Machine Research and Execution System.” IEEE Computer Architecture Letters (CAL). November 2017.

Ted Xie, Vinh Dang, Jack Wadden, Kevin Skadron, Mircea Stan. “REAPR: Reconfigurable Engine for Automata Processing.” In Proceedings of the 27th International Conference on Field-Programmable Logic and Applications (FPL’17). February, 2017.

Jack Wadden, Samira Khan, Kevin Skadron. “Automata-to-Routing: An Open Source Toolchain for Design-space Exploration of Spatial Automata Processing Architectures.” IEEE International Conference on Field Programmable Custom Computing Machines (FCCM’17). May, 2017.

PUBLICATIONS CONT'D (PRESENTING AUTHOR UNDERLINED)

- Jack Wadden**, and Kevin Skadron. "Advances in GPU Reliability Research." Chapter in Advances in GPU Research and Practice, Elsevier Science, 2017.
- Jack Wadden**, Nathan Brunelle, Ke Wang, Mohamed El-Hadedy, Gabriel Robins, Mircea Stan, Kevin Skadron. "Generating Efficient and High-Quality Pseudo-Random Behavior on Automata Processors." IEEE International Conference on Computer Design (ICCD'16). October, 2016.
- Jack Wadden**, Vinh Dang, Nathan Brunelle, Tommy Tracy II, Deyuan Guo, Elaheh Sadredini, Ke Wang, Chunkun Bo, Gabriel Robins, Mircea Stan, Kevin Skadron. "ANMLZoo: A Benchmark Suite for Exploring Bottlenecks in Automata Processing Engines and Architectures." IEEE International Symposium on Workload Characterization (IISWC'16). September, 2016.
- Jack Wadden**, and Kevin Skadron. "VASim: An Open Virtual Automata Simulator for Automata Processing Research." Supercomputing Frontiers 2016 (SCF'16). March, 2016.
- Keira Zhou, **Jack Wadden**, Jeffrey Fox, Ke Wang, Donald Brown, Kevin Skadron. "Regular Expression Acceleration on the Micron Automata Processor: Brill Tagging as a Case Study." In Proceedings of the 2015 IEEE International Conference on Big Data (BIGDATA'15). Santa Clara, CA. December, 2015.
- Jack Wadden**, et al. "Real-world Design and Evaluation of Compiler-managed GPU Redundant Multithreading." IEEE International Symposium on Computer Architecture 2014 (ISCA '14). June, 2014.

TEACHING AND MENTORING EXPERIENCE

- University of Michigan**, Ann Arbor, MI Spring 2020
Lecturer EECS 370 "Intro to Computer Organization" – Department of Computer Science and Engineering
 - Lectured to over 550 students over three sections. Managed remote lecturing and exam proctoring.
- University of Michigan**, Ann Arbor, MI Fall 2019
Lecturer EECS 498/598 "Accelerators for AI and Health" – Department of Computer Science and Engineering
 - Designed homework, lectures, and projects from scratch in collaboration with Prof. Satish Narayanasamy
- University of Virginia**, Charlottesville, VA Summer 2014 – Summer 2017
Undergraduate Advisor – Department of Computer Science
 - Advised 11 students through research projects in automata processing, performance analysis, and GPU acceleration
- University of Virginia**, Charlottesville, VA Fall 2011 – Spring 2012
Teaching Assistant – Department of Computer Science
 - Assisted instruction in Advanced Programming and Advanced Software Engineering
 - Ran three lab sections, supervising over 200 students and their coursework
 - Helped create and grade homework assignments, labs, student projects, and course exams
- University of Virginia**, Charlottesville, VA Spring 2015 – Fall 2017
Invited Lectures – Department of Computer Science
 - GPU Architecture and SIMT Programming (4 lectures)*
 - Micron's Automata Processor: Overcoming the von Neumann Bottleneck (1 lecture)*
- Williams College**, Williamstown, MA Fall 2008 – Spring 2009
Teaching Assistant – Department of Computer Science
 - Assisted instruction in advanced programming and data structures
 - Ran and assisted weekly labs

HONORS, AWARDS, AND PROFESSIONAL DEVELOPMENT

- TECHCON 2017**, Austin, TX Fall 2017
Best in Session: Novel Architectures and System Design
- ARCS Foundation**, Washington, DC 2017 -- 2018
Metropolitan Washington Chapter of Achievement Rewards for College Scientists Foundation Scholar
- University of Virginia**, Charlottesville, VA 2016 -- 2017
Graduate Student Award for Outstanding Research
- ARCS Foundation**, Washington, DC 2016 -- 2017
Metropolitan Washington Chapter of Achievement Rewards for College Scientists Foundation Scholar
- Los Alamos National Labs**, Los Alamos, NM 2015 -- 2016
Science of Signatures Advanced Studies Institute
- ARCS Foundation**, Washington, DC 2015 -- 2016
Metropolitan Washington Chapter of Achievement Rewards for College Scientists Foundation Scholar
- University of Virginia**, Charlottesville, VA 2013 -- 2014
Graduate Student Award for Outstanding Research