HAN DONG

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https://github.com/handong32

https://scholar.google.com/citations?user=i1VhZwgAAAAJ

EDUCATION

Boston University
PhD in Computer Science — 2014-2023
Dissertation: A Data-Driven Study of Operating System Energy-Performance Trade-offs towards System Self Optimization

University of Maryland Baltimore County
MS in Computer Science — 2011-2013
Thesis: A System for Social Media Data Analytics Applied To Hurricane Sandy

University of Maryland Baltimore County
BS in Computer Science — 2006-2010

TEACHING EXPERIENCE

Visiting Assistant Professor, Hamilton College, Clinton, NY — 1/1/2025-4/17/2025
Taught CS 101: Computer Science for All, created lecture slides, programming assignments, exams, and projects. Held biweekly labs for in-depth teaching.

Boston University
Graduiate Teaching Assistant, CS 451/651 Distributed Systems, Spring 2018, Fall 2018, Spring 2020
Graduate Teaching Assistant, CS 210: Introduction to Computer Systems, Spring 2015, Spring 2016, Fall 2017

University of Maryland Baltimore County
Teaching Assistant, CMSC 491/671 Parallel and Distributed Processing. Spring 2012

RESEARCH POSITIONS AND INTERNSHIPS

Postdoctoral Associate, Hariri Institute, Boston University, Boston, MA — 2023-2024

- Performing a data-driven study of performance and energy efficiency in the Apache Flink stream processing system.
- Collaboration with IBM and Red Hat researchers on the PEAKS (Power-Aware Kubernetes Scheduling) project, developed a prototype scheduler that leverages multi-objective bayesian optimization for pod placement that reduces application power by 14% while improving latency by 5X.
- Work on the Massachusetts Open Cloud to leverage open-source access to server-class hardware to investigate performance of large inferencing systems.

Red Hat Research Internship, Boston, MA — 2019-2022

- Applied machine learning techniques to automatically tune system settings to improve Cloud application performance and energy efficiency.
- Mentored summer interns and new PhDs in systems research.

Graduate Research at Scalable and Elastic Systems Lab (SESA), Boston University, Boston, MA — 2014-2022

- Data-driven performance and energy efficiency analysis of different OSes, found how tuning certain systems can yield over 2X efficiency improvements.
- Wrote driver for Intel 10 GbE network device; ported virtualized EbbRT OS to run baremetal. Debugged network stack and optimized network path lengths and demonstrated over 2X latency improvements.
- Built virtualized infrastructure for efficient Docker container bring-up and tear-down to improve performance of OpenWhisk serverless applications by using SEUSS OS.
- Developed virtual memory page walker in RISCV linux kernel to run on Zybo/Zed FPGAs in order to support different applications.

Oak Ridge Institute of Science and Education, Food and Drug Administration, Silver Spring, MD — 2012-2014

- Built a system for real-time radiation dose monitoring to reduce exposure in medical communities. Integrated the sensor data with CUDA-based algorithms to accelerate radiation exposure notifications.
- Worked with radiologists to develop visualization tools for different x-ray imaging libraries.

Graduate Research Fellowship, Center for Hybrid Multicore Productivity Research, University of Maryland Baltimore County, Baltimore, MD — 2011-2013

- Built systems that applied natural language processing to social media data in order to provide better evacuation and public feedback during hurricanes.
- Ported NASA climate physics code with OpenCL for 24X speedup.
- Awarded UMBC best MS research award.

Summer Internship, Los Alamos National Lab, Los Alamos, NM — 2011

- Collaborated with physicists and mathematicians to parallelize neutron transport equation solver for multicore CPU/GPU and achieved 30X performance.

Summer Internship, Google Summer of Code, Silver Spring, MD — 2010

- Developed new GUI components for open-source Scilab program.

Undergraduate Research Fellowship, University of Maryland Baltimore County, Baltimore, MD — 2009-2010

- Built visualization tool to simulate optical network behavior.

- Awarded UMBC best undergraduate research award.

SKILLS

PROGRAMMING

C/C++, x86 assembly, RISCV, Bash, Golang, Python, JavaScript, Java, OpenCL, CUDA, OpenMP, MPI, Jupyter

TOOLS/LIBRARIES

PyTorch, Ax.dev, qemu, GDB, valgrind, iperf, git, tcpdump, wireshark, Arduino, Boost, Lucene, gensim

KERNEL/PROTOCOLS

Linux, TCP/IP, TFTPBOOT, UEFI, ACPI, IRQ, NMI, IDT, GRUB, ELF, Intel PMU, Serial I/O, SSE/AVX

RESEARCH PUBLICATIONS

Towards Performance and Energy Aware Kubernetes Scheduler. **Han Dong**, Parul Singh, Yara Awad, Felix George, Krishnasuri Narayanam, Sanjay Arora, and Jonathan Appavoo. 2025. SIGENERGY Energy Inform. Rev. 5, 2 (July 2025), 69–75. https://doi.org/10.1145/3757892.3757902

Taming and Controlling Performance and Energy Trade-offs Automatically in Network Applications. **Han Dong**, Yara Awad, Sanjay Arora, Orran Krieger, Jonathan Appavoo. 2024. http://arxiv.org/abs/2502.14987

Can OS Specialization Give New Life to Old Carbon in the Cloud? **Han Dong**, Sanjay Arora, Orran Krieger, Jonathan Appavoo. 2024. In The 17th ACM International Systems and Storage Conference (SYSTOR '24), September 23–24, 2024, Virtual, Israel. ACM, New York, NY, USA, 8 pages. https://doi.org/10.1145/3688351.3689158

Slowing Down for Performance and Energy: An OS-Centric Analysis of Network Applications. **Han Dong**, Sanjay Arora, Yara Awad,

Tommy Unger, Orran Krieger, Jonathan Appavoo. 2021. https://arxiv.org/abs/2112.07010

SEUSS: Skip Redundant Paths to Make Serverless Fast. James Cadden, Thomas Unger, Yara Awad, **Han Dong**, Orran Krieger, and Jonathan Appavoo. Proceedings of the Fifteenth European Conference on Computer Systems (EuroSys '20). Association for Computing Machinery, New York, NY, USA, Article 32, 1–15. DOI:https://doi.org/10.1145/3342195.3392698

EbbRT: A Framework for Building Per-Application Library Operating Systems. Dan Schatzberg, James Cadden, **Han Dong**, Orran Krieger, and Jonathan Appavoo. Proceedings of the 12th USENIX Symposium on Operating Systems Design and Implementation (OSDI 2016), November 2–4, 2016, Savannah, GA.

A Scalable System for Community Discovery in Twitter During Hurricane Sandy. Yin Huang, **Han Dong**, Yelena Yesha and Shujia Zhou. SCRAMBL: The 1st Workshop on Scalable Computing for Real-Time Big Data Applications, May 26-29, 2014, Chicago, IL.

Web-based, GPU-accelerated Monte Carlo Simulation and Visualization of Indirect Radiation Imaging Detector Performance. **Han Dong**, Diksha Sharma and Aldo Badano. Medical Physics, 41, 121907 (2014), DOI:http://dx.doi.org/10.1118/1.4901516

A Compendium of Publicly Available Monte Carlo Transport Codes (including new tools) for the Simulation of Radiation Imaging Detectors. Diksha Sharma, **Han Dong**, Yuan Fang, Aldo Badano, Proc. SPIE 8668, Medical Imaging 2013: Physics of Medical Imaging, 866858 (19 March 2013); https://doi.org/10.1117/12.2007434

Social Media Data Analytics Applied to Hurricane Sandy. **Han Dong**, Milton Halem, Shujia Zhou. Proceedings of 2013 ASE/IEEE International Conference on Social Computing, September 8- 14, 2013, Washington, DC.

A Real-Time Radiation Dose Monitoring System for Patients and Staff During Interventional Fluoroscopy using a GPU Accelerated Monte Carlo Simulator and an Automatic 3D Localization System based on a Kinect Depth Camera. Andreu Badal-Soler, Fahad Zafar, **Han Dong**, Aldo Badano. Proceedings of SPIE (The International Society for Optics and Photonics) Medical Imaging 2013, Lake Buena Vista, Florida.

Hybrid Deterministic/Monte Carlo Neutronics using GPU Accelerators. Jeff Willert, C. T. Kelley, D. A. Knoll, **Han Dong**, Mahesh Ravishankar, Paul Sathre, Michael Sullivan, William Taitano. Proceedings of 11th International Symposium on Distributed Computing and Applications to Business, Engineering & Science, October 19 – 22, 2012, Guilin, Guangxi, China.

Cross-Platform OpenCL Code and Performance Portability for CPU and GPU Architectures Investigated with a Climate Physics Model. **Han Dong**, Dibyajyoti Ghosh, Fahad Zafar, Shujia Zhou. Proceedings of Fifth International Workshop on Parallel Programming Models and Systems Software for High-End Computing, September 10, 2012, Pittsburgh, PA.

X10-Enabled MapReduce. **Han Dong**, Shujia Zhou, David P. Grove. Proceedings of the Fourth Conference on Partitioned Global Address Space Programming Model, October 12, 2010, New York, NY.

ARTICLES

Operating Systems Approach to Sustainability. **Han Dong**, Jonathan Appavoo. NSF Workshop on Sustainable Computing for Sustainability. April 16, 2024. https://edas.info/web/nsf-wscs24/accepted-contributions.html

Tuning Linux kernel Policies for Energy Efficiency with Machine Learning. **Han Dong**. May, 2023. https://research.redhat.com/blog/article/tuning-linux-kernel-policies-for-energy-efficiency-with-machine-learning/

A Tutorial on Building Custom Linux Appliances. **Han Dong**, Jonathan Appavoo. December 11, 2021. https://www.usenix.org/publications/loginonline/building-linux-appliances

PRESENTATIONS

ORAL

PEAKS: Orchestrating Power-Aware Kubernetes Scheduling. 08/16/2024. https://www.youtube.com/watch?v=9orOkUztJHs. DevConf, Boston, MA.

A Generic ML-enhanced Controller that Optimizes Network Application Energy Efficiency. 10/30/2023. https://www.youtube.com/watch?v=9FEUY0DxZ0E, Netdev 0x17

Saving Money by Reducing Power Consumption. 9/24/2020. https://devconfus2020.sched.com/event/eW4g/saving-money-by-reducing-power-consumption, DevConf.US, Boston, MA.

Impact of OS Design and Hardware Configuration on the Power Performance Tradeoff. 2/14/2020. https://www.youtube.com/watch?v=PkHa1nL9c-E. BU Cloud Computing Workshop, Boston, MA.

Automatic Configuration of Complex Hardware. 8/15/2019. https://www.youtube.com/watch?v=8UQTlNQTKtQ, DevConf.US, Boston, MA.

A Demonstration of Adapting HW to SW Needs for Network Workloads. 10/30/2018. https://youtube.com/watch?v=2cfRayVVaWI. Fourth Annual Mass Open Cloud (MOC) Workshop, Boston, MA.

Cross-Platform OpenCL Code and Performance Portability for CPU and GPU Architectures Investigated with a Climate Physics Model. 9/10/2012. Fifth International Workshop on Parallel Programming

Models and Systems Software for High-End Computing, Pittsburgh, PA.

X10-Enabled MapReduce. 10/12/2010. Fourth Conference on Partitioned Global Address Space Programming Model, New York, NY.

POSTER

EbbRT: A Framework for Building Per-Application Library Operating Systems, OSDI 2016, Savannah, GA.

Social Media Data Analytics Applied to Hurricane Sandy. 2013. ASE/IEEE International Conference on Social Computing, Alexandria, VA.

Hybrid Deterministic/Monte Carlo Neutronics using GPU Accelerators. SuperComputing 2011, Seattle, WA.

X10-Enabled MapReduce. ACM Student Poster Session, SuperComputing 2010, Seattle, WA.

PROFESSIONAL ACTIVITIES

IEEE International Conference on Cloud Engineering'15 - Sub-reviewer
CloudMICRO'21 - Sub-reviewer
IEEE Access (2023 - 2024) - Reviewer
USENIX Annual Technical Conference (ATC)' 24 - Extended Review Committee
USENIX Annual Technical Conference (ATC)' 25 - Review Committee