Harrison Williams

Senior Embedded Engineer, Efficient Computer

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Summary

Computer engineer with experience spanning hardware/software design, including custom silicon bringup, PCB-level schematic and layout design, and application optimization. My particular focus is on power-efficient design for embedded systems; my doctoral work developed hardware and software techniques to improve the performance and correctness of batteryless energy harvesting edge systems.

Education

PhD, Computer Science, Virginia Tech 2019-2024
Thesis: Circuit Support for Practical and Performant Batteryless Systems **Advisor:** Dr. Matthew Hicks
Dual BS, Electrical & Computer Engineering, Virginia Tech 2015-2019

Professional Experience

Senior Embedded Engineer 2026-Present
Embedded Engineer 2025-2026
Efficient Computer *Pittsburgh, PA*

- Lead designer for Efficient's first customer-facing evaluation board, from schematic development to software and toolchain support.
  - Schematic design and PCB layout integrating multiple microcontrollers, sensors, and digital/analog power domains on an HDI process.
  - Software design coordinating across multiple devices for low-power operation, in-system JTAG debug interface, and USB stack on device and host side.
- Bring up and optimize industry-standard ML benchmarks (MLPerfTiny) for automated testing on Efficient hardware and competitor devices.
- Optimize startup code and peripheral drivers, reducing boot time on Efficient chips by 60%.
- Collaborate with digital and physical IC design engineers for bringup of Efficient's first production-grade processor.
- Work with outside manufacturers and vendors on PCB design, bringup, and transition to volume production.
- Supervise and mentor an intern for an internal hardware-in-the-loop benchmarking system.

Postdoctoral Researcher 2024-2025
Virginia Tech *Blacksburg, VA*

- Conducted research on low-power computer architecture and embedded system design.
- Developed software-level support for next-generation embedded NVRAM technologies, transparently improving execution speed and energy efficiency by 26% and 24% respectively.
- Mentor and advise junior graduate students in conducting, reporting, and presenting research.

Graduate Research Assistant 2019-2024
Virginia Tech *Blacksburg, VA*

- Designed, implemented, and evaluated systems spanning the hardware/software stack to improve the performance and functionality of batteryless energy harvesting sensor systems.
- Built adaptive energy buffer circuits for energy harvesting systems, increasing the portion of energy available for useful computation by an average 25% and improving event responsiveness by 7x.
- Worked with compiler experts to develop LLVM passes and programming models to eliminate data movement and guarantee correct execution on batteryless embedded systems, improving performance by 2-5x over the state of the art.

Undergraduate Research Assistant 2017-2019
Virginia Tech *Blacksburg, VA*

- Worked with faculty and other undergraduate students on transistor-level hardware security research, focusing on data and program state burn-in to volatile memory.
- Built hardware and software systems to rapidly age microcontrollers and automatically collect/analyze memory startup statistics to recover secure on-chip information.

Technical Intern Summers 2017, 2018
Raytheon Missile Systems *Tucson, AZ*

- Developed Universal Verification Methodology (UVM) testbenches for combinational logic and state machines and worked with designers to maximize code and functional test coverage.
- Designed software abstractions for simulating communication interfaces across missile hardware stack.

Software/Languages

Embedded System Development: MSP430, ARM (Ambiq Apollo, M2L31), RISC-V (FE310, Andes N22).
Circuit Simulation and Design: LTSpice, KiCAD, Vivado, Verilog, SystemVerilog, VHDL.
Programming and Scripting: C, Assembly (MSP430, ARM, x86), Python.

Publications

[7] **A Software Caching Runtime for Embedded NVRAM Systems**.
Harrison Williams and Matthew Hicks.
Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2025.

[6] **A Survey of Prototyping Platforms for Intermittent Computing Research**.
Harrison Williams and Matthew Hicks.
International Workshop on Energy Harvesting & Energy-Neutral Sensing Systems (ENSsys), 2024. **Best Paper Award.**

[5] **A Difference World: High-performance, NVM-invariant, Software-only Intermittent Computation**.
Harrison Williams*, Saim Ahmad*, and Matthew Hicks. *Equal contribution.
USENIX Annual Technical Conference (ATC), 2024.

[4] **Energy-Adaptive Buffering for Efficient, Responsive, and Persistent Batteryless Systems**.
Harrison Williams and Matthew Hicks.
Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2024.

[3] **Practical Considerations of Energy Harvesting Source in Minimization of Age of Information with Updating Erasures**.
Fariborz Lohrabi Pour, Harrison Williams, Matthew Hicks, and Dong Sam Ha.
International Symposium on Circuits & Systems (ISCAS), 2023.

[2] **Failure Sentinels: Ubiquitous Just-in-time Intermittent Computation via Low-cost Hardware Support for Voltage Monitoring**.
Harrison Williams, Michael Moukarzel, and Matthew Hicks.
International Symposium on Computer Architecture (ISCA), 2021.

[1] **Forget Failure: Exploiting SRAM Data Remanence for Low-overhead Intermittent Computation**.
Harrison Williams, Xun Jian, and Matthew Hicks.
Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2020.