Max Hawkins

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Education

Georgia Institute of Technology *Fall 2023 - Current*
PhD in Computational Science and Engineering
Research: *Exploring tradeoffs of system hardware specialization, the impacts of datacenters at scale, and minimizing communication bottlenecks in HPC through compression and SmartNICs*

The University of Alabama – Tuscaloosa *Graduated May 2023*
BSc in Computer Engineering - Minors in Computer Science, Math, and Research GPA: *4.0/4.0*

Experience

NVIDIA *Systems Performance at Scale Intern, May 2024 - Aug 2024*
- Worked on low-level security aspects of datacenter operations and node provisioning
- Dealt with Linux boot processes, NVIDIA kernel modules, and communication protocols to ensure security isolation

NATIONAL RADIO ASTRONOMY OBSERVATORY *Software Engineer Trainee, Jan 2023 - May 2023*
- Developed remote execution capabilities to support petabyte data processing for common radio astronomy pipelines
- Created documentation for new interactive GUIs to support next-generation radio telescope arrays (e.g. ng-VLA)

BREAKTHROUGH LISTEN *Student Researcher, Jun 2022 - Aug 2022*
A 100 million dollar, 10-year research initiative to search for signs of extraterrestrial life through radio and optical astronomy
- Decreased pipeline runtimes by ~30% by implementing an efficient, GPU-accelerated dedoppler algorithm in Julia
- Benchmarked and analyzed existing dedoppler algorithm runtime performance, usability, and features
- Analyzed Fourier-domain dedoppler algorithms' computational and scientific potential for future work

JULIAHUB *Software Engineering Intern, Jan 2022 - May 2022*
A for-profit company that delivers products to make the Julia programming language easy to use, deploy, and scale
- Achieved 89% of the M1 GPU's peak performance on dense matmul with a single-line command via compiler optimizations
- Helped develop a GPU backend targeting Apple's M-series GPUs for the Julia programming language using LLVM
- Expanded Julia's Metal array interface allowing for high-level operations to dispatch to M1 GPUs or other accelerators
- Debugged low-level/LLVM IR errors with LLDB and altered codegeneration to maintain compatibility between Julia/Apple

NOAA GOES-R PRODUCT DEVELOPMENT TEAM *Hollings Scholar Intern, May 2021 - Aug 2021*
A government group handling the creation, validation, processing, and dissemination of satellite weather and climate data
- Developed a cloud-based, interactive data visualization framework serving National Weather Service forecasters
- Demonstrated remote visualization at scale using low-latency data streaming of satellite data

BREAKTHROUGH LISTEN *NSF-Funded REU Participant, Jun 2020 - Aug 2020*
A 100 million dollar, 10-year research initiative to search for signs of extraterrestrial life through radio and optical astronomy
- Demonstrated a ~5x speedup on radio correlation when using CUDA tensor cores on low-precision FP data
- Created a high-level, high-performance data processing framework by integrating C/CUDA code into Julia
- Helped develop the data processing pipeline backend at the MeerKAT radio telescope array handling > 200 GB/s data rates
- Experimented with spectral kurtosis as a general energy detection algorithm

GREEN BANK RADIO ASTRONOMY OBSERVATORY *NSF-Funded REU Participant, May 2019 - Aug 2019*
- Reduced interference data loss by up to 50% at microsecond time resolutions using a custom-trained ML segmentation model
- Created a multi-class semantic segmentation model to classify data as desired signal, unwanted signal, or fast radio bursts

UA ECOCAR *Machine Learning Subteam Lead, Sep 2018 - Dec 2019*
- Created a customized deep learning binary classifier algorithm to determine driver awareness state using TensorFlow
- Managed a team of 15 undergraduate students to apply machine learning toward automotive autonomy
- Gained experience with CAN communication, signal processing, and automotive radar sensor fusion

Awards/Skills

- 2021 UA Goldwater Nominee
- 2020 NOAA Hollings Scholar
- 2021 UA Outstanding Junior ECE Student Award
- Primary Programming Languages: C and Julia
- Experience with: LLVM, LLDB, C++, CUDA, Python, TF, Pytorch, AWS CLI, Microsoft SQL**,** Linux, Git

Publications & Presentations

Max Hawkins, Christian Engman, and Ivan Rocha - "Runtime and Energy Analysis of SpMV Hardware Execution Choice", Energy HPC Conference 2025, Rice University, Houston, TX, February 2025

- Presentation: https://youtu.be/ZYr3d-NgWsE?feature=shared
- Slides: https://f0e64b40-640b-4917-ad65-1c72f230a8a2.usrfiles.com/ugd/f0e64b_401916001a2f4bc38f9a00d078cb8972.pdf

Max Hawkins and Tim Besard, "Metal.jl - A GPU backend for Apple hardware," JuliaCon 2022, virtual, August 2022

- Presentation: https://youtube.com/watch?v=IARikXzRU7s
- Code: https://github.com/JuliaGPU/Metal.jl

M. W. Hawkins, D. J. Czech, D. H. E. MacMahon, S. Croft and A. P. V. Siemion, "High-Performance Radio Telescope Array Data Processing Framework," in 2021 XXXIVth General Assembly and Scientific Symposium of the International Union of Radio Science (URSI GASS), Rome, Italy, 2021, pp. 1-4, doi: 10.23919/URSIGASS51995.2021.9560539.

- Paper: https://www.ursi.org/proceedings/procGA21/papers/URSIGASS2021-Fr-J07-AM2-1.pdf

M. W. Hawkins, "High-Performance Radio Telescope Array Data Processing Framework," Council on Undergraduate Research - Posters on the Hill, Washington D.C., 2021

- Discussed the importance of HPC and SETI research to U.S. Congress members and staffers
- Moved remote due to COVID

Hawkins, M., Lynch, R., Hawkins, L., and Smith, E., "High Time-Resolution Radio Frequency Interference and Single Pulse Pulsar and FRB Detection using Machine Learning Semantic Segmentation," American Astronomical Society Meeting Abstracts, Honolulu, HI, vol. 235, 2020.

Lynch, R. S., Hawkins, L., McCullough, R., Ray, J., Jensen, L., **Hawkins, M.**, Smith, E., "Ultra-wideband Digital Technologies for the Green Bank Telescope," American Astronomical Society Meeting Abstracts, Honolulu, HI, vol. 235, 2020.

Mentorship, Community, and Advocacy

Research Mentorship

Helping students gain research experience

- Elizabeth Hong - GT PURA award 2024 and Fulbright South Korea Semi-Finalist 2025 *Aug 2023 - Current*
- Panya Bhinder *Jan 2025 - Current*
- Multiple freshmen at U. of Alabama through the Randall Research Honors Program *Aug 2019 - Dec 2021*

Graduate Student Advocacy

- College of Computing Graduate Student Advisory Committee Member *Oct 2024 - Current*
- Vice President - School of CSE GSA *Aug 2024 - Current*
- Social Chair - School of CSE GSA *Oct 2023 - May 2024*

K12 STEM Involvement

- STEM penpal for a middle school student through the Letters to a Pre-Scientist program *Oct 2024 - Current*
- Mentored two middle school students as they created/presented engineering science fair projects *Oct 2022 - Jan 2023*