Benjamin C. Carter

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Objective

A current computer science PhD student in the Lab for Research on Adaptive Computing Environments (RACELab) at UC Santa Barbara. A problem-solver at heart, who for fun loves figuring out problems in computing. I am currently conducting research in distributed embedded systems. Specifically, I am investigating novel IoT-to-cloud integration techniques for real-time data inference in support of Physical AI applications and digital twins.

Education

2025–30* PhD Student in Computer Science
Lab for Research on Adaptive Computing Environments (RACELab)
University of California, Santa Barbara

2021–25 **B.Sc.** Computer Science with Emphasis in Big Data Analytics
Grand Canyon University, Phoenix, AZ
– Honors College Student
– Graduated *summa cum laude*, 4.0 GPA

Research Experience

2025– **Student PhD Researcher** RACELab: Lab for Research on Adaptive Computing Environments. University of California, Santa Barbara
– Researching distributed systems for Physical AI
– Researching IoT-to-cloud multiscale integration.
– Joined a DoE funded project on smart agriculture, investigating systems for combining HPC with IoT for real-time data inference for AI+Science applications.

2024–25 **Student Researcher** RESHAPE: REsearch in Software: Human Aspects, Practices, and Education. Northern Arizona University, Flagstaff, AZ
– Researched intersections between AI and open source software development

2024–25 **Student Researcher** Artificial Intelligence And Augmented Reality Lab
Grand Canyon University, Phoenix, AZ
– Built a peer-to-peer dataflow runtime in Python. Used DHTs.
– Presented at the Canyon Undergraduate Research Symposium to university administration. Received remarks of praise from university president.

2021–22 **Student Researcher** Computational AI & ML Robotics Lab
Grand Canyon University, Phoenix, AZ
– Participated in Amazon Deep Racer research
– Explored computer vision principles in Raspberry Pis.

*Expected.

Research Papers / Conference Proceedings

[A1] L. Kurafeeva, **Benjamin Carter**, R. Hartung, A. Subedi, A. Biswas, M. Fay, S. Jha, C. Krintz, A. Merzky, D. Thain, M. C. Vuran, and R. Wolski, "Growflow: Low-latency computational fluid dynamics at the edge for real-time agricultural decision support," in *IEEE Smart Connected Systems and Emerging Technologies Conference*, 2026.

[A2] L. Kurafeeva, R. Hartung, **Benjamin Carter**, A. Subedi, A. Biswas, M. Fay, S. Jha, C. Krintz, A. Merzky, D. Thain, M. C. Vuran, and R. Wolski, *Hybrid edge-hpc systems for low-latency data-driven inference*, 2026. arXiv: 2605.20532 [cs.DC]. [Online]. Available: https://arxiv.org/abs/2605.20532.

[A3] **Benjamin C. Carter**, J. R. Contreras, C. A. L. Villegas, P. Acharya, J. Utzerath, A. O. Farner, H. Jenkins, D. Johnson, J. Penney, I. Steinmacher, M. A. Gerosa, and F. Santos, "Skillscope: A tool to predict fine-grained skills needed to solve issues on github," in *4th International Workshop on Natural Language-based Software Engineering*, 2025. DOI: 10.1109/nlbse66842.2025.00007. NLBSE: 2501.15922 (cs.SE).

[A4] **Benjamin C. Carter**, N. Dilla, M. Callahan, and A. Ambala, "Deepfake detection via facial feature extraction and modeling," *Canyon Journal of Undergraduate Research*, 2025.

Google Scholar

Employment

2026 **Genesis Mission Graduate Student Intern**
Princeton Plasma Physics Laboratory, NJ
– Designed, built, and spearheaded a novel digital twin framework for AI-for-science workflows.
– Framework ties together streaming data, AI surrogate modeling, and HPC simulations for real-time decision making.
– Ran experiments on Perlmutter.

2025– **Teaching Assistant**
– Teaching "Operating Systems" to undergraduate students at UCSB.
– I received a midterm student rating of 4/4.

2023 **Software Engineer Intern**
Benchmark Electronics, Tempe, AZ
– Created a debugging tool to capture logs in embedded devices
– Tool used for client's project
– Recommended by VP of Engineering for future projects
– Used Zephyr RTOS, Embedded C, Nordic SDK, and Python

Talks

2025 **StarfishOS: A Decentralized & Distributed Dataflow Runtime**
Canyon Undergraduate Research Symposium
Grand Canyon University, Phoenix, AZ
– One of two projects selected to represent College of Engineering at research symposium to senior university administration.
– Received praise from university president,
– Report of symposium published in school's newspaper, highlighting my talk.

Projects

2025 ***FrostByteFS* - A file system written in C with FUSE**
– Graduate project to build a complete file system using FUSE.
– Only submission to pass in-class tests
– Supports Git, SQLite, and other uses.

2024–25 **Senior Capstone *StarfishOS*:** Distributed Operating System Research
– Leveraging peer-to-peer networks to create a distributed dataflow runtime.

2024 **Minimalist C Compiler**
– Building a minimalist C compiler with Flex/Bison
– Experimented with a custom Round-Robin approach for register allocation

2023 **Forest Lifecycle Simulator**
– A modeling simulation in OpenGL that simulates the forest lifecycle.

2022 **Console Photo Viewer**
– Built a custom console graphics library similar to *libcurses*
– Used C++ and OpenCV to display images via ASCII

2022 **Virtual Reality Game**
– For class, built an immersive video game including a scene of the player running around a virtual college campus
– Experimented with Unity and custom VR shoes

2019– **Personal Website codingcando.com**
– Built a custom personal website running Flask, MySQL, and NGINX.
– A launchpad for many other personal projects

2019–22 **SchedulED: A Student Tutoring Application**
– Used by the school of 3k for official tutoring record.
– Over 20,000 tutoring sessions in an academic year.
– Presented to School Board Member, receiving praise.

2019–20 **Software Lead for Underwater Robotics Team**
Self-taught and built a custom LAN protocol system that multiplexes video and control signals from one computer to an embedded device
– Socket programming and embedded dev

2017–25 **Autonomous Christmas Light Display**
Created fully-custom hardware and software to control 10k lights to music
– Features a custom UART protocol
– Embedded Systems, Raspberry Pi, Arduino.

2017–19 **VeX Robotics Team Captain and Software Lead**
– Developed automonous routines for robots
– Taught and lead a team to state competition, earning Judges Award for Teamwork in regional competitions.

Awards & Licenses

2025 **Amateur Extra License AJ7GM**
2022–2025 **University President's List** – Grand Canyon University
2021 **GCU Honors College Academic Excellence and Servant Leadership Scholarship**
2021 **Barbara A. McDonald Resilience Award Scholarship**

Other: Teaching & Activities

2026– **UCSB Amateur Radio Outreach Officer**
Responsible for introducing new members to the club as well as spreading awareness of amateur radio.

2025– **UCSB Amateur Radio Club Member**
– Participated in the California QSO competition, making >120 contacts

2022–25 **Scholarship Role as Peer Mentor and Chaplain – "Life Leader"**
– Served as peer mentor/chaplain for four residence halls at Grand Canyon Univ.
– From 2023-25, served as a "head-leader" responsible for overseeing other peer mentors in residence halls.
– In the head-leader role, I inspired and trained five others to successfully take over my role upon my graduation.

2020 **Participant at MIT Hackathon HackMIT**
– Created a dashboard of real-time and crowdsourced wildfire data

2019–21 **Chief Python Instructor**
– Officer in Programming Club in high school.
– Oversaw and taught lessons about Python to ~20 peers in high school