James Crews

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INTRODUCTION

My interests / involvements include **research in ML architecture, the development of digital twins (DTs), and real-time hardware deployment**. I am currently working on my MS thesis on creating specialized solvers for accelerating the simulation of power electronic converters using physics-informed neural networks and real-time deployment on FPGA hardware. This research is in line with my work on Digital Twins for Naval Power and Energy Systems (NPES).

I am seeking a position that is in need of research/development regarding Digital Twin systems and/or implementation of machine learning on real-time systems.

EDUCATION

University of South Carolina **Jan 2024 – Present**
Master's of Science in Computer Engineering, GPA: 3.70 *Columbia, SC*

University of South Carolina **Aug 2021 – Dec 2023**
Bachelor's of Science in Computer Engineering, GPA: 3.85 Columbia, SC

University of Alabama in Huntsville – *Transferred to University of South Carolina* **Aug 2020 – May 2021**
Bachelor's of Science in Computer Engineering, GPA: 3.78 Huntsville, AL

SKILLS & CLEARANCE

Programming Languages & Libraries: PyTorch, Python, MATLAB, C/C++, Assembly, ASP .NET, Java, R, HTML, CSS, React.JS, Typescript, RedwoodJS, Kotlin, Unix OS

Database Management: SQL, PostgreSQL, Firebase, GraphQL, Prisma

Hardware: HDL, VHDL, FPGA, Arduino, ESP32

Clearance: Secret Clearance (*Obtained 08/2024*)

EXPERIENCE

Digital Twin for Navy Power and Energy Systems (NPES) **Apr 2024 - Present**
Graduate Research Assistant - ML & High Performance Computing *Columbia, SC*

- Designed and trained a neural network for predicting system outputs to speed up digital simulation
- Created an optimization algorithm using inverse operation on a trained neural network to select system inputs given a desired output state

Applied Research Laboratory for Intelligence and Security (ARLIS) **May 2024 - Aug 2024**
Research for Intelligence & Security Challenges (RISC) Initiative Intern *[Remote] College Park, MD*

- Worked with Intelligence Community members to understand topics for research in intelligence and security challenges
- Developed an auto-encoder architecture for feature abstraction and size reduction to improve classification models

LEAP-HI: A Data-Driven Fragility Framework for Risk Assessment of Levee Breach **Jan 2024 - May 2024**
Graduate Research Assistant - Hardware/Software Development *Columbia, SC*

- Developed wireless sensor packages with conductivity probes for distributed real-time soil saturation assessment in levees. *NSF Award Abstract # 2152896*

ScholasTech LLC - Wordification **May 2023 - Present**
Development Lead *Columbia, SC*

- Lead an interdisciplinary team, managing communication of linguistic principals into software development
- Developed a "gamified" approach to teaching K-2 children how to spell based on phonics rather than memorization
- Employed LLMs for data generation to curate a custom language database & research in voice generation

Lexington Medical Center **Aug 2019 - Jan 2020**
Software Engineer Intern *Lexington, SC*

- Developed an application to query an outdated medical record database

PROJECTS

Digital Twin Input Optimization Methods | *PyTorch, Python* **Mar 2025 - Present**

- Investigating machine learning algorithms to improve genetic-based optimization methods for digital twin systems

Hardware Accelerated Simulation of Buck Converters using Physics-Informed Neural Networks (*MS Thesis topic)* | *PyTorch, TensorFlow, Python, MATLAB, SPICE, ML, FPGA* **May 2024 - Present**

- The real-time simulation of power converters is necessary for the health monitoring and preventative maintenance to avoid critical failures
- Developed a digital twin of a buck converter for simulation and health monitoring to be deployed on FPGA with a 1ns time-step

ML Brain Tumor Segmentation | *PyTorch, Python, ML, CNN, Transformers* **Feb 2024 - May 2024**
https://github.com/lxaw/mamba-tumor-seg

- Developed an ML model for image segmentation of brain tumors in MRI images using a Mamba model, a competitor to Transformers boasting a faster throughput. Additional approaches using transformers and CNNs were also implemented.

FPGA Projects | *FPGA, VHDL, Assembly, C* **Aug 2023 - Dec 2023**

- Motor Controller: Developed a controller on DE2-115 FPGA for a motor to run as the second hand of a clock
- Calculator: Developed all basic functionality for a CPU in assembly for a simple calculator and implemented on DE2-115 FPGA

Capstone Project: *DKMS* | *ReactJS, Typescript, Firebase* **Jan 2023 - May 2023**
https://github.com/SCCapstone/DKMS

- Worked in a team setting to create a social media platform integrated with Spotify

LEADERSHIP & AWARDS

Presented at IMECE 2024, in Portland, OR - *Distributed real-time soil saturation assessment in levees using a network of wireless sensor packages with conductivity probes. Chowdhury, Crews, Moktar, et. al.* **Oct 2024**

STEM Outreach Award – South Carolina Space Grant Consortium **May 2024**

President's List **Fall 2022 - Spring 2023**

Dean's List **Fall 2020 - Spring 2023**