Nicholas Hoffs

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EDUCATION

UNIVERSITY OF VIRGINIA August 2022 - Present

Computer Science B.S / Mathematics B.A. - 3.9 GPA

- Coursework: Data Structures & Algorithms, Computer Architecture, Math for Data Science, Machine Learning with Graphs, Discrete Mathematics, Linear Algebra, Machine Learning in Robotics
- Clubs & Activities: Assistant-Coach/Player UVA Men's Club Water Polo, Gracie Jiu-Jitsu

EXPERIENCE

Cavalier Autonomous Racing May 2024 - Present, Charlottesville, VA

Perception Team Member

- Trained and integrated NVRadarNet to **boost radar-based opponent detection by 22% IoU** over clustering baseline.
- **Extended trajectory prediction system to support multi-agent inference**, enabling first-ever 4-car autonomous race at IAC CES 2025.

University of Virginia August 2024 - December 2024, Charlottesville, VA

PhD Research Assistant

- Integrated multimodal knowledge graphs (MMKGs) with LLMs for question answering using GNN aggregation and cross-modal attention.
- Designed and curated a **novel QA dataset of 200k+ samples** for training/testing on MMKGs.

Caju AI May 2024 - August 2024

Staff AI Engineer

- Architected a unified evaluation suite for AI pipelines (RAG, entity extraction, sentiment analysis), enabling CI/CD for new models.

Unbox June 2020 - February 2021

Website Developer and Designer

- Built and deployed public resource site using HTML/CSS/JavaScript with GIS API integration; supported thousands of active users.

PROJECTS

Implemented Quaternion-Based Unscented Kalman Filter for 3D Drone Orientation Tracking

- Calibrated raw IMU data (gyro/accel) into physical units using Vicon-based reference alignment.
- Implemented a quaternion-based UKF for real-time estimation of orientation and angular velocity (7D state); included custom quaternion averaging.

Reproduced Mechanistic Interpretability paper in TinyGrad

- Replicated "Progress Measures for Grokking" using TinyGrad; achieved 100% test accuracy on modular addition task.
- Verified learned periodicity via FFT analysis on learned parameters to confirm results.

Trained custom LLM from scratch

- Built and trained a **125M-parameter** GPT model on TinyStories dataset using TinyGrad; supported single-/multi-GPU training via DDP.
- Achieved **1.9 validation loss**; generated coherent English samples after **~16 hours** of training.

TECHNICAL SKILLS

- Machine Learning: PyTorch, TinyGrad, Pandas, LangChain, OpenAI API, FastAPI, postgreSQL, pgVector
- DevOps: Git, GitHub, GitLab, Docker, Jira, AWS Lambda, AWS Step Functions, AWS EC2, Apptainer
- Programming Languages (ordered by fluency): Python, C/C++, SQL, Java, HTML, Javascript, CSS
- Robotics Software/Hardware: ROS2, rclpy, rclcpp, LIDAR, RADAR, Camera, Eigen, Colcon, CMake