

Edwin Baker Herrin

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EDUCATION

Master of Science in Mechanical Engineering December 2024

University of Florida - Gainesville, FL (GPA: 3.48/4.0)

Bachelor of Science in Electrical Engineering December 2021

University of Florida - Gainesville, FL (GPA: 3.56/4.0)

Robotics Coursework: Linear Controls, Control Theory, Nonlinear Control, Optimal Estimation & Kalman Filtering, Robot Geometry 1 & 2, Sensor-based Path Planning, Analytical Dynamics, Autonomous Robotics, Stochastic Methods

ML Coursework: Physics-Informed ML, Applied ML Systems, Fundamentals of ML

Embedded Coursework: Microprocessor Applications I & II (ATMEL and ARM), Digital Design (FPGAs)

TECHNICAL SKILLS

Programming Languages: Python, Embedded C, C++, MATLAB, VHDL, ARM assembly, LABVIEW

AI/ML Architectures: Transformers, CNNs, Neural Radiance Fields (NeRF), Gaussian Splatting (deployed on NVIDIA GPUs)

Libraries and Tools: PyTorch, Tensorflow, Git, Docker, MMDetection3D, Ubuntu Linux, ROS2, Rviz, Gazebo, Simulink, IsaacSim, Omniverse Code, Blender, Altium, Teststand

WORK EXPERIENCE

Graduate Research Assistant

University of Florida - APRILab: Gainesville, FL

August 2022 - Current

- Developed ROS2-based perception and planning systems on embedded Linux (Jetson Nano, Raspberry Pi), using DDS messaging and real-time ML inference.
- Mentored undergraduate teams on system identification, PCB design, and hardware/software integration for autonomous underwater vehicles.

Applications Engineering Intern

Texas Instruments: Dallas, TX

July 2024 - August 2024

- Modified BEVFusion for multi-camera inference in MMDetection3D Python framework on Ubuntu Linux, validating system performance with the NuScenes dataset.
- Wrote internal documentation with Git-linked change tracking and system diagrams to support scalable deployment and debugging.

Research Intern

UF Research and Engineering Education Facility (REEF): Ft. Walton Beach, FL

May 2024 - July 2024

- Conducted fundamental research in approaches to 3D change detection using Neural Radiance Fields (NeRFs) as a 3D map representation.
- Presented results regarding post-hoc quantification of uncertainty in pretrained radiance field maps weekly to researchers and PhD students.

Validation Engineering Intern

Texas Instruments: Dallas, TX

June 2022 - August 2023 (Summers)

- Automated hardware test flows using Python, LabVIEW, and TestStand; documented issues using Jira and Git.
- Validated I2C, and CAN/LIN transceivers against ISO specs with PXIe systems, and MSO58 scopes.

Undergraduate Research Assistant, PCB design and component testing

University of Florida: Gainesville, FL

July 2021 - April 2022

- Developed python code on Raspberry Pi to control 24 actuators for a haptic vest.
- Designed and assembled a Pi-Hat PCB for power and communication between the Raspberry Pi and the haptic actuators.

Teaching Assistant, Circuits I

University of Florida: Gainesville, FL

August 2019 - May 2022

- Instructed 3 lab sections of 12 students each on the use of circuit simulation and analysis software (LTspice and Waveforms). Taught students how to physically realize their circuit designs on breadboards, and ultimately on a PCB.
- Aided students in debugging their bread-boarded circuits, graded lab reports, and made updates to the course manual and laboratory instructions.

PROJECTS

Info-driven Underwater 3D Reconstruction with Gaussian Splatting

University of Florida: Gainesville, FL

December 2024 - Present

- Developed an information-driven path planning algorithm predicting view-dependent loss reduction to optimize robot navigation for underwater 3D reconstruction.
- Implemented A* search and random view selection in Python within the Gaussian Splatting PyTorch framework, comparing reconstruction quality metrics against baselines such as FisherRF using PSNR, LPIPS, and SSIM metrics.

3D Change Detection with Neural Radiance Fields

University of Florida: Gainesville, FL

May 2024 - Present

- Developed a Python-based dataset preprocessing pipeline to merge pose and camera image data from Blender, enabling automated dataset generation, experiment execution, and model evaluation for 3D change detection.
- Explored uncertainty-based 3D change detection by analyzing spatial variance in NeRF density and color gradients using variograms and clustering techniques to identify regions of structural change.

Underwater Action Recognition for Diver-Robot Collaboration

University of Florida: Gainesville, FL

January 2025 - March 2025

- Developed real-time ROS2 gesture recognition system for diver-robot teaming, using a PyTorch transformer-based model trained/inferred on NVIDIA RTX 3070 and deployed with tether connection to a BlueROV2 with Raspberry Pi4.
- Integrated vision, control, and robot response using ROS2 Humble; conducted open-water scuba validation and system debugging for IROS submission.

Physics Informed Machine Learning Project

University of Florida: Gainesville, FL

September 2024 - December 2024

- Collaborated with a team to develop a physics-informed approach for localizing light sources in real-world scenes using Neural Radiance Fields (NeRFs) and Helmholtz reciprocity principles.
- Implemented PyTorch-based surface reflection analysis by detecting sharp RGB gradients in high-density regions of the radiance field, presenting findings in a departmental poster session.

Robust AI Test Event (RAITE) 2024

University of Florida: Gainesville, FL

September 2024 - November 2024

- Built MLOps pipeline with PyTorch for robust object detection for UAV and UGV tracking; tracked metrics and reproducibility using Weights & Biases and REST API integrations
- Deployed models in real-world testing scenarios to evaluate AI system robustness and performance degradation.

Introductory Neural Radiance Fields Program

University of Florida: Gainesville, FL

September 2023 - May 2024

- Developed an easy-to-use PyTorch-based codebase for training and testing vanilla Neural Radiance Fields (NeRFs) on Blender synthetic datasets, with Jupyter notebooks guiding dataset preparation and experimentation. [Try it!](#)
- Released the program on GitHub to provide an accessible introduction to NeRFs, enabling users to understand dataset setup, training, and evaluation without deep prior experience. [Learn More Here!](#)

Modularis - Autonomous Underwater Vehicle Design

University of Florida: Gainesville, FL

September 2022 - September 2023

- Led cross-functional teams of ECE students through two senior design cycles, managing system integration from embedded hardware to ROS2 software deployment for an autonomous underwater vehicle.
- Developed modular ROS2 software stack, advised custom PCB and power subsystem design, and debugged PWM motor drivers and power electronics for underwater navigation and perception.

Electrofisher Design

University of Florida: Gainesville, FL

August 2021 - December 2021

- Worked with a partner to design, build, and field-test a 48 V electro-fishing system to temporarily stun catfish for population sampling. [Link](#)

- Developed a custom PCB for voltage step-down and waveform generation, integrating an ESP32 microcontroller to display adjustable settings on an LCD screen and control output waveforms via ADC and DAC.

Oyster Mapping (Cedar Key, Florida)

University of Florida: Gainesville, FL

August 2021 - November 2021

- Assisted in field data collection using an autonomous surface vehicle (ASV) to survey oyster reefs, integrating Waterlinked Underwater GPS for geo-referencing.
- Developed a Python script to generate underwater mosaics from geo-referenced GoPro footage, enabling visual estimation of oyster and fish populations. [Link](#)

Fish Sex Classification Algorithm

University of Florida: Gainesville, FL

April 2021 - May 2021

- Formulated and tested a hypothesis that fish sex could be classified using scale features imperceptible to humans, collecting high-resolution microscope images from adult Bluegill specimens.
- Trained a Support Vector Machine (SVM) classifier to predict fish sex from scale images with 90% accuracy, providing a non-invasive alternative to traditional necropsy. [Link](#)

Microprocessor Applications II Pong Wi-Fi Project

University of Florida: Gainesville, FL

April 2020 - May 2020

- Programmed MSP432 microcontrollers in embedded C and ARM assembly to implement a custom RTOS with TCP/IP for real-time Pong gameplay over Wi-Fi.
- Designed and integrated a graphics library in C for a capacitive touch LCD screen, enabling user interaction for ball generation and interface control.

PUBLICATIONS

- Z. Zhang, E. Baker Herrin, *et al.*, “Action Recognition for Underwater Gesture Communication in Human Diver and Robot Teaming,” in *Proc. IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, 2025. (accepted)
- E. Baker Herrin, *et al.*, “Lessons from RAITE: Real-World Evaluation of Robust Multimodal Target Detection and Tracking Under Adversarial Attacks,” *Proc. SPIE Defense + Commercial Sensing*, Vol. 13480, Orlando, FL, May 2025. <https://doi.org/10.1117/12.3053971>
- E. Baker Herrin, *et al.*, “SGD11: A Diver Gesture Recognition Dataset for Underwater Human-Robot Collaboration,” *Proc. ICRA 2025 AQ2UASIM Workshop*, Atlanta, GA, May 2025.
- E. Baker Herrin, *et al.*, “Modularis: Modular Underwater Robot for Rapid Development and Validation of Autonomous Systems,” *Proc. OCEANS 2023 - MTS/IEEE U.S. Gulf Coast*, Biloxi, MS, Sep. 2023. <https://doi.org/10.23919/OCEANS52994.2023.10337059>

LEADERSHIP & INVOLVEMENT

- **Volunteer Tutor** with Greenhouse Church for youth in east Gainesville - Aug. 2023 - May 2024
- **Curriculum Chair** in IEEE UF Student Branch - June 2019 - June 2021
- **Vice President of Electrical and Computer Engineering** in UF Gatorloop Design Team - Sep. 2017 - June 2020
- **Certifications:** Scientific and Rescue Diver (AAUS), First AID

PROFESSIONAL AFFILIATIONS

- Member, **SPIE** (International Society for Optics and Photonics)
- Member, **IEEE** (Institute of Electrical and Electronics Engineers)