E. Baker Herrin

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SUMMARY

AI/Robotics Engineer with hands-on experience developing deployable systems across **perception**, **planning**, **embedded platforms**, and **MLOps**. Experienced in building and deploying **ROS2-based robotic systems** with GPU-accelerated inference and autonomous control in real-world testing environments. Strong background in **Neural Radiance Fields**, **Gaussian Splatting**, and distributed training on **HiPerGator HPC**. Comfortable working in **cross-functional teams**, delivering robust, maintainable solutions across the full stack—from hardware validation to ML pipelines.

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

SKILLS

Python, C, C++, Java, MATLAB, SIMULINK, VHDL, ARM Assembly, PyTorch, ONNX, Transformers, Neural Radiance Fields (NeRF), 3D Gaussian Splatting, SLURM, SSH, HiPerGator, GPU compute workflows, MMDetection3D, ROS2, Gazebo, IsaacSim, Omniverse Code, Blender, URDF, XACRO, Git, CI/CD, DDS, Linux, Altium Designer, TestStand, LABVIEW, Weights & Biases, Kalman Filter, PID, Visual Studio Code, Conda, Leadership, Technical Mentoring

PROJECTS

Info-driven Underwater 3D Reconstruction with Gaussian Splatting
University of Florida: Gainesville, FL — *December 2024 - June 2025*

- Created **synthetic and real-world datasets** for underwater 3DGS reconstruction using **Blender**, **Nvidia Omniverse**, and GoPro recordings; estimated poses with **COLMAP** and **Nerfstudio** for baseline evaluations in controlled vs. underwater conditions.
- Led development and team coordination of a **real-time 3DGS training pipeline** for a BlueROV2 platform, integrating **IsaacSim** simulation, ROS2-based navigation, and **Qualisys motion capture** for ground-truth pose tracking.
- Adapted **A* search** and random view selection as baseline controls within the 3DGS **PyTorch framework** to test novel information-driven view selection methods (e.g., FisherRF); benchmarked reconstruction quality using PSNR, LPIPS, and SSIM, and prepared team members for research handoff and continued development.

Underwater Action Recognition for Diver-Robot Collaboration
University of Florida: Gainesville, FL — *January 2025 - March 2025*

- Developed **ROS2 dynamic gesture recognition** system for diver-robot teaming, using a **PyTorch transformer-encoder model** trained on **NVIDIA RTX 3070** and deployed via tether connection to a BlueROV2.
- Performed open-water validation and iterative system debugging as diver and operator; supported successful IROS submission with end-to-end integration of vision, recognition, and control modules.

Robust AI Test Event (RAITE) 2024
Muscatatuck Training Center: Muscatatuck, IN — *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.
- Deployed models in real-world testing scenarios over the course of a week to evaluate AI system **robustness and performance degradation** across 18 real-world adversarial test attack scenarios. Attacks were performed by NSWC Crane and NAWCAD.

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 ROS2 robotics software stack, **advised custom PCB and power subsystem design**, and debugged PWM motor drivers and power electronics.

WORK EXPERIENCE

Graduate Research Assistant (AI/Robotics Research Engineer)
University of Florida - APRILab: Gainesville, FL *August 2022 - June 2025*

- Designed and deployed **ROS2-based robotic perception systems** on **embedded Linux platforms** (**Jetson Nano**, **Raspberry Pi 4**), enabling **real-time multi-target tracking** and **underwater human-robot interaction** using **synchronized sensor fusion** and **machine learning inference**.
- Built a **modular marine robotics research platform** and **underwater tank testing environment** for real-world experiments in **robot perception and control**; developed simulated pipelines in **Blender** and **NVIDIA Omniverse** to generate training datasets for **3D Gaussian Splatting** and **Neural Radiance Fields**, supporting **3D reconstruction**, **change detection**, and **active view planning** research.
- Led and mentored senior design students through iterative development of **PCBs**, **sensor integration**, and **mechanical design** for an **autonomous underwater vehicle (AUV)**; oversaw multiple **design-revision cycles** to deliver a **field-tested AUV platform** used in real-world robotics experiments and contributed to **3 published conference papers and 1 workshop paper in AI/robotics**.

Applications Engineering Intern
Texas Instruments – Dallas, TX *July 2024 – August 2024*

- Collaborated with senior technical mentor to adapt the **BEVFusion 3D object detection algorithm** for **multi-camera inference** within the **MMDetection3D** framework on **Ubuntu Linux**, targeting deployment on **TDA4VM/TDA5VM automotive processors**.
- Diagnosed and resolved a critical **coordinate transform bug** that was degrading BEVFusion's performance on the **NuScenes dataset**, aligning training and inference results with published benchmarks; validated the full pipeline for **reproducibility** prior to **ONNX export** and **quantization**.
- Authored comprehensive **Confluence onboarding guide** covering **BEVFusion pipeline structure**, **training/inference workflow**, and bug resolution steps to accelerate future development and processor integration. Delivered a technical presentation on **Neural Radiance Fields** and **Gaussian Splatting**, and documented **Nerf-Det architecture** as a potential candidate for deployment.

Research Intern
UF Research and Engineering Education Facility (REEF) – Ft. Walton Beach, FL *May 2024 – July 2024*

- Developed a **modular experimental pipeline** for evaluating **3D change detection** using **Neural Radiance Fields (NeRFs)**, automating **dataset generation** in **Blender**, **model training** across hyperparameter sweeps, and **3DIoU-based evaluation** using ground-truth point cloud segmentations from **CloudCompare**.
- Explored **uncertainty quantification (UQ)** methods to detect **structural change** in 3D scenes; delivered **weekly technical briefings** and **monthly research presentations** to **AFRL**-affiliated mentors and peers.

Validation Engineering Internships
Texas Instruments – Dallas, TX *Summers: June 2022 – August 2023*

- Owned **validation of TCAN and other transceiver ICs**, verifying **electrical and timing characteristics**—including protocol-level timing for **CAN**, **LIN**, and **I2C**—against **ISO and customer-specific standards** using **PXIe systems**, **MSO58 oscilloscopes**, and **function generators**. Streamlined test coverage by designing **multi-channel probing setups** to minimize manual instrumentation reconfiguration.
- Designed the **"Current Commander" PCB** to regulate **capacitor bank discharge** for instrumentation loads; created internal **CAN bus protocol documentation** and **TestStand test flow guides** to support handoff.

Circuits I Laboratory Instructor
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 **breadboard** and **PCB**.
- Aided students in **debugging** their bread-boarded circuits, **graded lab reports**, and made updates to the **course manual** and **laboratory instructions**.

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