

Carson Sobolewski

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EDUCATION

Bachelor of Science in Computer Engineering

University of Florida

Spring 2025

Current GPA: 4.0/4.0

RESEARCH EXPERIENCE

Uncertainty Quantification for Object Detection Transformers (DETRs) | Dr. Navid Azizan

- Examined the underlying mechanisms behind object predictions in DETR models
- Proposed OCE, an object-level calibration error for evaluating DETR performance while simultaneously calibrating for optimal separation of positive and negative predictions
- Extensively contributed to both the ideation and implementation of this co-first-author work, which is under review at CVPR 2025

Distribution-Free Out-of-Distribution Correction for Image-based Control | Dr. Ivan Ruchkin

- Led a project on increasing the reliability of image-based controllers by automatically repairing distribution shifts and image corruption using CycleGAN models
- Supported by grant funding from the UF Center for Undergraduate Research's AI Scholars Program

Explainable Counterfeit Part Detection Using DiffLogic Networks | Dr. Domenic Forte

- Providing transparent, rule-based image classification based on the structure of a variational autoencoder (VAE)'s latent space using differential logic gate (DiffLogic) networks
- Creating a classifier for counterfeit parts that is provably reliable and trustworthy

Autonomous Localized Friction Estimation for Small-scale Race Cars | Dr. Ivan Ruchkin

- Leveraging simultaneous localization and mapping (SLAM) and raceline optimization algorithms to push an F1/10th autonomous race car to its limits and compute localized friction estimates
- Designed an algorithm for detecting loss of traction based on discrepancies between IMU and odometry data

Calibrated Safety Chances for Image-based Autonomy | Dr. Ivan Ruchkin

- Created robust evaluators for determining the safety of an autonomous vehicle in top-down images, removing unnecessary information, and combating distribution shift caused by hallucinations in forecasted images from a VAE
- Converted existing CNN controllers from TensorFlow to PyTorch, adapting them to fit our existing codebase
- Assisted with the writing, review, and submission of a second-author paper to L4DC 2024

Pipeline for Automated PCB Reverse Engineering | Dr. Domenic Forte

- Designed a Python pipeline for the creation of PCB design files from images of physical boards obtained through X-ray computed tomography (CT) scans
- Supported by grant funding from the UF Center for Undergraduate Research's University Scholars Program
- Set the primary research direction of this project, working largely independently on a first-author work that is currently under review at ISQED 2025

AWARDS

ECE Undergraduate Research Excellence Award | Recognition

Spring 2024

- Recognized as the top undergraduate researcher in the Electrical and Computer Engineering (ECE) department, comprised of nearly 600 undergraduate students

AI Scholars Program | Research Funding

Fall 2024

- Awarded \$1750 in grant funding to conduct research on automated image repair for vision-based control

University Scholars Program | Research Funding

Fall 2023

- Awarded \$1750 in grant funding to conduct research on automated PCB design reconstruction from X-ray CT scans

Wentworth Honors Study Abroad Scholarship | Scholarship

Summer 2023

- Awarded \$1500 in funding to study abroad in Kyoto, Japan during summer 2023

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| Helen E. Khouri Memorial Scholarship <i>Scholarship</i> | Fall 2022, Fall 2023 |
| <ul style="list-style-type: none"> Awarded a \$1250 academic scholarship two years in a row for being a top student in the ECE department | |
| University Honors Program <i>Recognition</i> | Fall 2021 |
| <ul style="list-style-type: none"> Admitted to the UF University Honors Program, recognizing top incoming undergraduate students | |
| Benacquisto Scholarship <i>Scholarship</i> | Fall 2021 |
| <ul style="list-style-type: none"> Awarded a full-ride academic scholarship based on my recognition as a National Merit Scholar | |
| National Merit Scholar <i>Recognition</i> | Fall 2021 |
| <ul style="list-style-type: none"> Recognized for scoring in the 99th percentile of students taking the PSAT | |
| Bright Futures Scholarship <i>Scholarship</i> | Fall 2021 |
| <ul style="list-style-type: none"> Awarded full tuition to attend Florida public universities based on grades, test scores, and community service | |

PUBLICATIONS

- Y. Park*, **C. Sobolewski***, and N. Azizan, “Identifying Reliable Predictions in Object Detection Transformers,” **Under review** at *IEEE/CVF Conference on Computer Vision and Pattern Recognition*, 2025.
- C. Sobolewski**, D. Koblah, and D. Forte, “A Framework for PCB Design File Reconstruction from X-ray CT Annotations,” **Under review** at *26th International Symposium on Quality Electronic Design*, 2025.
- Z. Mao, **C. Sobolewski**, and I. Ruchkin, “How Safe Am I Given What I See? Calibrated Prediction of Safety Chances for Image-Controlled Autonomy,” *Proceedings of the 6th Annual Learning for Dynamics & Control Conference*, PMLR 242:1370-1387, 2024.

PRESENTATIONS

- 2024 Warren B. Nelms Annual IoT Conference** | *Demonstration* Fall 2024
- Won **best demonstration** out of 26 demonstrations, explaining the functionality of the TEA Lab’s F1/10th cars that operate with a SLAM-based pure pursuit controller
- 2024 MIT Summer Research Program Poster Session** | *Poster Presentation* Summer 2024
- Presented my work on uncertainty quantification for object detection transformers (DETRs) to other MIT Summer Research Program students and MIT faculty/staff
- 2024 Spring Undergraduate Research Symposium** | *Poster Presentation* Spring 2024
- Presented my University Scholars Program work on PCB design file reconstruction
- ECE Department External Advisory Board** | *Demonstration* Spring 2024
- Demonstrated the functionality of the TEA Lab’s F1/10th cars, including both a follow-the-gap controller and a SLAM-based pure pursuit controller

TEACHING

- Assistant Instructor/Mentor** | *Reliable and Safe Autonomous Racing* Spring 2024
- Led a team of first-year students to build F1/10th autonomous race cars and design control algorithms for them
- Undergraduate Peer Instructor** | *Microprocessor Applications* Spring 2023
- Assisted with teaching 90 students the characteristics and capabilities of microprocessors in assembly and C

EXTRACURRICULAR ACTIVITIES

- Treasurer** | *Eta Kappa Nu (HKN) Epsilon Sigma* Summer 2024 - Present
- Serve on the executive board of the IEEE’s honor society, managing finances and creating fundraising opportunities
- Peer Advisor and Ambassador** | *UF Center for Undergraduate Research* Fall 2023 - Present
- Provide guidance to undergraduate students on how to find research opportunities and interact with faculty
- Resident Assistant** | *UF Department of Housing and Residence Life* Fall 2022 - Present
- Mentoring first-year undergraduate students on acclimating to campus life and fostering community development
- Industry Chair** | *Eta Kappa Nu (HKN) Epsilon Sigma* Spring 2024
- Interacted with various companies in electrical and computer engineering to plan info sessions and events