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Troi Williams

I am an AI & Robotics Engineer

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♣ The complete list of sections below are available on my LinkedIn (link) or full CV (link).

Overview

Experienced patented engineer with a strong background in AI, robotics, and aviation. Explored robotics topics in perception uncertainty, autonomy, localization, mapping, deep learning (DL), sensor modeling, optimization, planning, decision-making, and reinforcement learning (RL). Developed and patented frameworks for perception uncertainty that enhance the safety and reliability of robots (like cars, drones, and humanoids). Eager to leverage expertise to drive innovation and have a real-world impact.
****U.S. Citizen and eligible for clearances.****

Selected Skills, Licenses, & Certifications♣

Technologies & Tools	Machine Learning (PyTorch, scikit-learn), Generative AI (LLMs, LVMs), Computer Vision (OpenCV, CNNs), Git, ROS, ArUco, AprilTag, Simulators (Gazebo, Unity3D, Unreal Engine, AirSim), FMEA
Programming	Python, C/C++, Multi-threading, Cython, C#, MATLAB, SQL, Bash, Java, LaTeX, JavaScript, HTML, CSS, PHP
Robotics and Devices	State Estimation (Kalman, Particle Filtering), DJI Inspire/Matrice, Turtlebot, VOXL m500, GPS, Intel RealSense, LiDAR, Sensor Fusion, Vicon MCS, MAVROS, Intel Neural Stick, PX4, Crazyflie, Arduino
Licenses	Private Pilot License w/ Instrument and Multi-Engine ratings + Complex Endorsement
Operating Systems	Linux, Mac OS, Windows, VirtualBox, VMWare, Docker
Communication	English (native), Spanish & German (elementary level), Mentoring, Grant Writing, Project Management

Selected Experience♣

University of Maryland (College Park, MD) **Postdoctoral Research Fellow and Instructor** Dec. 2021 — Present
- Driving an independent line of research exploring various topics–several topics are mentioned in the "Overview" section above.
- Designing novel AI frameworks for camera-based robot perception (including misclassifications with YOLO (Python)) using Generative AI, simulated data, and real data. Deploying solutions on drones and ground vehicles in simulation and the real world.
- Managed 6+ cross-functional student teams to publish at premier robotics conferences and authored grant proposals for Samsung, Amazon, and NSF.
- Instructed "CMSC 426: Computer Vision" in Summer 2025.

University of South Florida (Tampa, FL) **Doctoral Research and Teaching Assistant** Jan. 2016 — Dec. 2021
- Developed and patented a novel perception uncertainty framework for camera and LiDAR sensors.
- Engineered sensor models using simulated and real data for localization with Kalman and Particle Filters. Deployed models to aerial and ground robots.
- Mentored 5+ students, supervised a student deploying the YOLO object detector for a robotics company, assisted in teaching, led various community outreach activities, and authored grants for Ford Foundation, Amazon, Microsoft, FDACS, and USAID.

Intel Corporation (Santa Clara, CA) **Software Development Intern** Jun. 2018 — Aug. 2018
- Worked within Intel FLEX-IT and AIPG to develop a pre-silicon simulator.
- Contributed to nGraph, an open-source C++ deep learning compiler designed to optimize the computation of neural networks.
- Implemented optimized computational operations and ensured execution correctness for deep learning models in simulations.

Cisco (Santa Jose, CA) **Software Development Intern** Jun. 2015 — Aug. 2015
- Analyzed intelligent wireless sensor network protocols for event detection and aggregation in conversation parks.
- Produced a technical white paper that qualitatively evaluated each protocol's effectiveness and robustness under realistic cases.

Norfolk State University (Norfolk, VA) **Graduate Research and Teaching Assistant** Aug. 2012 — Dec. 2013
- Created Tekkodu (link), a programming framework enabling intuitive control of autonomous robotic manipulators.
- Reverse engineered and formalized how Microsoft Kodu Game Lab works–one of the first works to do so.
- Bridged the behavioral gap between a simulated Kodu character and a physical robot using innovative strategies wrriten in C++.

NASA-Johnson Space Center (Houston, TX) **Software Development Intern** Aug. 2011 — Dec. 2011
- Enhanced Project Morpheus' Predictor Guidance software package with legacy NASA (C++) code and authored a best-practices guide to streamline team onboarding.
- Streamlined the analyses for a new rocket engine within the propulsion group.
- Presented products to the Morpheus team, EG6's branch chief, and EG's deputy and division chiefs.

Air Force Research Laboratory (Fairborn, OH) **Software Development Intern** Aug. 2011 — Dec. 2011
- Developed an advanced point-to-point navigation tool (C#) that leveraged GPS and head tracking sensors to simulate real-world soldier training scenarios.
- Supported the development of a real-time multi-user combat simulation environment.

Education

Doctorate of Philosophy (Ph.D.) in Computer Science and Engineering, *University of South Florida* — Aug. 2015 — Dec. 2021
Master of Science (M.Sc.) in Computer Science, *Norfolk State University* — Jan. 2012 — Jun. 2014
Bachelor of Science (B.Sc.) in Computer Science, *University of the Virgin Islands* — Aug. 2007 — May 2011

Selected Publications♣

1. **Troi Williams**. "The SET Perceptual Factors Framework: Towards Assured Perception for Autonomous Systems." *Workshop on Public Trust in Autonomous Systems—The 2025 IEEE International Conference on Robotics & Automation*, 2025. (Paper link)
   Topics: Perception Uncertainty, AI, Simulation, Sensor Modeling & Optimization. **Position Paper in Robotics**.
2. Chak Lam Shek, Kasra Torshizi, **Troi Williams**, and Pratap Tokekar. "When to Localize? A Risk-Constrained Reinforcement Learning Approach." *American Control Conference (ACC)*, 2025. (Paper link)
   Topics: Localization, Planning, Decision-Making, Reinforcement Learning.
3. **Troi Williams**, Kasra Torshizi, and Pratap Tokekar. "When to Localize?: A POMDP Approach." *IEEE International Symposium on Safety, Security, and Rescue Robotics (SSRR)*, 2024. (Paper link)
   Topics: Localization, Planning, Decision-Making. **Best Poster at 2023 MRS**.
4. **Troi Williams**, Po-Lun Chen, Sparsh Bhogavilli, Vaibhav Sanjay, and Pratap Tokekar. "Where Am I Now? Dynamically Finding Optimal Sensor States to Minimize Localization Uncertainty for a Perception-Denied Rover." *International Symposium on Multi-Robot & Multi-Agent Systems (MRS)*, 2023. (Paper link)
   Topics: Perception Uncertainty, Target Localization, Planning, Sensor Modeling & Optimization, Multi-Agent Systems.
5. Harnaik Dhami, Kevin Yu, **Troi Williams**, Vineeth Vajipey, and Pratap Tokekar. "GATSBI: An Online GTSP-Based Algorithm for Targeted Surface Bridge Inspection." *International Conference on Unmanned Aircraft Systems (ICUAS)*, 2023. (Paper link)
   Topics: Localization, Planning, Deep Learning, Mapping, Sensor Optimization, Sensor Fusion.
6. **Troi Williams** and Yu Sun. "Learning State-Dependent Sensor Measurement Models with Limited Sensor Measurements." *IEEE International Conference on Robots and Systems (IROS)*, 2021. (Paper link)
   Topics: Perception Uncertainty, Localization, Transfer Learning, Sensor Modeling. **2021 RSS Pioneers Award**.
7. **Troi Williams** and Yu Sun. "Learning State-Dependent Sensor Measurement Models for Localization." *IEEE International Conference on Robots and Systems (IROS)*, 2019. (Paper link)
   Topics: Perception Uncertainty, Localization, Deep Learning, Sensor Modeling. **Patented**.

Selected Awards & Patents♣

The Presidential Postdoctoral Fellowship, *University of Maryland* — Apr. 2024 — Present
The PROMISE Academy Fellowship, *University of Maryland* — Apr. 2024 — May 2025
CRA Computing Innovation Fellowship (CIFellow), *University of Maryland* — Sept. 2021 — Apr. 2024
RSS Pioneer Award, *Robotics: Science and Systems Conference* — Jul. 2021
Learning State-Dependent Sensor Measurement Models for Localization, *U.S. Patent (link)* — Feb. 2020
Dissertation Grant, *Microsoft Research* — Aug. 2019 — Jul. 2020
Invitation to the 2nd Round–Combating Zika and Future Threats Grand Challenge, *USAID* — Jul. 2016
Ph.D. Fellowships, *Florida Education Fund* ● *Alfred P. Sloan Foundation* ● *National GEM Consortium* — During Aug. 2015 — Dec. 2021
2nd Place, *2014 ARTSI Robotics Competition (Tapia Conference)* — Feb. 2014
Winner, *2013 ARTSI Robotics Competition* — Mar. 2013
Honorary Top Computer Scientists Award, *University of the Virgin Islands* — 2010

Selected Leadership Activities♣

Reviewer, *IEEE (ICRA, IROS, SSRR, Transactions-ASE)* ● *IFRR (ISER, ISRR)* ● *ACM (SAC)* — 2019–2025
IRMAS Track Program Committee, *The 40th ACM/SIGAPP Symposium on Applied Computing* — Oct. 2024 — Apr. 2025
Doctoral Mentoring Program, *University of Maryland* — Feb. 2024 — May 2024
Pioneers Workshop Program Committee, *The Robotics: Science and Systems Conference* — Nov. 2022 — Jun. 2023
Postdoctoral Symposium Planning Committee, *University of Maryland* — Jul. 2022 — Sept. 2022
Range Sensing Session Chair, *The IEEE International Conference on Intelligent Robots and Systems* — Sept. 2021
Resource and Event Coordinator, *University of South Florida* — Aug. 2020 — May 2021
USF College of Engineering Representative, *The 2017 Florida Automated Vehicle Summit* — Nov. 2017
USF Graduate School Recruiter, *The National Society of Black Engineers' 43rd Annual Convention* — Nov. 2017
Undergraduate Student Mentor, *Norfolk State University* — Aug. 2012 — Feb. 2014

Selected Professional Organizations♣

Black in Robotics — Sept. 2020 — Present
Institute of Electrical and Electronics Engineers (IEEE) ● IEEE Robotics and Automation Society (RAS) — Jun. 2019 — Present
Black in Artificial Intelligence — Jun. 2019 — Present
National Society of Black Engineers — Mar. 2017 — Mar. 2018