Courtney R. Smith

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EDUCATION

NORTHWESTERN UNIVERSITY — **Evanston, IL**
Master of Science in Robotics — **December 2024**

GEORGIA INSTITUTE OF TECHNOLOGY — **Atlanta, GA**
Bachelor of Science in Biomedical Engineering — **December 2022**
Minor in Robotics – Controls and Perception

SKILLS

Robotics: ROS2/ROS, Machine Learning, PyTorch, Embedded Systems, Control System Design, SLAM, Gazebo, Rviz, CoppeliaSim
Software: Python, MATLAB/Simulink, C++, C, Java, Linux OS, Git, Cmake, Gazebo, MoveIt, OpenCV, Unit Testing,
Hardware: SOLIDWORKS, 3D Printing, Laser Cutting, Mechatronics, Soldering, Microcontrollers, Oscilloscopes,

PROJECTS

Autonomous Obstacle Course Traversing Drone (in progress) — *Winter 2024*
- Collected and processed a custom image data set to train a detection and classification Machine Learning YOLO model
- Deployed an ML model in real time to inform a controller to command the Tello Drone to avoid the obstacle

Simultaneous Localization and Mapping (SLAM) from Scratch (in progress) — *Winter 2024*
- Developing a ROS2 package in C++ for SLAM on a turtlebot3 both in RVIZ and in real time
- Compiles a differential drive library in C++ to calculate the robot kinematics, odometry, and simulated LiDAR

7-DOF Robot Arm for Autonomous Painting — *Fall 2023*
- Collaborated with a team of 5 to develop a Python ROS2 package for a Franka Panda 7-DOF robot arm to paint
- Developed a Python ROS2 API wrapper to plan and execute trajectories using MoveIt2
- Led employing Realsense camera and Apriltags to calibrate the camera to the scene containing paint, brushes, and canvas

Mobile Manipulation Pick and Place with Kuka youBot — *Fall 2023*
- Simulated a a pick and place task of a mobile manipulator using modern screw theory to generate an end-effector trajectory
- Implemented a feed forward + PI controller to minimize error between actual trajectory and reference trajectory
- Performed physical simulation using an ODE and displayed system in CoppeliaSim

Neural Network from Scratch for Robot Motion — *Fall 2023*
- Coded from scratch a fully connected neural network to learn the next state of a robot given its current state and control inputs
- Utilized mini-batching to decrease model training time and optimized model hyperparameters to get the best model for the aim

EXPERIENCE

Exoskeleton & Prosthetic Intelligent Controls (EPIC) Lab — **Atlanta, Georgia**
Petit Undergraduate Research Fellow — *January 2022 – December 2022*
- Leading a year-long independent research project focused on using machine learning (ML) to optimize exoskeleton control
- Developed and optimized a deep learning model using wearable sensor data in MATLAB and Python
- Evaluated the accuracy of optimized linear regressions, xgboost models, and temporal convolutional networks
- Presented a poster presentation of completed work at an international conference in Canada

Avanos Medical — **Alpharetta, Georgia**
Laboratory Technician — *Spring 2021*
- Performed validation testing on 10+ respiratory, digestive, and pain management medical devices
- Conducted tests including tensile strength evaluation, air flow capabilities, and device life span and durability
- Recorded observations of product successes and failures to use for future design iteration

Research and Development Engineering Intern — *Fall 2020*
- Provided clarification for regulatory bodies in foreign nations pertaining to product design verifications and validations
- Edited 530 drawing specifications in 1 month and tracked technical approvals during the Change Control Process
- Organized design history files and created specifications based on market and product requirements to improve design traceability

PUBLICATIONS

Published:
J.K. Leestma, P.R. Golyski, C.R. Smith, G.S. Sawicki, and A.J. Young, "Linking whole-body angular momentum and step placement during perturbed walking", *(published in the Journal of Experimental Biology)*
In Preparation:
C.R. Smith, J.K. Leestma, G.S. Sawicki, and A.J. Young, "A deep learning approach for estimating whole body angular momentum using wearable sensors" (*in preparation for submission to IEEE Transactions on Biomedical Engineering)*