Henry Buron

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Education

Northwestern University | McCormick School of Engineering **Sep. 2023 – Dec. 2024 (Expected)**
M.S. in Robotics, GPA: 3.71 *Evanston, IL*

William & Mary **Sep. 2019 – May 2023**
B.S. in Engineering Physics, Cum Laude *Williamsburg, VA*

Relevant Coursework

Embedded Systems in Robotics, SLAM for Robotics, Computer Vision, Robotic Manipulation, Machine Learning, Machine Dynamics, Advanced Mechatronics, Classical Mechanics, Ordinary Differential Equations, Linear Algebra

Skills

Software: Python, C++, C, Linux, Bash, CMake, Version Control (Git), Unit Testing, Docker
Robotics: ROS/ROS2, SLAM, Motion Planning, Machine Learning, Computer Vision, Gazebo, ArduPilot
Hardware: Electronics, Microcontrollers (PIC32, RPi Pico), CNC Machining, 3D Printing, CAD (Inventor/OnShape)

Projects

Extended Kalman Filter SLAM on TurtleBot3 | *C++, ROS2, CMake, Unit Testing* **Jan. – Mar. 2024**
- Implemented EKF SLAM algorithm from scratch in a ROS2 C++ package for localization of a TurtleBot3.
- Created a full C++ kinematics control and odometry library for a differential drive robot.

Mobile Robot with Auxiliary Drone Deployment | *ROS2, Python, Multi-Robot System* **Jan. – Mar. 2024**
- Mobile exploration robot built from the ground up; deploys auxiliary drone with autonomous landing capabilities.
- Maps environment using slam_toolbox and provides RViz interface with SLAM and live video from the rover and drone.
- Drone localizes itself with AprilTags and plans a path to autonomously re-land itself on top of the rover.

Polyglotbot: A 7 DoF Robot Arm that Writes Translated Text and Speech | *ROS2, Python* **Dec. 2023**
- Co-developed a ROS2 package for a Franka Emika robot arm that plans and executes cartesian paths.
- Created a custom Python API for the ROS2 Moveit2 package to control the robot arm's motion.
- Localized AprilTags, created speech-to-text functionality, converted waypoints to movement with Moveit2 package.

Machine Learning Emotion Classification | *Python, Image Processing, Feature Extraction* **Nov. 2023**
- Developed a machine learning pipeline for emotion classification in facial images, achieving up to 77% accuracy.
- Employed Histogram of Oriented Gradients (HOG) feature extraction to capture subtle changes and edges.

Computer Vision-Controlled Robot Arm | *Python, Computer Vision, Image Processing* **Sep. 2023**
- Designed pipeline using OpenCV and inverse kinematics to detect, localize, and grasp a purple pen with robot arm.
- Utilized RGB image segmentation, depth map alignment, and coordinate transformation to guide the end-effector.

Unmanned Electric Race Boat | *ArduPilot, Electronics, Autonomous Systems* **Sep. 2022 – May 2023**
- Led a team in building electric catamaran from scratch, earning 3rd place in the competition's Unmanned Division.
- Primarily responsible for ArduPilot integration and electric propulsion systems, enabling autonomous navigation.

Experience

Baltimore Aircoil Company **May 2022 – Aug. 2022**
Mechanical Engineering Intern *Jessup, MD*
- Collaborated with engineers to design intricate sheet metal parts for manufacturing in Autodesk Inventor.
- Enhanced sheet metal design consistency and reduced errors through use of automated updates with parametric models.

William & Mary Makerspace **Sep. 2021 – May 2023**
Makerspace Student Engineer *Williamsburg, VA*
- Operated and managed the Makerspace's 3D printing, electronics, and prototyping services for R&D.
- Led workshops on additive manufacturing, CNC machining, laser cutting, and building FPV drones from scratch.