Henry Buron

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Education

Northwestern University | McCormick School of Engineering **Sep. 2023 – Dec. 2024 (Expected)**
M.S. in Robotics, GPA: 3.81 *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, IoT, Dynamics, Mechatronics, Classical Mechanics, Ordinary Differential Equations, Linear Algebra

Skills

Software: C++, Python, Linux, Bash, CMake, Git, Unit Testing, Docker
Robotics: ROS/ROS2, Computer Vision, SLAM, Motion Planning, Kinematics, Gazebo, ArduPilot
Hardware: Electronics, CNC Machining, 3D Printing, CAD (Inventor/Fusion)

Experience

NASA Jet Propulsion Laboratory **Jun. – Sep. 2024**
Robotics Software Intern *Pasadena, CA*

- Developed ROS C++ packages enabling advanced teleoperation of a mobile robot in hazardous terrain.
- Improved robot stability and control by developing IMU and camera-based algorithms based on robot kinematics.
- Deployed custom ROS packages on NASA's robot, conducting in-field debugging for real-time performance.

Baltimore Aircoil Company **May – Aug. 2022**
Mechanical Engineering Intern *Jessup, MD*

- Collaborated with engineers to design sheet metal parts for manufacturing in Autodesk Inventor.
- Enhanced sheet metal design consistency and reduced errors through use of automated updates with parametric models.

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.

Computer Vision-Based Basketball Trainer | *Python, OpenCV, Data Analysis* **Apr. 2024**
- Developed a virtual basketball trainer that analyzes a video of your basketball shot and provides data-driven feedback.
- Designed an algorithm to track and analyze basketball trajectory and body motion, scoring them on several metrics.

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.

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.