Grayson Gilbert
ACTIVE DoD TOP SECRET/SCI Clearance
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Education

University of Maryland, College Park **May 2026**
Master of Engineering, Robotics GPA 4.0

University of Maryland, College Park **May 2022**
Bachelor of Science, Mechanical Engineering
College Park Scholar – *Environment Technology Economy Scholar Program*
A. James Clark Legacy Scholarship Award Winner | Dean's List Fall 2021, Spring 2022

Technical Skills & Certifications

- **CAD:** Siemens NX, Solidworks, Autodesk Fusion|**Software/Programming**: Python, C++, Linux, Bash | **Simulation/Robotics:** ROS2, Gazebo, OpenCV, MATLAB, Simulink, Arduino, Raspberry Pi |**Development Tools**: Git, Google Test, Docker | **Fabrication**: CNC Routing, 3D Printing, Laser Cutting, Rapid Prototyping
- **Certifications:** FAA Part 107 Remote Pilot, FCC Amateur Radio Technician

Work Experience

Hardware Engineer **April 2024—Present**
Northrop Grumman, Dolphinworks Sonar Development Lab — Annapolis, MD

- Awarded "Top Performer" rating in 2025 (top 10% of employees at job level) for exceptional performance and contributions in engineering and business impact
- Lead mechanical and integration engineer for next-generation multi-spectral Synthetic Aperture Sonar (SAS) sensor
- Modeled production components and tooling in Siemens NX, and produced ASME-compliant drawings for manufacturing
- Developed and performed factory acceptance testing for next generation SAS sensor
- Designed, fabricated, and integrated a man-portable SAS payload onto multiple Autonomous Underwater Vehicles (AUV) platforms; extensive on-water experience as vehicle operations and test lead
- Led SAS mechanical and software integration on customer AUV, and served as subject matter expert; traveled to customer site and integrated directly with customer teams
- Developed Python-based controller to autonomously operate payload, reducing data retrieval and analysis time by 50%
- Developed multithreaded C++ navigation interfaces utilizing serialized UDP data streams to seamlessly bridge embedded sonar hardware with AUV navigation sensors

Model Integration Lead **October 2023—March 2024**
Northrop Grumman Pathways Program — Annapolis, MD

- Awarded "Top Performer" rating in 2023 for exceptional performance and contributions in mechanical engineering
- Developed 5 high fidelity MATLAB Simulink/Simscape models for a complex submersible system including hydraulics, life support, high-pressure air, and 2 ballast models.
- Developed integration and test plans of said models to create one integrated performance MATLAB model
- Established interfaces of several sub-models to ease integration into a larger system level performance model and part of a broader MBSE approach
- Served as main point of contact for all MATLAB modeling related questions on the program, and successfully resolved other teammates problems reducing down time

Hydraulics System Development Team Member **May 2023—October 2023**
Northrop Grumman Pathways Program — Annapolis, MD

- Developed a high-fidelity hydraulics model for a complex submersible using MATLAB Simulink/Simscape, reducing development costs associated with physical prototyping
- Validated the model with hand calculations and real-world data from analogous systems
- Presented hydraulic model to engineering leadership, securing approval for its use in design decisions and trade studies
- Derived system requirements and leveraged the model to modify and verify the design against performance criteria

Associate Manufacturing Process Engineer **August 2022—May 2023**
Northrop Grumman Pathways Program — Surface Mount Technology (SMT) – Baltimore, MD

- Led operator downtime monthly review meeting to recognize and drive SMT manufacturing process improvement
- Oversaw and approved Autoline manufacturing process as lead Duty Engineer on a weekly basis
- Developed and optimized both Stencil Print and Solder Paste Inspection programs to minimize production CCA defects

Technical Experience

Zero-shot Sim2Real Control of Furuta Pendulum **April 2026—May 2026**

Deep Reinforcement Learning Project – College Park, MD

- Achieved zero-shot sim2real transfer of a Proximal Policy Optimization (PPO) reinforcement learning policy to control an underactuated Furuta pendulum
- Trained a robust control policy within a custom Gymnasium environment featuring domain randomization, noise injection, and action latency buffers, utilizing a high-fidelity MuJoCo physics simulation
- Designed and prototyped hardware in SolidWorks, assembling 3D-printed parts with a brushless motor, magnetic encoders, and an ESP32 microcontroller
- Developed dual-core C++ embedded software for the resource-limited ESP32 to evaluate the policy and execute precise Torque Field Oriented Control (FOC)
- Validated system robustness through physical endurance testing, successfully maintaining an active, continuous balance for over an hour

Multi-Agent Robotic SLAM Simulation **November 2025—December 2025**

Autonomous Mobile Robot SLAM Project – College Park, MD

- Designed a multi-agent SLAM architecture in ROS 2 and Webots to coordinate autonomous robot fleet area mapping
- Developed a C++ map-fusion node to mesh distributed occupancy grids from independent robots into a single global map
- Engineered sector-based exploration algorithms for waypoint navigation to survey unknown indoor environments
- Constructed CI/CD pipelines using GitHub Actions, enforcing TDD via GoogleTest to ensure high code reliability

Monocular Perception and Tracking Library **September 2025—November 2025**

OpenCV, DepthAnything, and YOLOv5 Project – College Park, MD

- Engineered a C++ perception module fusing YOLOv5 object detection and Depth Anything models to accurately detect, track, and estimate the 3D position of humans from monocular video
- Developed an object-oriented C++ library using OpenCV 4.10, providing an adaptable framework for implementing advanced monocular depth estimation and tracking in custom robotics applications
- Implemented a robust CI/CD pipeline using GitHub Actions and CMake, TDD and ensuring high code quality across the perception stack
- Architected and deployed the module using Docker, incorporating comprehensive code coverage analysis and automated Doxygen documentation generation

Adaptive RRT-Connect Path Planning Simulation **January 2025—May 2025**

Autonomous Mobile Robot Path Planning Project – College Park, MD

- Implemented Adaptive RRT-Connect path planning algorithm in Python, achieving 97% faster execution (17ms vs 1.6s) in complex robotic navigation scenarios
- Engineered intelligent sampling strategy that improved navigation through narrow passages by 40% using Principal Component Analysis and greedy sampling techniques
- Developed bidirectional tree expansion system with adaptive node selection, reducing path planning time to 56ms in mixed open/constrained environments
- Validated robotic solution in Gazebo simulation using TurtleBot3 across 4 test environments including maze configurations and narrow corridor navigation

Autonomous Barista Robot **November 2024—December 2024**

6-DOF Robot Manipulator Project – College Park, MD

- Developed a ROS2 package to enable autonomous operation of a 6-DOF Universal Robots UR10e manipulator
- Simulated autonomous coffee-making tasks in a custom Gazebo environment, utilizing RViz for sensor data visualization
- Designed and implemented position, velocity, and effort controllers for precise robotic manipulation in a physics-based simulation.
- Applied inverse velocity kinematics to compute joint positions, ensuring accurate tracking of the desired end-effector trajectory

Extended Kalman Filter (EKF) based Linear Quadratic Regulator (LQR) **September 2024—November 2024**

Underwater Optical Wireless Communication (UOWC) Control Project – College Park, MD

- Re-derived and validated results from an IEEE journal paper implementing an Extended Kalman Filter (EKF) algorithm and a Linear Quadratic Regulator (LQR) controller for optimal stabilization of an UOWC system
- Simulated system dynamics and control performance using MATLAB and Simulink
- Developed state-space representations and conducted system analysis for the communication model
- Optimally calculated Kalman and LQR gains to enhance system stability and control performance