

EDUCATION

- **University of Pittsburgh (Swanson School of Engineering/Frederick Honors Col.)** **Pittsburgh, PA**
B.S. - Computer Engineering (Autonomous Systems Focus); GPA: 3.99/4.00 *August 2022 - April 2026*

PROFESSIONAL EXPERIENCE

- **ESTAT Actuation** **Pittsburgh, PA**
Robotics Developer Co-op *May 2025 - Present*
 - Building and commissioning multiple robotic test stands expanding clutch testing capacity by 133%, covering mechanical assembly, electrical wiring, programming, and documentation for long-term use and potential sales to external customers.
 - Directing the assembly and delivery of 6 custom battery boxes for the Suzuki Moqba robot, showcased at the Japan Mobility Show. Overseeing quality control, leading debugging efforts to resolve heating issues, and ensuring a professional final build.
 - Testing new generation rotary clutch prototypes to improve reliability and evaluate longevity. Creating documentation explaining all the steps taken, and using these prototypes to inform design decisions for next generation production clutches.
- **Carnegie Mellon University Robotics Institute** **Pittsburgh, PA**
Undergraduate Roboticist Researcher *April 2023 - Present*
 - **ZOË 2 Rover (Advisor: Dr. David Wettergreen):** (tinyurl.com/zoe2rover)
 - * Assisting in the development of software architecture and the robotic controller implementation for a novel 4-wheeled rover with a unique passive steering mechanism.
 - * Enabling low-level software development for the rover using ROS2 and C++ to interface with motor controllers and encoders via CANOpen protocol.
 - **Underwater Snake Robot (Advisor: Dr. Howie Choset):** (tinyurl.com/humrsCMU)
 - * Implemented High-Frequency Injection methods in Brushless DC thrusters to achieve control at low/zero speeds thus reducing minimum speed by 80% allowing for reduced oscillations in station-keeping control loops.
 - * Deployed station-keeping feature using AprilTags, IMU readings, and Nested PID Controllers to perform robot state-estimation underwater.
 - * Conducted major repairs on the buoyancy module of the robot and assisted in continual electrical/hardware maintenance.
 - **Apple's E-Waste Recycling Project (Advisor: Dr. Matthew Travers):** (tinyurl.com/applecmu)
 - * Labeled datasets consisting of thousands of images for Machine Learning Models to detect screws in e-waste images.
 - * Integrated ROS1 and Python packages to track AprilTags using a Realsense camera for localization of UR3 robotic arm.
 - * Manufactured custom AprilTags using lasercutters and sheet metal manufacturing methods.

LEADERSHIP & ACTIVITIES

- **Robotics and Automation Society (University Rover Challenge/Micromouse)** **Pittsburgh, PA**
Chief Engineer/Integration Lead *August 2022 - Present*
 - Leading a multidisciplinary team of 30 students in engineering a rover, coordinating integration efforts across mechanical, electrical, software, and bioscience teams. (tinyurl.com/roverimages)
 - Mentoring younger students in Onshape, KiCAD, and general manufacturing processes through hands-on building.
 - Securing and managing over \$7,000 in funding to support team development and future growth.
 - Proposed and spearheaded the development of a prototype robotic hand utilizing pneumatics. (tinyurl.com/hydraarm)

PROJECTS

- **Micromouse Robot:** Designed, assembled, and programmed a custom Micromouse robot through iterative PCB development, integrating motor control, IMU, IR sensors, and a display system with low-level embedded programming. Implemented PID control loops for navigation. Placed 3rd in competition at Stony Brook University IEEE conference. (tinyurl.com/goyalmm)
- **An Artistic take on Bipedal Robots:** Created a bipedal robot using Onshape and Arduino to carry a symbolic lantern given to all freshmen, reimagining a campus tradition through an artistic and technological lens. (tinyurl.com/gbipedal)
- **Formula SAE E-Brake Bias:** Developed a 3D-printed e-brake bias system for a Formula SAE racecar using Solidworks, improving performance and usability; won the FSAE Innovation Award for implementation of the project. (tinyurl.com/ebrakeb)

PUBLICATIONS

- M. Nye, A. Raji, A. Saba, E. Erlich, R. Exley, **A. Goyal**, A. Matros, R. Misra, M. Sivaprakasam, M. Bertogna, D. Ramanan, and S. Scherer, "**BETTY Dataset: A Multi-modal Dataset for Full-Stack Autonomy**," in Proc. IEEE Int. Conf. Robot. Autom. (ICRA), 2025. [Online]. Available: (arxiv.org/abs/2505.07266)

SKILLS AND AWARDS

- **Software:** Linux, ROS1, ROS2, Github, Python, C++, C, MATLAB, ARM and RISC-V Assembly, CANOpen, Google Colab
- **Electrical:** KiCAD, LTSpice, Soldering, Arduino, ESP32
- **Mechanical:** Solidworks, Onshape, Milling, Lathe, MIG Welding, Laser Cutting, General Shop Tools
- **Awards:** SSOE Design Expo 1st place Art of Making, Micromouse Competition 3rd place, FSAE Innovation Award, Eagle Scout