

Aragya Goyal

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EDUCATION

University of Pittsburgh (Swanson School of Engineering)

Pittsburgh, PA

- *B.S. - Computer Engineering (Autonomous Systems Focus); GPA: 3.99/4.00*

August 2022 - April 2026

Courses: Data Structures and Algorithms, Embedded Processors, Microelectronics, Digital Circuits

PROFESSIONAL EXPERIENCE

Carnegie Mellon University Robotics Institute

Pittsburgh, PA

• *Undergraduate Robotics Research Intern (Part-Time)*

April 2023 - Present

- **ZOË 2 Rover:** (Link: <https://tinyurl.com/zoe2rover>)

- * Developing low-level software stack for the 2nd generation Zoë Rover set to conduct science in the Atacama Desert including CAN protocols via the ros_canopen package for ROS2 to communicate with encoders and motors.
- * Validating motor/motor controller datasheet specifications via physical testing.

- **Underwater Snake Robot:** (Link: <http://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 improved overall performance of the robot.
- * Implemented station-keeping feature using AprilTags, IMU readings, and Nested PID Controllers to perform robot state-estimation underwater.
- * Conducted major repairs on the robot and assisted in continual maintenance of the robot.

- **Apple's E-Waste Recycling Project:** (Link: <https://tinyurl.com/applecmu>)

- * Created large datasets for Machine Learning Models to detect screws in e-waste images.
- * Integrated ROS and Python packages to track AprilTags using a Realsense camera for localization of robotic arm.
- * Manufactured custom AprilTags using lasercutters and sheet metal manufacturing methods.

RELEVANT EXPERIENCE

Society of Astronautics and Rocketry

Pittsburgh, PA

• *Chief Engineer (Student Led Organization)*

August 2022 - Present

- Leading a group of approx. 30 students to design and fabricate a rover to participate in the University Rover Challenge. (Link: <https://tinyurl.com/roverimages>)
- Acquiring and managing over \$7000 in funding for the team.
- Led the development of a prototype robotic hand using pneumatics. (Link: <https://tinyurl.com/hydraarm>)

FIRST and VEX Robotics

Exton & Royersford, PA

• *Team Captain/Design Engineer (Student Led Organization)*

August 2018 - June 2022

- Designed six robots in Solidworks across four years. All robots qualified for higher level of competition including Worlds.
- Mentored younger students about robot design and manufacturing through workshops and general building.
- Won the VEX Judges Award, FIRST Excellence in Engineering Award, FIRST Industrial Design Award, and the FIRST Chairman's Award. (VEX Link: <https://bit.ly/3w7a6b1>) (FIRST Link: <https://tinyurl.com/dwbot17>)

PROJECTS

- **STM-32 Elevator Simulator (ARM Assembly, Project Integration):** Designed and Implemented software architecture in ARM Assembly to operate a physical elevator simulator PCB. (Link: <https://tinyurl.com/stmelevator>)
- **Custom Cane (Human Centered Design, Solidworks):** Designed and fabricated a Walker-Cane Fusion to increase bathrooms accessibility for wheelchair users. Won first place at the Senior Design Expo. (Link: <https://tinyurl.com/CustomCane>)
- **Formula SAE E-Brake Bias (Solidworks):** Developed an e-brake bias system for a formula style racecar, utilizing Solidworks and 3D printing technology to enhance performance and usability. Won the FSAE Innovation Award for the design and implementation of the project. (Link: <https://tinyurl.com/ebrakeb>)
- **Formula SAE Low-Cost Slip Angle Sensor (OpenCV, Raspberry Pi):** Worked to design and code prototypes of sensors which would allow for validation of slip angle using mouse sensors, digital cameras, and IMU's.
- **String Art Generator and Optimizer (Research, Python):** Developed an innovative string art optimization tools and GUI using Python programming to improve upon existing string art generators. (Link: <https://tinyurl.com/goyalstring>)
- **Silicon Prosthetic Hand (Research, Solidworks):** Designed and Manufactured prototype prosthetic hand with silicone soft actuators and tested with human participants for AP Research Project. (Link: <https://tinyurl.com/myprosthetic>)
- **Bird Sanctuary Restoration (Eagle Scout Project, Volunteering):** Organized a project to restore parts of the Audubon Bird Sanctuary by painting fences, guardrails, and small buildings. (Link: <https://tinyurl.com/goyaleagle>)

SKILLS AND AWARDS

- **Languages:** Python, C++, ARM Assembly
- **Technologies:** Linux, ROS, ROS2, Docker, Github, Solidworks, MATLAB, Microsoft Products, Microcontrollers, OpenCV
- **Manufacturing:** Milling, Soldering, Laser Cutting, General Shop Tools
- **Awards:** Dean's Honor List (2021-Present), Honor List (2021-Present), Eagle Scout

CMU Research

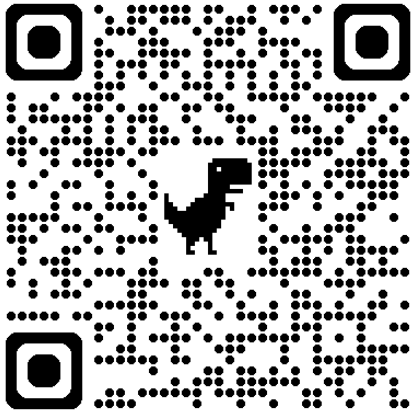


Figure 1: Zoë Rover

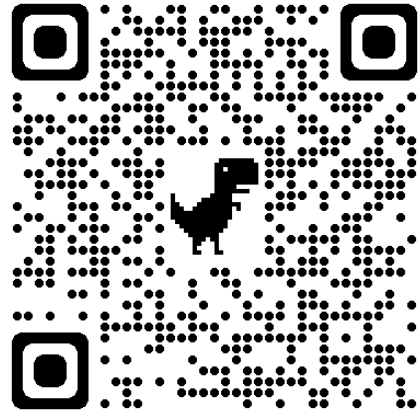


Figure 2: Underwater Snake Robot

Finished Projects

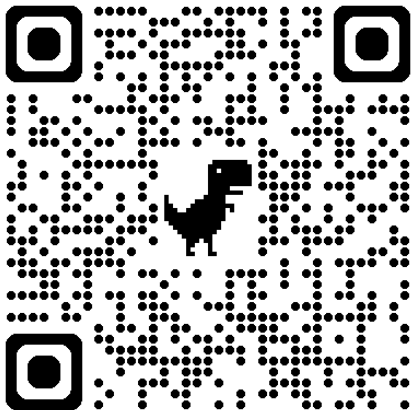


Figure 3: STM32 Elevator Simulator

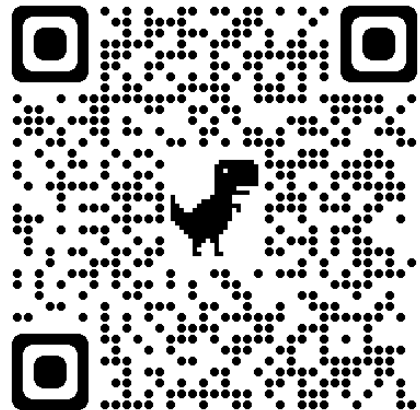


Figure 4: Custom Cane

High School Robotics

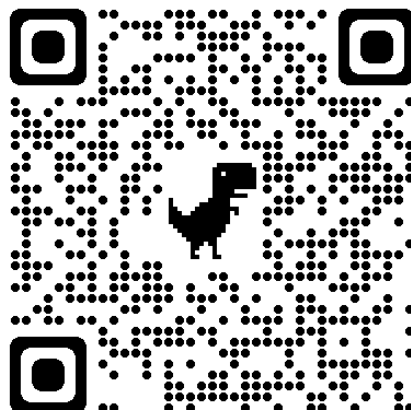


Figure 5: Dewbot XVII



Figure 6: VEX Robotics