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Aragya Goyal

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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*

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

Professional Experience

- **Carnegie Mellon University Robotics Institute** **Pittsburgh, PA**
  Undergraduate Roboticist Intern *April 2023 - Present*
  - **ZOË 2 Rover**: (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.
    - Developed and conducted validation of motor and motor controller datasheet specifications via physical testing.
  - **Underwater Snake Robot**: (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**: (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.

Student Organizations

- **Society of Astronautics and Rocketry** **Pittsburgh, PA**
  Chief and Integration Engineer *August 2022 - Present*
  - Engineering and integrated a rover to participate in the University Rover Challenge. (tinyurl.com/roverimages)
  - Leading a multidisciplinary team of 30 students, coordinating between mechanical, electrical, software, and science teams.
  - Securing and managing over $7,000 in funding for team development and future growth.
  - Proposed and led the development of a prototype robotic hand using pneumatics. (tinyurl.com/hydraarm)

- **FIRST and VEX Robotics** **Exton & Royersford, PA**
  Team Captain/Design Engineer *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: bit.ly/3w7a6b1) (FIRST Link: 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. (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. (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 implentation of the project. (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. (tinyurl.com/goyalstring)

Skills and Awards

- **Languages**: Python, C++, ARM Assembly, RISC-V 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

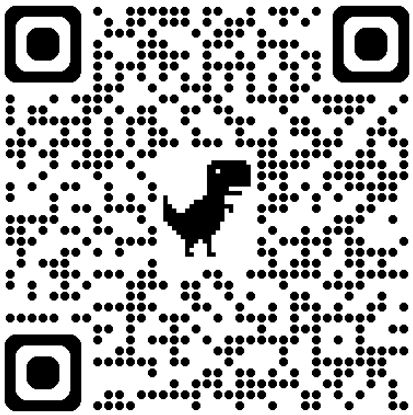

Figure 1: Zoë Rover

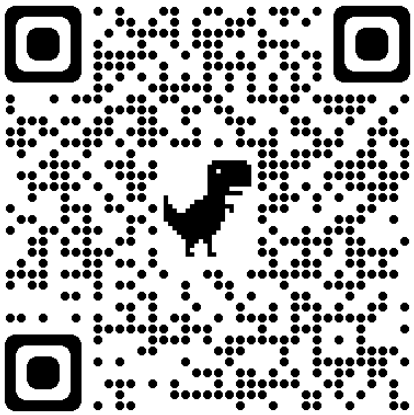

Figure 2: Underwater Snake Robot

Finished Projects

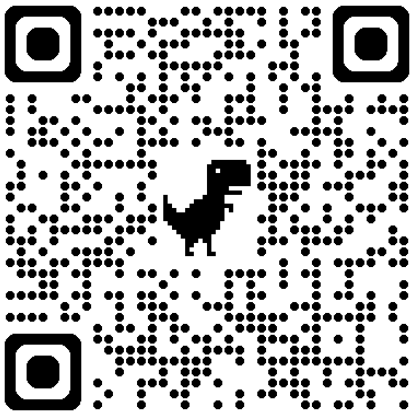

Figure 3: STM32 Elevator Simulator

Figure 4: Custom Cane

High School Robotics

Figure 5: Dewbot XVII

Figure 6: VEX Robotics