

Aaron Omadutt

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Education

Swarthmore College | [Swarthmore, PA, USA](#)

May 2024

B.Sc: Engineering (General) & **B.A:** Mathematics (Applied)

Technical Skills

Engineering & CAD: Mechatronics & Embedded Systems, R&D, PCB design, Inventor, Fusion360

Math & Programming: Modeling, Control Systems, Kinematics, MATLAB, Python, C

Experience

Mechatronics Engineer | [Leibniz-Institut für Astrophysik Potsdam \(AIP\)](#) April 2025 – Present

- Design and develop high-precision mechatronic components for a robotic fibre positioner system intended for the Wide-field Spectroscopic Telescope (WST).
- Integrate mechanical, electronic, and software subsystems to meet stringent precision, reliability, and environmental standards required for spectroscopic surveys.
- Collaborate with a 23-institution, 10-country consortium on WST engineering design, leveraging shared expertise in optical telescopes and spectrograph systems.
- Contribute to design trade-off studies for sustainability, open data systems, and risk-mitigated deployment strategies within WST's €800M development plan.

Undergraduate R&D Engineer | [Swarthmore College](#)

June 2023 – Jan. 2024

- Developed a biomimetic robotic system for NSF-IOS 2136018, replicating barnacle nauplii swimming techniques for hydrodynamic studies.
- Designed and simulated nitinol spring housing using Fusion360 and MATLAB, ensuring biologically accurate limb movement and component compatibility.
- Created a custom PCB and control circuit with an ESP32 microcontroller, achieving multi-limb actuation with C-based algorithms for synchronized, sinusoidal motion.
- Analyzed actuation patterns in MATLAB, achieving a $90\% \pm 5\%$ match with nauplii swimming, validated through motion tracking alignment.

Projects

Omnidirectional Sorting Robot

github.com/Swarthmore-Robotics/Swerve-Drive

- Designed and implemented an autonomous omnidirectional drivetrain robot equipped with a web camera for intelligent sorting to simulate industrial workplace scenarios.
- Used Fusion360 to design CAD models and generate CNC milling toolpaths for robot fabrication.
- Assisted in Java-based control systems programming, including implementing swerve drive kinematics, tuning PID controllers, and developing teleoperational and autonomous object detection.

Modeling Path Trajectories and Object Avoidance for a Differential Drivetrain Robot

- Modeled a differential drivetrain robot using kinematics, dynamics, and control theory to simulate motion and optimize path planning in dynamic environments.
- Developed and implemented potential field-based guidance and collision avoidance algorithms in MATLAB for real-time and preplanned trajectory execution.