James C. Marwell

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EDUCATION

Stanford University, currently enrolled in Mechanical Engineering Major *September 2023 – Present*
Lick-Wilmerding High School *August 2019 – June 2023*
Coding Temple Full-Stack Bootcamp *June 2023 – September 2023*
The School for Ethics and Global Leadership, Washington, D.C., Spring 2022 Cohort *January 2022 – May 2022*

ENGINEERING EXPERIENCE

Mytra Inc., Warehouse Robotics Company Based in Brisbane, California *June 2025 – September 2025*

- Mytra is building **high load warehouse automation robots**. Each robot navigates through a 3D matrix of 8'x4'x4' steel cells to organize packages on standard pallets with a **max load of 3000lb** and **max speed of 20mph**. Once a package is in a cell it sits on a pallet, which sits on Mytra's custom **Cell Tray (CT)**, which can either be statically placed on brackets within a cell or lifted by the robot for movement. The company is in production and their first set of full systems has been installed.
- Worked as summer Hardware Test Engineering Intern for the Systems Engineering team. Performed all test reporting (CONOPS, fixture documentation, etc.) for all testing performed/designed.
    - Designed, modeled, and began construction of a **5000lb Cyclic Loading Fixture** for **Mytra's Cell Tray (CT)**. This was the Verification & Validation subteams first permanent fixture (previous testing fixtures were quick/temporary), intended for FEA validation, and production verification (lower cycle). The fixture itself was designed to withstand the 5000lb loading conditions under high-cycle conditions. One cyclic loading test constitutes **200k cycles**, with an intended fixture **lifespan of 5-10 years** and **10M+ cycles** (with maintenance on hydraulics). The linear actuation is managed through dual sets of hydraulic actuators with relevant mounting feet, retaining geometry, and mechanical stops. System controls rely on in-line pressure transducers, SMT-32 dev boards, and solenoid hydraulic valves. I performed trade studies, interfaced with suppliers, and provided my PO with final quotes for all COTS and custom machined components (JLCCNC, Oshcut). The final BOM constituted roughly ~$40k in components, but ~$15k of which can be reused for future testing (hydraulic pump/infrastructure).
    - Managed and began construction of a **800lbf Cyclic Fatigue Fixture** for **Mytra's Cell Brackets**. This fixture instead used a pneumatic system to directly load both sides of the custom bracket with ~800lbf, intended again for FEA/production verification/validation. This test has a cycle count of **50k cycles/test**, with an expected lifetime of **2-3 years and 1M cycles**. The decreased lifespan is in large part due to the **8020 frame** in contrast to the hydraulic fixture's **3"x3" SS square tube frame**. The decreased cost, however, allowed the team to build 2 more identical fixtures, tripling testing rate. The control systems were made identical to that of the hydraulic fixture for uniformity, only altering the type of valve for system compliance.
    - Designed, built, and operated a semi-permanant fixture for **Ribbon Cable Fatigue Testing**. The primary goal was to validate & characterize cable failure rates at differing bend radii. The fixture consisted of four 3D printed brackets, mounted to a Zaber linear actuator and Thorlabs optics board. I performed testing at R = 20mm, 25mm, and 30mm. The lifespan of the cable increased from **~45k cycles to ~200k cycles** with increased radii, reflecting the approach of the copper's fatigue strength.
    - Built and Operated a series of quick-test fixtures, including: a **Permanent 8ft Pallet Verification Fixture**, used to verify that the systems intended load size could fit, and to validate beam squaring/leveling; a **Temporary Polycarbonate Vibe/Bowing Fixture**, used after the manufacturing team discovered crack propagation of screw torquing to verify that vibration/bowing would not accelerate crack propagation; a **Permanent Thermal Impedance Setup** used to measure the thermal impedance on the robot's charging pads and validate integrated type k thermocouples.

Navier Boat, Electric Hydrofoiling Maritime Company Based in Alameda, California *June 2024 – September 2024*

- Worked as summer Mechanical Engineering Intern for the Mechanical Engineering team.
    - Designed, modeled, and built a **High Voltage Power Distribution Unit (HVPDU)** streamlining the hardware in two previously installed power distribution systems. The combination of these two power systems reduced space consumption within the boat's electronics bay by roughly 1 cubic meter and cut approximately 40kg of weight.
    - Made extensive modifications to previously manufactured **carbon fiber cowlings**. After receiving these cowlings, designed to conceal the boat's motors and their control boxes, several major errors were identified that prevented mounting and fitment. Both constructive and destructive modifications were made, whether adding custom carbon fiber blocks to ensure proper fitment or removing excess material (i.e., screw mounting holes, cable clearance, etc.).
    - Designed and manufactured a **variety of production jigs** for changes to the company's first production boat. The application of these jigs included: mounting the bow eye, temporarily covering the electronics bay with an easy to remove platform, and custom mounting plates for wire harnessing.
    - Assisted with **boat wiring** and **miscellaneous mechanical design.**

BETA Technologies, eVTOL Aerospace Company Based in Burlington, Vermont *June 2022 – June 2023*

- Worked as summer Mechanical Engineering Intern for the Demonstration, Electronics, Manufacturing, and other teams.
    - Designed and built multiple physical demos, including a **mock battery demo** and parts of an **inverter demo**. These demos were used to highlight BETA's innovations to investors, school groups, and other educational institutions. They are

also used to teach BETA employees about the technology other teams are working on to cultivate greater company wide understanding of the plane as a whole.
    - Designed, modeled, and fabricated several jigs including **battery cooling tube cleaning and processing jigs** and a **stator welding jig**. Jigs were used to increase efficiency and precision of a given process: cooling tube foreign object debris (FOD) removal, cooling tube sandblasting, and stator wire ultrasonic welding.
    - Designed, modeled, fabricated, and wired various parts for the company's new **battery lift cart** which enables rapid installation and removal of the batteries into the plane by one to two operators. I worked on a **lift orientation system** to both position and level the cart, using a collection of sensors for distance and location orientation. I also built several safety features including a variety of 3D-printed **safety cover plates** to prevent accidental harm to machine or persons.
- Transitioned to a virtual role building online interactive demonstrations for the Study Hall team.
    - Designed, programmed, and animated a series of virtual demos to exhibit BETA's technologies using Unity, Blender, p5.js, and C#. Demos included: **pulse width modulation**, an **interactive charge map**, **virtual batteries**, and a **virtual motor**.

Stanford Archaeology Center, Amphorae Analysis Research Assistant *January 2024 – Present*

- Designed and executed a series of **finite element analysis testing scenarios** on a collection of Greek and Roman Amphorae collected from the Mediterranean. This testing was performed to give insight in Classical design evolution, specifically as the Roman Empire declined.

SKILLS

Skills: Design, Blender, Solidworks, Onshape, Fusion 360, Rhino, Additive Manufacturing (FDM, SLA, DLP), Subtractive Manufacturing (Wood, Plastics, Metal), Python, JavaScript, C#, p5.js, MBSE