Logan Garby

Engineering Portfolio

Table of Contents

Introduction

Hey there! I'm Logan, a Mechanical Engineer with a passion for innovation and problem-solving. Growing up in Boulder, Colorado, I developed a love for the outdoors, which fueled my devotion for sustainability and renewable energy solutions. From designing high-voltage battery systems for electric vehicles at Lucid Motors to leading mechatronics projects at Cal Poly, I've always been drawn to cutting-edge technology that makes a positive impact on the world.

Outside of work, you'll find me socializing with friends, golfing, cooking, lifting weights, working on personal engineering projects, and spending time outdoors like camping, fishing, skiing, mountain biking, and discovering new places. I also love to play guitar and tennis.

Projects at Lucid Motors

- Thermal Runaway (TR) Detection
  - Responsible to developing novel TR detection system for the Lucid Gravity program.
  - Sole project leader and DRE responsible for delivering deeply cross functional system.

- Busbar Cost-Optimization
  - Re-sourced and redesigned nearly all pack busbar resulting in a cost savings of over $100 per vehicle.

- Battery Disconnect Unit Redesign
  - Currently designing next generation of battery disconnect unit.
  - Packaging and optimizing contactors, fuses, and battery management system hardware.
  - Using comprehensive battery system knowledge to drive design.
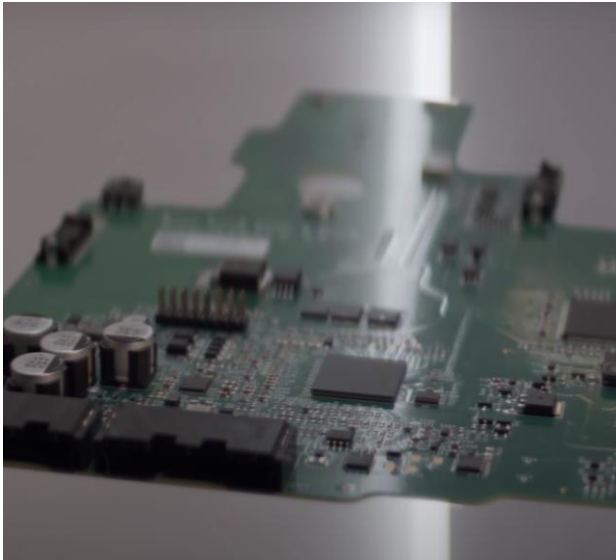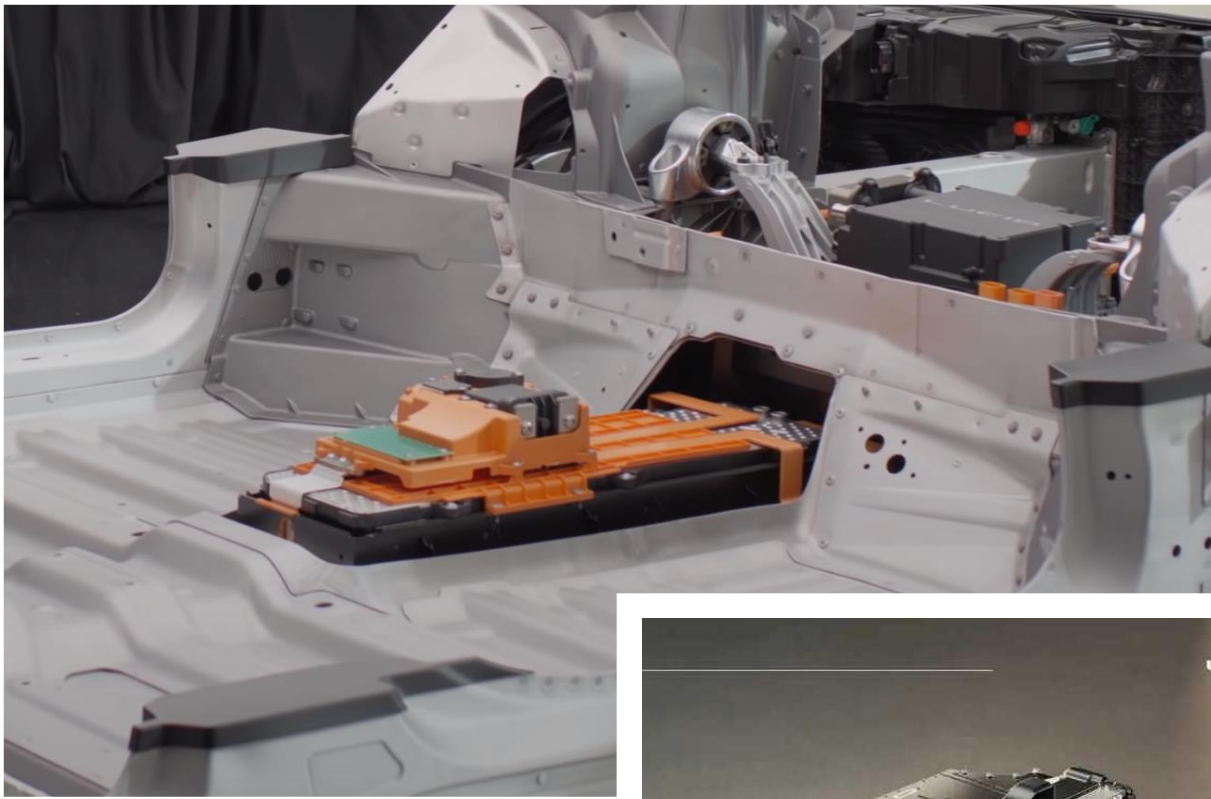
Solar Tracking Mechanism

My senior design project for the Cal Poly Solar Regatta Team tasked us with designing and building the mechanism on a solar powered boat to continuously point the solar panels at the sun throughout the duration of the race. The goal of this system was to increase the available power for the boats propulsion by improving solar capture efficiency.

- Designed, built, and coded all electromechanical systems and mechatronics.

- Led the in-person team (project occurred during COVID) to manufacture the product.
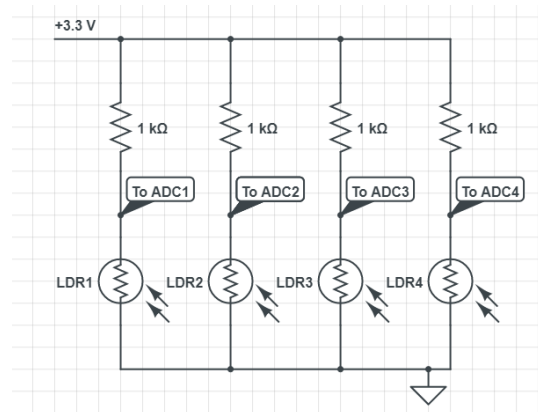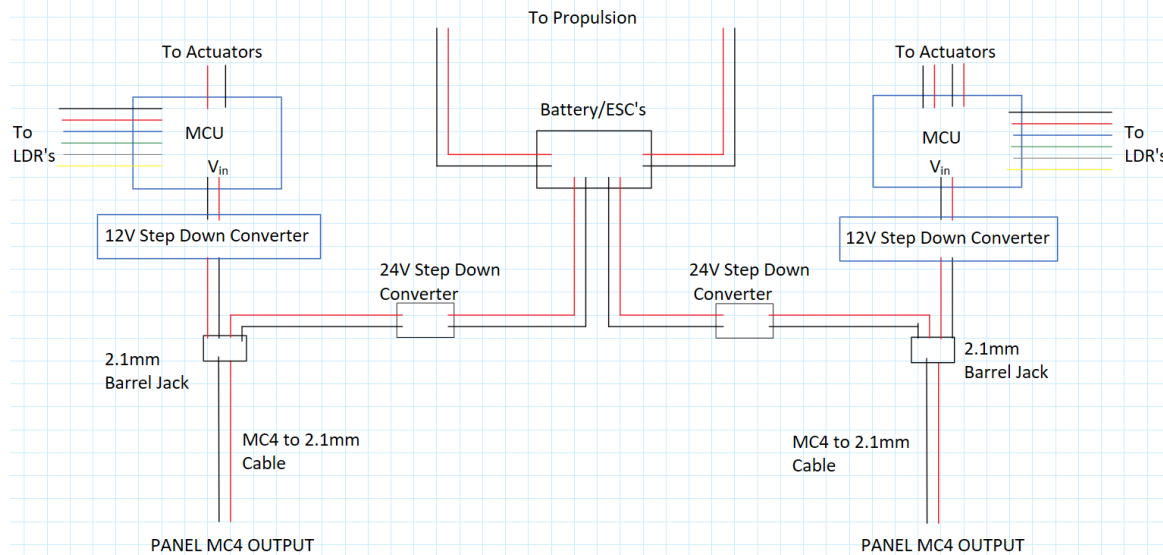
Solar Tracking Mechanism

Check out this [YouTube link](#) for a video demonstration of the tracker

- **Top Left:** Nucleo STM32 microcontroller and motor driver used to control system, read LDR circuit, and power actuators.

- **Top Right:** CAD rendering of entire competition race boat including propulsion, steering, and solar panel mechanism.

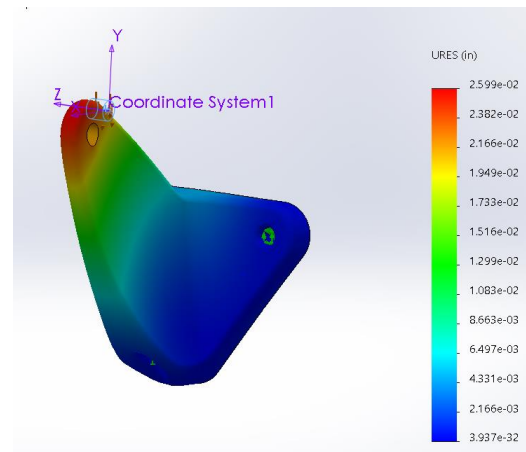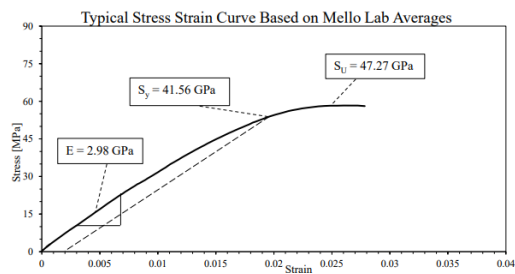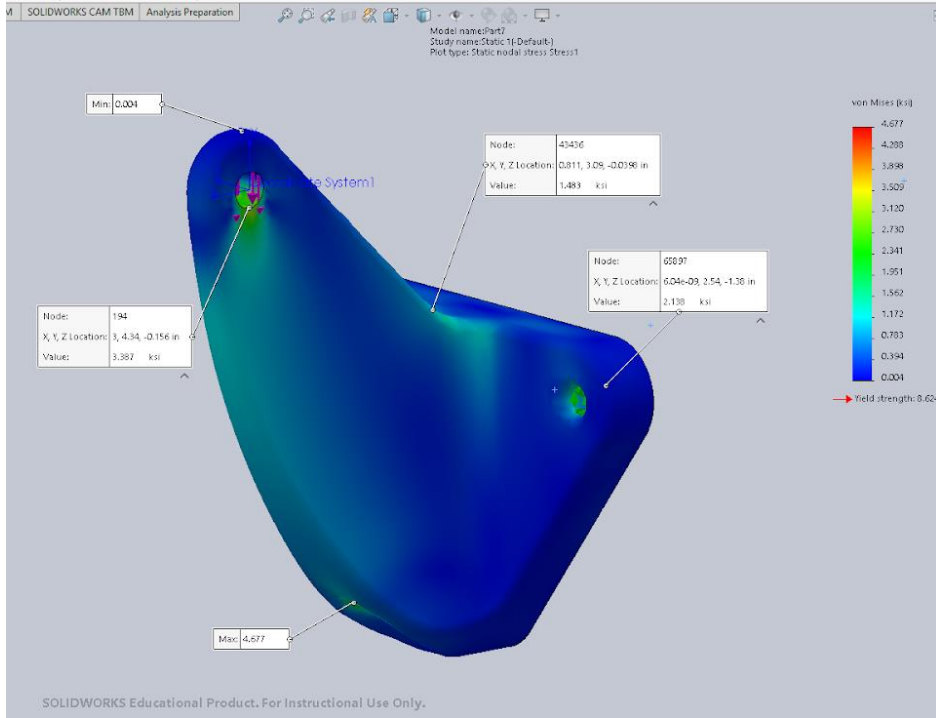- **Bottom:** Completed and working solar tracking mechanism
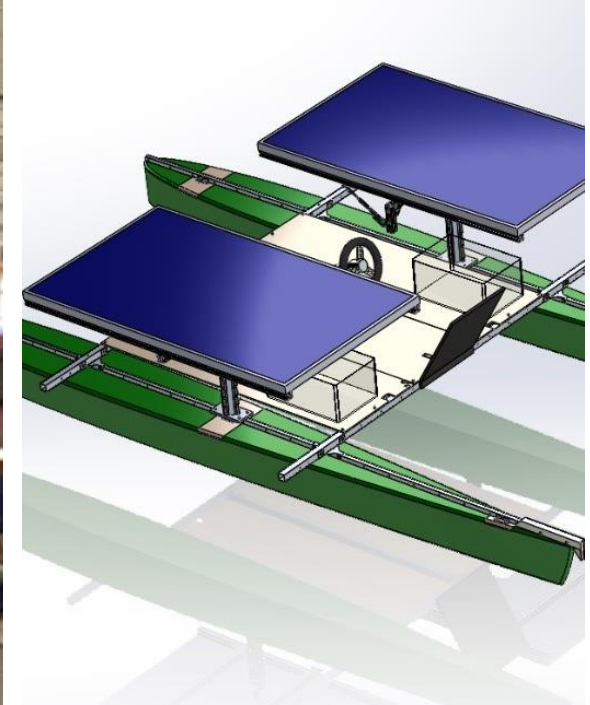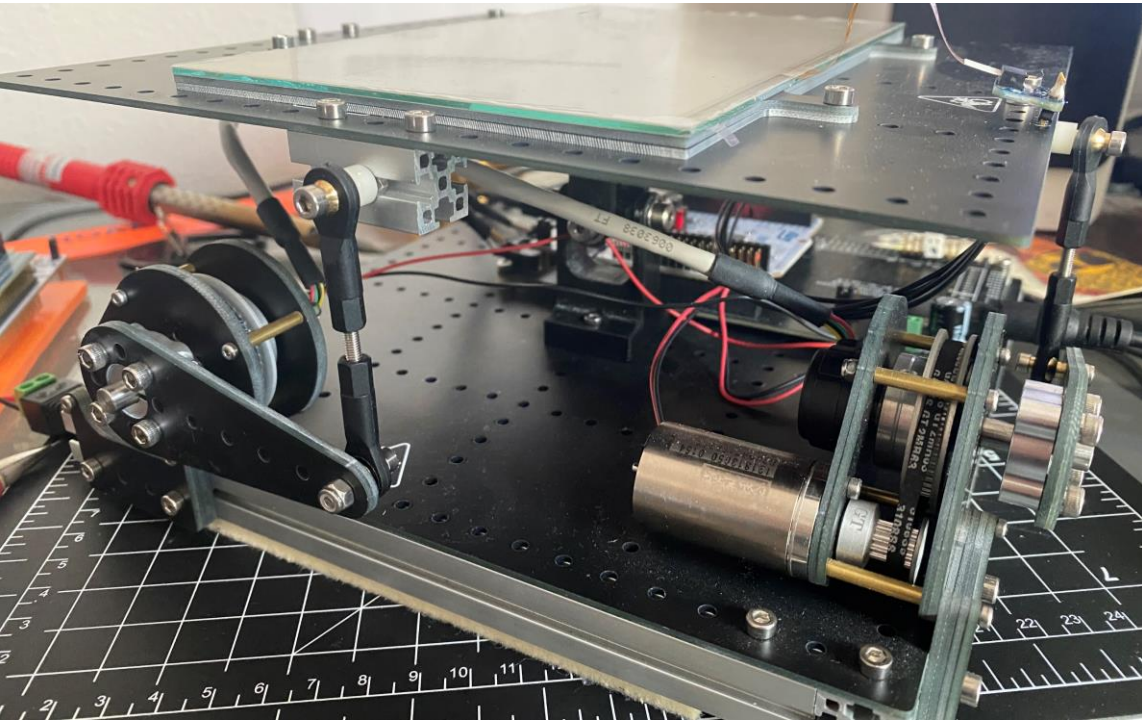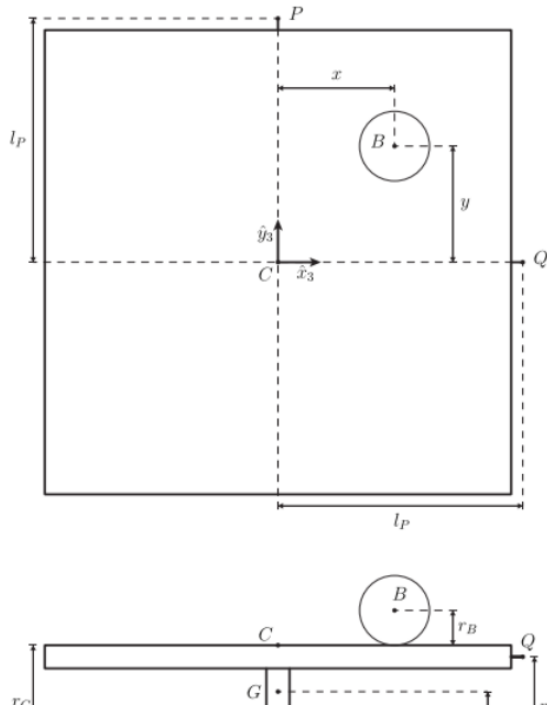
Mechatronic Balancing Board

- A year-long project for my mechatronics concentration, which tasked me with keeping a ball balanced on a platform despite being disturbed.

- Applied kinetics and kinematics to create equations of motion and solve them, obtaining a 4th order state space matrix representation.

- Used symbolic MATLAB to perform a Jacobian linearization.

- Utilized classical control theory and Simulink to model closed loop PD system control.

- Assembled/soldered components and programmed a microcontroller to control the system using Python.

- **See it in action with this YouTube link**

- **Visit this website for the python documentation and other mechatronics projects:** lgarby.bitcucket.io

Fuel Tank Fixture Design

- Given specific geometric requirements, allowable deflection, and maximum load, I was tasked to design a part that minimized material used while meeting requirements.

- Tensile strength tested chosen material (PLA).

- Analyzed test data to get experimental tensile strength, yield strength, and modulus of elasticity.

- Conducted a multitude of SolidWorks FEA simulations.

- Used a weighted decision matrix to narrow down best designs.

- 3D printed and tested final design which held 2.35 times the designed load.

Thank You