Project Portfolio

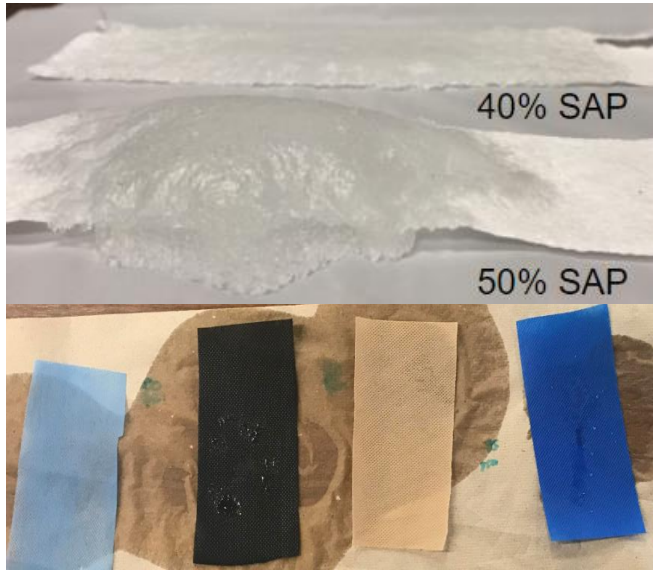
Siddharth Kurwa
B.S. Mechanical Engineering Honors (Dec 2018)
University of Texas at Austin
https://skurwa.github.io

Contents

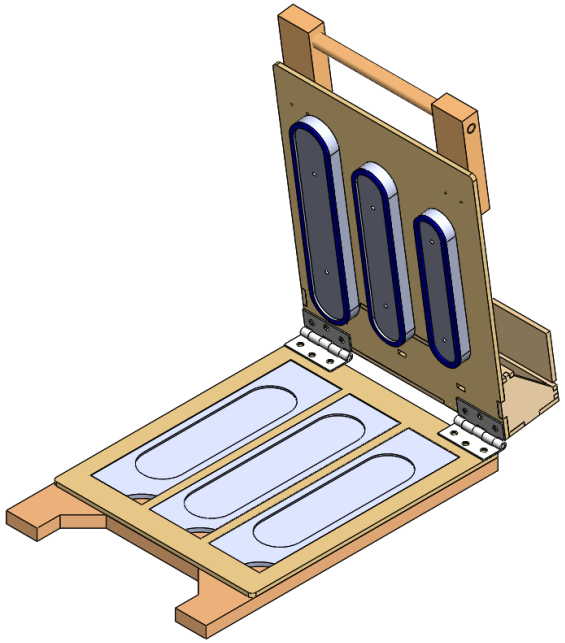
Academic Projects

Menstrual Pad Fabrication Device

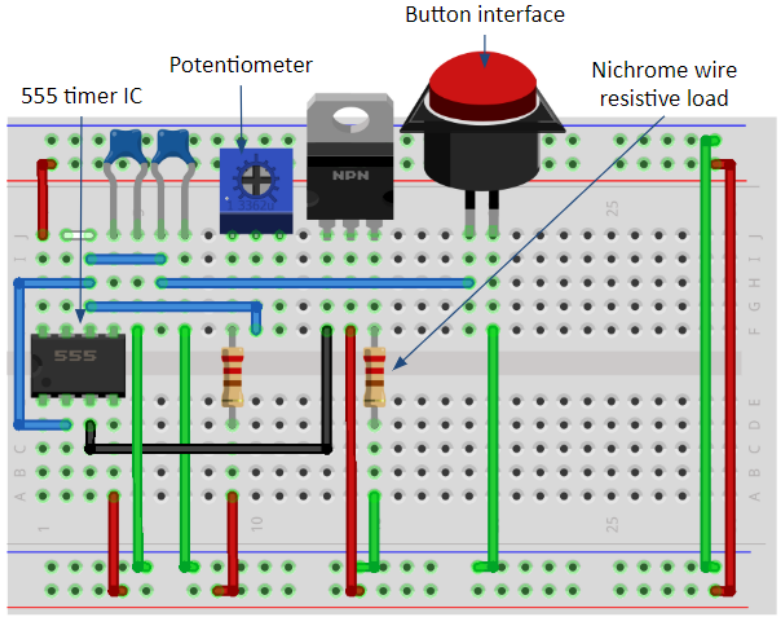
Lead team of 4 to develop a functional prototype that enables Lebanese Syrian refugees to locally fabricate low-cost menstrual pads.



Tested fabrics to determine pad architecture and manufacturing steps.



Led design and build of prototype thermoplastic heat sealer.

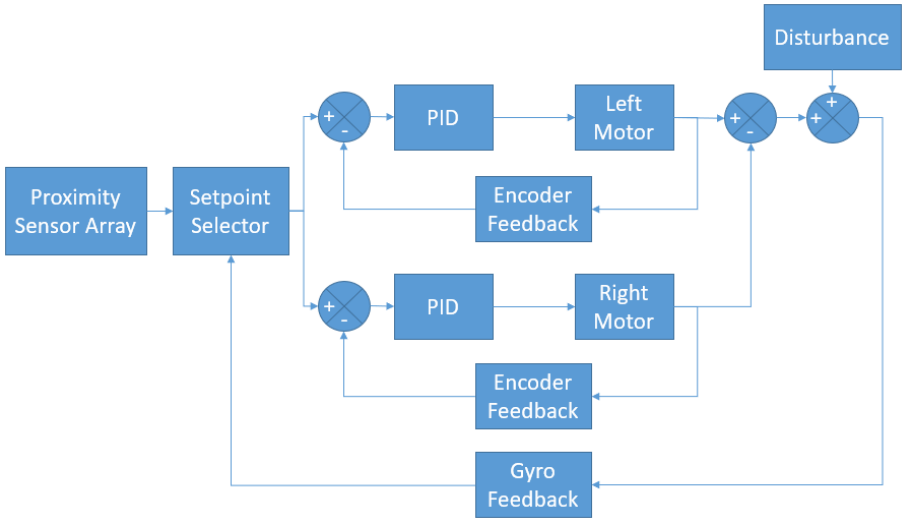


Designed circuit to control heating duration of circuit element.

Design Review

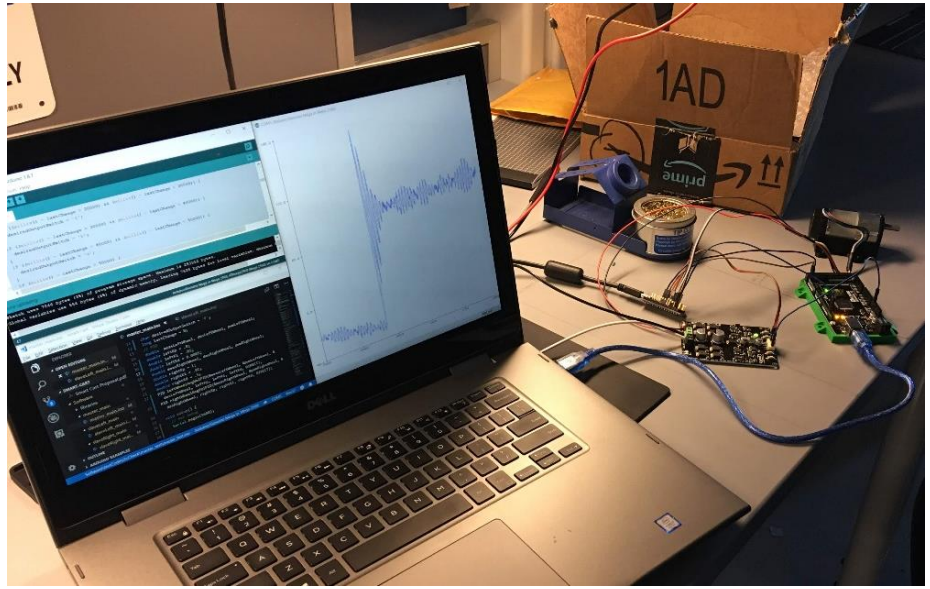
Smart Cart

Independently design, analyze, and prototype the mechanics, electronics, and software of an autonomous shopping cart.



Designed control system architecture for closed-loop obstacle avoidance, steering, and speed control.

SolidWorks design of cart frame.

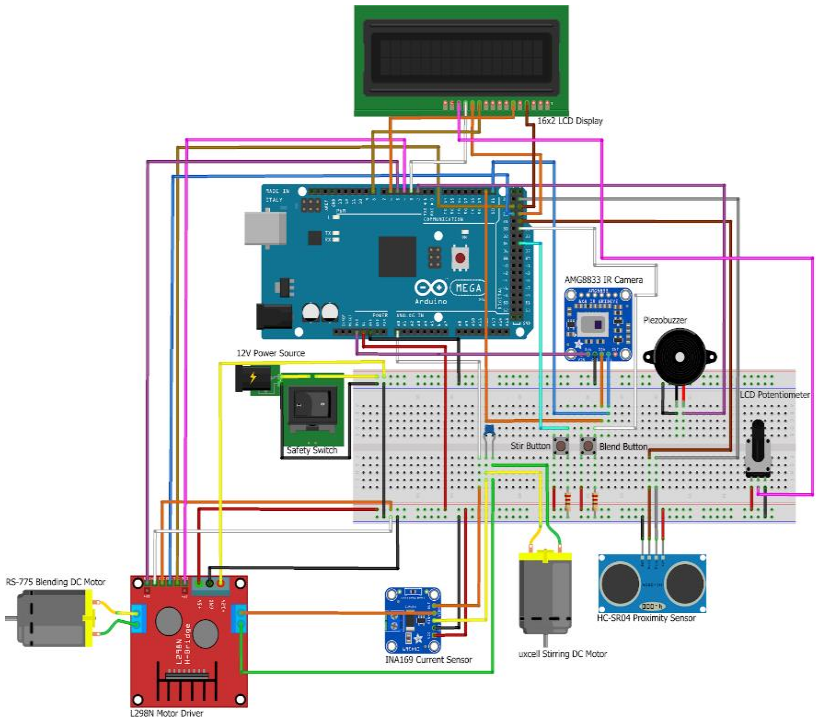


Used Ziegler-Nichols tuning to tune PID controller.

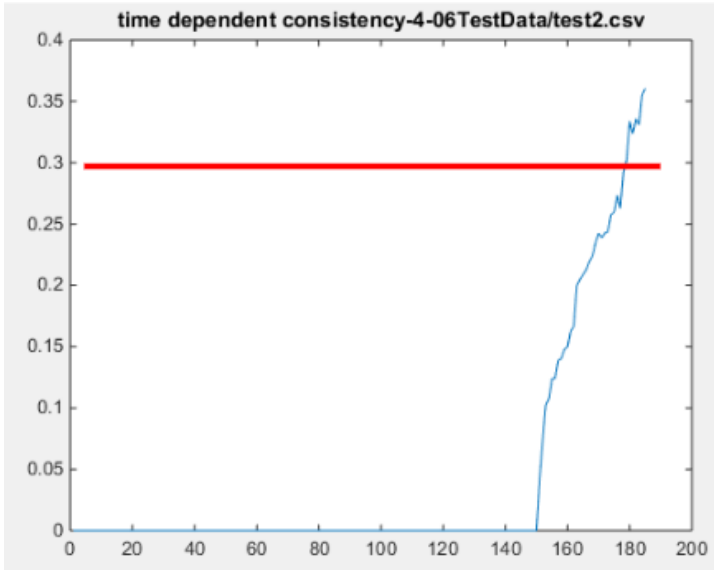
[Github Repository]

VeganEgg Scrambler

Led team of 6 to develop a prototype that whisks and scrambles an egg while monitoring changing consistency and temperature.



Executed electrical and software design, testing, and debug.



$$con_i = con_{i-1}(1-W) + [min(\overrightarrow{cur_i})(1 - \frac{t_i - t_0}{300}) + max(\overrightarrow{cur_i})(\frac{t_i - t_0}{300})]W$$

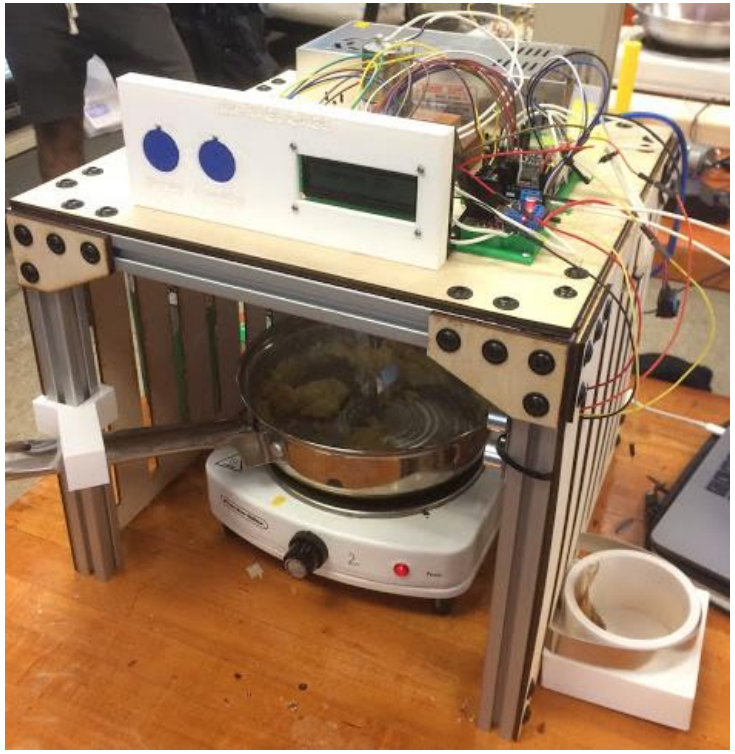
$con = consistency$

$cur = current$

$t_0 = initial\ time$

$W = filter\ weight$

Built a time-weighted model for egg consistency by fitting empirical motor current data.

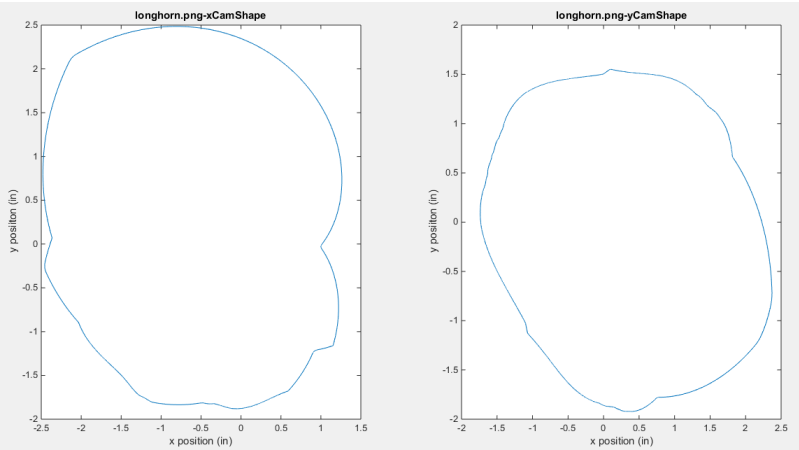


Led team of 6 to deliver successful prototype under budget and on schedule.

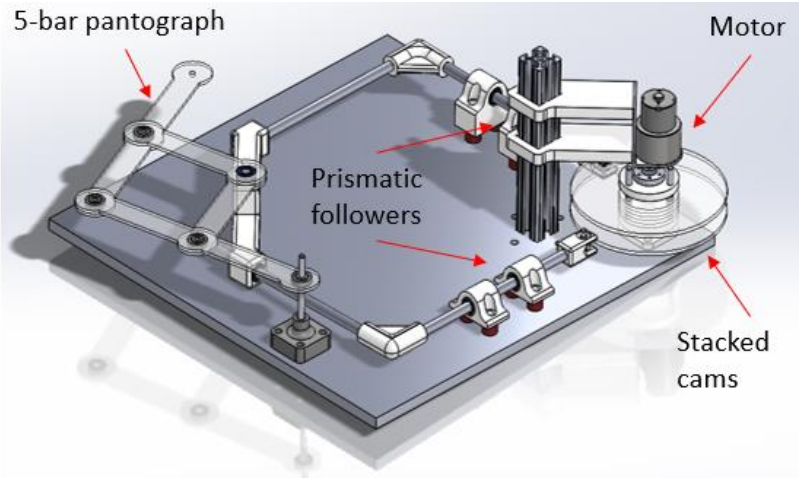
Final Presentation | Github Repository

CamSketch

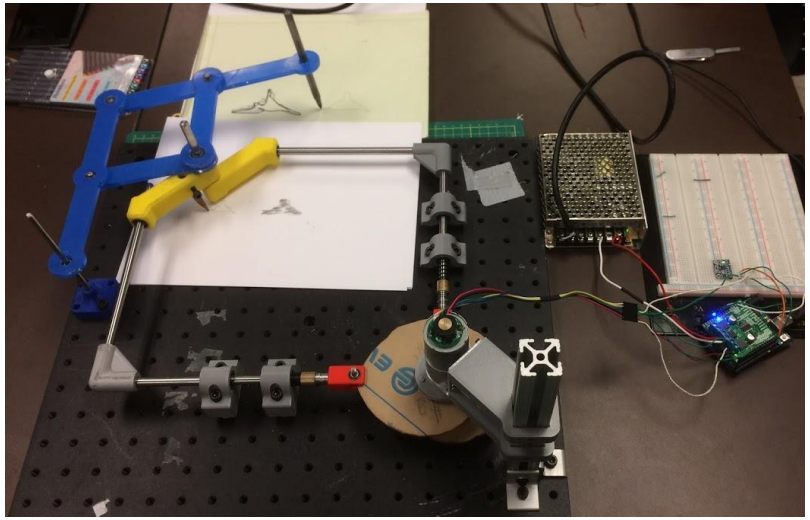
Led team of 3 to develop an accessible sketching mechanism for motor-impaired elementary school art students.



Wrote MATLAB script to generate cam profiles from an input image of a shape.



Collaborated to design mechanical system in SolidWorks.

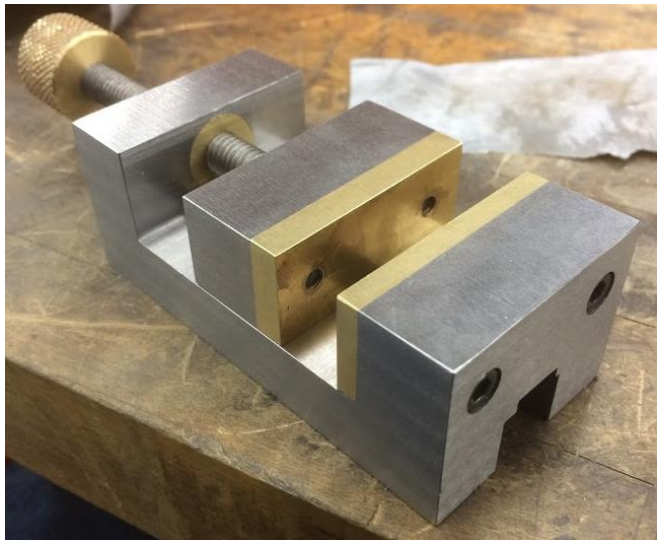


Iterated through rapid prototypes to successfully demonstrate functional system.

Project Documentation | Github Repository

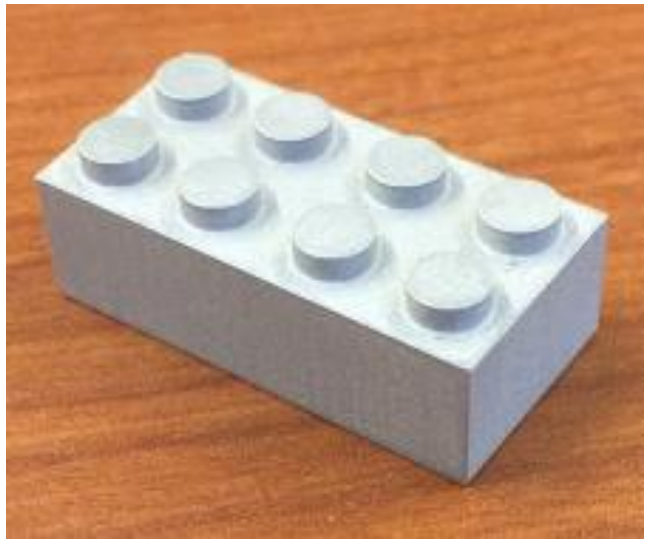
Machine Shop Projects

Build familiarity with shop equipment and basic manufacturing methods.



Manufactured 9 steel and brass parts with a manual mill, manual lathe, and a CNC mill and finished with a surface grinder.

Lost-foam casting of a mountain in aluminum.



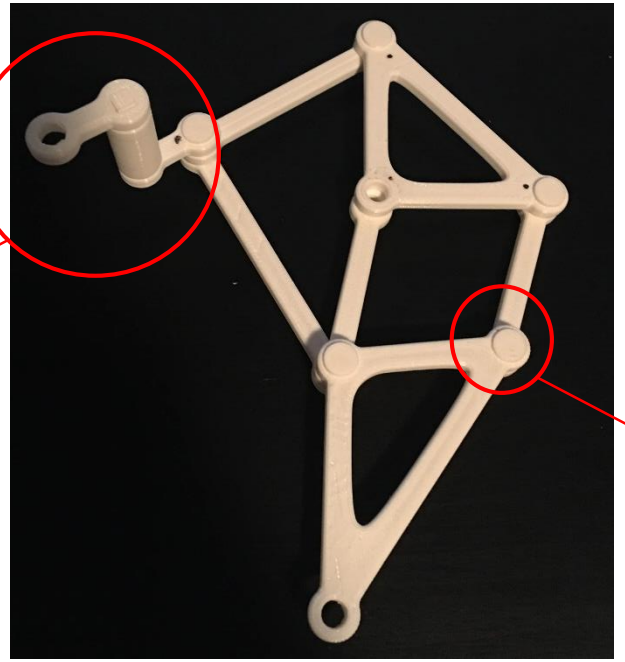
Generated toolpaths in Mastercam, CNC-milled, and beadblasted an aluminum Lego brick to scale.

Personal Projects

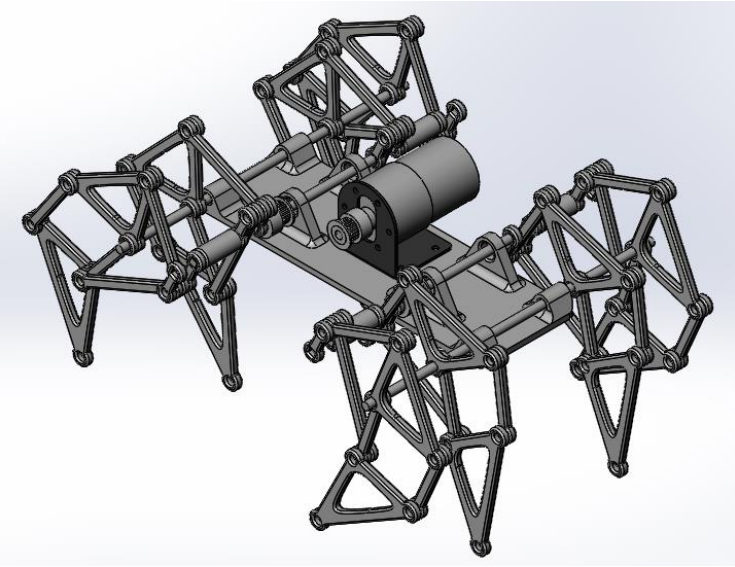
Walking Mechanism

Design and build a walking mechanism based on Theo Jansen's Strandbeest.

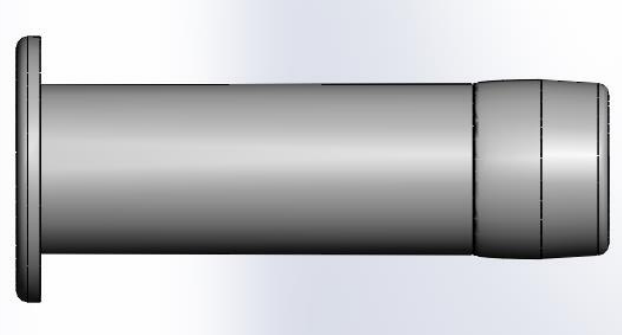
Prototyped test parts to determine dimensions for interference and slip fits.



3D-printed Jansen's linkage.



Mechanism design in Solidworks uses 8 Jansen's linkages, 2 driveshafts, and 1 motor to walk.

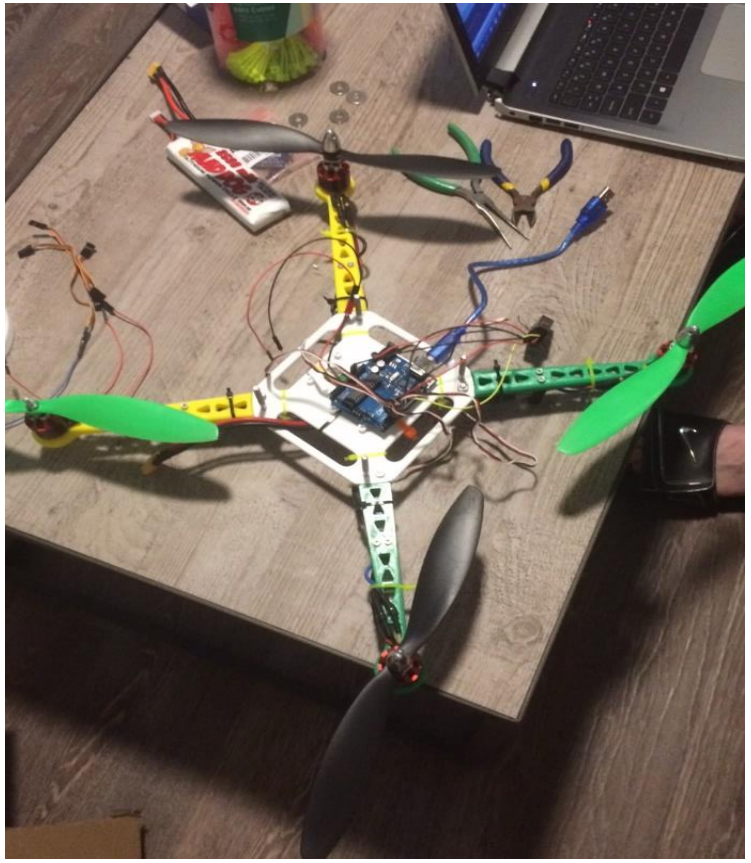


Slight detent to create interference fit with outer link, easing assembly while maintaining a low-friction slip fit bearing surface.

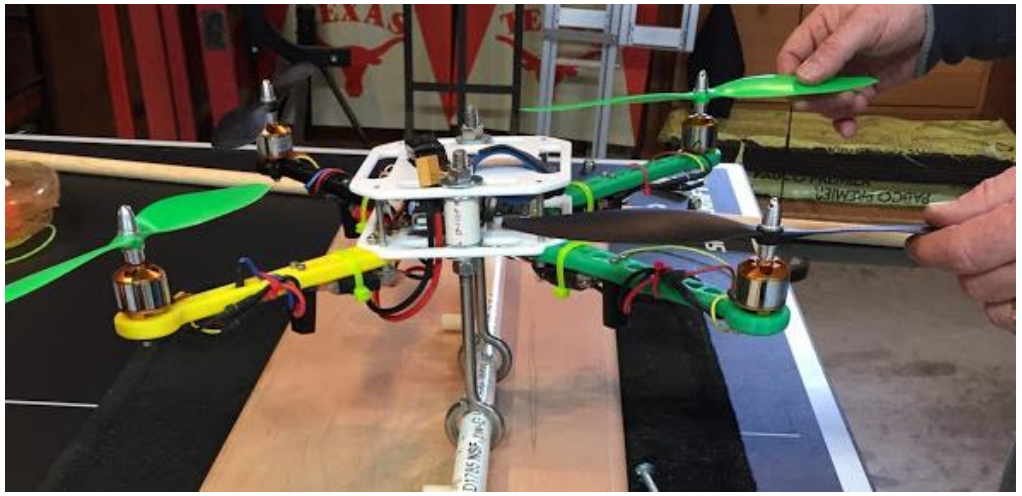
CAD Files

Quadcopter

Apply mechanical design and rapid prototyping on a multidisciplinary team project.



Designed and built mechanical assembly.

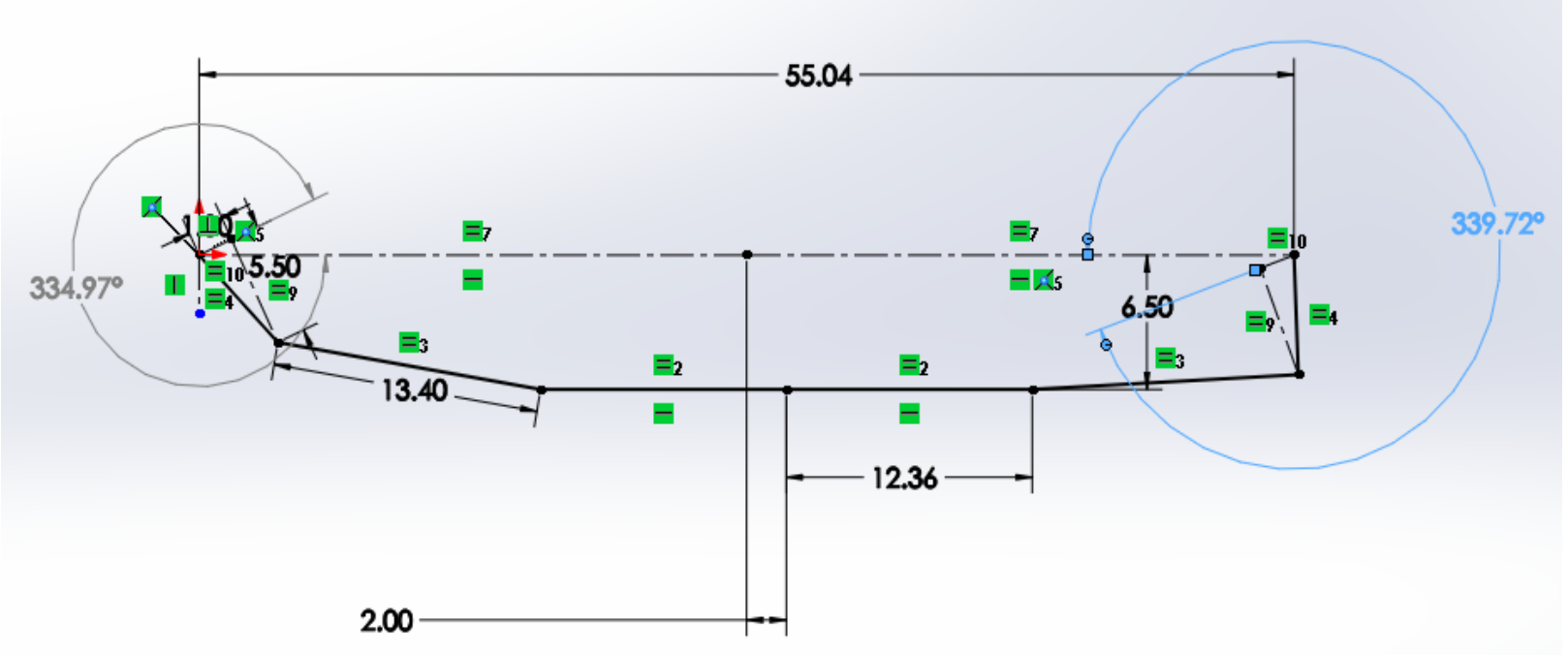


Test stand for PID and motor trim tuning.

Github Repository

Solar Vehicle Steering Design Tool

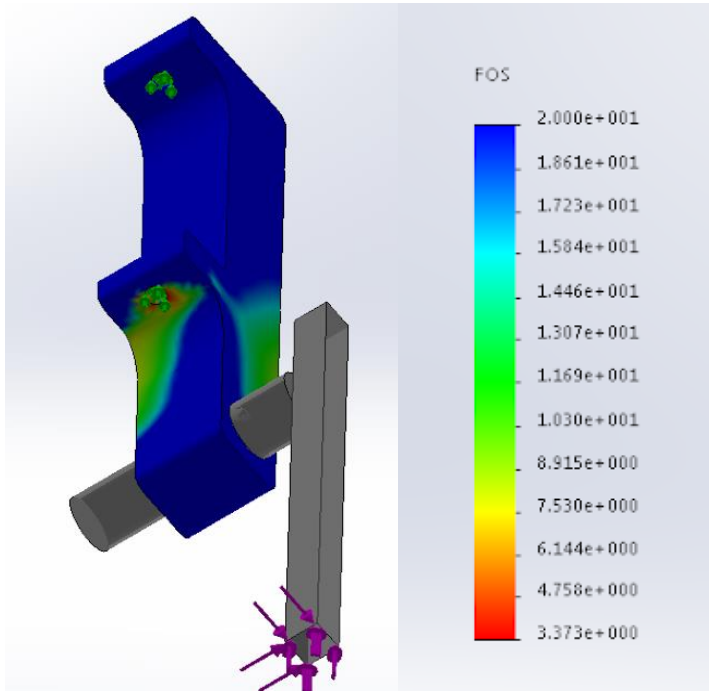
Design a tool to model the steering system for the Solar Vehicles Team.



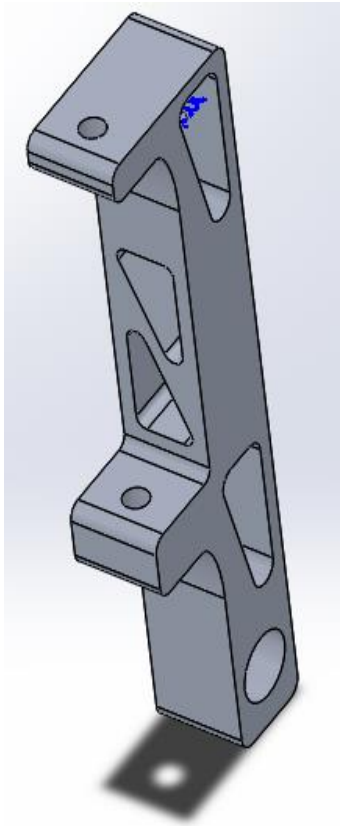
Solidworks sketch models Ackermann steering linkages in order to properly specify required link lengths and pinion travel to achieve desired vehicle turn radius.

Solar Vehicle Upright Design

Design lighter uprights for the Solar Vehicles Team while satisfying structural loading requirements.



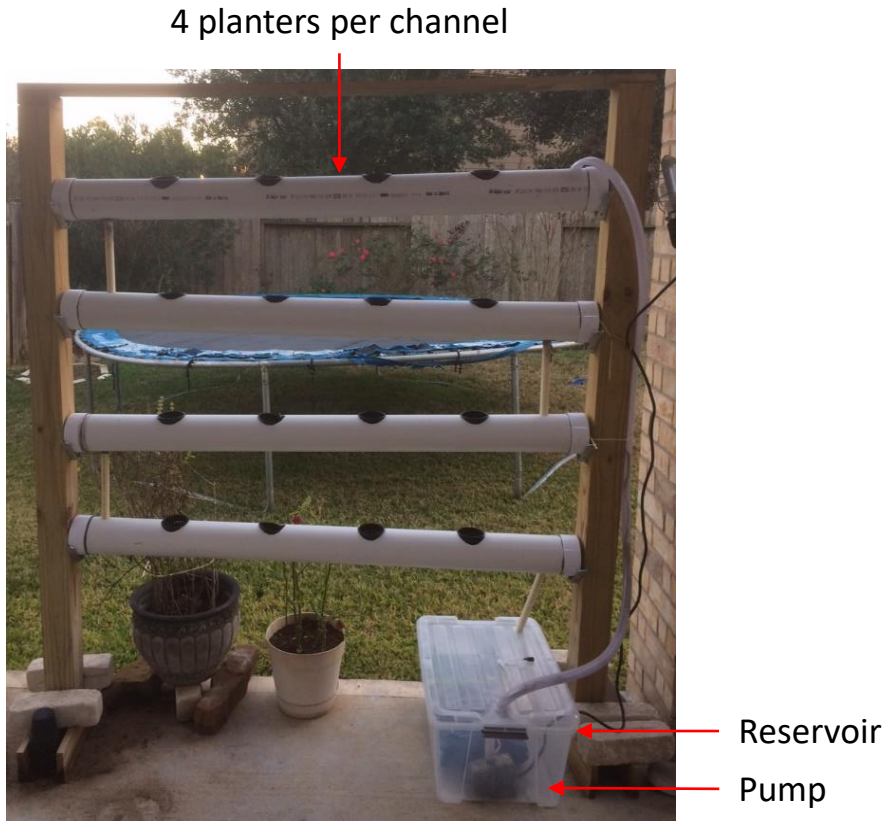
Used Solidworks static simulation to iterate through designs, optimizing for safety factor and weight.



Final upright design in Solidworks with a 3.13 lb weight and a 3.1 minimum safety factor to yield.

Hydroponic Garden

Design and build a continuous flow hydroponic garden to enable low-maintenance gardening.



Calculated pump size and max allowable channel angle to achieve desired flow rate. Then, spec'd parts and built functional system.