DESIGN PORTFOLIO

Dixun Cui {Fall 2021}

Contents

Recumbent Tricycle Design

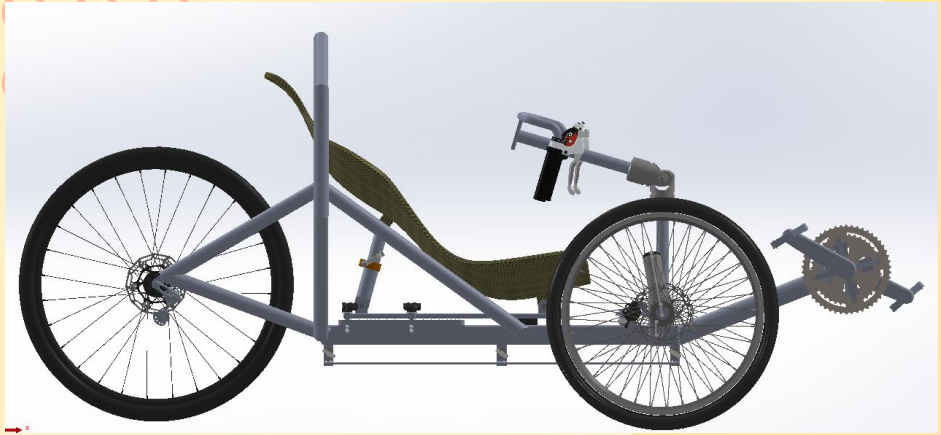
Berkeley Human Powered Vehicle Team | 2020 - 2021

overall assembly

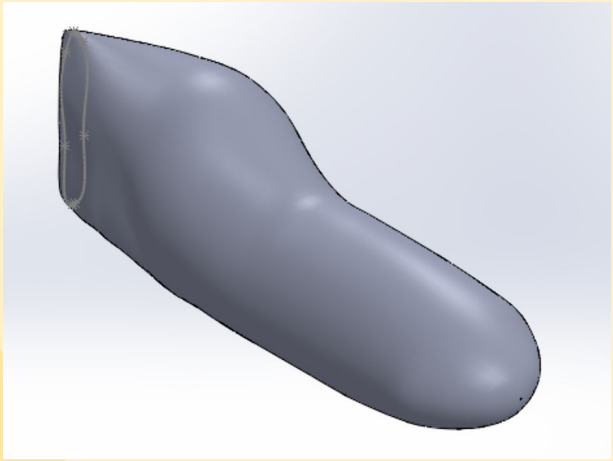
Our goal was to design a recumbent bicycle to compete in the **2021 ASME Collegiate Human Powered Vehicle competition**, a virtual event involving a design report, simulation testing, and a presentation.

As the **team lead**, I am responsible for **building and managing the overall assembly**, while coordinating the design and integration of our chassis, steering, drivetrain, braking, fairing, and safety elements.

Our tadpole configuration tricycle was design for **optimal control and flexibility**, with an adjustable seat and a **compound chainring and internal hub drivetrain** to allow for static shifting and a variety of speeds. The **aluminum chassis** is lightweight and designed for ease of manufacturing.



frame side view



fairing shell

We placed 2nd out of over 90 teams in the ASME international collegiate human powered vehicle design challenge. We look forward to stepping up to compete in the World Human Powered Speed Challenge in 2022, with a target of reaching 60 mph.

For the 2019-2020 competition, I led the **frame subteam**, designing, ordering parts, and machining and assembling the frame. We managed to **assemble the jig for welding** before the facilities shut down and the event was cancelled due to COVID.

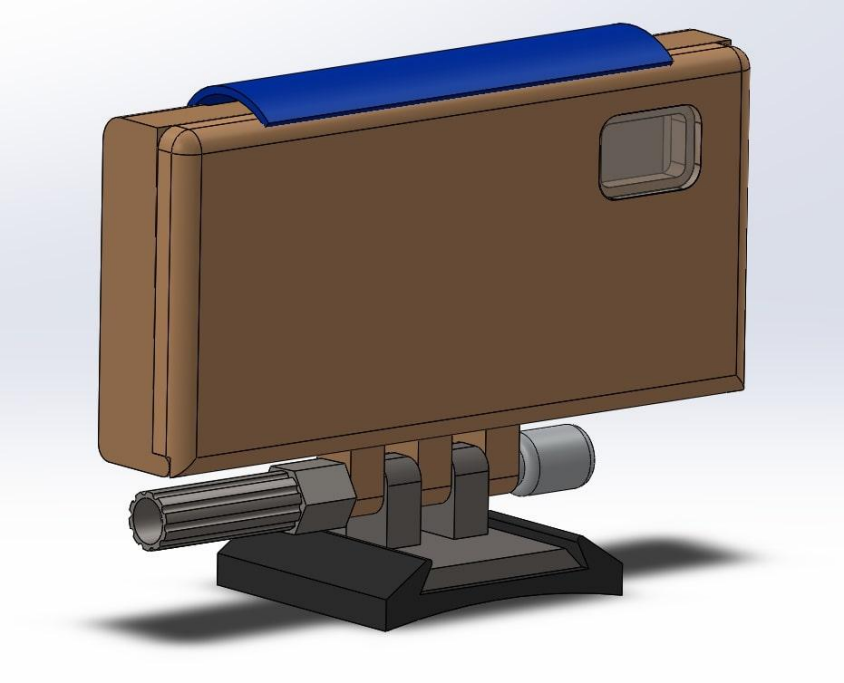
2019-2020 frame jig

welding practice

I learned **TIG welding** for steel and aluminum in order to build our frame. Here I was practicing welding tubes and joints.

Snowboard Helmet Phone Mount

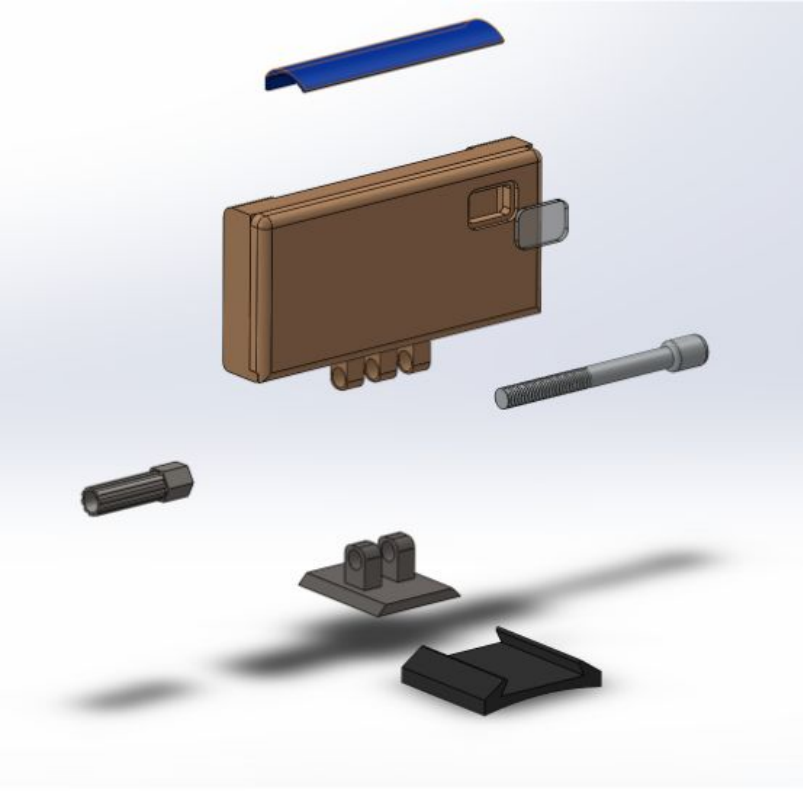
Manufacturing & Tolerancing Class Project | Feb - May 2020



closed helmet mount

In a team of five, our goal was to **design and fully dimension and tolerance** a consumer product that interfaced with a smartphone to expands its capabilities.

Our product was a snowboard helmet mount that allowed a smartphone to be used as an action camera. I was individually responsible for the **product design and CAD models** while working with my team on **dimensions, fits, tolerances, and prototyping/production plans.**



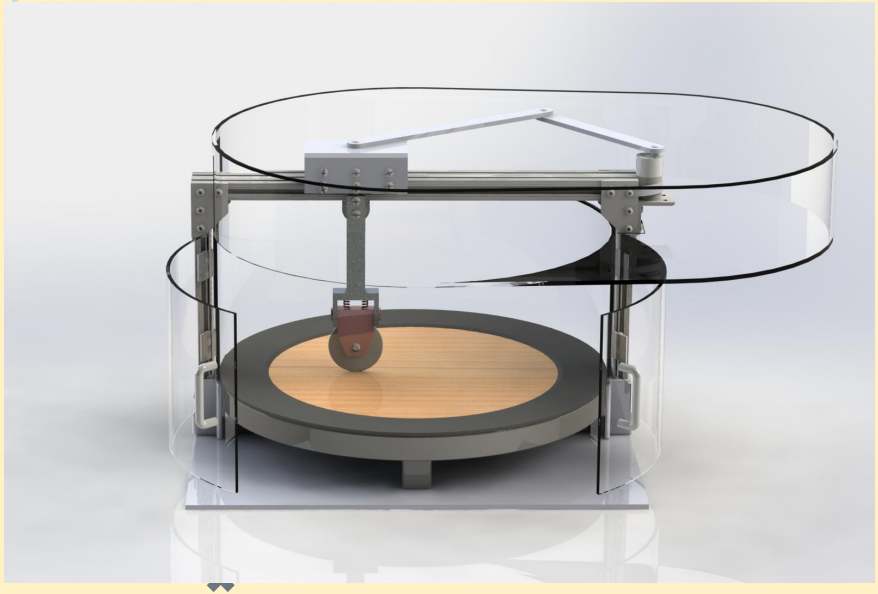
mount assembly view

Our product used a combination of **snap fits, running fits, and transition fits** to allow for secure attachment as well as easy adjustability. All tolerances were specified for the selected fits and were chosen so that they would be achievable using our prototyping methods.

Though we weren't able to build a prototype of the product (due to COVID), we specified our selected manufacturing methods for prototyping (3D printer, laser cutter, lathe) and large-scale production (injection molding, standard parts).

Automatic Pizza Cutter

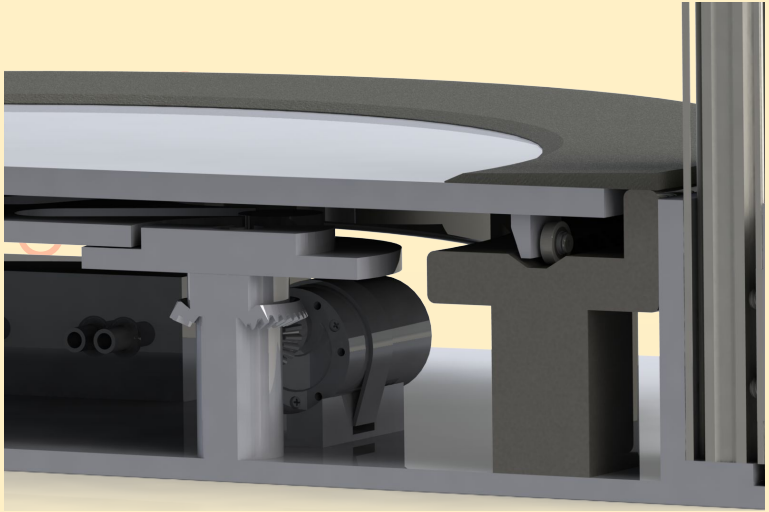
Design of Planar Machinery Class Project | Sep - Dec 2020



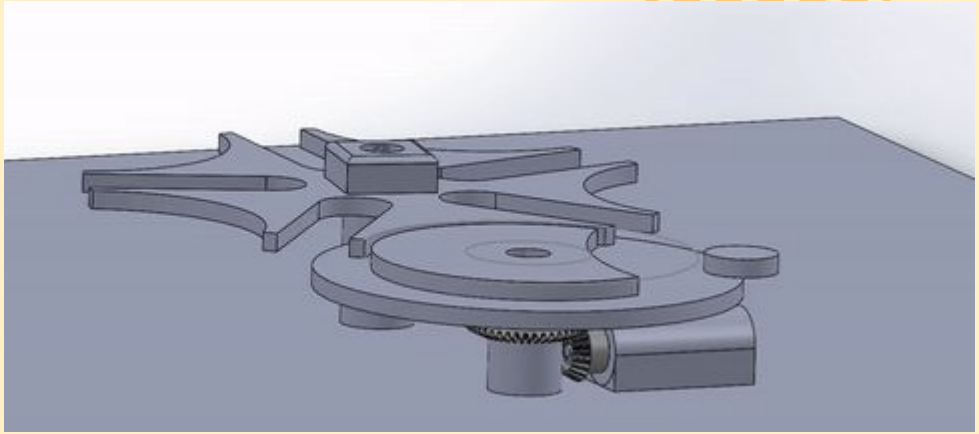
roller assembly

In a team of five, our goal was to apply planar machinery design concepts in designing an exciting, novelty pizza cutter.

Our cutter works using a **Geneva mechanism** turntable to ensure repeatable, consistent slices, along with a **slider-crank** with a spring-loaded blade. I was responsible for the **mechanical design** as well as **simulation testing.**



turntable cross section

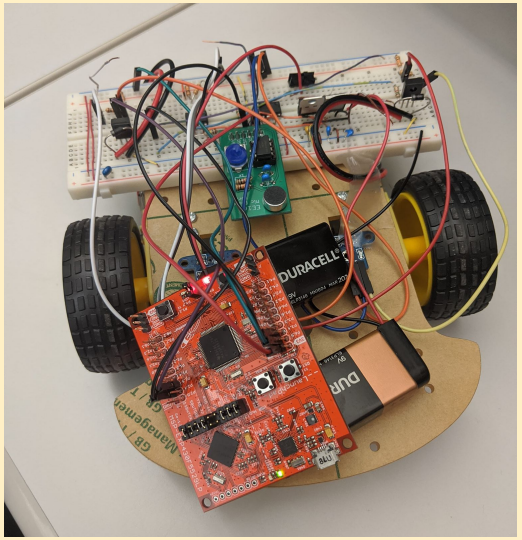


geneva wheel animation

All components were designed in Solidworks, along with animations used to verify the functionality of the moving links. We also performed **Solidworks simulation stress analysis** to verify our hand calculations and ensure that stresses and deflections fell within our factor of safety.

Other Projects

2018 - Present



[1]: 3D Printed Face Shields for Hospitals
[2]: Voice-Controlled Car
[3]: Wind Turbine Prototype
[4]: Piano Rack

{About Me}

When I was young, I was fascinated by Lego sets, disassembling them and putting them back together in different ways to breed whatever fantastical creations I had thought of that day. That same desire is what drives me to be a mechanical engineer today: the love for building things and bringing to life new ideas that can positively impact people's lives.

In my free time, when I'm not tinkering in the machine shop or designing/programming in front of a computer, you can find me swimming, cooking, playing the guitar, running, or watching all sorts of sports. Once in a while, I may also be writing up a short story or trying to learn a new instrument.

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