

Brenden KOO

Brenden Koo | 2024

More info can be found at brendenkoo.com





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Photo from Studio Scott

<https://www.studio-scott.com/work/stanford-product-realization-lab>



Who I Am

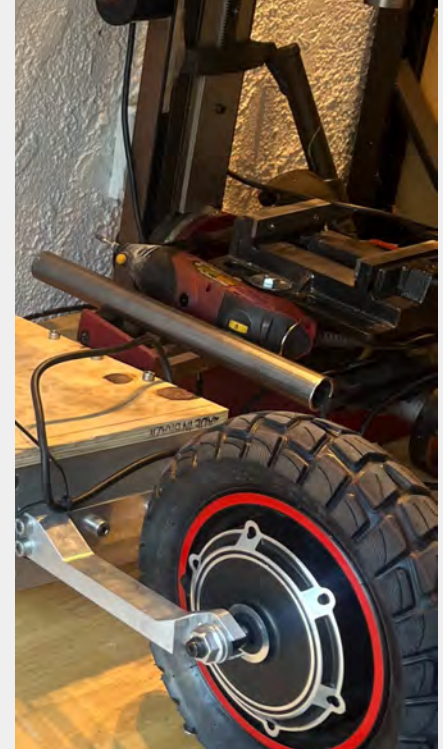
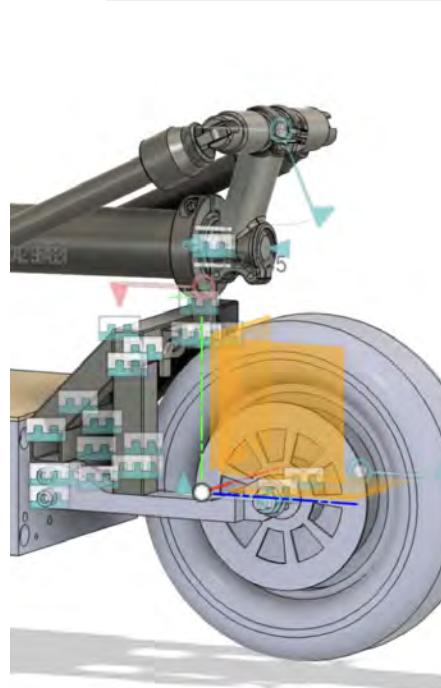
AN ENGINEER

<https://brendenkoo.com/product-design/>

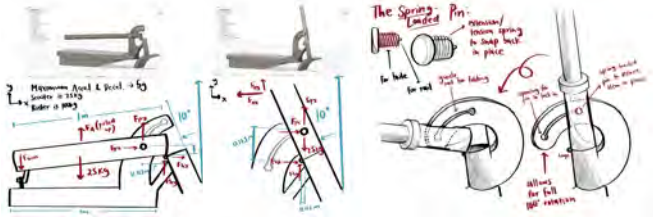
01.

Buoyant Aero

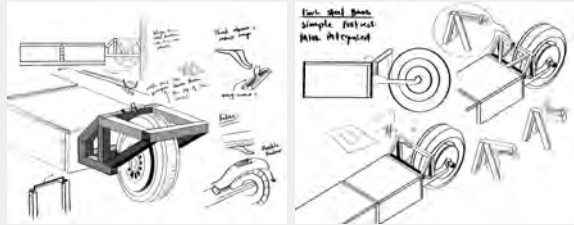
During my 2023-24 gap year between my Undergraduate and Graduate studies at Stanford, I worked as a **Mechanical Engineering Intern/Contractor for Buoyant Aero**, a startup company focused on bringing a new electric scooter model to market. I had a hand in designs, calculations, CAD sketches, and physical manufacturing.



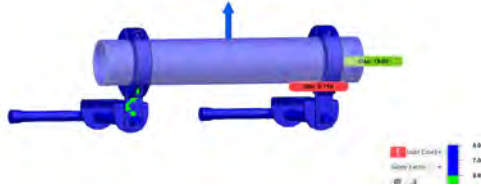
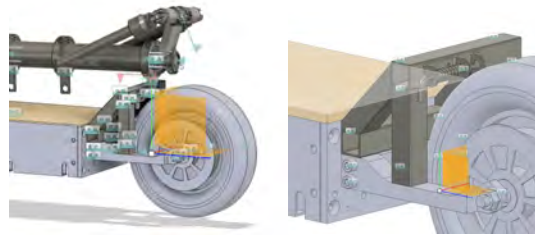
Sketches



I created many sketches, from concept designs to FBDs—fashioning aesthetics with mechanical principles to understand how the scooter design could function and improve.

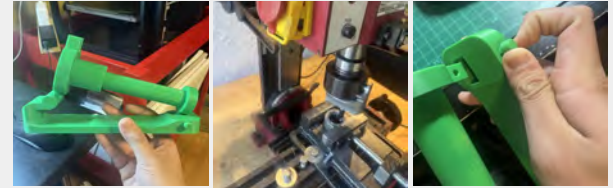


CAD Designs



Utilizing Fusion 360, I modeled and simulated key elements of the scooter with custom-designed and off-the-shelf parts (models in the images have been greatly generalized).

Machining



With a 3D printer and a sense of resourcefulness, I helped bring some of the sketches and CAD to life. My team utilized rapid prototyping and modified off-the-shelf pieces to create a functional scooter prototype.

Processes:

- Milling, Turning, Boring
- 3D Printing
- Cutting and Assembling

I am presenting my work in a manner that respects the Non-Disclosure Agreement (NDA) I am bound to. Details have been generalized and do not disclose any sensitive information. The content herein is designed to showcase my skills and professional experiences without compromising the confidentiality of any projects or clients. The information is for demonstrative purposes only, aiming to highlight my capabilities while upholding the highest standards of professionalism and confidentiality. For any inquiries or clarifications, please contact me directly.

02.

Springboard Carrying Case

As a natural product designer, I am constantly seeking areas of need and determining product solutions. As the **Stanford Women's Gymnastics Volunteer Assistant Coach**, I wanted to design a case to transport the 50lb springboard to and from competitions.



The Specifications:

Dimensions:

The board is 2ft x 4ft x 9 inches

Durability:

The case must be able to survive travel and handling

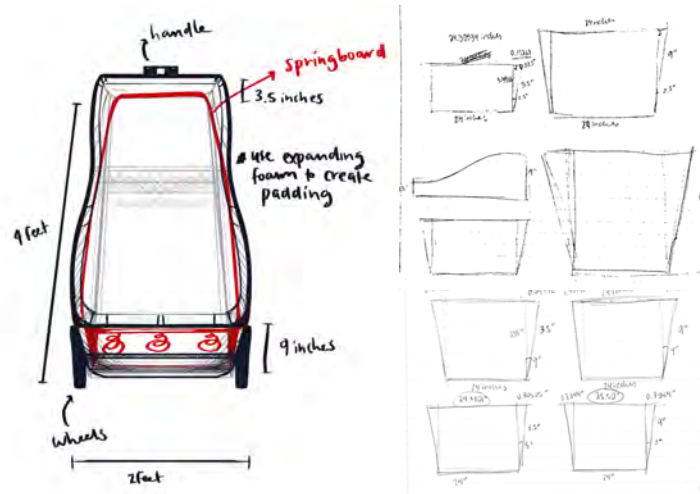
Lightweight:

Be under 20lb to avoid overweight airport fees

Portability:

Implement wheels to be easy for travel

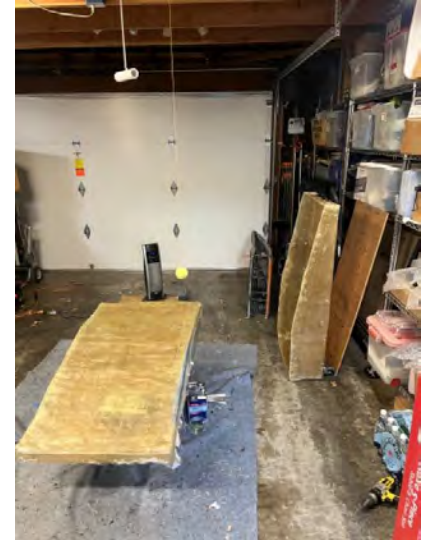
The Plug: Designing a fiberglass mold with a 5° draft angle for mold removal



Building the Case:

I created a case out of fiberglass cloth and resin, using a power sander and angle grinder to refine the design.

I attached wheels, clasps, and handles to the fiberglass, reinforcing the hardware with steel plating to ensure durability. I am constantly improving and developing this design to ensure longevity and portability of the design.



03

Fret-Me-Not

As a designer, one of my greatest values is accessibility. When tasked with designing and manufacturing a project for my ME 103 course, I wanted to take the first step towards my goal for accessible and inclusive art and music.



Focusing on Accessibility

Throughout the 10 week design process for ME 103: Design and Making, I designed the Fret-Me-Not in SolidWorks and brought the design to life.

The device functions by screwing onto the neck of the guitar with a set of four 3D-printed clamps. There are 24 hand-turned buttons spring-loaded into bearings that are press-fit into a sheet of aluminum. Each button is meticulously positioned in four groups of six so that there can be one button on each of the six strings for the first four frets, without interfering with one another. The idea behind the product is that the user can press the smooth buttons of the product to activate the strings, avoiding the calluses caused by the harsh textures of the guitar strings.

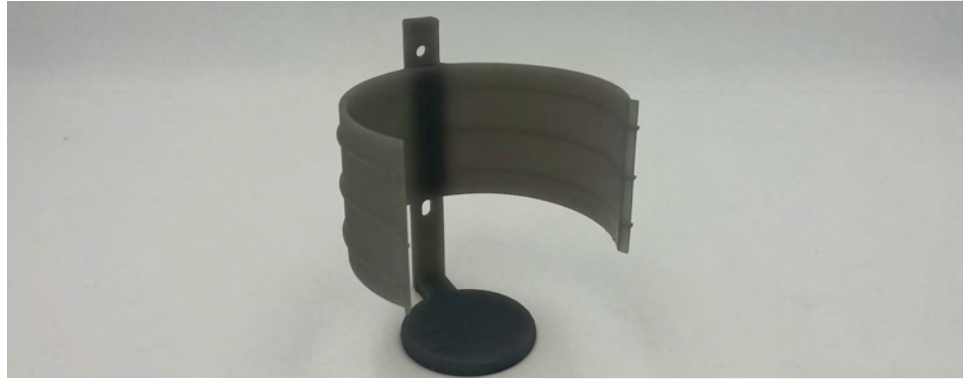
Takeaways: GD&T, Repetition with machining

Processes: Turning, Metal-Bending, Press-Fitting, 3D Printing, Bead Blasting, Sanding, Polishing

Materials: Aluminum, Bronze, and Zinc-Plated Steel.



04. PortaBottle



As someone who drinks an egregious amount of water on the go, I wanted to design a new bike-mounted water bottle holder that has a satisfying *snap* feature as it secures the water bottle in place.



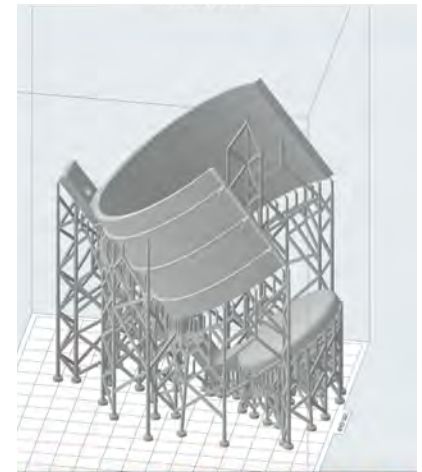
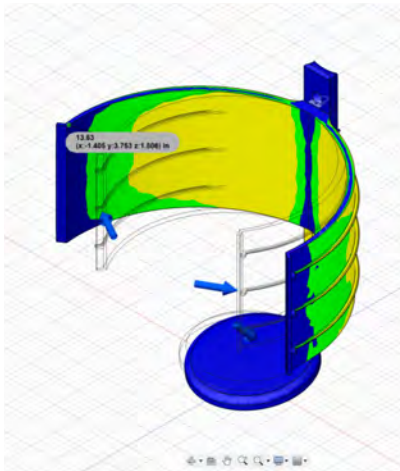
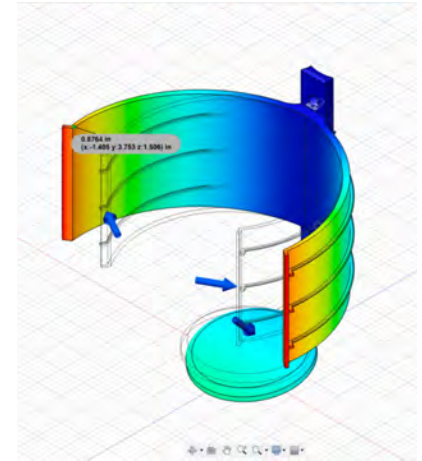
As the final project for my Designing for Additive Manufacturing class, I designed a flexible water bottle holder. I took advantage of the material properties of Tough 1500, as the natural state of the design is slightly smaller than the diameter of the water bottle. When the water bottle is inserted into the holder, the latter flexes and extends to secure the bottle into place.

I used Fusion 360 to design and simulate not only necessary load cases of the water bottle being inserted into the holder, but also some error cases—if the bottle was hastily inserted or the path that the bike travels causes the bottle to rattle in place.

Processes: FormLabs SLA Printing

Materials: Tough 1500, Nylon

Takeaways: Finite Element Analysis, Simulating load cases, Rapid prototype prints to validate simulations



05.

Combo

I collaborated with a team of Product Designers and Mechanical Engineers for a 10-week project to manipulate the Design Thinking process to revolutionize the composting experience for young adults. Together, we utilized Bokashi Composting to reduce food waste and help people compost with confidence.



My team interviewed a number of young people living in small/limited apartment spaces, and found that time and discomfort are the two major deterrents of composting.

Bokashi is a form of composting that eliminates odor, works in small spaces, and lets users compost otherwise un-compostable food waste, from meat and dairy to citrus peels. Bokashi ultimately produces a nutrient-rich liquid that can act as a natural fertilizer.

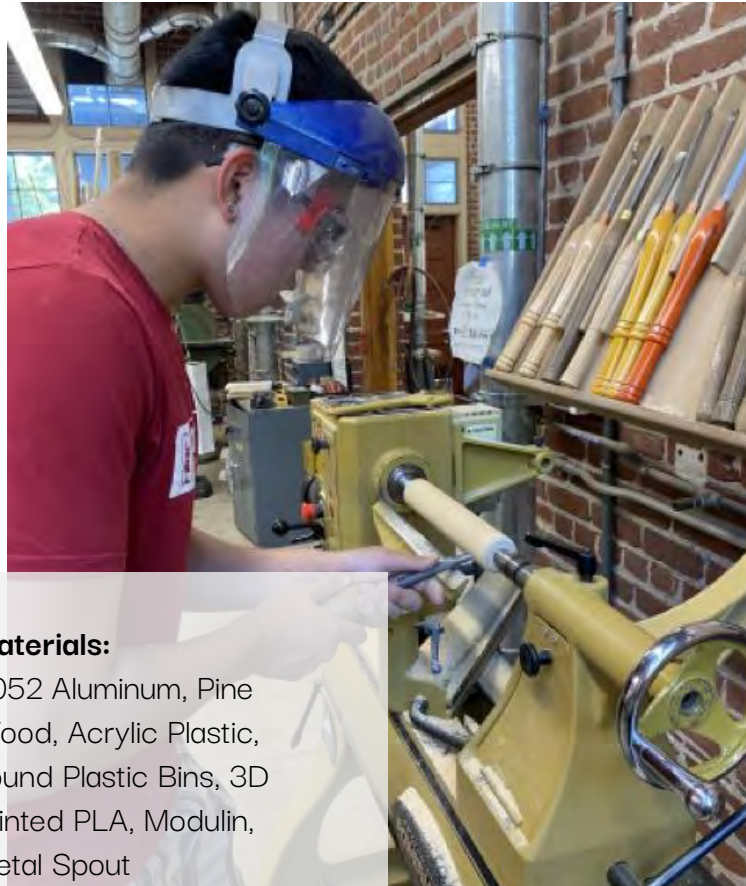
Combo Features:

- Dual-Bin design for around-the clock composting
- Aesthetically attractive
- Spigot automatically drains tea into spray bottle
- Plunger for no-contact compression
- Removable stand for versatile placement in small spaces

Needfinding and rapid prototyping played major roles in developing this product.

Focusing on Sustainability





Materials:

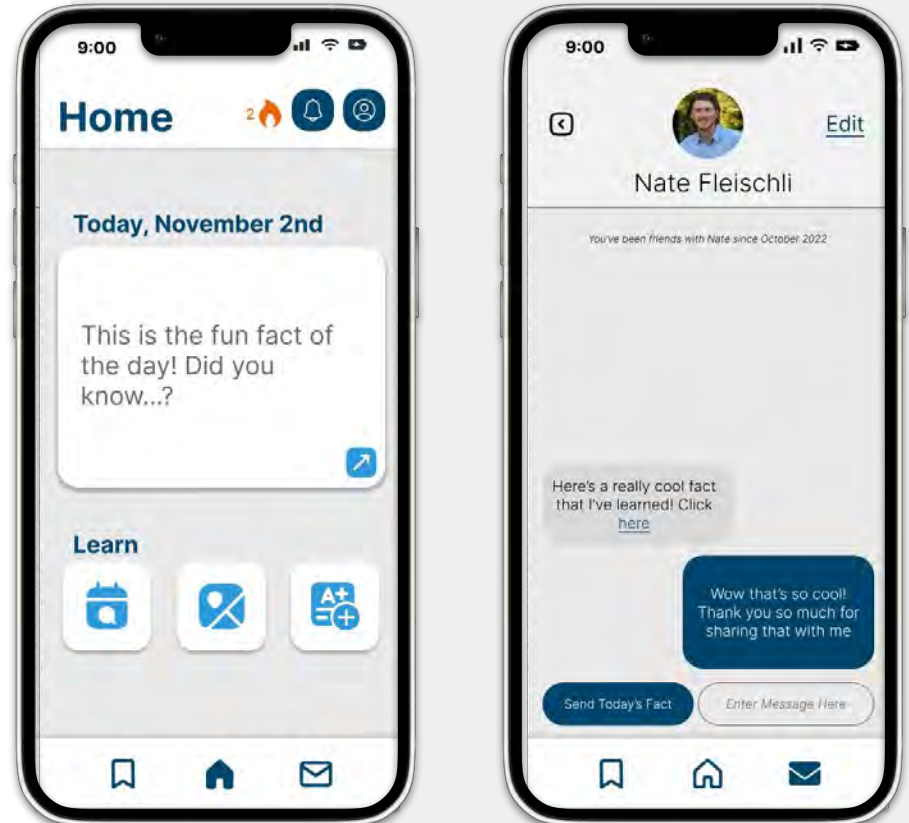
5052 Aluminum, Pine
Wood, Acrylic Plastic,
Found Plastic Bins, 3D
Printed PLA, Modulin,
Metal Spout



<https://hci.stanford.edu/courses/cs147/2022/au/projects/EquitableHealthcare/EduCare/>

06. EduCare

Our mission is to educate students about their healthcare to prepare them for all life moments, expected and unexpected.



Be Aware with EduCare

Throughout the 10 week design process for CS 147: Introduction to Human-Computer Interaction, my partner Nate Fleischli and I designed a functioning app that educates young students about their healthcare.

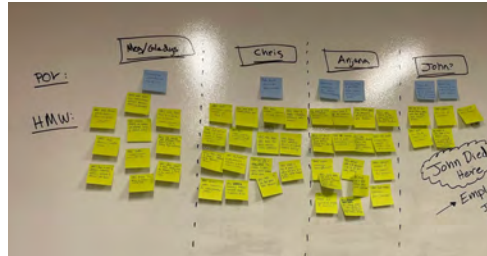
EduCare was designed through a ten-week process of needfinding, POVs and Experience Prototypes, Lo-Fi Prototypes, Medium-Fi Prototypes, Heuristic Evaluations, culminating in a High-Fidelity EXPO CLI and React Native app that is fully interactable.

The app has three main tasks:

- Receive a notification and toggle between the current and previous fun facts received.
- Engage with and participate in the scavenger hunt learning module
- Share the current fun fact of the day with peers and Check for any messages

Tools Used: React Native, Expo CLI, Figma

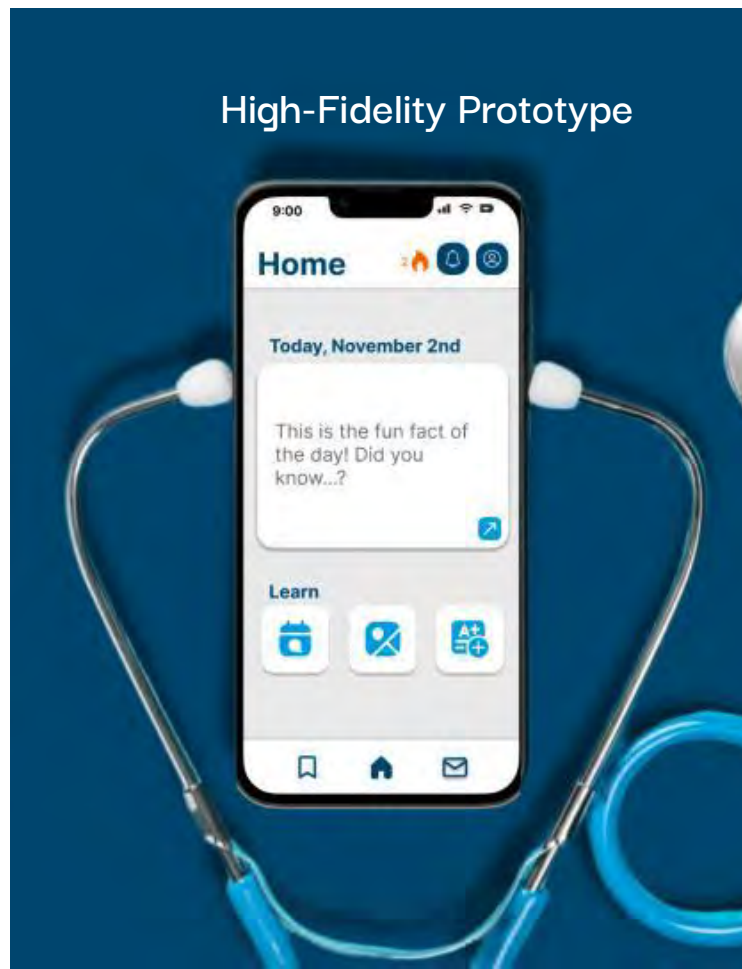




Needfinding Process



User Testing



High-Fidelity Prototype



Lo-Fi Prototype



Med-Fi Prototype



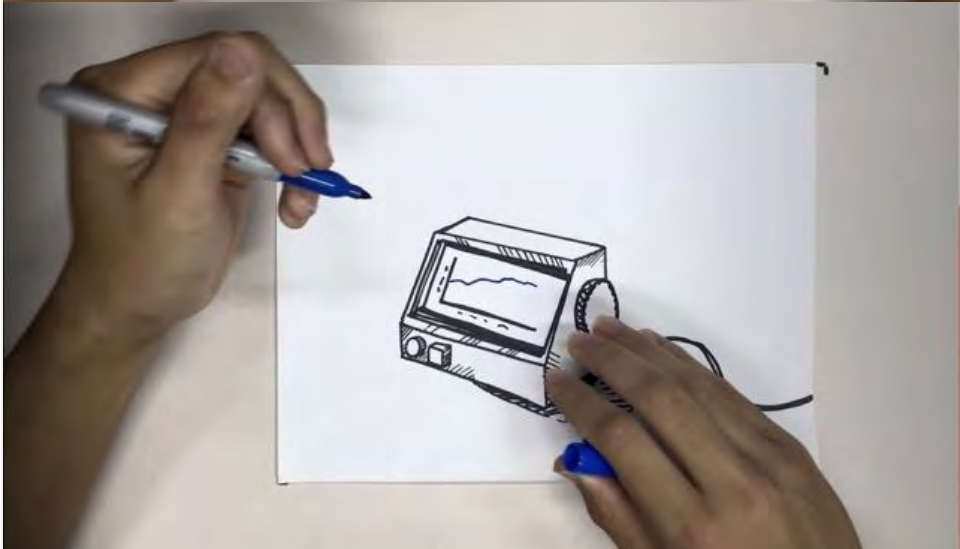
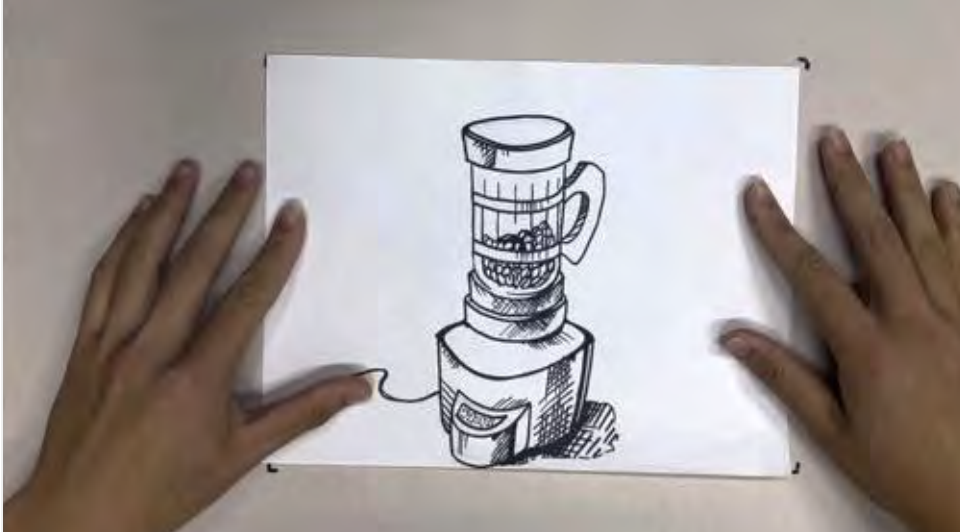
Who I Am A DESIGNER

<https://brendenkoo.com/portfolio/>

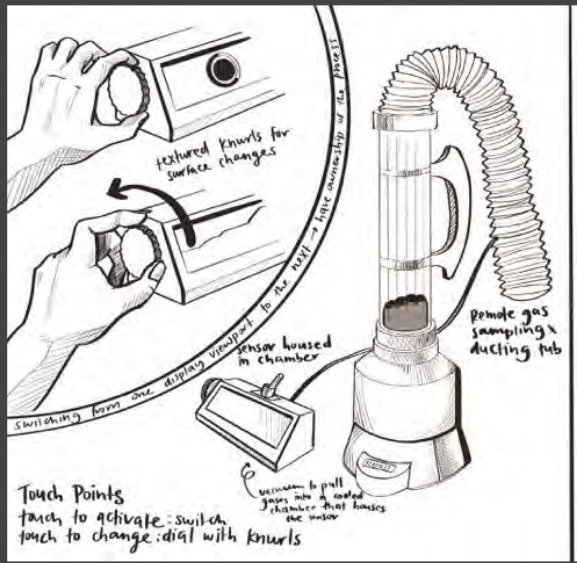
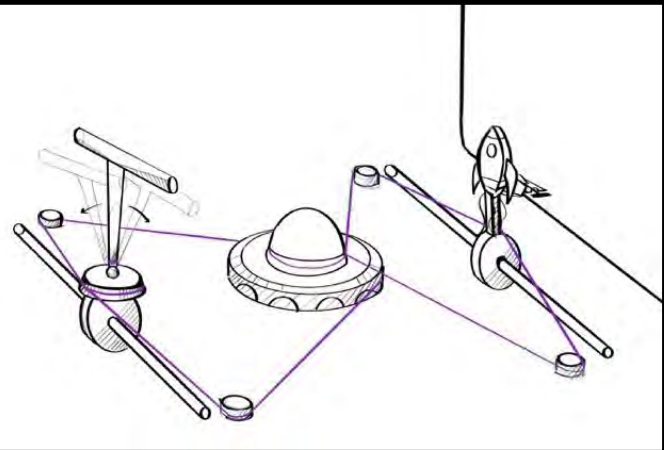
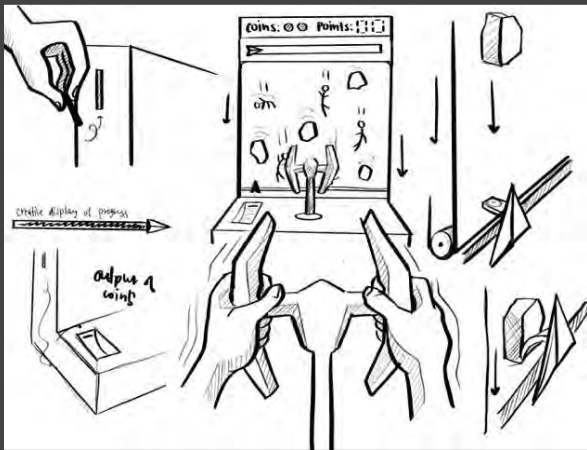
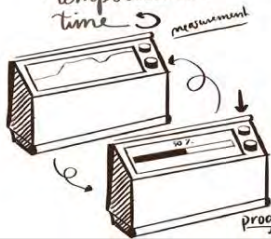
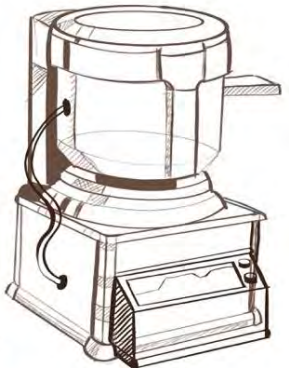
07.

Design Sketches

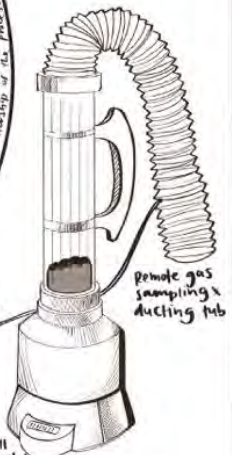
One of my greatest assets is my ability to use my skills to bring my design concepts to life through visualization. By creating design sketches and digital prototypes, I can effectively bridge the gap between design thinking and product realization.



Give beginner users confidence in their roasting journeys
- user interface -
↳ show humidity
VOCs
temperature
time

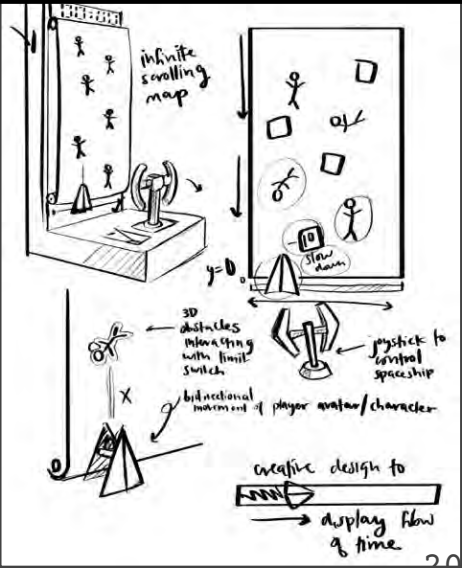


Touch Points
touch to activate: switch
touch to change: dial with knobs



These are just some sketches I created through prototyping and design processes.

Although these sketches are not entirely representative of the final design, they catalyze the process of helping my teammates and peers understand what the design could resemble in its physical components. This helps translate the customer's voice into piece-part characteristics.



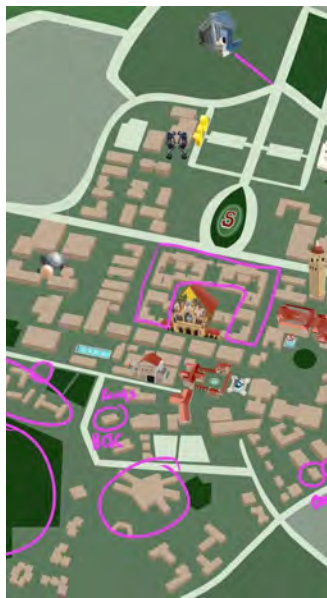
08 Daily Vocab For My Mom



Throughout high school, I created and published Daily Vocab For My Mom. My mother is a Korean-American immigrant, always looking to improve her English. Whenever she would come across a new word in the media she consumed daily, **I would illustrate and define the word for her, to be compiled into a lexicon of over 200 entries.** As the dictionary continued to develop, she shared these entries with her friends, who were similarly looking to improve their English. They have even had meetings to discuss and review definitions together.

09

A Student's Guide to Stanford



Taking inspiration from the engaging Disneyland maps, I designed A Student's Guide to Stanford for my role as one of the 2021 New Student Orientation Coordinators. I created this map digitally via the illustration software Procreate. Although this map's initial purpose is for the interactive scavenger hunt—where students traverse campus to find iconic Stanford locations and learn fun facts about their new home—it has extended its longevity beyond 2021 as it still serves a purpose for many large-scale campus events such as Parents' Weekend, Admit Weekend and more.



A

Who I Am

LEADER

10. Stanford Gymnastics



In 2022, I was appointed the team manager of the Stanford Women's Gymnastics team. What started as a way to support two of my friends on the team ultimately became an integral part of my collegiate career. I was initially supposed to move mats during practice, but my **passion**, grit, and **determination** allowed me to gain the trust of the entire team and the coaching staff. Because of my energy around the gym, I had the opportunity to travel to every competition, even when not all of the gymnasts were on the travel roster.

On the competition floor, my **exuberance** and nonstop dancing attracted the attention of many fans, increasing the **visibility** of the program.

Something I have developed in this position is my **grit and initiative**—I have designed many leotards, branding posters, and recruiting materials for the team.



11

Rodriguez Lab VR



Due to HIPAA Restrictions, there are only a few photos that I can use as documentation.



As a research assistant for the Rodriguez Lab, I was working on a project utilizing Virtual Reality as a **novel intervention for hoarding disorder in patients older than 55**. I led the entire VR world-rendering process, individually building nine VR worlds replicating the patients' living conditions for the clinical study. I was initially supposed to be an assistant to the lead VR developer, but unforeseen circumstances during the COVID-19 pandemic ultimately led me to assume their position.

[Check out the Stanford Medicine Feature here!](#)



Who I Am

ABOUT ME

No longer blonde
Still wearing pearls

Autobiography

Throughout my childhood, I have had a comprehensive range of interests yet a particular lack of natural talents. I have learned in each instance to make up for my lack of natural ability by unconventionally applying my skills to maximize my impact. When I was cast in the non-speaking role of Hatmaker #2 in my middle school production of *Fiddler on the Roof*, I volunteered to lead the set designs process to make myself useful to the cast and crew. While I could utilize my skills to find my niche in my middle school drama class, I never imagined that I could do the same in the athletic realm.

I've never excelled in athletics, despite my parent's best efforts. Nevertheless, I was put into soccer, tee ball, baseball, volleyball, tennis, and swimming, only able to hold onto the latter sport for a prolonged period into my teenage years. After dedicating many mornings and evenings to countless hours of swim practices, I simply lacked natural ability in the water. I wish I could speak to a Cinderella story where my "hard work and determination" propelled me to victory over my teammates, but that is far from the case. I was quickly outswum by my peers with more natural ability, watching my ten years of training be rendered useless against my teammates' one or two. I never had high-level accomplishments in my swimming career, and it was quickly evident that I participated in the sport for recreation, not competition. I did, however, find other ways to contribute to the team. I put my artistic abilities to use, spending hours drawing gigantic posters and lugging them to every swim meet, standing at the end of every lane and screaming unintelligible words of support. Even if I couldn't contribute to the team effort by winning races, I could at least cheer on those who did. When I eventually hung up my swimsuit, I continued to doubt that I would find athletic success, thinking I would turn my back on athletics entirely.

At Stanford, I maintained an interest in sporting events, supporting my friends at

their respective meets and games. I eventually attended meets so frequently that I was invited to join the Women's Varsity Gymnastics Team as a student manager. I had no previous knowledge of the sport, and I couldn't even touch my toes, let alone provide any insight into the gymnasts' tricks and skills. However, my curiosity and desire to be a part of something greater than myself led me to take the position. The first couple weeks were disastrous: I moved the mats at a glacial pace, constantly stood in the path of the vault runway, and kept falling between the mats. There was little I could provide in terms of advice, let alone corrections, and I couldn't help but feel out of place amongst these women, who have dedicated most of their lives to perfecting skills in this exact and competitive environment. As I grew more comfortable during these practices, I started to loosen up—dancing, cheering, and letting my personality through.

As I dance on the sidelines, I realize my role is not to be the star athlete. While this may sound bleak, I am content with my position on the team. My strength is my ability to bring energy to the room, especially during a grueling practice. Every team needs a cheerleader, and I am happy to fill that role. By understanding how I can utilize my strengths—my high energy and outgoing personality—to my advantage, I have maximized my contribution to the team more than if I had tried to leverage my lack of athleticism. The coaching staff realized that I excelled in filling any role required, whether it was to organize the storage closet or to help lead team-building activities; I actively sought out any way I could positively contribute to the team. I even learned how to set the springboard and change the uneven bar settings. Because of my energy and skillful contribution to the team, the coaches have elected to travel me across the country to each competition, something I had never imagined I could do. Even when I lack natural ability, I always find a way to make an impact in whatever I do. My unconventional impact has led even the out-of-shape kid who can't touch his toes to make waves on a Division I Women's Gymnastics Team.

Graduate student in mechanical engineering at Stanford University. With a passion for physical product design and mechanical engineering, I excel in the pursuit of pushing boundaries of innovative design. I bring with me a lifetime of passion for problem-solving and development through collaboration with colleagues, team members, and mentors. I thrive under pressure and actively seek challenges to advance the goals of myself and those I work with.

Education

Stanford University | Stanford, California

M.S. Candidate Mechanical Engineering

B.S. Product Design and Minor in Computer Science

GPA: 3.875

Course Assistant | CS148: Introduction to Computer Graphics and Imaging

Team Manager and Volunteer Assistant Coach | Stanford Women's Gymnastics Team

April 2023–Present

September 2019–June 2023

Experiences

Buoyant Aero, Mechanical Engineering Intern

November 2023–January 2024

- Utilized an arsenal of CAD tools, additive and physical manufacturing in various mechanical engineering projects.
- Developed hands-on experience prototyping and iterating physical manufacturing designs.

Virtius, Product Design Intern

July 2023–December 2023

- Designed and implemented a landing site via Figma and Webflow, informing audiences of the Virtius company, services provided, and a teaser of the Virtius experience.
- Developed an interactive Unity demo experience to excite and inform gymnastics fans and audiences.

OpenPool, Product Design Intern

October 2022–January 2023

- Utilized an arsenal of Figma, brand identity, and UI/UX toolkits to refine the landing page.
- Developed OpenPool's iterative design to help the startup identify visual brand and voice.

Zelle | Early Warning Services, Product Design Intern

May 2022–August 2022

- Improved Zelle implementation guide, or dFIUX, to optimize UI/UX in key user flows.
- Prototyped with Figma different ways to increase consistency and engagement of content presented in the dFIUX.
- Developed a competitor matrix to understand how Zelle's services and designs could improve.

Stanford University School of Medicine, Rodríguez Lab Assistant and VR Developer

August 2020–September 2021

- Created 9 unique VR landscapes in Unity to find an intervention for elderly patients with hoarding disorder.
- Communicated with participants to recreate their living spaces and practice discarding their "belongings."
- Collaborated with the Stanford Psychiatry Department in learning clinical practices associated with research.

Daily Vocab for My Mom: Volumes 1 & 2, Author

2015–2018

- Authored and hand-illustrated a series of lexicographical works for non-native English speakers.
- Compiled hundreds of illustrated entries into published works available on Amazon.

Skills

Computer-Aided Design (SolidWorks, Fusion 360), Physical Prototyping (3D Printing, Laser-cutting, Mill, Lathe), **UI/UX Design**, Virtual Reality Development (Unity, C#), C++, Python, C, Swift, **Xcode**, Adobe Creative Cloud (Photoshop, Illustrator, Animate, InDesign), **WordPress**, Blender, **Figma**, Digital Art, **Design Sketching**

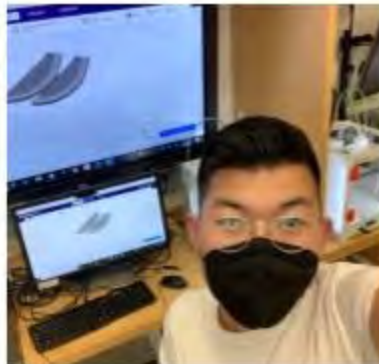
Languages

Fluency in Speaking/Reading/Writing: **English, French** | Proficiency: **Korean, Spanish, Italian**

A Final Word



I am tenacious, eager to learn, and excited to grow in new and exciting ways. If given the opportunity, I would love to demonstrate my candidacy further and answer any questions.





Thank You
For your Consideration