Project 1: Computational Design

A personalized, playful, portable and adjustable cell phone stand

DESINV 202
Technology Design Foundations (Fall 2023)

Xue HAN (Yuki) 3039632598

Content

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About Me

Designer
Engineer
Entrepreneur

Xue HAN

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Design	Research	Tools	Programming
Ideation	Interview	Adobe Creative Suite	Arduino
Storyboarding	Survey	SolidWorks	Python
Persona	Expert Interview	Rhino	
Sketching	Usability Testing	Keyshot	
Wire-framing	A/B Testing	Figma	
3D modeling	Statistical Analysis	Unity	
Rendering			
Prototyping			

Education

2023.8 - Present
University of California, Berkeley
Major | Master of Design

2019.9 - 2023.6
University of Nottingham Ninbgo China
Major | Product Design and Manufacture
Honors | President's Scholarship & Chinese National Scholarship

Internship

2021.7 - 2021.9
NetEase
Product Design Intern of the Innovation Design Center

Award

2022.7
Metaverse Interactive Design Hackathon
First Prize, Group Project - Parenting Simulator

Startup

2020.3 - Present
Xuegaoyun Education Technology Co., Ltd
Co-Founder

Experience

2021.5 - 2021.6
Yuanzhuang Primary School
Volunteer & Team Leader

2022.8 - 2022.9
Stanford University ICME Summer Workshop
Participant

Demonstration of the cell phone stand

Final 3d printed product

Product features

- Adjustable
For both portrait and landscape use

Flexible for different seating heights by allowing adjustments for the most suitable viewing angle through various slots.

- Portable
Light weight
Easy assembly

- Playful
The chair-shaped stand adds a touch of joy to its functionality

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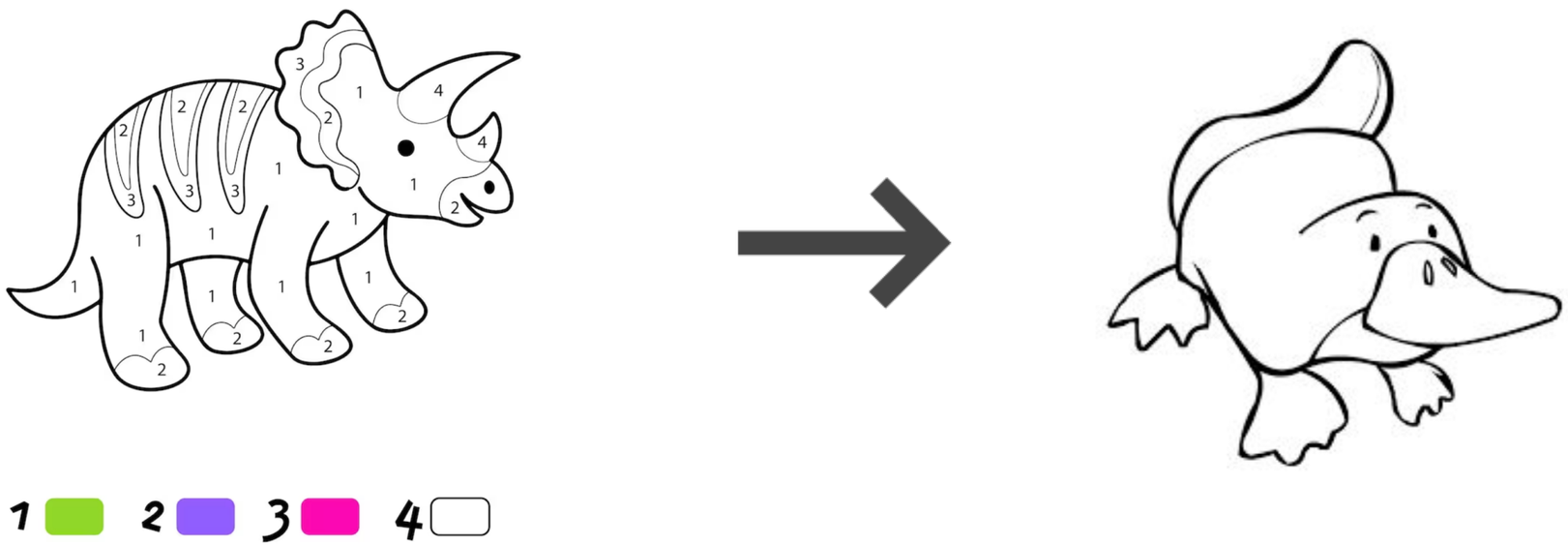
Challenges & Personalization

Challenge level choices



The challenge level shifted from Triceratops to Platypus
Because I was new to grasshopper, and I think the use of grasshopper in my future design projects was limited, so I chose level 1 at the beginning of the project, in which I was supposed to follow a set of simple instructions to create a predefined result. However, I gradually became interested in computational design and mastered grasshopper. And I personalized designed my cell phone stand based on my daily using scenario. In the process, I engaged with the technology and tried to add some new features to my design. Therefore, the challenge level was shifted to Platypus.

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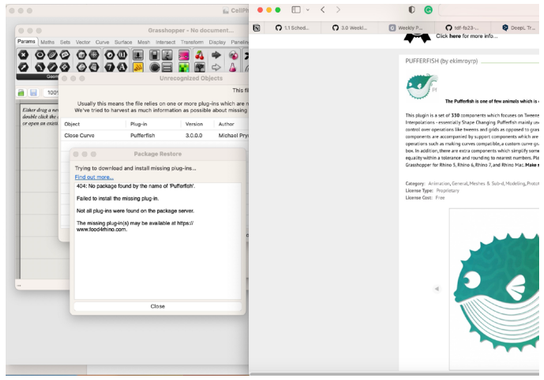
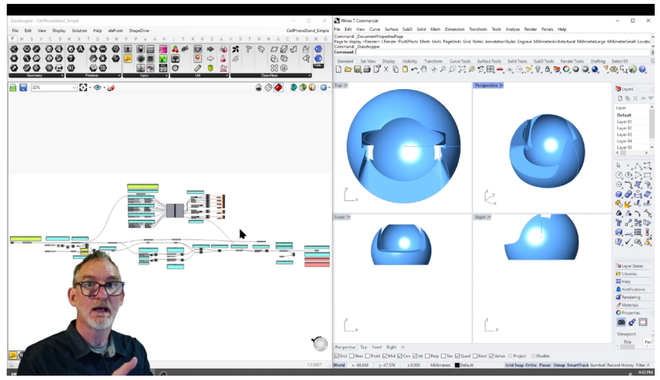
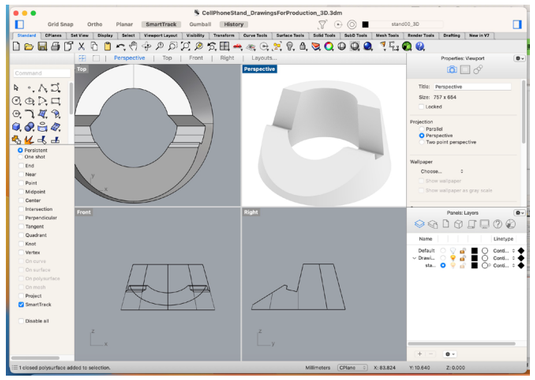
Challenges & Personalization

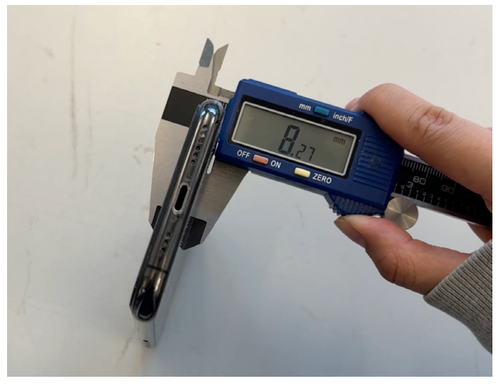
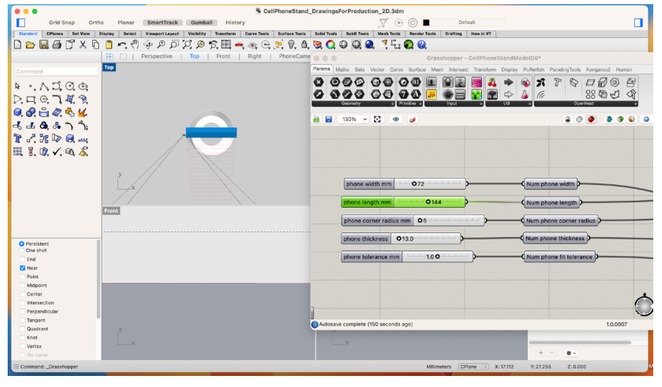
Challenges I took

- Level 1_Follow the instructions to take apart and reassemble the the worked example in Rhino and Grasshopper.
During my undergraduate study, I used Rhino as a CAD modeling tool before, but I never used it to create computational designs. Therefore, parametric modeling with Grasshopper is a novel experience for me!
To start with, I followed the instructions to download the required plugin on food4Rhino. Then I watched the tutorial of a simplified Cell Phone Stand Design, Evaluation, and Publication. In addition, I worked with provided model.

- Level 1_Change the parameters in the Grasshopper file and bake the Grasshopper model to fit my phone.
In this section, I measured my phone size with vernier calipers and modified the parameters in the grasshopper file to fit.



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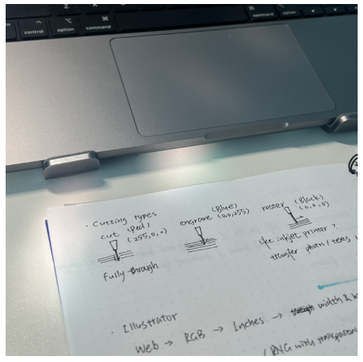
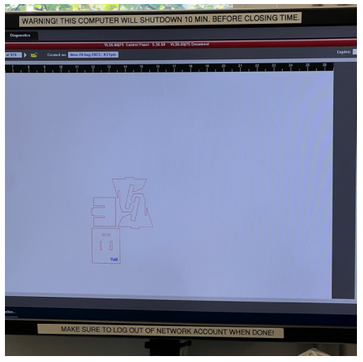
Challenges & Personalization

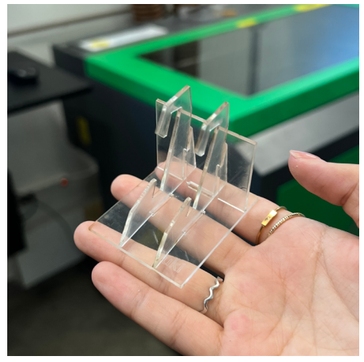
Challenges I took

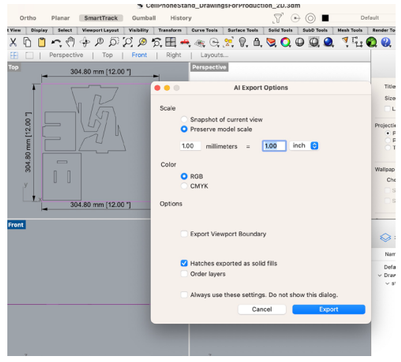
- Level 1_Fabricate the model (laser cutter and 3d printer)

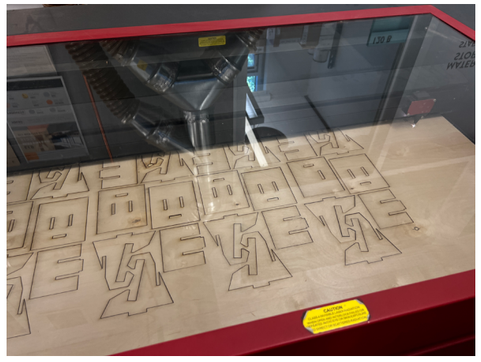
I completed both online and hands-on training to gain the Maker Pass. Below are my learning records for laser cutting.



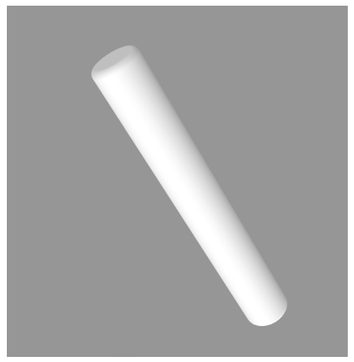


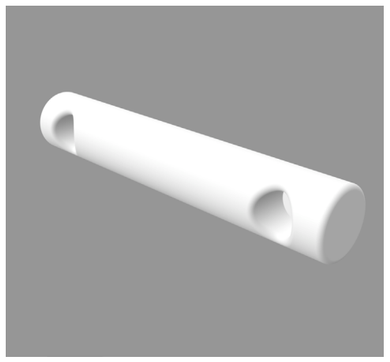


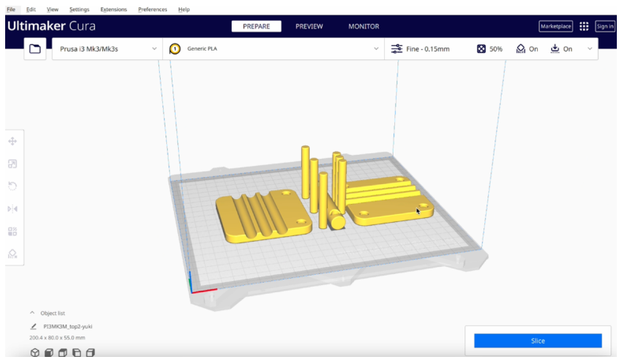




After personal customization, I used the 3d printer to fabricate my final design. Here are the files for 3d printing and how I prapared the printing set-up.







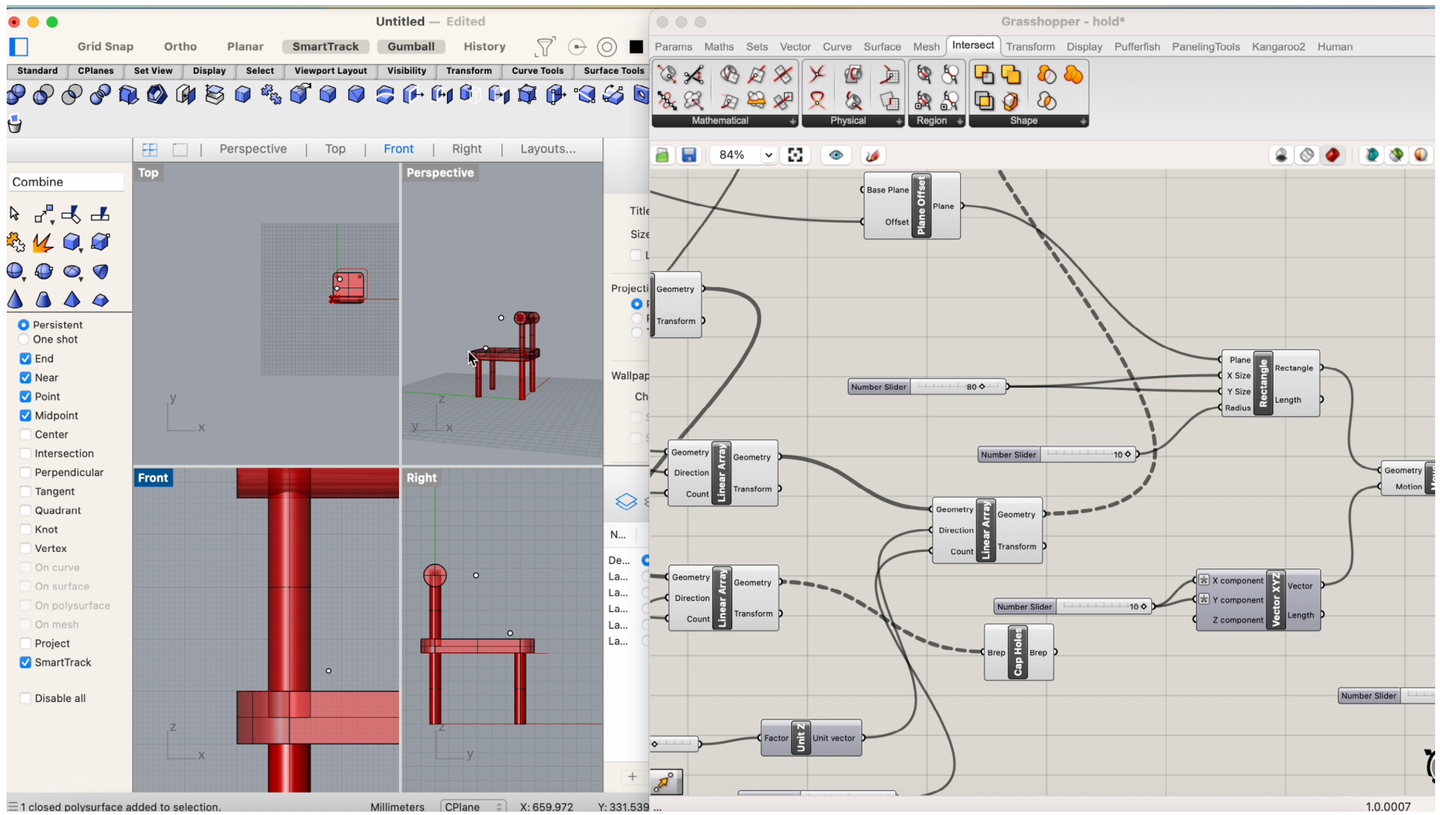
During the fabrication process, some problems arose, which will be analyzed in the chapter of speculations and reflections.

Challenges & Personalization

Challenges I took

- Level 2_Utilize my own aesthetic to redefine the Grasshopper model to generate a novel design which conforms to a new system.

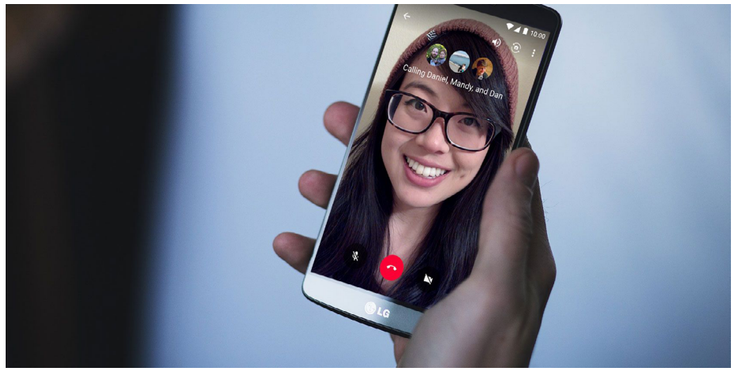
After mastering the basic grasshopper modeling logic, I tried to re-model with grasshopper based on my own personalized customization. In this process, I have special considerations for the design and plug structure of the model, so I think this project can be considered as level 2: Platypus.

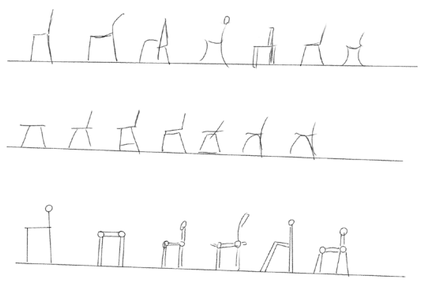


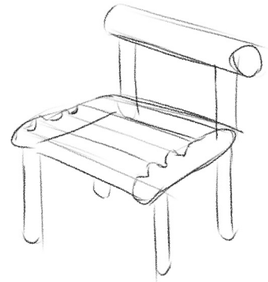
Challenges & Personalization

Personalization I made

- Redesign based on my daily scenario
Reflecting on my daily life, I noticed two common scenarios where I use a cell phone stand: FaceTiming with my family and friends and watching videos while eating. Therefore, I wanted my stand to accommodate both portrait and landscape orientations.







- Add product features based on personal preferences
Based on user journey analysis, problems of the current cell phone stand are listed here.
~The angle of use is fixed and cannot be adapted to flexible environments.
~The aesthetic consideration of the product is lacking and there is no product semantics.
~The cell phone holder is too bulky and not easy to carry.

To solve these problems, I brainstormed some concepts and made further design choices. I decided to give the product a semantic meaning by designing a chair for the phone. I did some quick sketches to define the shape and form. I chose a simple design style, using cylinders and cuboids. After defining the product features, I used Rhino and Grasshopper to create a 3D model, incorporating boolean operations to create the hole and shaft structure. 1 mm tolerance was set to ensure effortless assembly.

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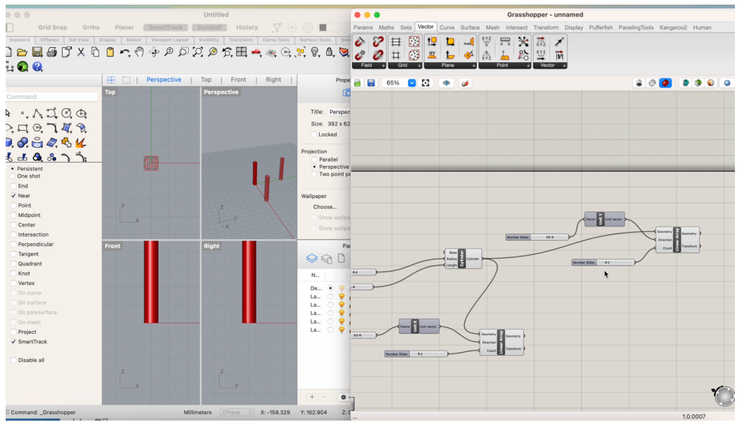
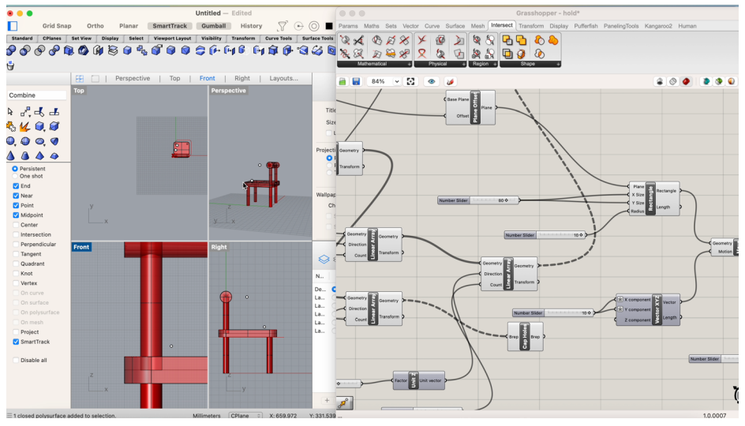
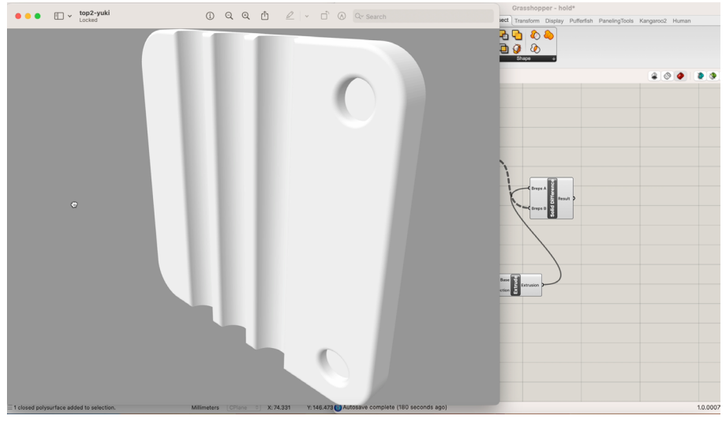
Challenges & Personalization

Demonstration of the results

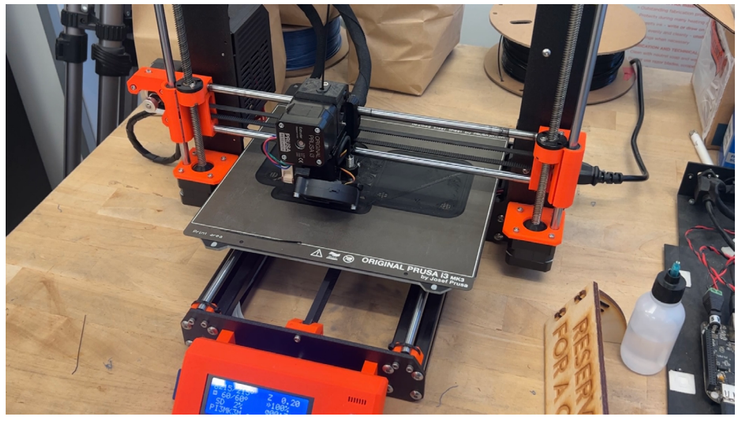
- Modeling and evaluation

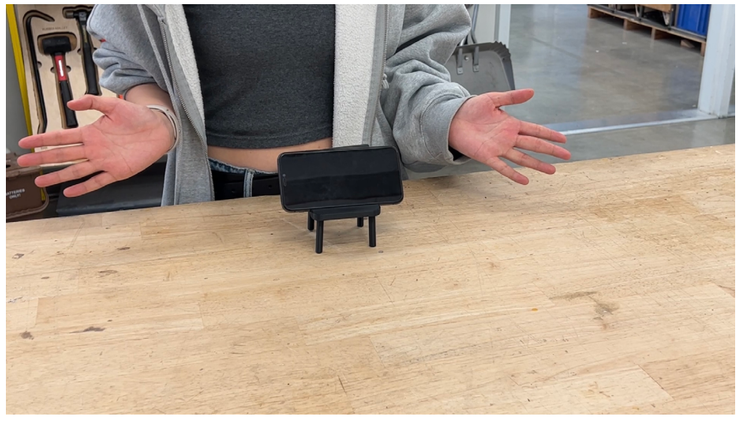






- Fabrication and testing





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Speculations & Reflections

- How computational design impact human experiences
In this project, the cute style product offers an enjoyable user experience while remaining portable and adaptable. It meets my initial design expectations and aligns with the concept of incorporating engaging aesthetics into products.

Emotional considerations in computer design are crucial for enhancing the user experience and establishing a deeper connection between the product and the user. The aesthetically pleasing design of the product evokes positive emotions such as joy, affection, and entertainment, thereby creating a pleasant and memorable interaction with the device. When a product elicits positive emotions, it not only enhances the overall experience but also fosters attachment and loyalty to the brand.

Furthermore, in a world where technology is deeply integrated into our daily lives, emotional design considerations can have a positive impact on mental health. Utilizing an endearing and cuddly product can offer users temporary respite from daily fatigue, bring smiles to their faces, and improve their overall mood. By fostering a positive emotional response, this delightful product helps deliver a more holistic and enjoyable user experience that caters not only to functional needs but also to emotional well-being. In essence, integrating emotional factors into computational design is essential for developing products that enrich lives while promoting healthier relationships within user communities.

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Visceral

Attractiveness
Pre-consciousness
Initial impression
Feelings

Behavioral

Usability
Product function
Performance
Effectiveness of use

Reflective

Meaning of product
Impact of thought
Sharing the experience
Cultural meaning

Speculations & Reflections

- How computational design impact engineering

After watching the video of Computational Design as described by John Maeda, I gained a deeper understanding about computational design and how computational design impact engineering.

Computational design has revolutionized the field of engineering, challenging conventional paradigms and significantly impacting the conception, development, and optimization of products and systems. In contrast to traditional design that involves physical artifacts created by localized designers, computational design operates at a digital level, enabling the creation of intricate products and services with a wide-reaching global user base. This paradigm shift dramatically accelerates the design iteration cycle, saving time and resources while expediting the product development lifecycle.

Moreover, computational design empowers engineers to tackle complex problems with unparalleled precision and scale. Daunting engineering challenges that would be insurmountable without computer assistance can now be effectively resolved. Advanced algorithms and simulation tools facilitate in-depth analysis such as stress simulation, thermal assessment, and fluid dynamics—allowing engineers to refine designs according to specific performance and safety standards.

Another significant aspect influenced by computational design is the integration of interdisciplinary elements within engineering. It facilitates seamless collaboration and integration among various disciplines like mechanical, electrical, and software engineering. Through comprehensive digital modeling and simulation techniques, engineers can ensure cohesive functionality and efficiency across all components and subsystems—a key factor in delivering holistic products.

Furthermore, computational design fosters a culture of optimization driven by data-informed decision-making processes. Engineers can iteratively optimize designs to continuously enhance performance while minimizing resource usage and cost implications. The vast amount of data generated during this process contributes valuable insights for informed decision-making purposes—ultimately fueling innovation for future projects.

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Speculations & Reflections

- The intersection of computational design and AI

In my understanding, AI, and specifically machine learning algorithms, can be integrated into computational design workflows to enhance automation, prediction, optimization, and decision making.

Generative design and AI algorithms: AI-driven generative design algorithms can help engineers create multiple design scenarios based on predefined criteria and constraints. Machine learning algorithms can learn from existing designs, patterns, and user preferences to generate innovative design solutions that may not be conceived through traditional methods.

Ai for Personalized design solutions: AI algorithms can analyze user data and preferences to tailor designs for individual users or specific groups of users. This personalization increases user satisfaction and engagement with the final product.
Optimization and efficiency of AI: AI algorithms can optimize designs by considering a large number of parameters and constraints simultaneously. This ensures that the final design is efficient, cost-effective, and meets specific performance standards.

Continuous learning and improvement :AI can continuously learn from user feedback and design results to improve and enhance future design iterations. This iterative learning process leads to continuous improvement in design quality and relevance.

The convergence of AI and computational design is changing the way engineers solve problems, resulting in smarter, more efficient, user-centric designs. This is a testament to the constant evolution of technology and its potential to reshape the future of engineering and design.

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Conclusion & Feedback

- Feedback from peers and how I improved my design

Positive	Negative	How to improve
The project successfully uses the phone dimensions and has great fit for the dimensions.	It would be interesting to explore further how it can be made portable! How the pieces can be made compact and fit with each other in more than one way.	**Design a small storage bag or allow parts to be combined with each other to save space and preserve parts**
I like that there are different levels of angles that user can choose when placing their phone on the stand. She was also able to include a touch of playfulness to her design which I really enjoyed.	It would be great if she can try modeling the stand for different screen size! E.g. iPad, etc.	**Change the parameters in the grasshopper file to achieve different sizes fit**
The playful take on the design makes it very interesting. The presenter provide three angles options using grasshopper.	More parameters could be added in grasshopper to make it possible to modify some more dimensions.	
Aesthetics and functions make sense to be a good product.	More well thought assembly method (for repetitive use	**The plug structure can be considered to be threaded**
SOOOOOO CUUUTTEEEE, the different components make it clear that you can adjust the size of each part of the chair and I really like that. The final product is so clean and I like that you can swap out parts, so you can probably adjust the base and legs to fit your specific eye line and height as needed.	I would like to maybe see further iterations on the leg designs (like the foldability I suggest later).	
The chair design is super cute! I also love that you made it into different parts so that it is portable and can be re-assembled	Maybe more stability could be added	**Elongate the back of the chair and adjust the center of gravity for increased stability.**
Xue utilized most of the functionalities of the computational design that we've been taught. And, she also made a very creative and customized version of a cell phone stand.	When I tried Hue's cell phone stand with my phone, it worked very well horizontally, but vertically my phone was slipping, so maybe improve it for the vertical orientation (it might be a good idea to make the back of the chair prolongable:D)	
The process from design thinking to how to change different parameters.	Maybe the test of the stability, cause I know it's really difficult to handle heavy items.	

Conclusion & Feedback

- Conclusion & Throughout

I'm happy with this design because it boasts an appealing, cute style and offers an enjoyable user experience while remaining portable and adaptable. It meets my initial design expectations and aligns with the concept of incorporating engaging aesthetics into products, particularly in today's era where psychological well-being is paramount – we need "warm" design.

However, it's important to acknowledge some limitations. Storage considerations were overlooked, and the loss of one support leg could hinder functionality. Additionally, I failed to incorporate the ability to charge the phone while using the stand, as reflected last week. This aspect could be a potential area for improvement.

In summary, this design may not be a typical computational design output, but it perfectly caters to my personal preferences. Overall, it was a refreshing experience to work with Grasshopper, and I thoroughly enjoyed the learning journey.

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Appendix <github & video links>

- GitHub repository

https://github.com/Berkeley-MDes/tdf-fa23-Yukihan528/tree/main/Project%201%20Computational%20Design

- Final Video Link

https://youtu.be/xUEL4fAkcL0