Pitch N’ Yaw Project Development Process

Ben Drake OSU Industrial Design ‘23

Introduction

Our original prompt from the Dayton Aviation Heritage National Historical Park was as follows,

4. Educating about flying

The Wright brothers were once inspired by the "puddle jumper," a hand-propelled flying toy. Contemporary versions of this toy are now handed out to the Dayton Aviation Heritage National Historical Park visitor to demonstrate some aspects of the principles of flight. Yet, those puddle jumpers are made of single-use plastic and do not promote sustainable practices. How to continue educating about flying principals, share the heritage of the Wright brother, and mass produce a sustainable product?

Phase 1 - Primary Research

Our first step consisted of visits to Park Service sites in Dayton, talking to our partner Ryan Qualls as well as other park volunteers/rangers, and visits to other similar places including the Franklin Conservatory and Orton Geological Museum.

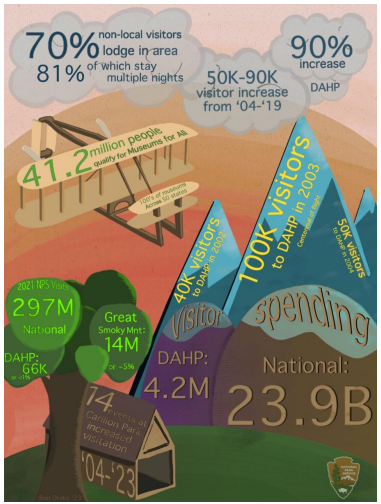
Phase 1 - Primary Research

Visiting these places lead me to believe that the problematic at hand had to do with access to the park, meaning its operating hours, its location, and the amount of text in the museums. I chose to address this by providing access to the park and its stories beyond these barriers. Primary research also included conversations with pilots, and creating design conjectures.

Phase 1 - Primary Meets Secondary

An *ah-ha!* moment happened for me when seeing the number of after hours events that happen at the Franklin Park conservatory during my visit there. This echoed a sentiment found in the article *Shifting Perspectives: The Millennial Influence on Museum Engagement,* that says young audiences want to connect with peers and share experiences together. We also have evidence in the DAHP notes from the last 19 years that off-hour events held at Carillon Park in Dayton have increased visitation. A problem here is, this was only noted to have occurred 14 times in that period, most of which were winter holiday events. It also stood out to me that the park's peak visitation was in the year 2003 due to the events surrounding the centennial of flight. For all of these reasons I believe DAHP's operating hours are one of its biggest barriers to reaching more people. It was then I realized the park has plenty exhibits and tells the story of he Wright brothers very well, and I don't need to thoroughly educate people or add an exhibit, but rather inspire interest beyond the barriers established here.

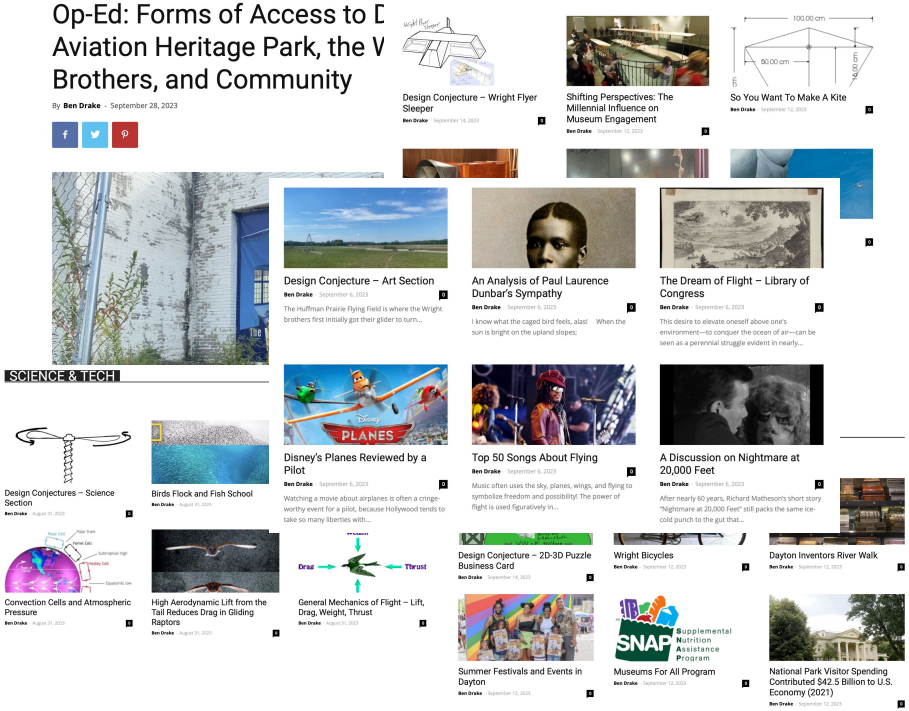
NPS Infographic



My Infographic

Phase 1 - Secondary Research Dossier

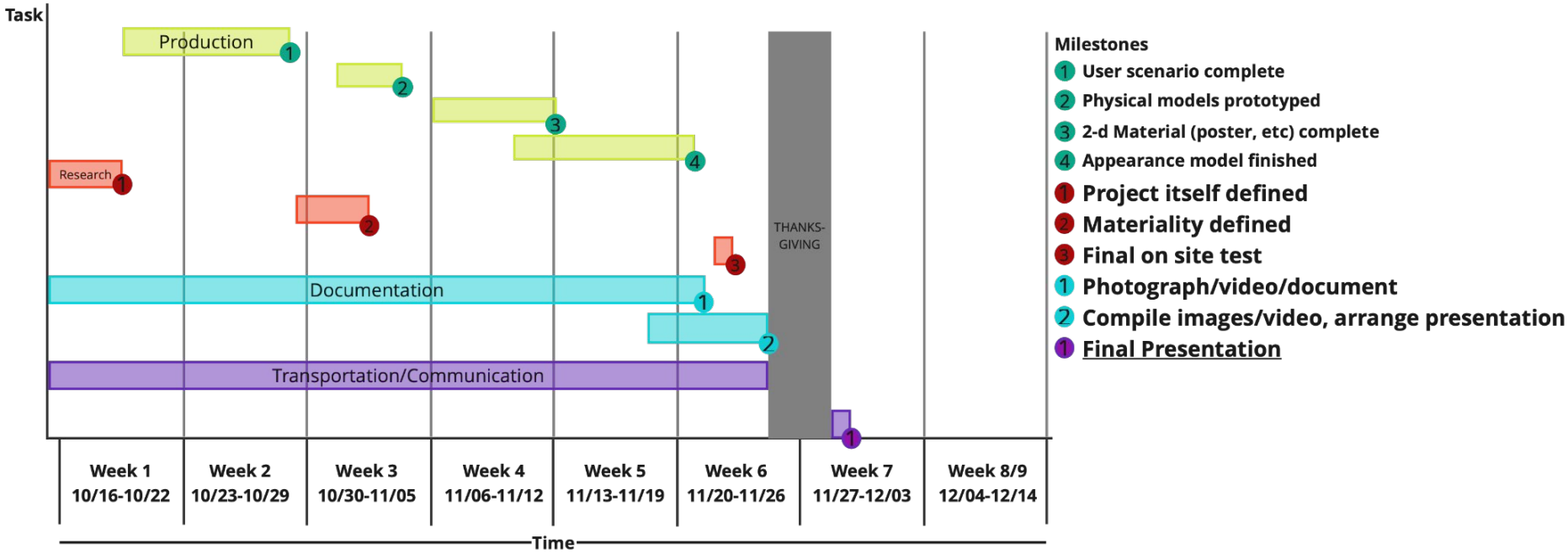
Reading articles focused on various aspects of the prompt helped me to understand what flight means to people on an emotional level. I wanted to use emotions to create a fun experience that evokes the feelings of flight and brings people together.



Phase 1 - Design Brief

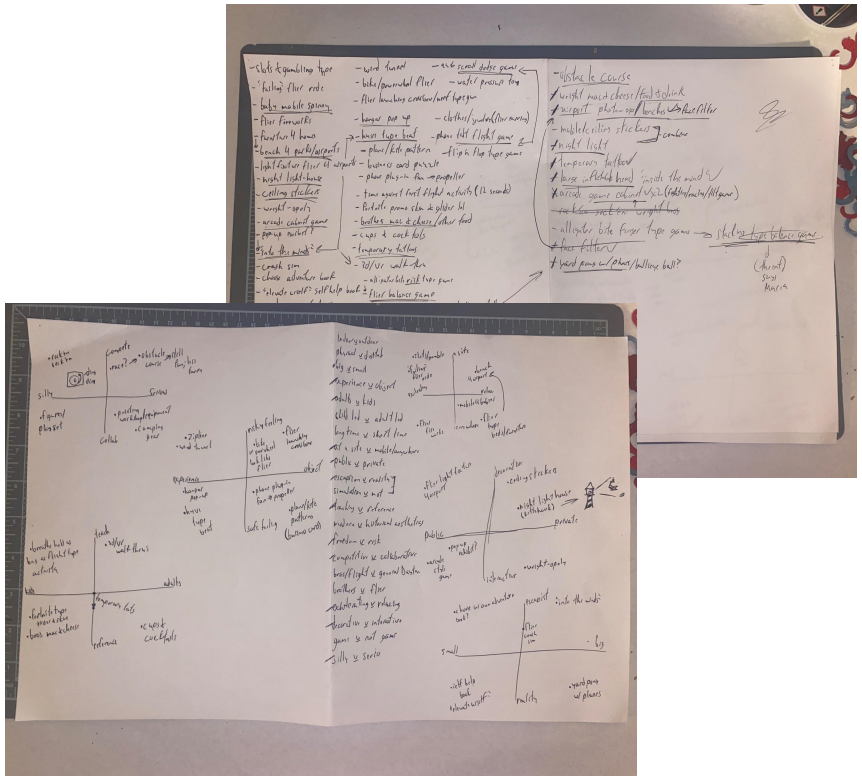
Types of Access	Feelings Associated w Flight/Wright Bros.	Other Goals	Other Goals II	Stakeholders
Physical Access	Risks/ Challenges	Shared Experience	Uses Emotions to Create Connecting Experience	Primary: DAHP; Park Visitors; Potential Visitors; People Who Can't Reach the Park
Academic / Literacy Access	Persistence/ Overcoming	Wright Brothers' Story	Something for Children and Adults	Secondary: Funding Groups; NPS
Time Access	Freedom/ Escapism	Not Site Dependent		Tertiary: Dayton Community
	Inspiration/ Wonder	Easy to Understand		

Phase 1 - Project Development Plan: Simplified Gantt Chart

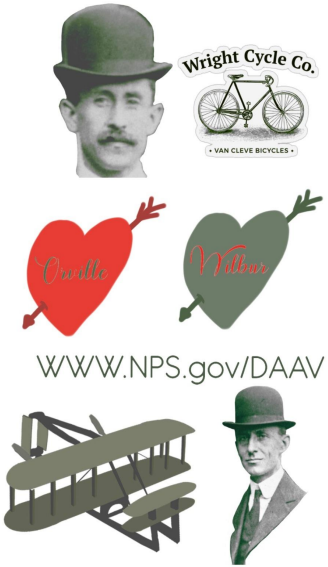


Phase 2 - Concept Iteration

The first step in project development was to carry out divergent scenarios. By pairing criteria on opposing axes and placing ideas along the matrices, new ideas can be generated within varying parameters. I came up with around 20 criteria and 60 ideas. These 60 were narrowed down into 7, 5 of which are pictured on the next slide. After these strongest ideas came to the forefront, formative assessment was carried out to determine which route would be the most compelling.



Phase 2 - Concept Iteration



Phase 2 - Formative Assessment Test 1 Results

Test 1: Wright Flier Identification

Research question: Can kids/young people readily identify the Wright flier either in silhouette or literal representation?

Evaluative goal: Understand if use of the flier is received as an icon of the Wright brothers/ aviation history.

Hypothesis: Kids may recognize the flier as an old form of plane, but may not know to associate it with the Wright brothers. Which could inspire further investigation.

Methodology: Send an image of the Wright flier's silhouette, and its form unobstructed separately to people I know with kids. Have them first ask their kids if they can recognize what the silhouette is, then repeat the question with the actual image of the flier. Finally a question like "do you know who invented that plane?".

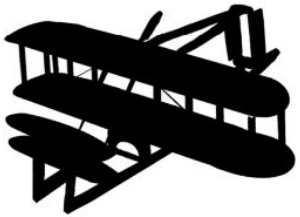
Sample: Kids of people I know, my little brother, my mom's friends, friends of mine with kids of various ages.

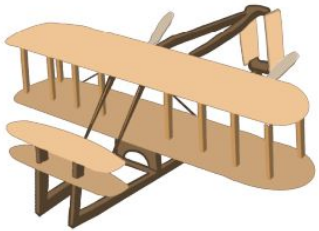
Indicators of success/failure: The silhouette is positively identified as at least an old plane, similar for the actual photo. A huge success would be if multiple kids mentioned or referenced the Wright brothers. Failure would be defined by most of the kids having no idea what the flier is.

Design Lessons:

Considering most of the kids (3/5), including the youngest of the bunch, were able to identify the flier itself, I'd say it is a reasonable form and icon to use. The silhouette however proved much harder to identify, even in this very limited sample (1/5 correct IDs). This knowledge supports straying away from obscuring the plane and using it pretty literally. Such an insight shows that the night light may not be effective if kids aren't even sure what that shadow spinning around their room is. Rather the balance game with a model of the flier will be something they can likely connect with.

Only one of the children knew about the Wright brothers based on either their or their parent's comments. Knowing that leads me to consider what kind of story might be told through the game's packaging or instructions to drop bits of history. This also lends legitimacy to my idea of using the brothers themselves as stacking elements as a way to introduce them to some players.





Phase 2 - Base Form Iteration + Test 2 Results

Test 2: Balance Mechanics

Research question: What kind of balance point is best for a flier based balance/dexterity game?

Evaluative goal: Determine how the base for a game of this nature could work in practice, determine difficulty level associated with each base.

Hypothesis: One of the bases will provide a nice middle ground for balance, being not so stable that the model never falls, and not so touchy that stacking is made impossible.

Methodology: Present participants with 2 or more styles of balance bases and a model on which to stack a few pieces. The model need not represent the Wright flier at this stage. Have the participants attempt to stack all of the provided components on each base.

Sample: Peers, adults, and kids that I have access to. These could be friends, classmates, family members, etc.

Indicators of success/failure: A successful test will have an outcome in which at least one of the bases is able to support all of the components for most of the participants. Depending on the number, a huge success would be characterized by having an option on which they succeed maybe 75% of the time, leaving room for failure in game. A failed test would look like all of the bases being too difficult to use for most of the participants.

Phase 2 - Base Form Iteration + Test 2 Results

Design Lessons:

The half dome shaped base was the best of the 5 forms tested allowing for what most closely matched my idea of gameplay.

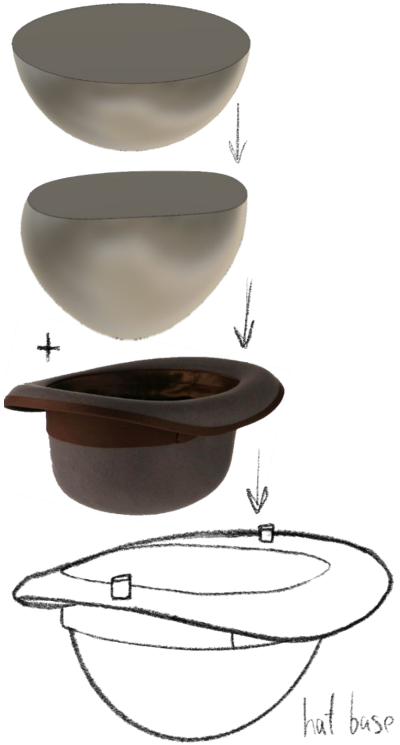
Testing the base proved to be difficult at first as the flier and stacking elements slid around atop the base until secured with clay. I will need to experiment with ways to attach the flier model to the base, perhaps pegs and holes or something like the Tippi Tree base that has cut outs for the flier to sit in.

The flier being flush to the base worked well fine when testing with others and clay blocks, however when moving to human figures on my own time I found that the figures' hands couldn't hold the flier properly. This means the flier will need to be raised up a tad off the base, allowing for stacking elements to hook on easily.

The players also needed both hands to affix blocks to the flier. At one point the players tried to steady the base with their hand, sort of defeating the fun. Creating elements that can slide onto the flier with one hand will be important to avoid extra movement/tipping during play.

The slots in the test blocks also proved to hold well as the plane tipped, holding them in place with tension in the same way the Tippi Tree blocks hold.

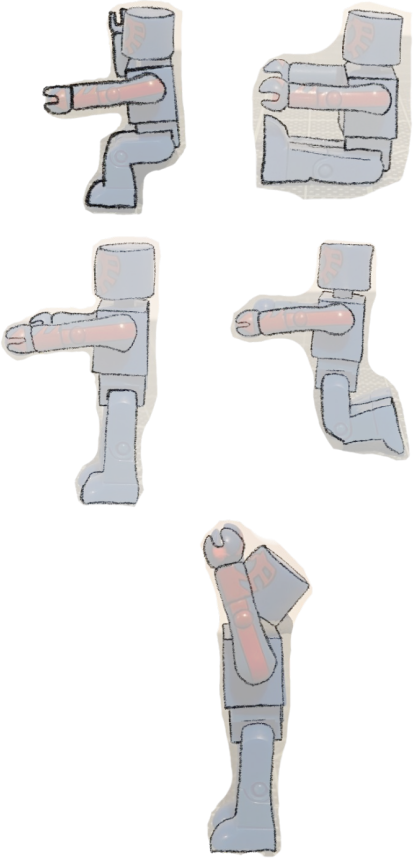
I may need stacking elements of different sizes and or weight in order to encourage variable gameplay. The players remarked that having blocks in different sizes gave the game an element of strategy. Needing to consider which piece made more sense to use based on how unbalanced the model was. The half dome base has enough room while tilting to allow for one side to be heavier than the others, without totally falling over.

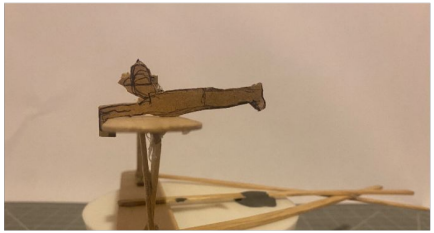


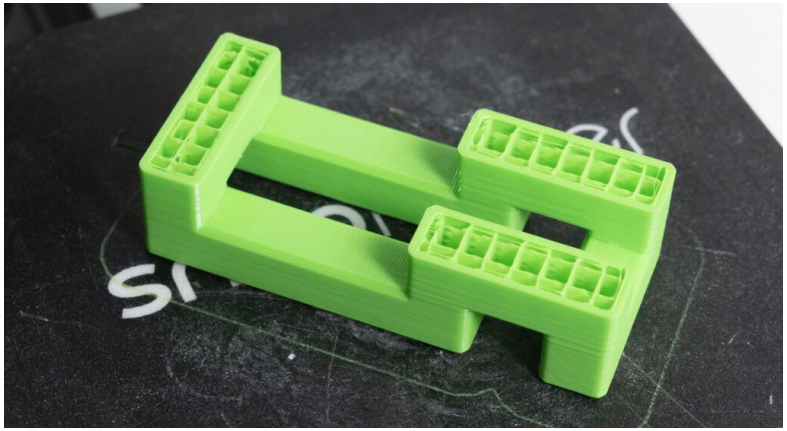
Phase 2 - Formative Assessment Test Results

The formative assessments lead me to believe that a balance game is an effective and easy to use thing, while informing the idea that people may not recognize the flier's silhouette, steering me away from the nightlight. However, in talking to our partner I found the lighthouse is a strong symbol for their group. Leading me to eventually combine these ideas.

Phase 2 - Stacking Piece Form Iteration/Inspiration





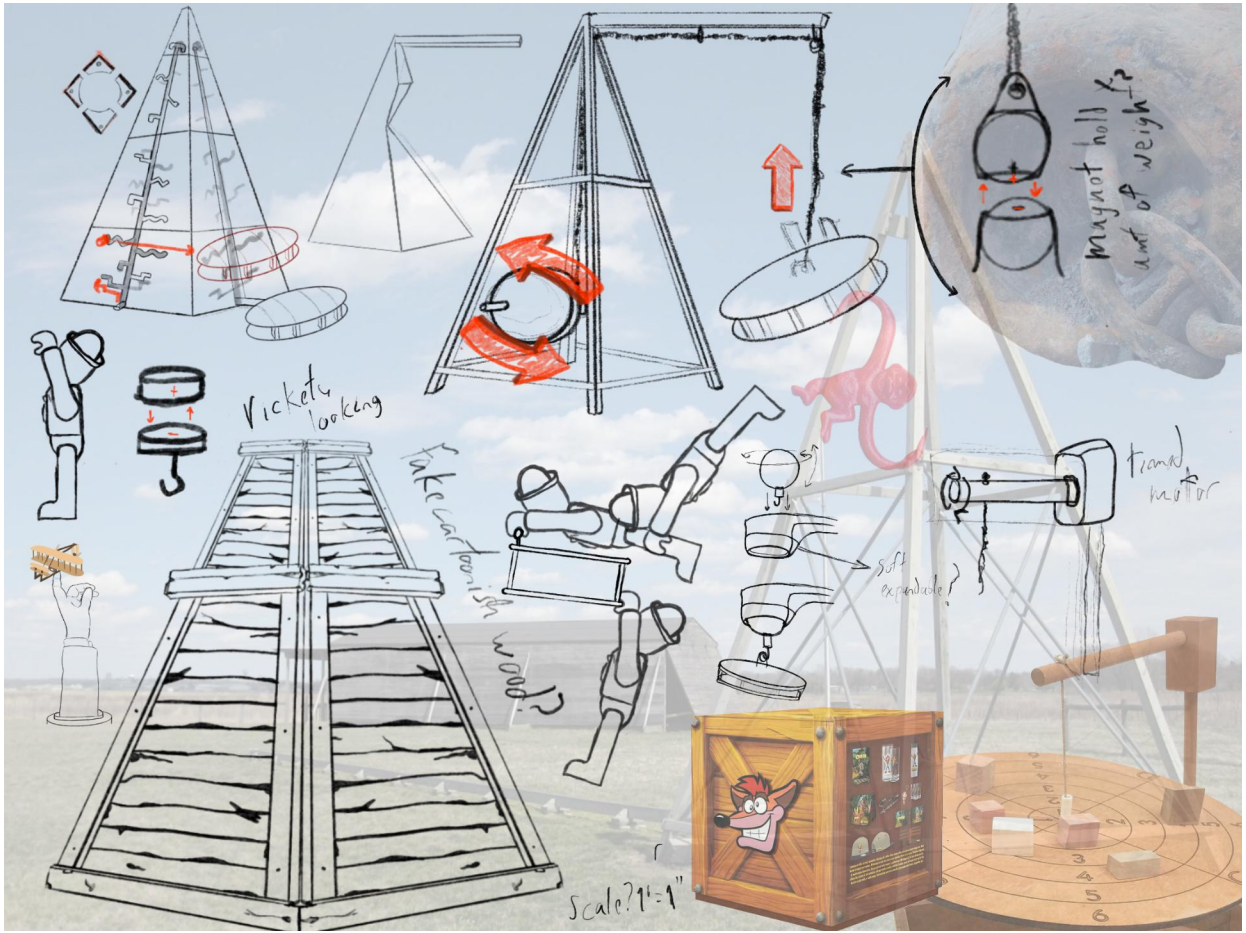


Phase 2 -

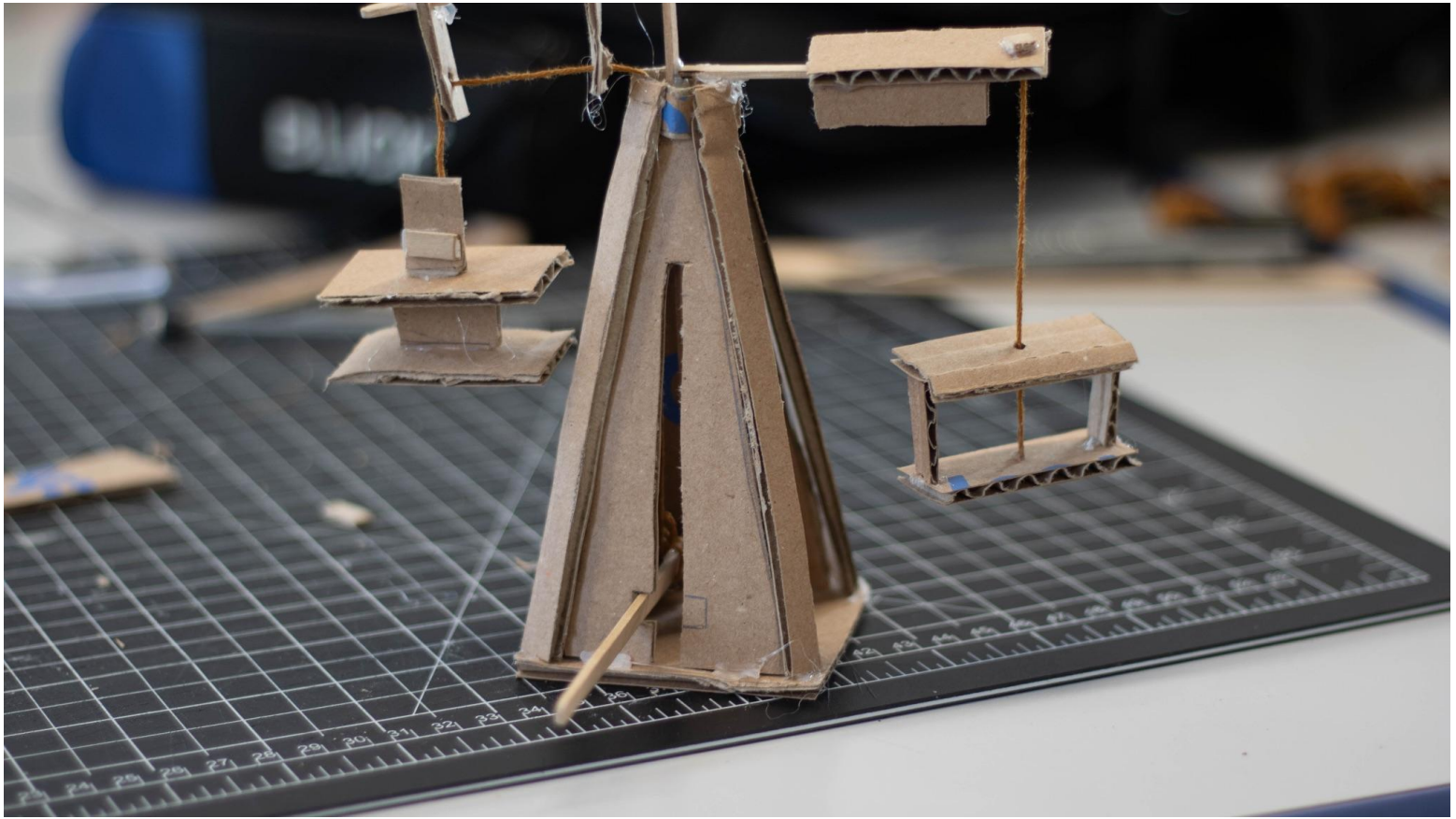
Moodboard 1st Draft

- Canvas/old paper textures
- Wood
- Bowler hat
- Brothers themselves
- Flier/technical diagrams
- Sepia or desaturated colors
- Early 1900's fonts

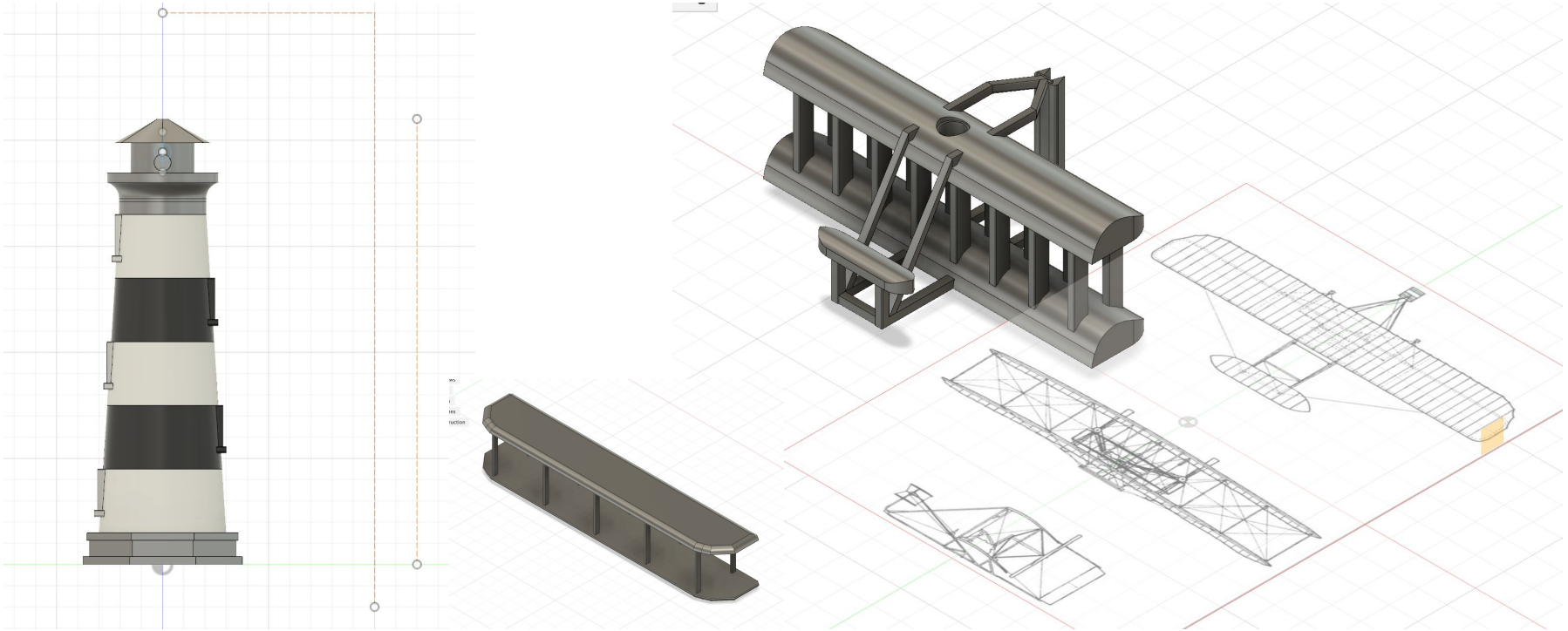
Phase 2 - Form + Device Iteration/VBL



Phase 2 - Form + Device Iteration

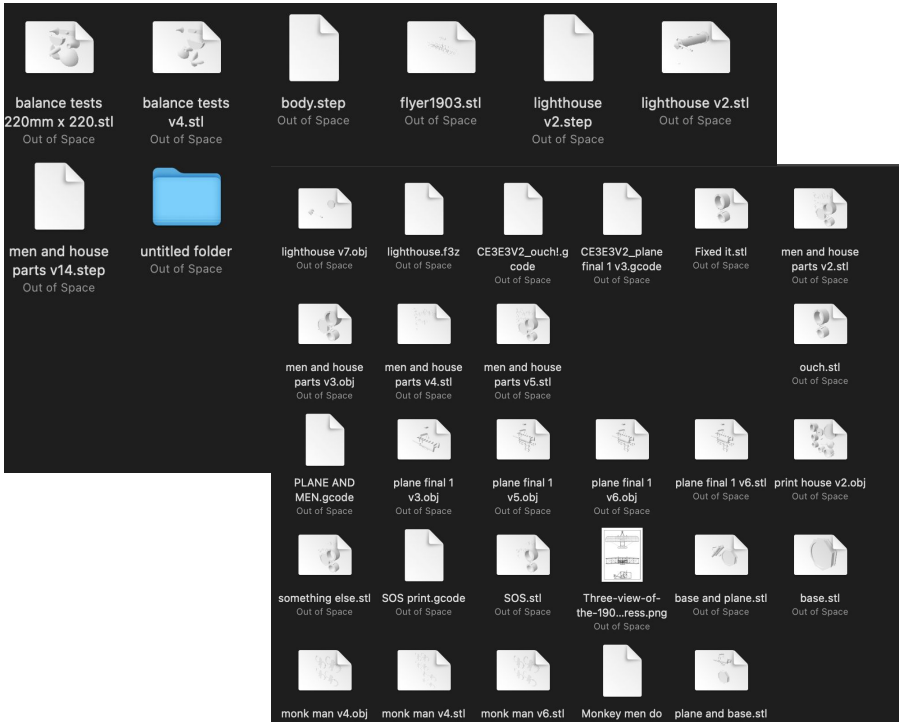


Phase 2 - Form Solidification - Fusion 360

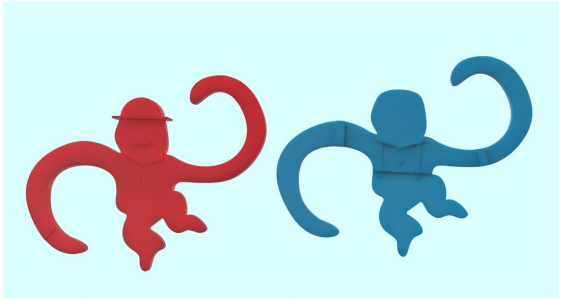


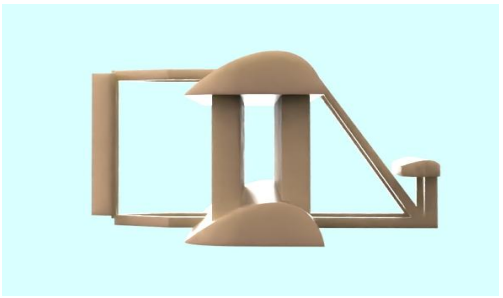
Phase 2 - Form Solidification

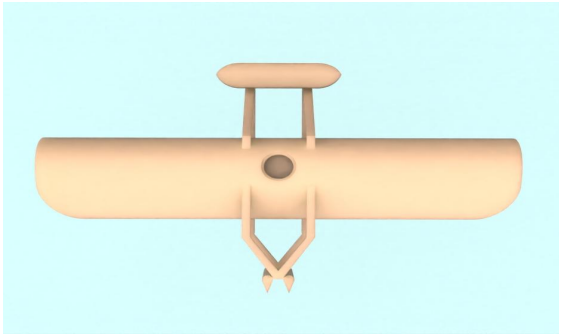
The 3d models on the previous slide show the change in scale from 12 inches to the final 10.5 in height. Taking these fusion models into Keyshot, Ultimaker Cura, and finally printing resulted in very many files and test prints.

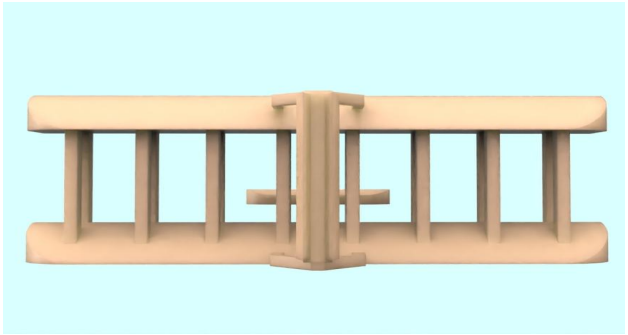


Phase 2 - Form Solidification - Keyshot

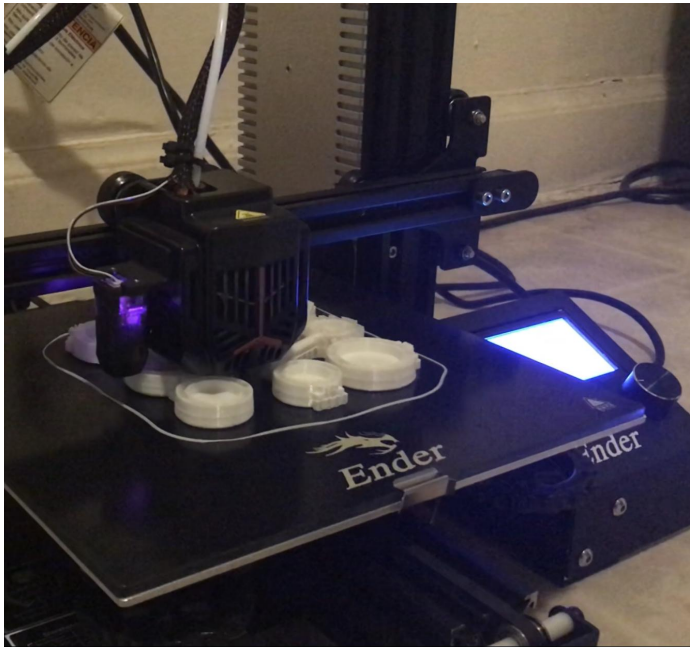








Phase 2 - Construction + Painting



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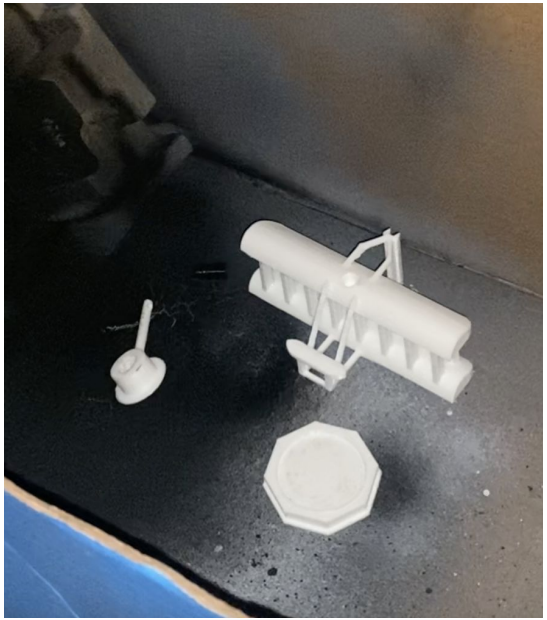


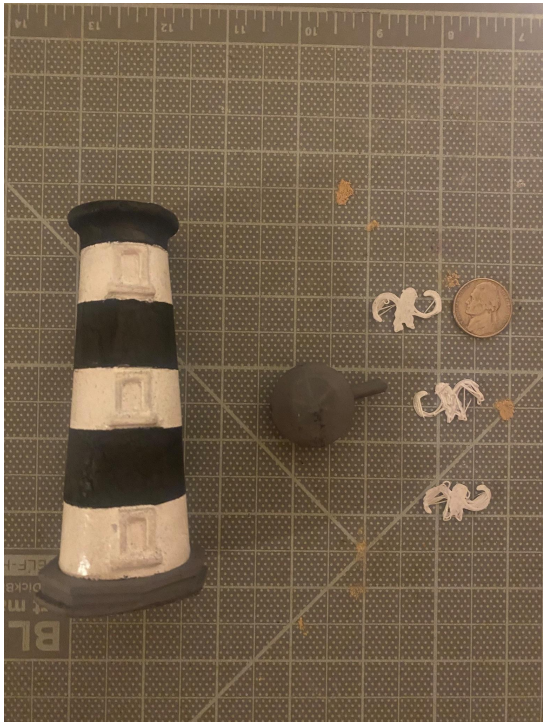
Phase 2 - Construction + Painting

After all pieces are printed they are clipped free of excess PLA, sanded, and glued together. After glue is applied woodfiller is applied to fill in gaps and layerlines. Sanding happens again then everyone gets a coat of primer. Sand, prime, and repeat again. After the final coat of primer is sanded tape is applied and pieces are spray painted, sanded, and painted again. Repeat tape process for other portions. Taped edges are then manually touched up with a fine brush and acrylic paint, finished with a clearcoat spray.

Phase 2 - Hardware Installation

Small ball bearings are installed on the peg atop the lighthouse. Magnets are installed in the top of the plane and in the magnet holder hanging from the lighthouse. A matching tan string is used to attach the magnet holder.

Phase 2 - Scale Models + Test Pieces

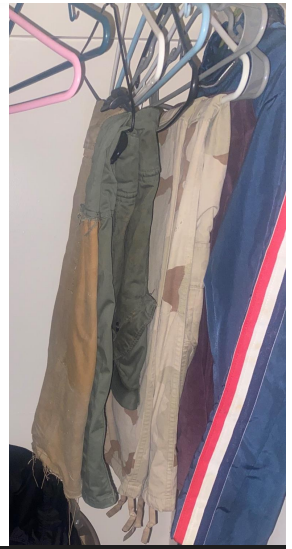


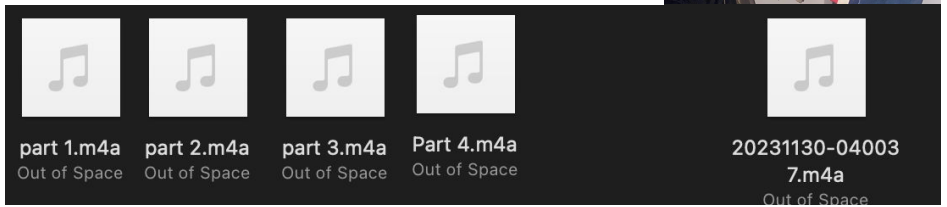
Phase 2 - Final Prototype

Phase 2 - Audio Recording

First I prepared a script, then tested a few microphones in my closet to prevent reverb. After recording my voice over in several takes I transferred it to my laptop.

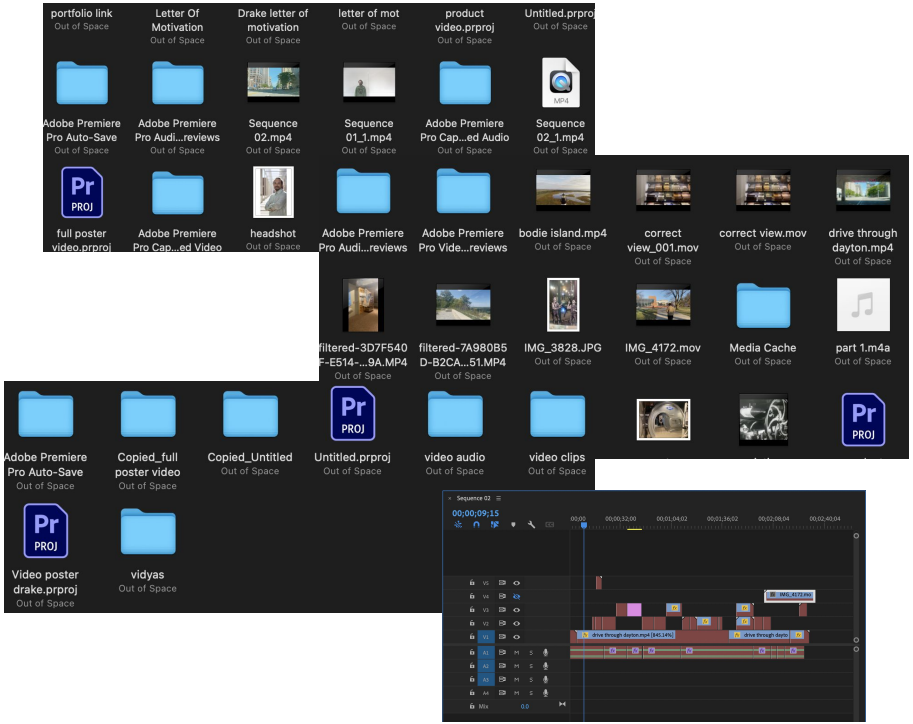
This is the city of Dayton, Ohio. Often called the cradle of creativity, Dayton has been home to many inventors and artists, and once held the record for the city with the most registered US patents in the country. Some of these innovations include the aluminum can pop top, the automatic engine starter, the cash register, and most famously, the airplane.
These first aviators were the Wright brothers, Orville and Wilbur. Long before their first flight, the brothers were known for their businesses in bicycle manufacturing and printing newspapers. But even as young boys, the wrights were fascinated by heavier than air flight. Their inspiration came from a rubber band wound copter that their father had brought home for the boys to play with. This moment would set them on their paths to brave and conquer the skies.
Fearlessly the brothers conducted test flight after test flight, iterating on their flying machine between each failure. The brothers fell from the sky at the Huffman Prairie Flying Field so frequently that undertakers would come to observe the test flights, waiting for a fatal crash. The brothers however would persist, adjust, and overcome the force of gravity in 1903 in Kitty Hawk, NC, near Bodie Island Lighthouse.
This historic flight spawned a legacy represented and carried by the Dayton Aviation Heritage National Historical Park, our external partner for this project. The National park service in Dayton uses these puddle jumper toys to recreate the moment of the Wright brothers inspiration. The puddle jumper also serves to allow the park's information and message to leave the park sites and become available anywhere at any time while accessible to kids.
The pitch and yaw, don't fall balance toy expands upon these qualities, and create some of the excitement of the brothers' many failed flights and numerous falls. Even with modern airplanes, not everyone can make it to Dayton, Ohio to visit the parks during their operating hours. Play with pitch and yaw exists beyond these boundaries of the NPS sites. As Wilbur and Orville take turns hanging from the flyer, the pitch, yaw, and roll of the plane shift, requiring minor adjustments in weight distribution to keep the brothers on the plane and in the air. As play continues the suspense builds until finally……the plane drops from the sky, crashing to the ground below. But these brothers are built to fly another day! Pitch N' Yaw recreates the competitive spirit of the Wright brothers and the thrill of the precise balancing act that was their first flight, inviting you to experience the adventure of the wright brothers anywhere in the world. Pitch N Yaw, don't fall!





Phase 2 - Video Editing

After recording audio, I laid that audio into Premiere pro as a guideline for where my footage should go, and adjusted it to the appropriate decibel level. I gathered extra footage and generated citations for them. I edited the footage together with the keyshot animations previously rendered. All of the footage was resized. After my product video was together, I edited together the sequence containing the project title, abstract, and myself, as well as the bottom slides for the poster. All of these assets were put together for our final presentation on campus.



Phase 2 - Final Product Video + Poster