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Tesla coat hook

“Tesla Motors
A common complaint among Model S and Model X owners was that there is no built-in coat hook in either vehicle. During my internship I developed an aftermarket accessory that would be unobtrusive and easy to install. I owned the project in its entirety from initial design through working with suppliers for manufacturing.

A few concepts were explored simultaneously, including placing the hook in the B-pillar of the Model X, in the headliner of the Model S, and recessing the hook into a bulge in the back of the seats. Each option was prototyped and tested in vehicle,

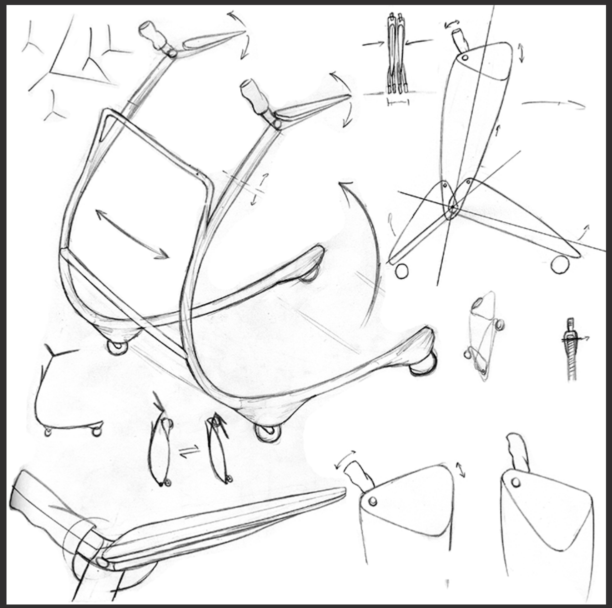
After an industrial design review, it was decided that a simple-to-attach seat accessory would be the best option. A slender hook was designed to match the upper profile of the seat, directly behind the moving headrest.

The hook is made of a thin piece of aluminum, overmolded with hard plastic, then a final thin overmold of silicone. The aluminum clips in at the top an bototm of the hook, allowing it to remain secure even around tight corners.

The final product is now available on Tesla's Accessory Store, and reviews have been overwhelmingly positive. The hooks are slender and unassuming enough to be left in place in most vehicles, even when not in use.

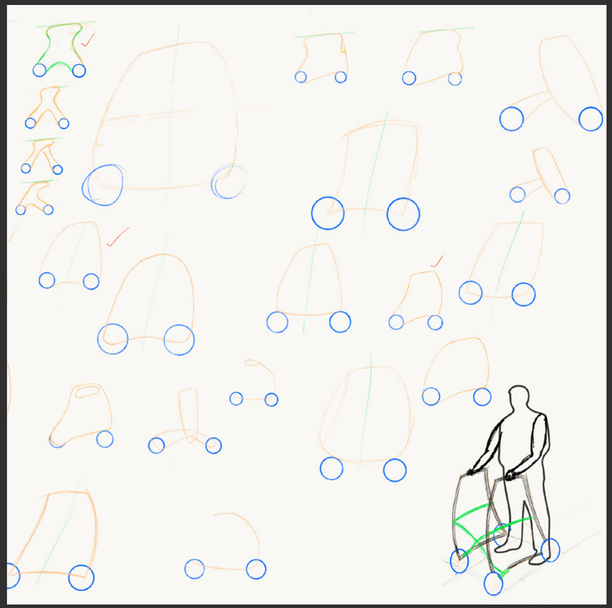
stride

“The Product Engineering Process.
Stride is a walker that reconsiders the form of assistive mobility technologies. It contains an innovative braking system, combined with a collapsible and customizable seat and storage area, all packaged into a sleek and usable design, giving users a walker that they can be proud of.



Many form factors were considered in generating the basic shape of the walker. After hundreds of sketches, a few options were pursued with sketch models to test usability.

After deciding on a design direction, initial CAD was developed to flesh out the braking and folding mechanisms, along with handle, wheel, and seat locations.

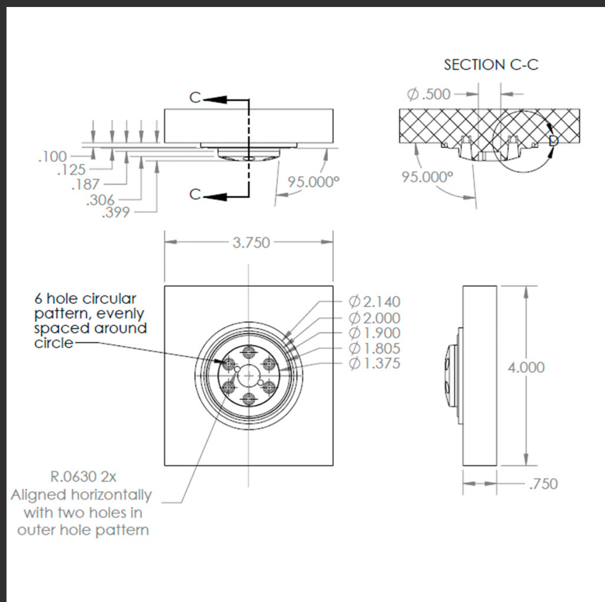


While developing the mechanics, it was determined that a closed frame design would be more rigid and secure. Each form was considered on the basis of its ability to communicate both security and motion.

The final product was developed and prototyped, then presented at the end of the semester. Stride's form communicates security and mobility, giving users a more dignified walking experience.

pokéball yo-yo

“Design and Manufacturing II.
Exploring the design for manufacturing process, we created a Pokéball yo-yo fit for scaled production. Fifty of these yo-yo’s were made and variation between parts and assemblies were analyzed along the way.



The yo-yo was initially designed in SolidWorks, then mold forms were derived and specified so that they could be machined. Four unique cores and one universal cavity mold were used to maximize efficiency in the process.

The molds were each machined on a variety of CNC mills and lathes with operations completed using MasterCAM. First the pin holes were drilled on a mill, then the majority of the shaping operations were performed on a lathe, and the finishing operations were completed in another mill.

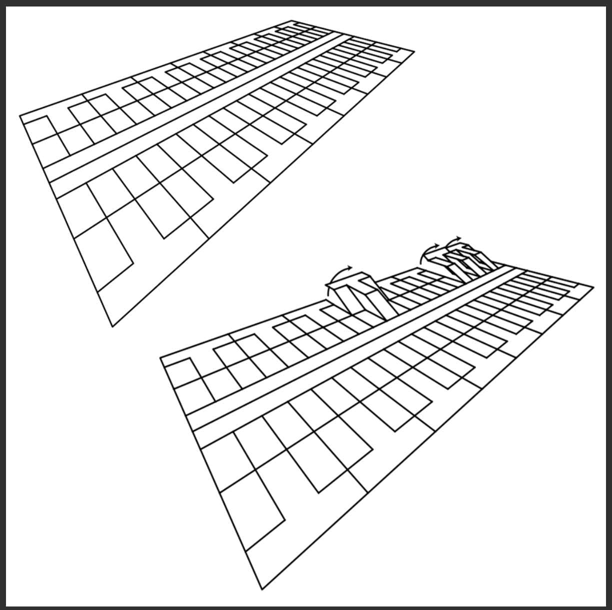
Large-volume manufacturing was simulated through the production of fifty yo-yo's. Throughout the process we were checking and adjusting parameters to achieve the most consistent parts before the final production run.

The pieces were then assembled into the final product. Each half consists of two partial domes and a center band anchored into the base. The front face also features a thermoformed button held by flexible pins which allows it to be pushed in. We received class awards for Best Manufacturing and Fastest Yo-Yo!

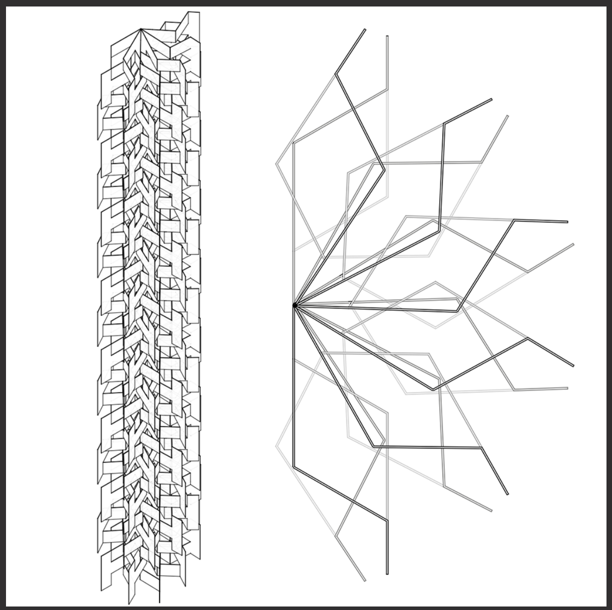
folding construction

“Architecture Design Foundations.
Exploring simpler means of construction and developing processes by reaching to maximize one dimension of a structure. This 15’ tower was accomplished by routing patterns into sheets of plastic and simply folding them on-site to assemble.

We began by exploring a number of concepts around the idea of folding surfaces. We looked at maximizing dimensions, creating user dictated interactions, and complex forms from single sheets of material. The goal was to introduce folding as our construction method, while creating a structure that didn't appear to be folded from single sheets of material.



The final concept consisted of these flat panels which would be folded up into the tower seen before. The panels were each cut using a CNC router and MasterCAM. Narrowing down the parameters for the cuts was quite complicated because of how thin the material was.

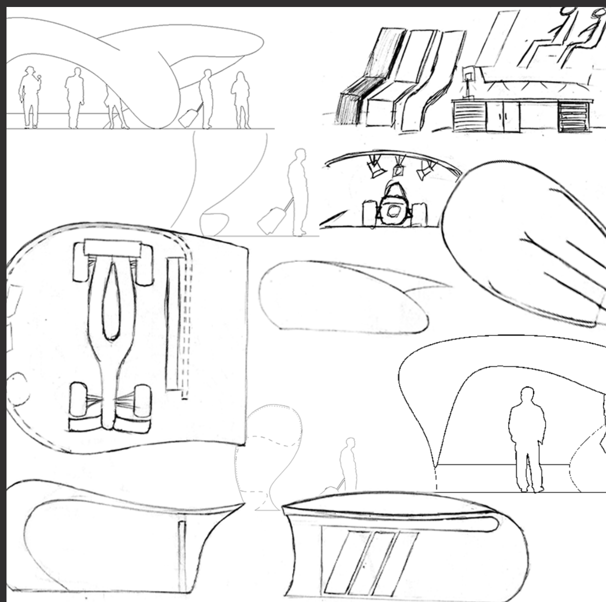


The panels were then all transported to the courtyard where the tower was to be assembled. On-site, the team was able to fold each panel into its final form, then stack these forms into the tower. Three panels were used for each level of the tower to create the wide and complex base.

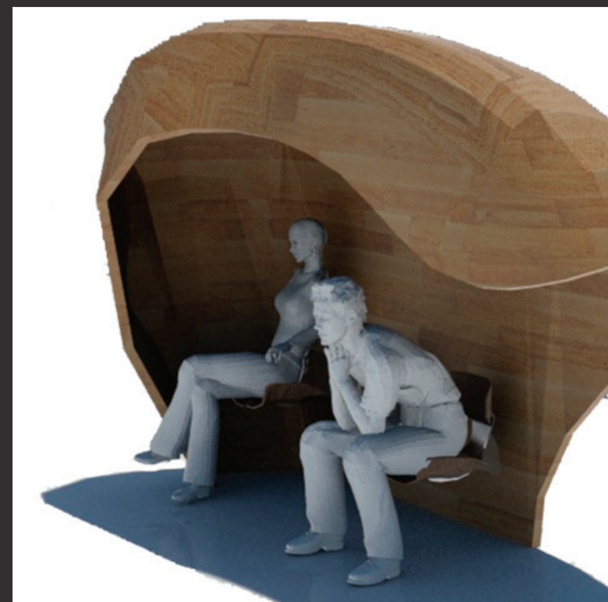
The tower stood at 15' tall in the courtyard of an MIT building for a number of weeks. Though the design and construction were so simplistic, the tower appears to be quite complex and its method of construction not easily discernible.

design of shelter

“Introduction to Geometric Modeling. Studying the design of public spaces and shelters, from bus stops to awnings and squares to pavilions. The purpose of the project was to become familiar with a number of CAD, rendering, and production tools.



Investigations began with form factor sketches for different types of shelters. These explored wave-form structures that would enclose around occupants, protecting them from the elements.



This bus stop concept was then chosen and modeled in Rhino. The scene surrounding it was then composed and rendered using 3ds Max.

The final render consisted of a garage and pavilion for my Formula SAE team, MIT Motorsports. The scene and render were completed in 3ds Max with various forms of interior as well as exterior lighting. The image was then finished in Photoshop.

The structure was 3D printed and cut the from a block of foam using a router attachment on a 5-axis Kuka robot. The robot was programmed using Grasshopper to cut the surface and then trace a pattern over it normal to that surface.

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