
GRASP
Designed by Regina Newlin

A huge thank you to all of my family, friends, professors, and class of 2020 from Jefferson University. The last four years have been a great experience, and the memories will be remembered for my lifetime.

This book is dedicated to Ken Root, who we unfortunately lost this year. He helped significantly with the beginning part of this project, and taught us all how to design sketch for the years we have attended here. His humor and character will surely be missed.

2020
Industrial Design

Designed by Regina Newlin

TABLE OF CONTENTS

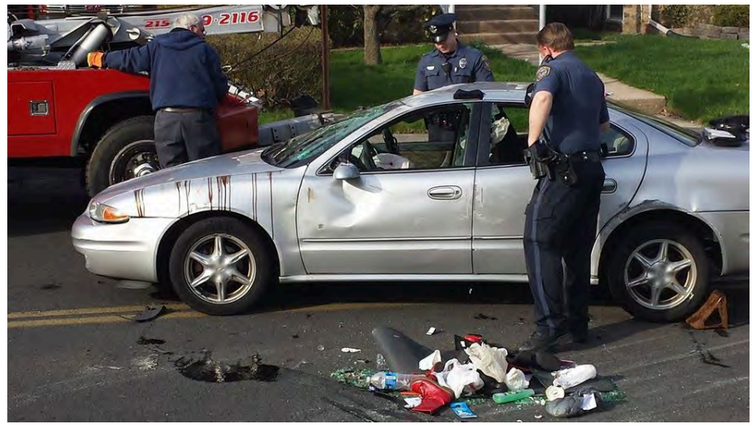
GRASP is a device to efficiently avoid causing an accident from items falling to the floor, by securely fastening them down.

PROJECT STATEMENT

RESEARCH

Distracted Drivers & Falling Objects

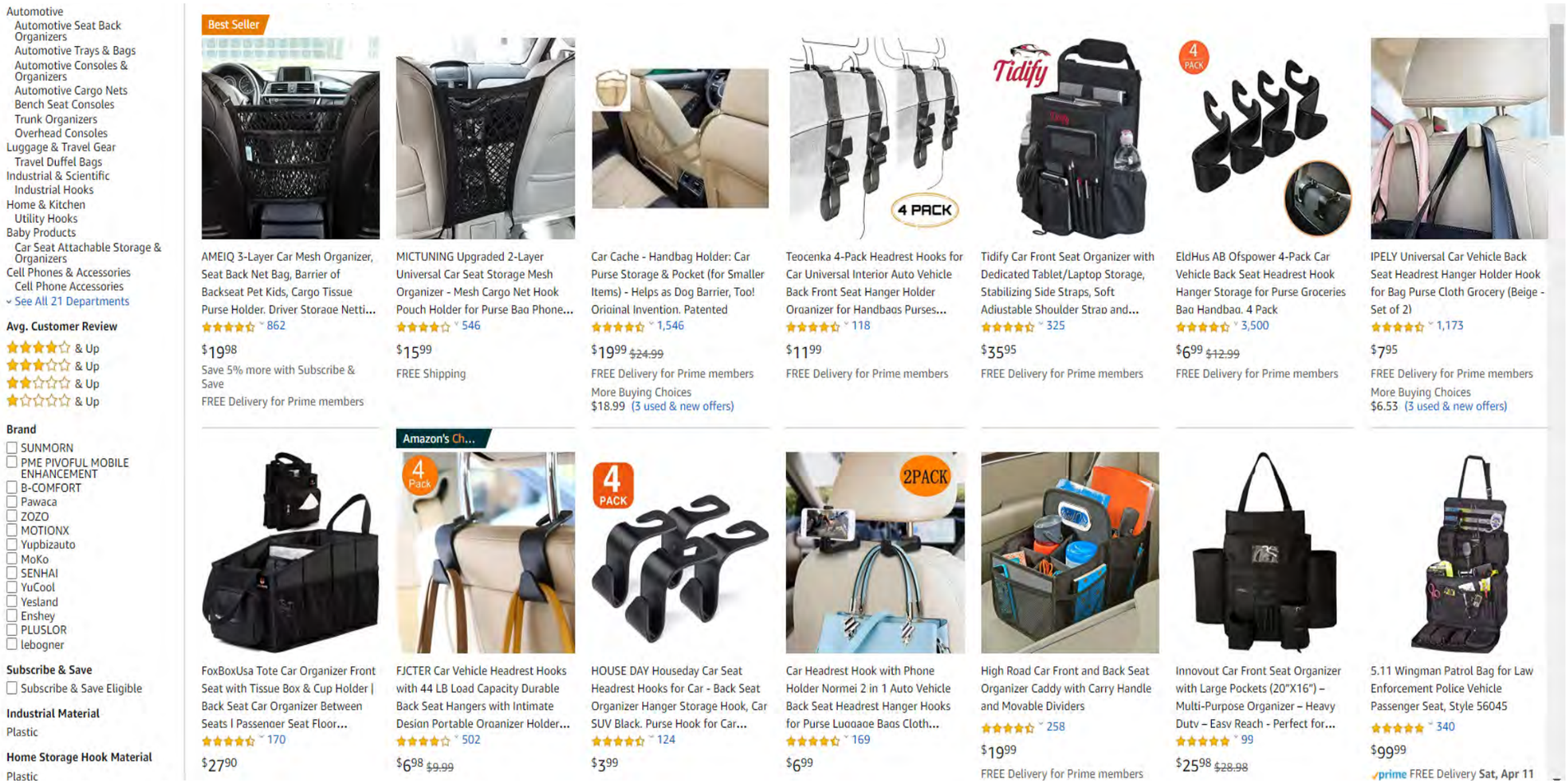
Quite often people are commuting by themselves to work or school. With more things to carry daily, people toss the items into the car without second thoughts. On the roads today, **people drive reckless** by stopping suddenly, cutting off someone behind them, or even almost missing the stop sign. This creates a risk of objects falling, and **becomes a distraction to the driver**. The ratio of leaning over to grab a fallen item is 8.82, compared to looking at your phone, 1.29.



The market is oversaturated & bland

When looking online for something to possibly solve this issue, people are lead to organizers or hooks. The organizers do not help the larger items that people commute with, and the hooks are all the same. The prices are not expensive, but the hooks are the closest solution to hold backpacks or grocery bags.

Most of the hooks are not complicated to use, or make. Most being made of injection molded plastic, and some even having nylon straps or made of metal. However, the design is theoretically the same. They go on the headrest poles, and the bags hang off of them.



....But

Critically looking at the design of the hooks further, it made no sense for what their intended purpose was. They failed in three major areas that commuting people would have an issue with.

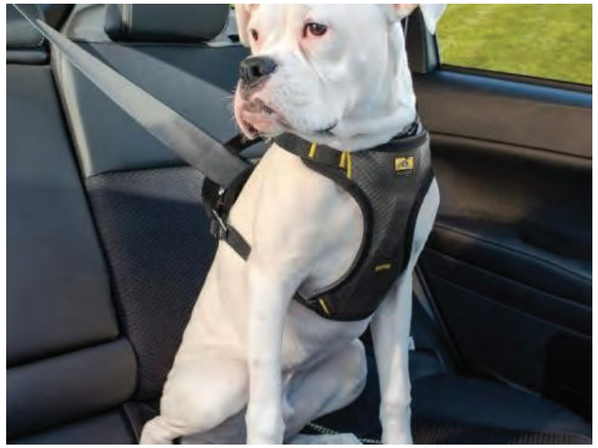
Some people wouldn't be able to use them. Some cars do not have adjustable headrests in the front seats.

The hooks had a weight limit. Most people have heavy items, like backpacks stuffed with tech they need. The hooks relied on the handles of the items themselves, which could ruin the handle. Finally, if there was no handle, what's the point of having the hook then?

For the items with no handles, there was no bottom support. In addition, stopping short is still going to swing out the item and risk breaking the handle of the item.

The bigger picture & broader market

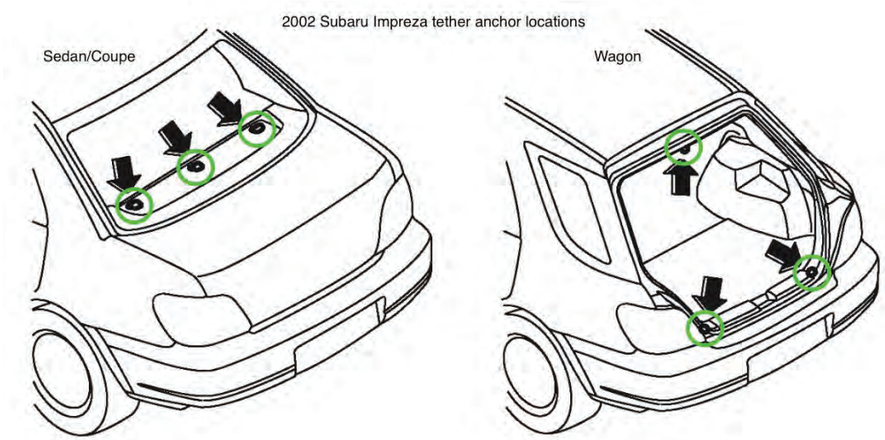
Taking a step back, and looking into other markets of securing things in the car, the pet accessory market popped up. There was a great range of devices and the insight could be implemented into the commuter market easily.

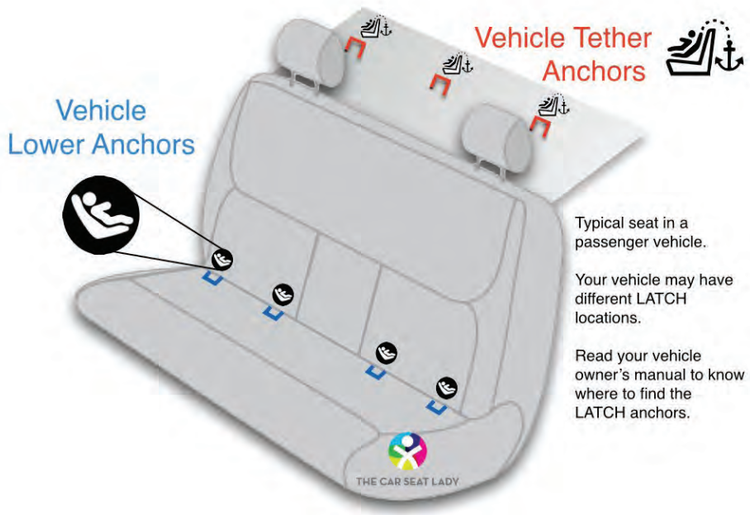


This type of construction is what items with no handles needed

Solutions for shortcomings

Although the pet accessory market brought a new direction, there was still an issue. These devices were often for the back seats of cars, and were a permanent setup for pets. Other anchors for things are often found in the backseat, not the front seat.



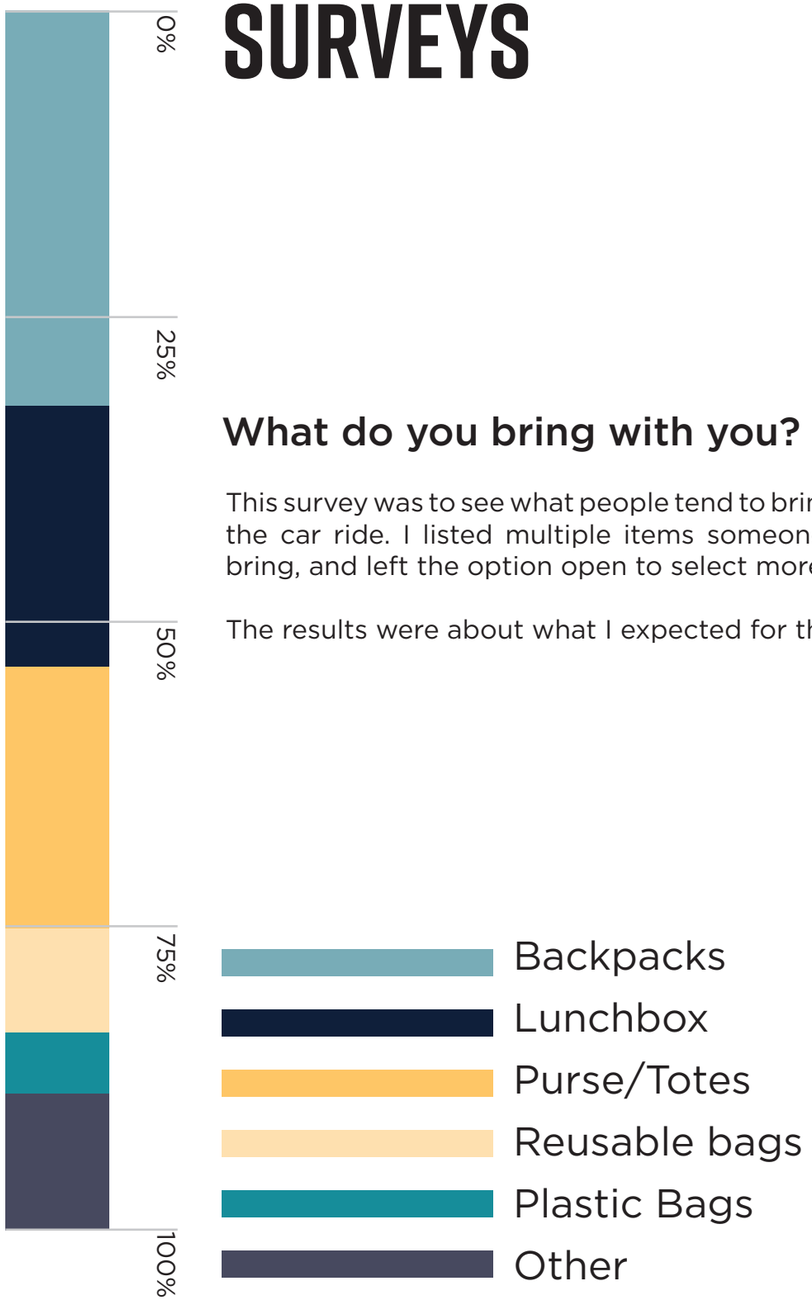


However, some devices do mount to the front seat. Seat cushions have a feature of mounting by a disk that slides between the seat. Very effective way of mounting due to having no anchors in the front seat.

Click image to open expanded view

The disc solves the issue of mounting to the front seats

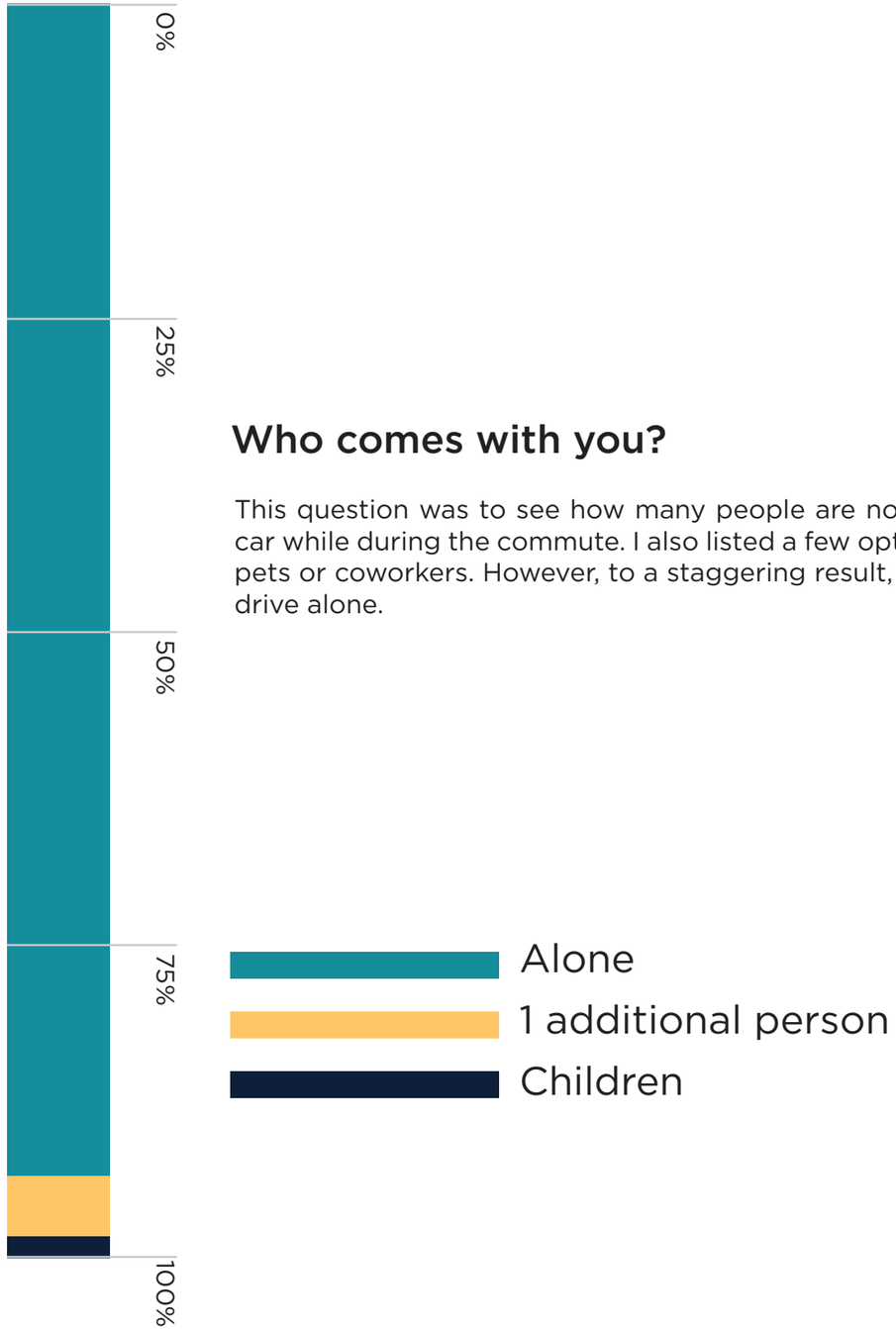
SURVEYS



What do you bring with you?

This survey was to see what people tend to bring with them during the car ride. I listed multiple items someone could potentially bring, and left the option open to select more than one.

The results were about what I expected for this question.



Who comes with you?

This question was to see how many people are normally in the car while during the commute. I also listed a few options, such as pets or coworkers. However, to a staggering result, most people drive alone.

DESIGN CRITERIA

Design & Development

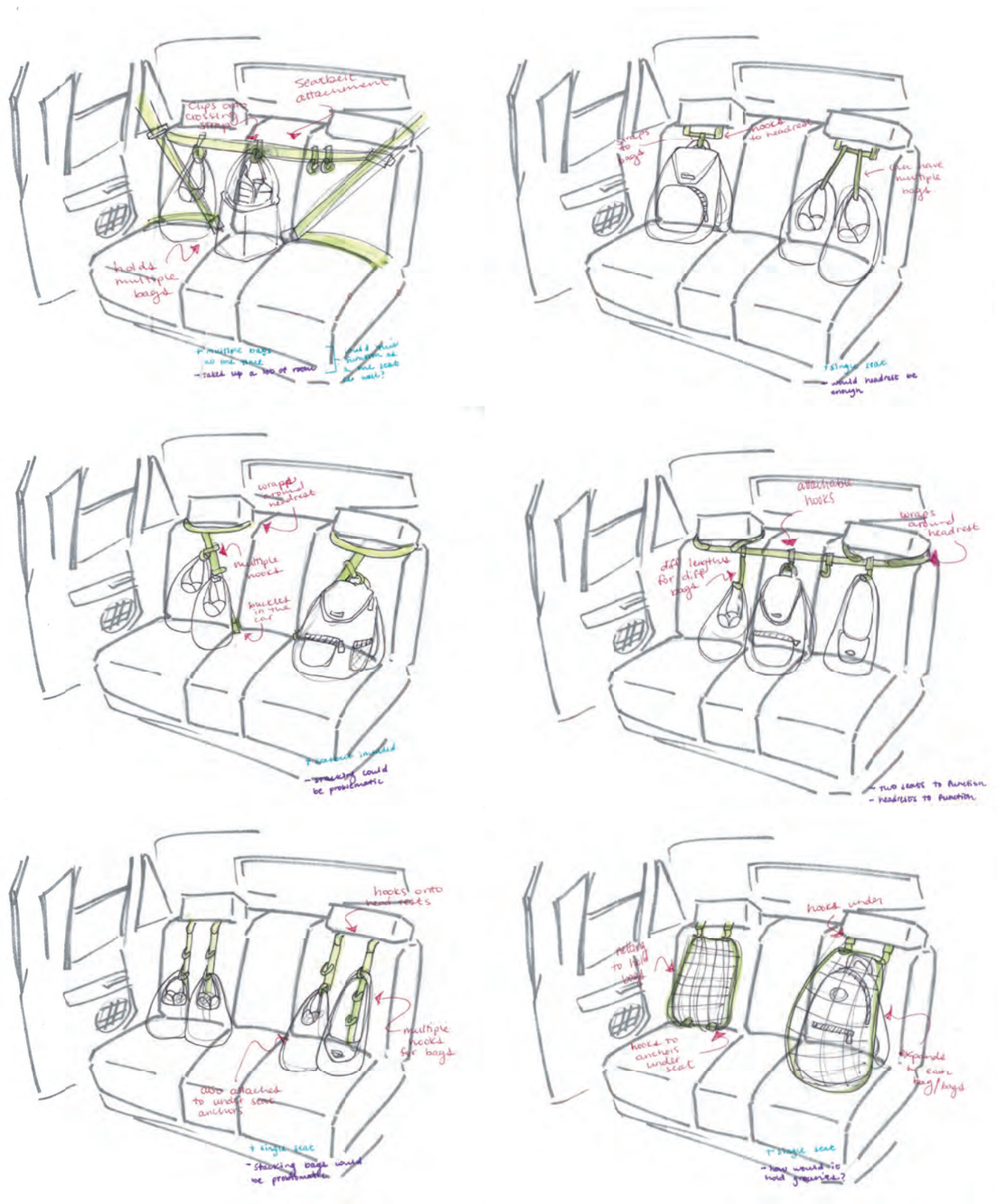
Round 1

The clone

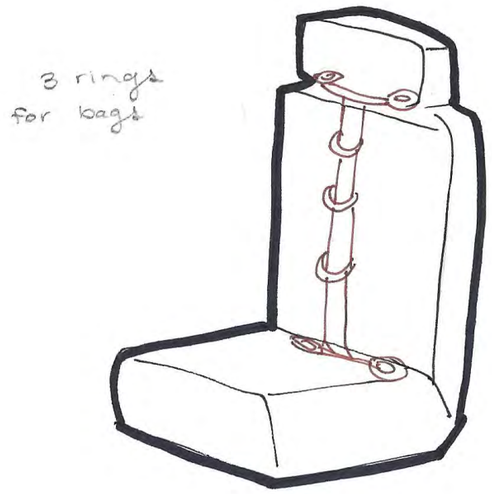
The first round of designs were heavily influenced by what is on the market now. This was a good foundational insight to figure out what really was the problem with what exists in the market now.

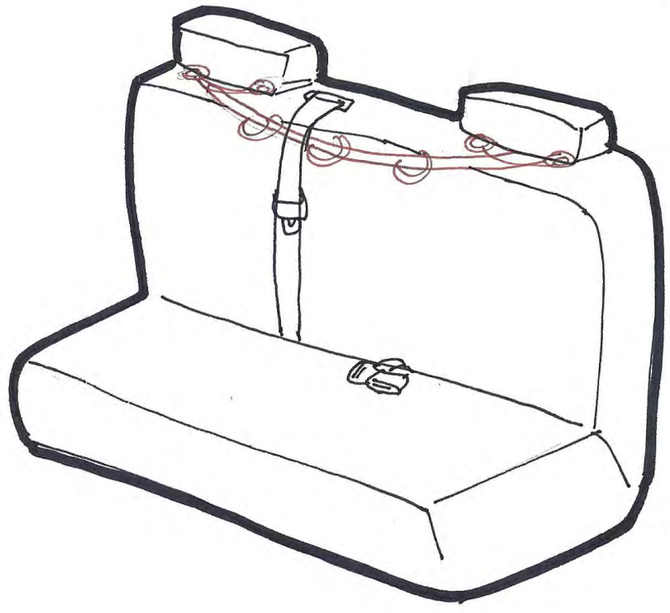
Design in the current market

After examining the what is most popular, I started off by mimicking and combining aspects of other designs. I compiled different versions, and then designed a single one with positives from the collection.



These were focused on the backseats, until I got results from the surveys

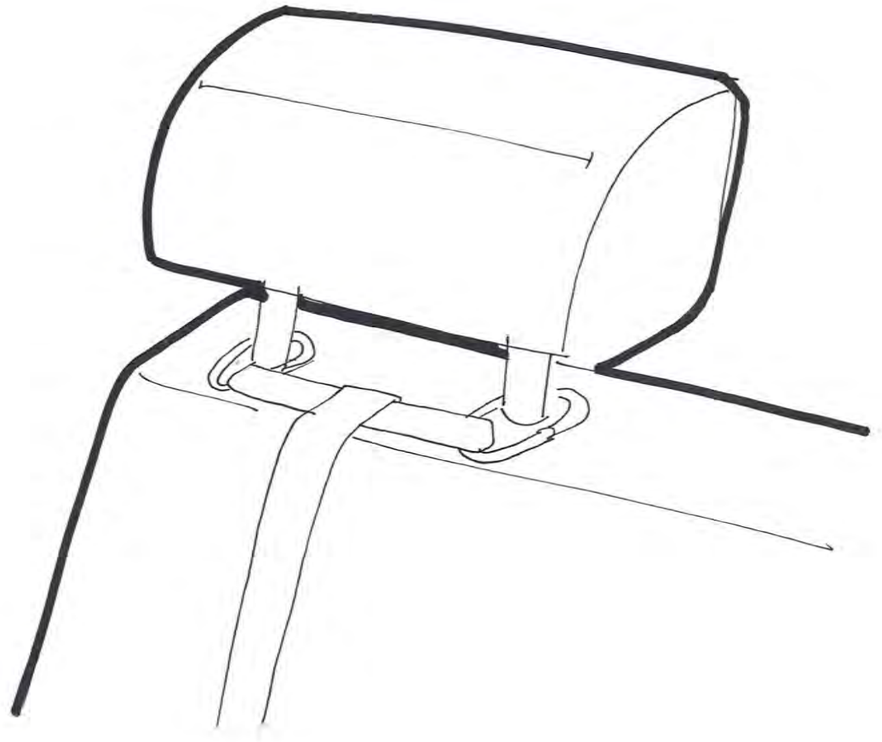




This was to adjust to span multiple seats, or to stay with one seat.

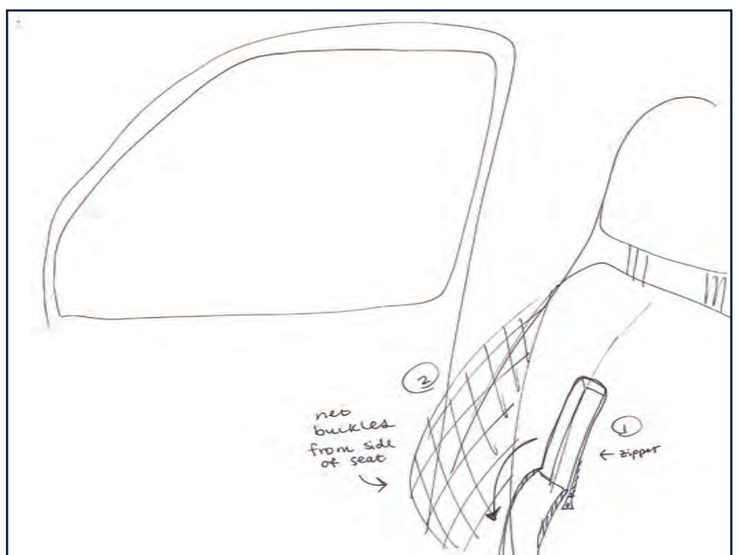
“As seen on TV”

This product design did bring together the better features into one. However, feedback told me that it looked dull, and too much like ads you see in commercials.



Clips would allow for the mounting at the top be easy to remove at a later time.

I expanded upon the ideas by iterating it within the seat. This lead to going to an idea of a new and improved passenger seat that could have all of the features for the user right there.



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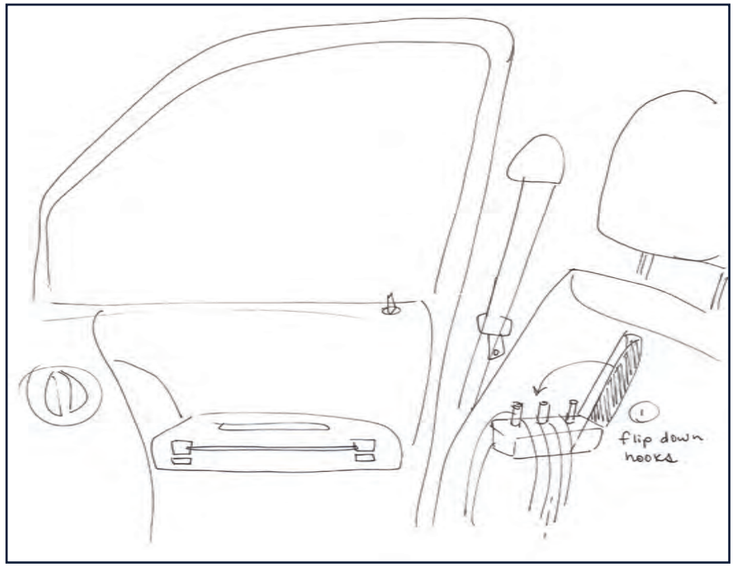

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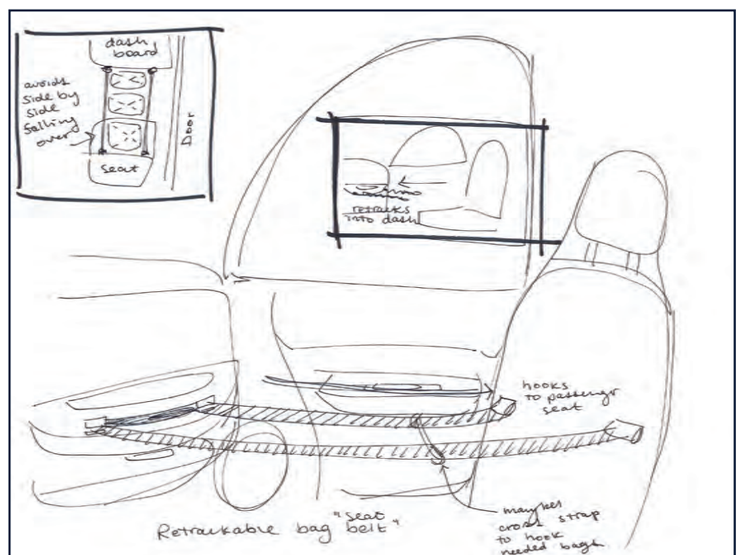
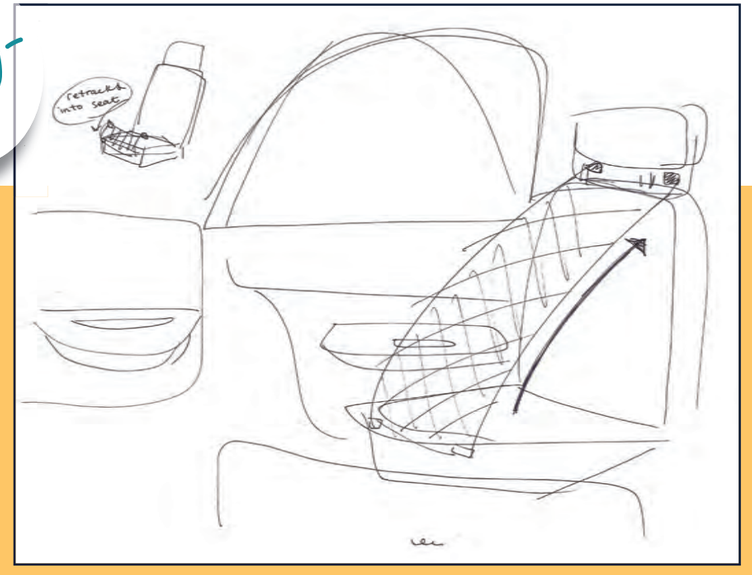


This was to adjust to span multiple seats, or to stay with one seat.

Creating a barrier seemed the most plausable

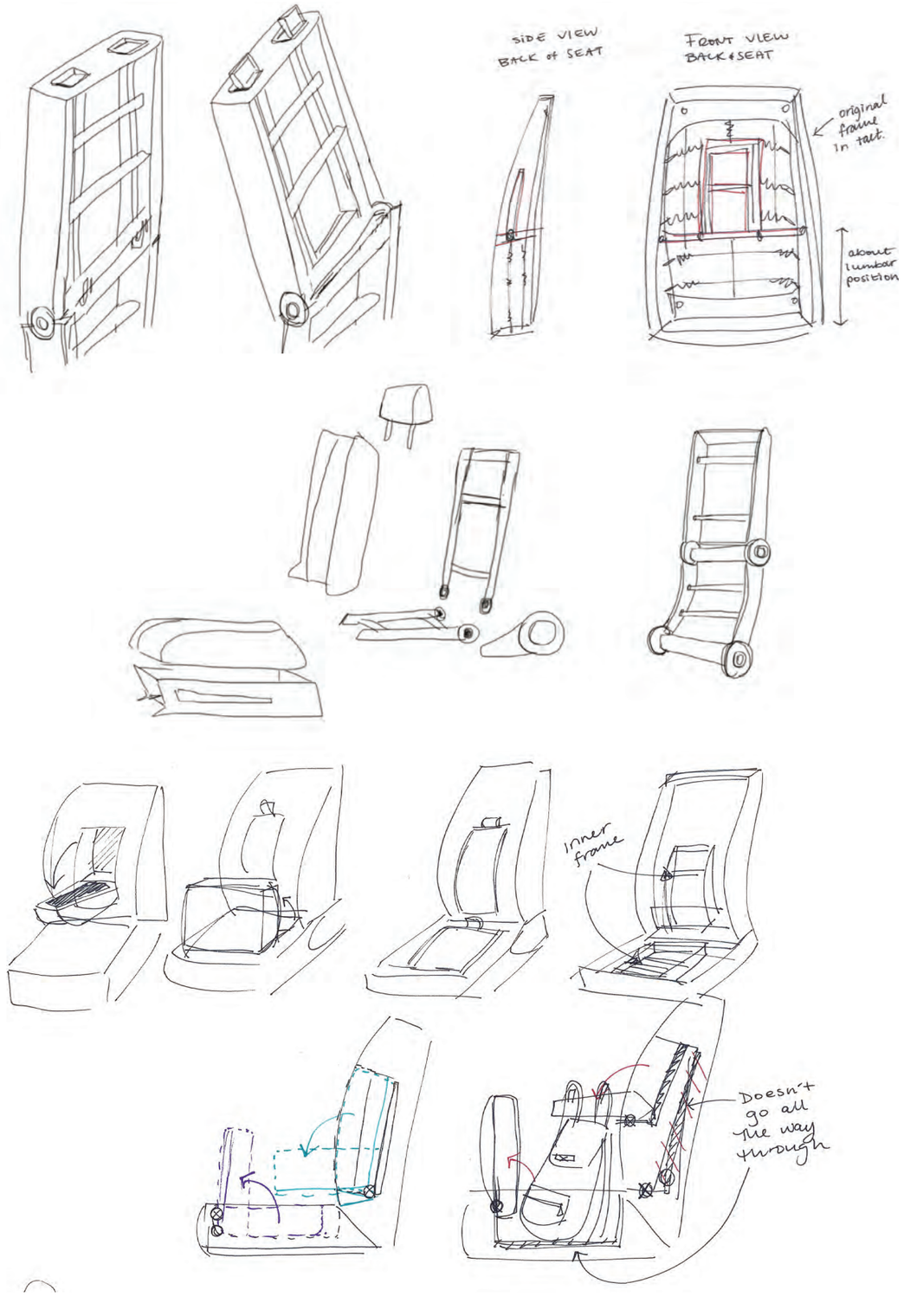


This was to adjust to span multiple seats, or to stay with one seat.

Round 2

The new passenger seat

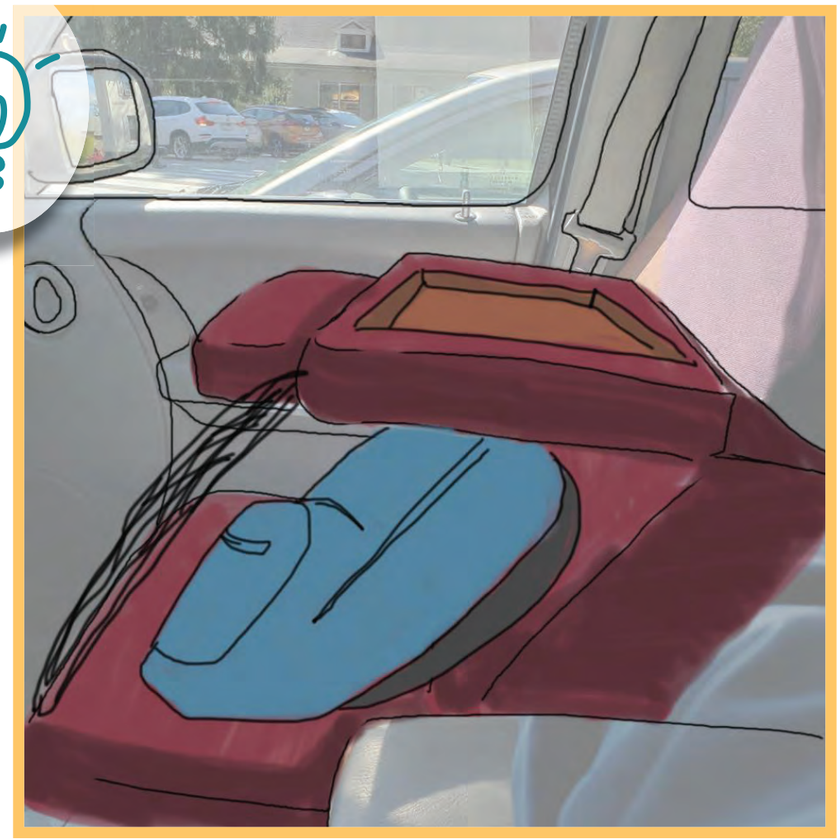
This is when I had to step out of the box to get ideas out in the open. The original influence of this idea was from the late Ken Root, a professor who worked at Subaru as a designer back in the 1990s.



New frame, new cushion, new feature

Ken Root, a Jefferson professor had a lot of auto design experience. He lead me to some insight of cars updating features, and that the passenger seat was one feature that hasn't been touched in a long time.

Creating the pocket needed to go further



The net would create the barrier from the items falling onto the floor.

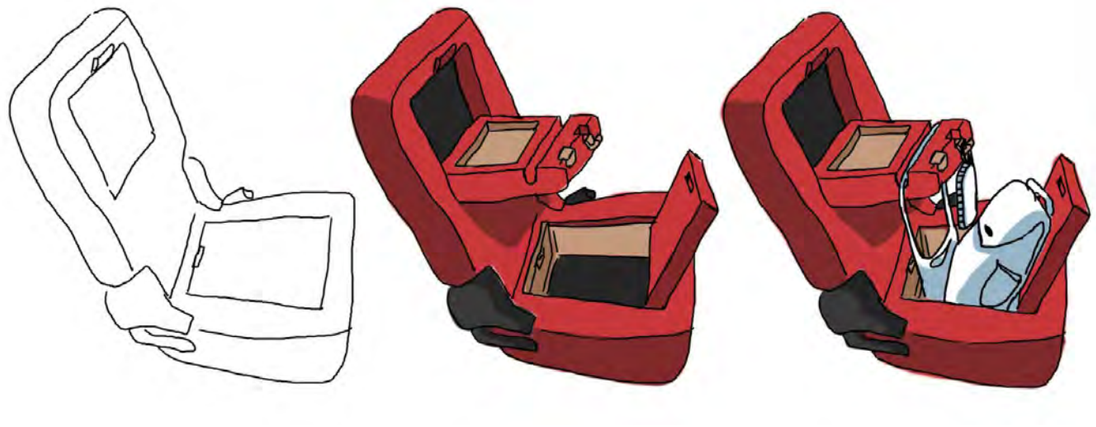
Taking insight from existing features

While researching features of cars, I found a similar feature I was trying to incorporate into the front. In a 1997 Chevy Tahoe, there was a pull down middle console that revealed more storage options. This is also when I got an unusable front seat of an early 2000 Ford sedan model.

The frame was much simpler than I thought it was going to be on the inside.

Figuring out the mechanics

I made several sketches and notes of how this could work, and to help me visualize it, I made a storyboard. The storyboard and the sketching allows for me to map out what feedback told me.



The new seat would be manufactured to multiple styles of cars.

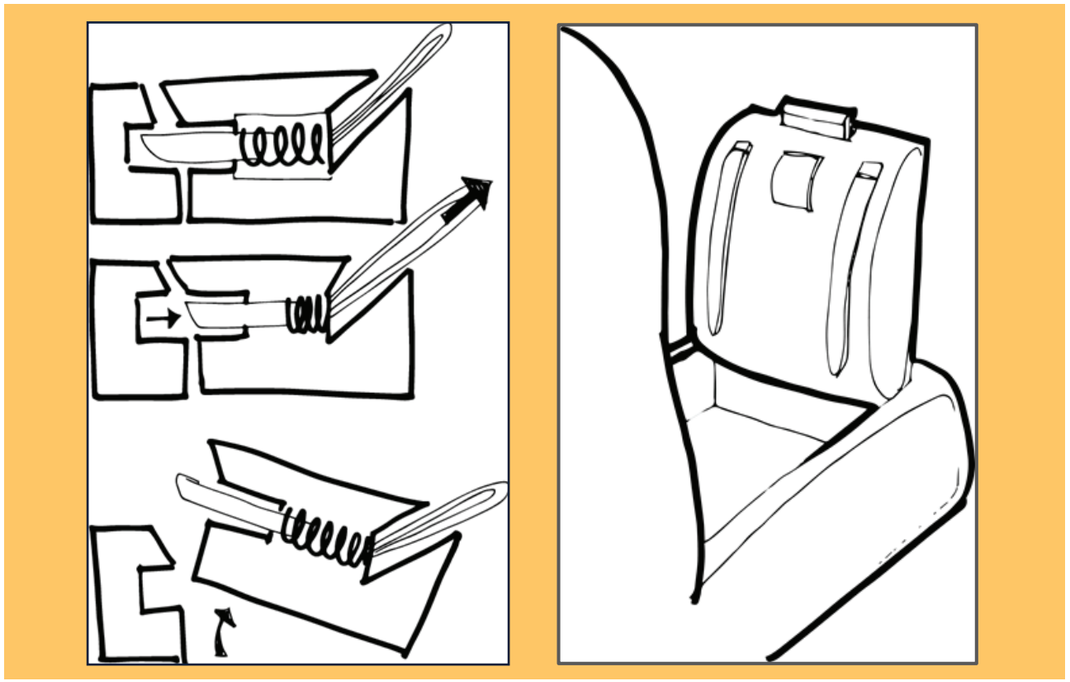
I made a mock-up in the old car seat, and showed it to a few people in person, and several more through pictures. Most of the feedback was positive, so I continued to develop the features that would be incorporated into the seat.

Pocket idea needs to be pushed further

Testing was not taking into consideration of the cushion mass.

The Bucket

Most of the commuter demographic loved the idea of this bucket feature in the design. This would create the bottom support it needed to hold large items that also did not have handles. A few features included a spring loaded latch, some arms to create side barriers and a plastic lining to prevent spills.



There would be a pull down hook as well for items with handles.

Failed to realize....

I failed to consider the manufacturing end. The wild idea was out there, but served no purpose for the limited amount of time I had. The idea was not scraped, because the bucket pocket feature seemed to answer the issues the hooks could not.

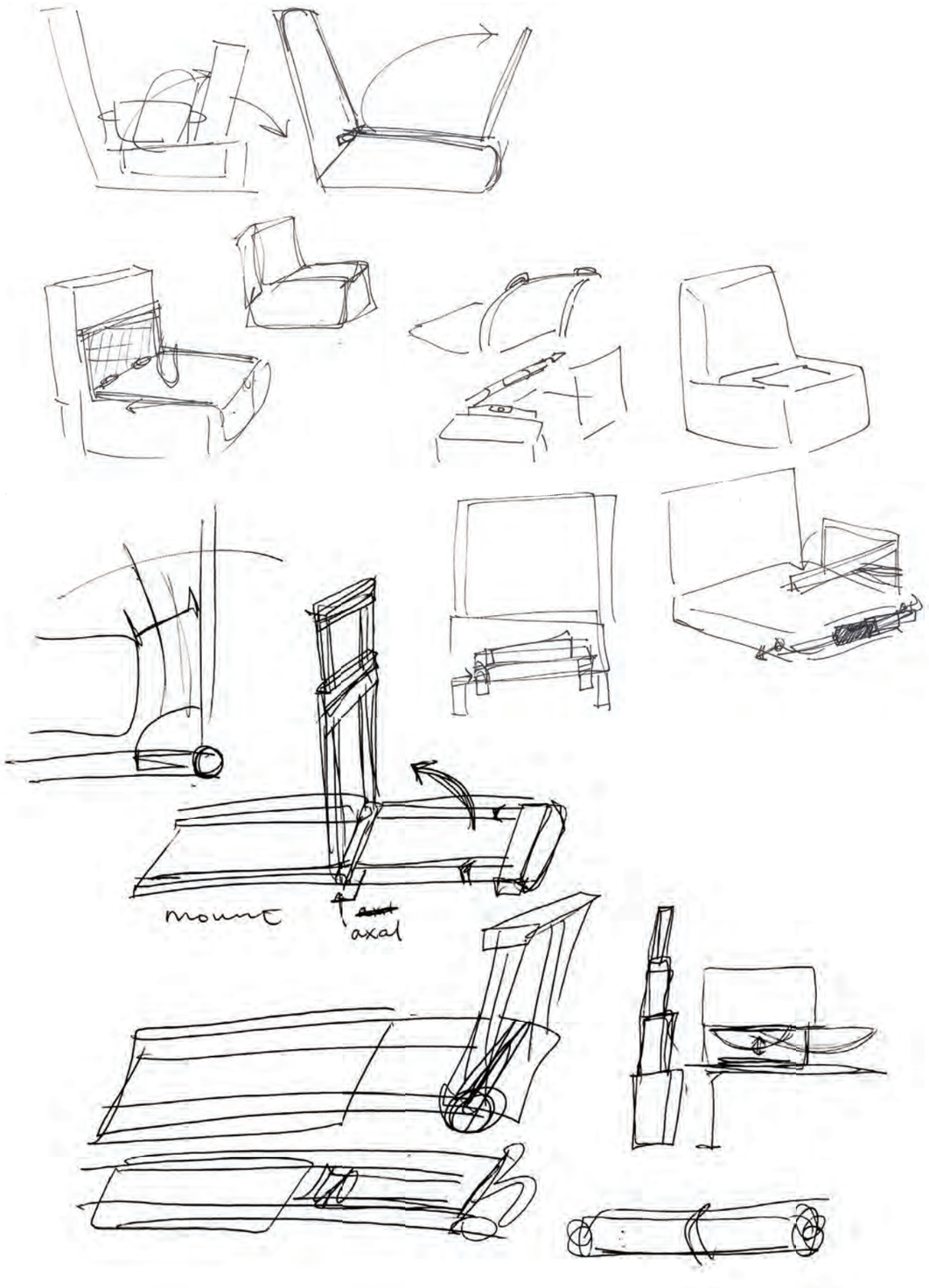
Needs to move away from being a seat feature

A sketch render of what it could look like installed in a new car.

Round 3

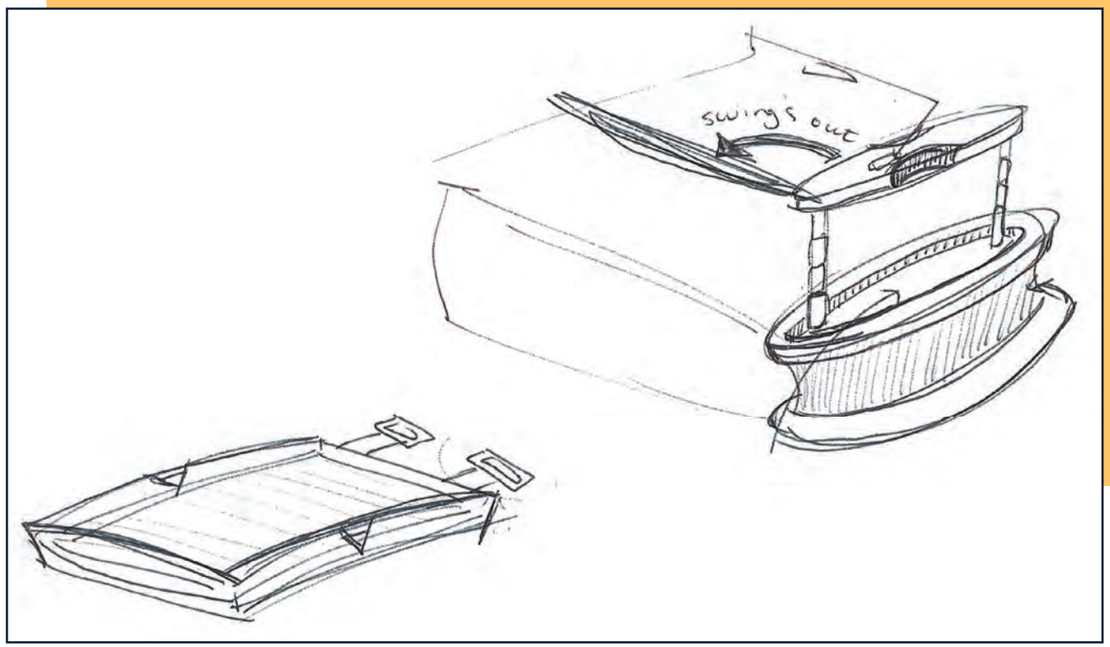
The mat & strap

Over the winter break in between semesters, there was a road block. The last round did not truly work due to several issues. Taking a step back, I reconsidered the idea of what round 2 was creating, but how I could make it work for an accessory for the car.



I took this time to try and create a modification to the seat, without having to go through an actual car manufacturer. This design did create the pocket, but it was just more framework. There was no design, let alone it was very rigid.

But why does it have to be another frame?



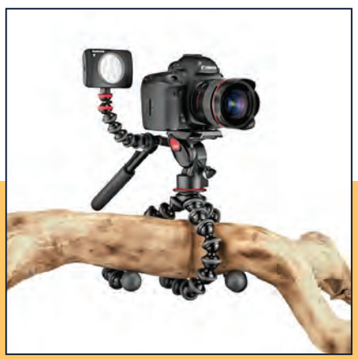
This was based off of the mechanism of a luggage telescoping handle.

Geese & Gorillas

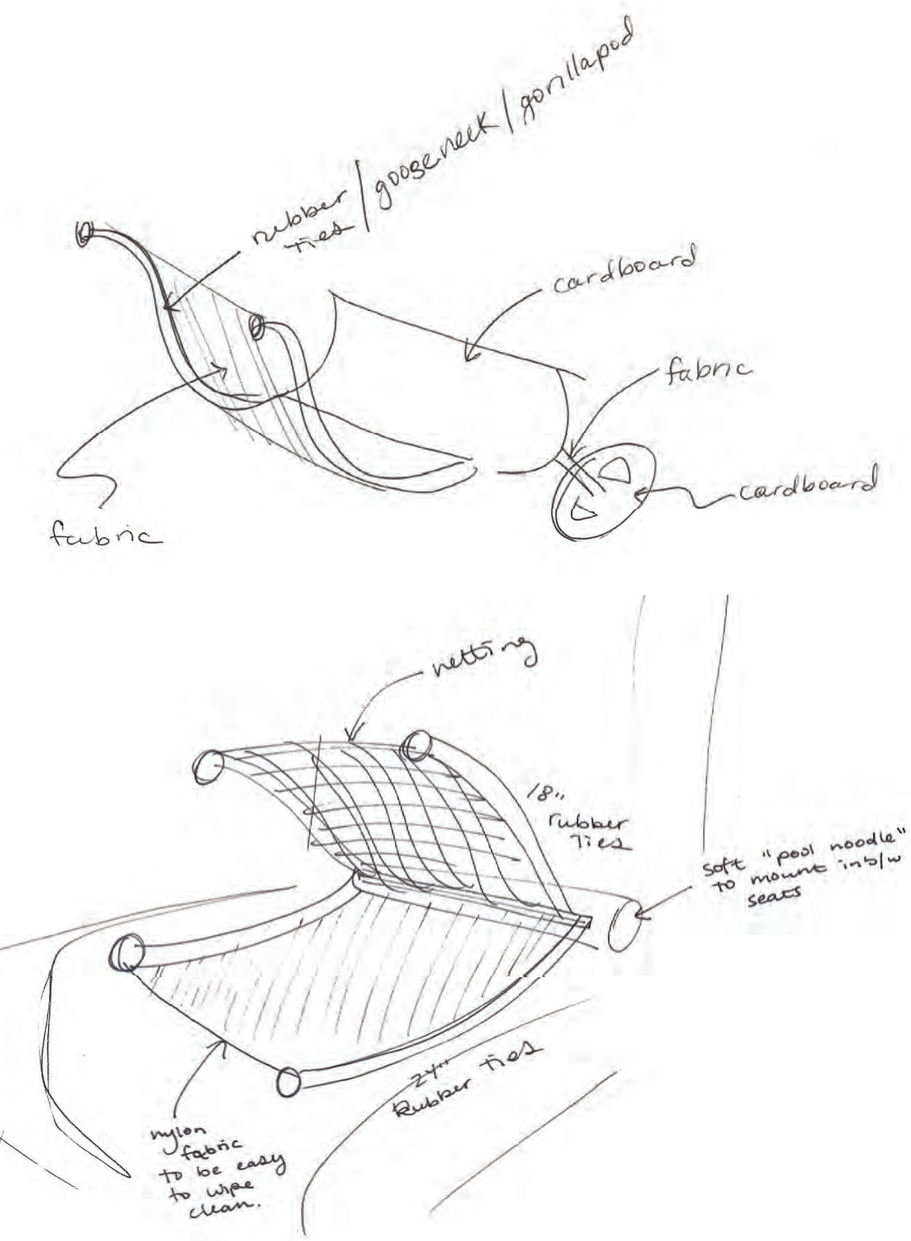
This lead to looking at goosenecks and Gorilla pods for the adjustable leg frames. This opened up the design to become organic and form to whatever the commuter needed at that moment. The idea was to utalize the legs within a fabric to encase the item. This could morph into various shapes for the user.







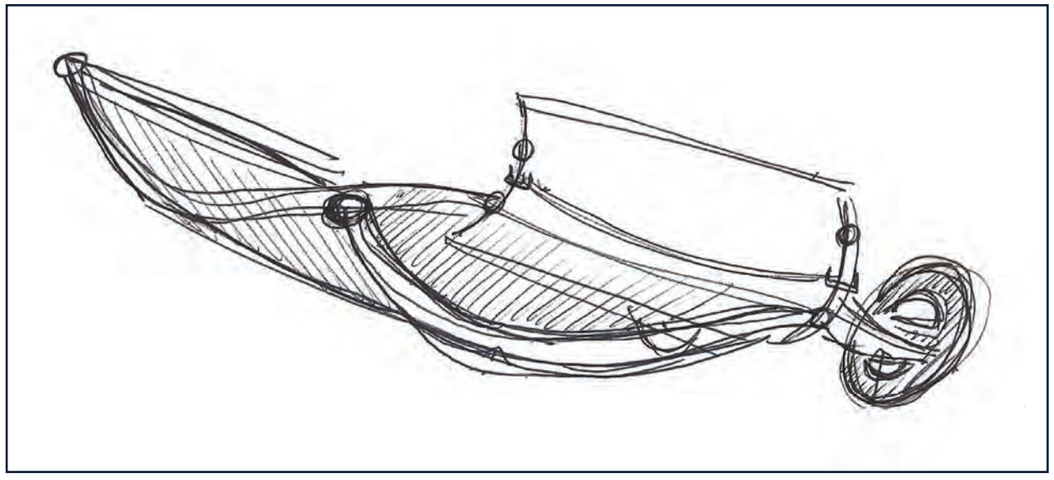
The bednable armatures could be 3D printed sockets with an O-ring



The fabric material was meant to be stretchy, but also water tight.

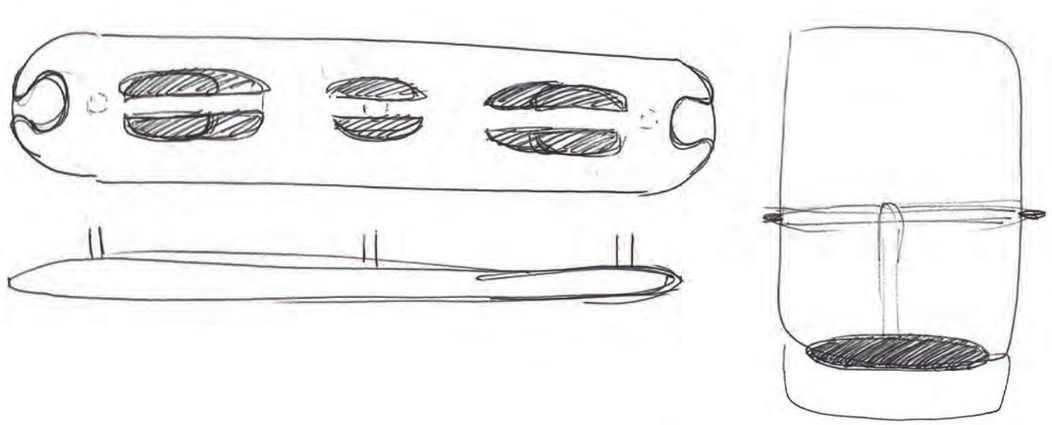
Making a clamshell

Although this prototype only had the two wire arms, there was going to be an additional two mounted higher. These would be free, and not encased in fabric, to allow for the user to wrap as a handle for items.

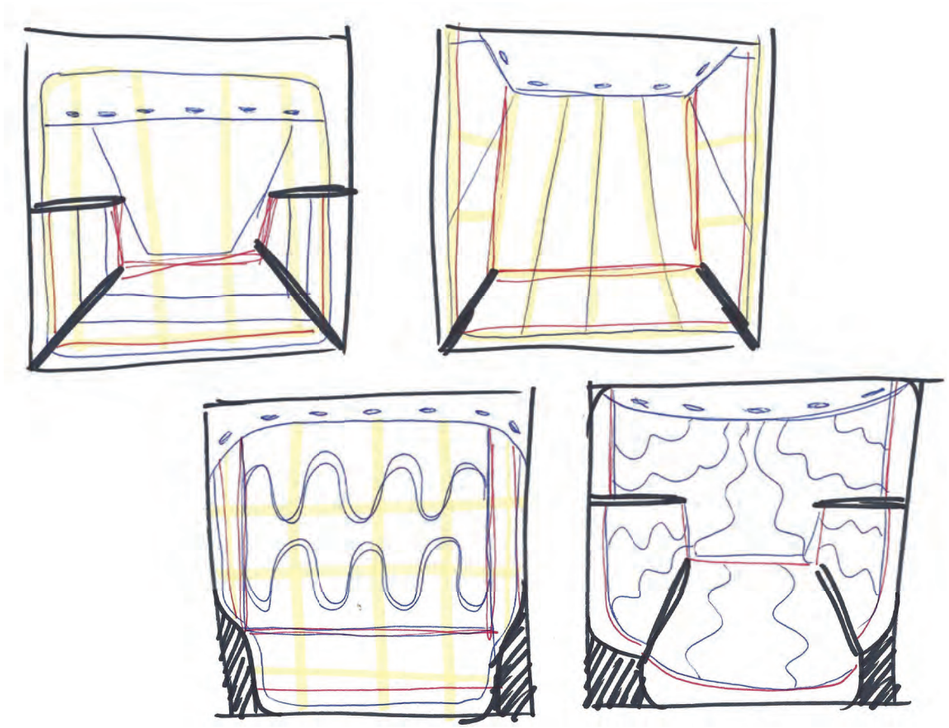


There was a cover to protect spills from getting between the cushions.

The wires were prototypes with reusable zip ties.



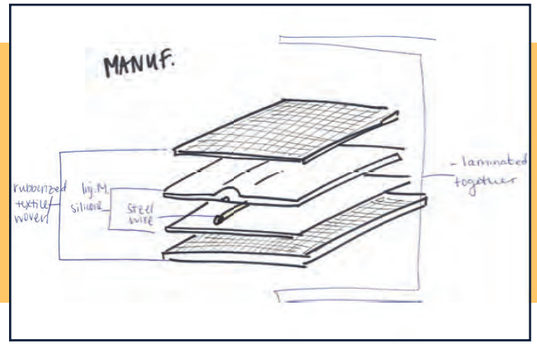
This was designed to be attached after the mat was made.

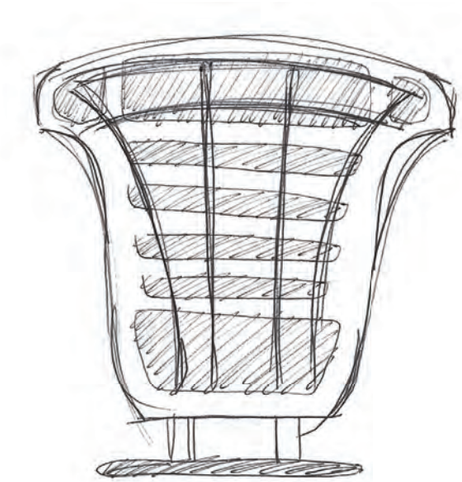


Sketches that showed different types of arms to wrap around the item.

Mounting it was easy, materials were not

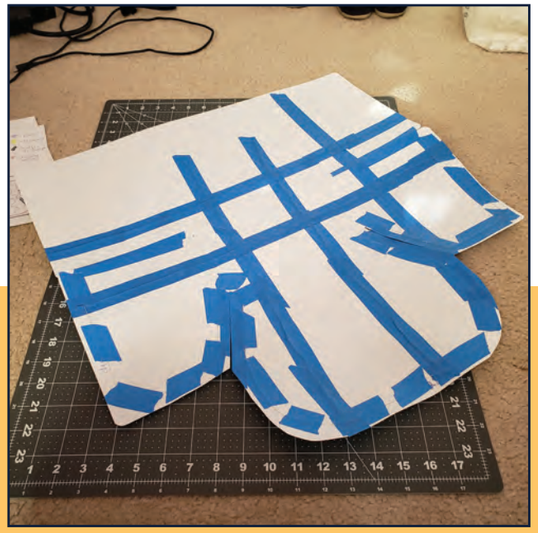
This is when the manufacturing of the design became very important, to learn of the wire frames on the inside. This evolved into having layers to protect the wire, and even a neoprene layer to keep spills of items from destroying seats.





Paper models to test size

Sketching was not helping anymore, so I made a paper mock-up to test size. This is also when the upper strap was developed due to the lack of support the wire actually would be giving to the mat. The cushion mount disc worked perfectly, so I proceeded to keep the overall idea in tact.



The paper model was sturdy, but too large for the average car seat.

Upper support needs to be pushed further

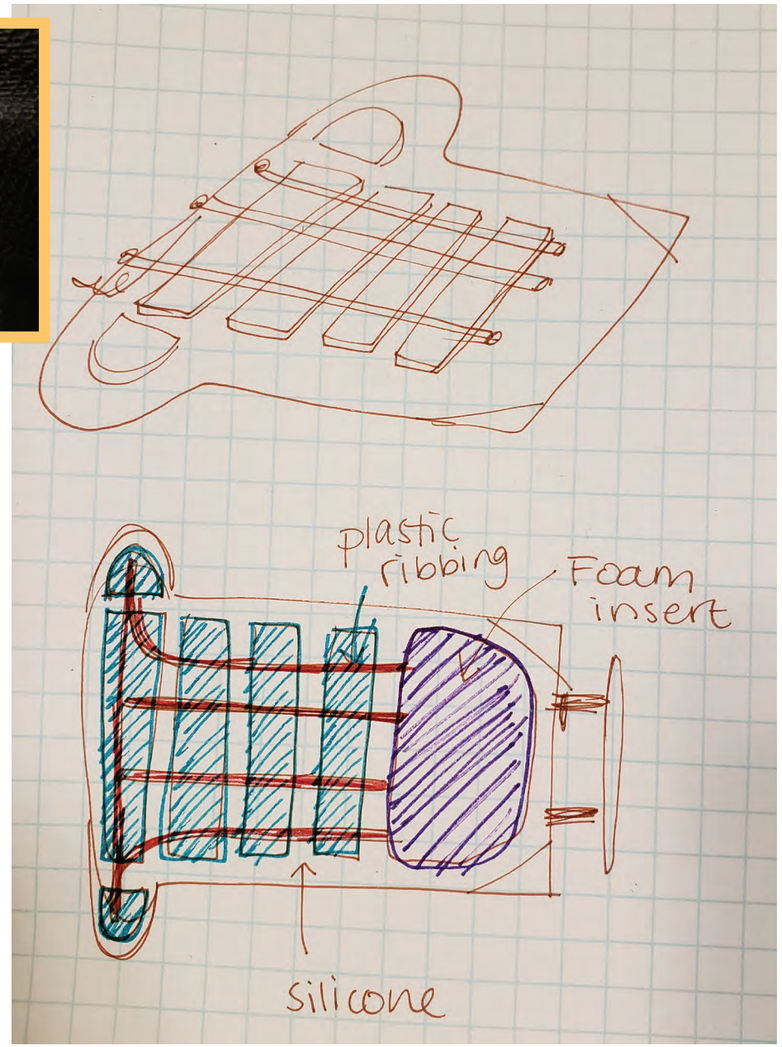
The upper strap was needed after testing, and it failed because of no support

The paper model was adjusted and cut into a better form, but with the manufacturing part, it was put on the back burner. In this stage, the ribbing was added for support of the rubber. The way the mat would fold was unattractive and the ribs would act as a way to flatten it out without the wires becoming too twisted.

This paper model had ribs sandwiched to mimic the layering.

The layout of the ribs was drawn, and placement of the wires were finalized. This is when I took it to Eric Sneider to discuss a more thought through material choices to aide my design.

This material doesn't allow it to shift when sat on



To avoid the mat from sliding around on the seat, PVC mesh fabric was suggested

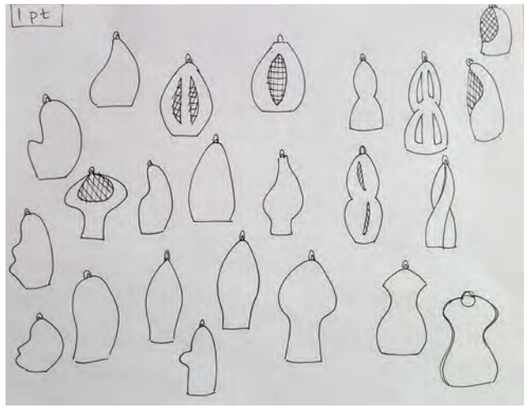
Round 4

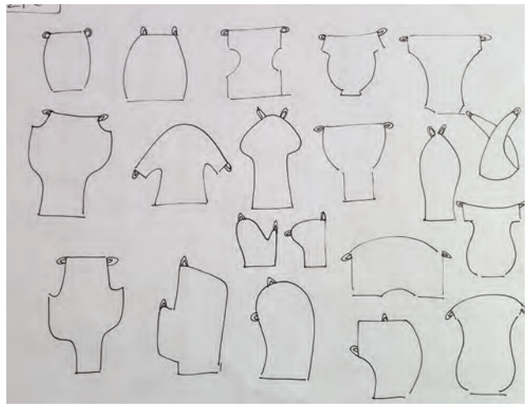
Two Shapes

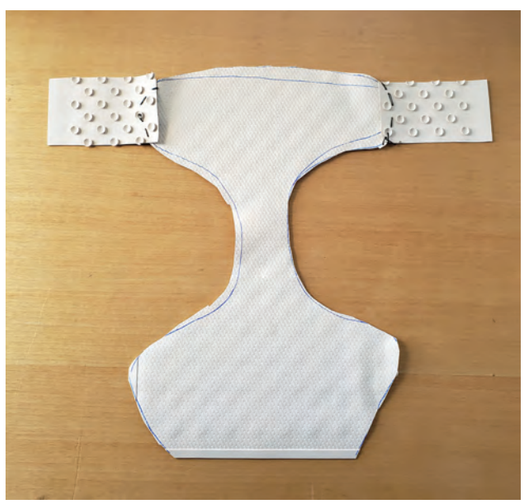
Expanding with the two shapes helped define pros and cons of each of them. This is when bigger prototypes to actually be tested was critical. Also testing layouts of the mats and strap directed how one might use this.

Expanding the shapes

With the upper strap and lower mat finalized with materials, it was testing of different shapes that were next. I sketched out multiple versions of the mat with two points of contact, and one. This allowed for a variety of ways to secure items down. Prototypes were sewn for the upper strap sizes, and the lower mats were made of cut up bath mats, to get closest to the material I would be using at the time.







I had to stitch the extensions on, since none of the glues were working.

The upper strap was sewn based on universal average sizes of seats.

Prototype test 1

The fastest available car I had was my own 2005 Jeep Liberty. I drove to school that day, and it worked very well. From here, I needed to work on details, since the overall idea still worked with the different materials.

Could work without wires inbedded as well

The mat was not as structured as I would have hoped.

During testing, my backpack was heavy with my normal supplies.

The shapes I pushed forward were the tee and the teardrop. I constructed two more prototypes out of the bath mat material, with wire laced inside of it. I then had to attach a fabric on the outside to mimic the layering of the rubber and neoprene.

I tested both again, on the way to school. I also prototyped a better strap, that had hardware that was more than just ribbon, to achieve closer to the final prototype.

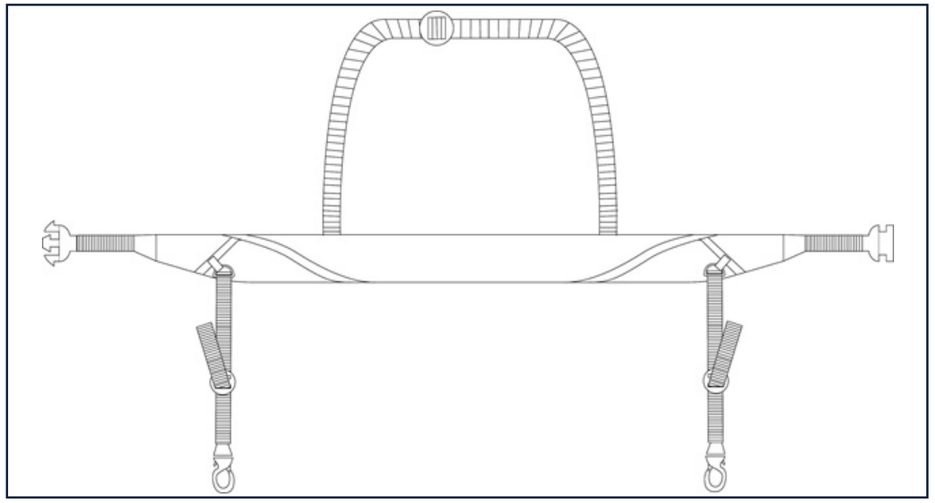
Another big test was to make sure both shapes held other large items as well that commuters would bring with them. Both had pros and cons for just two of the main items, but it furthered a need to simplify between the two shapes.

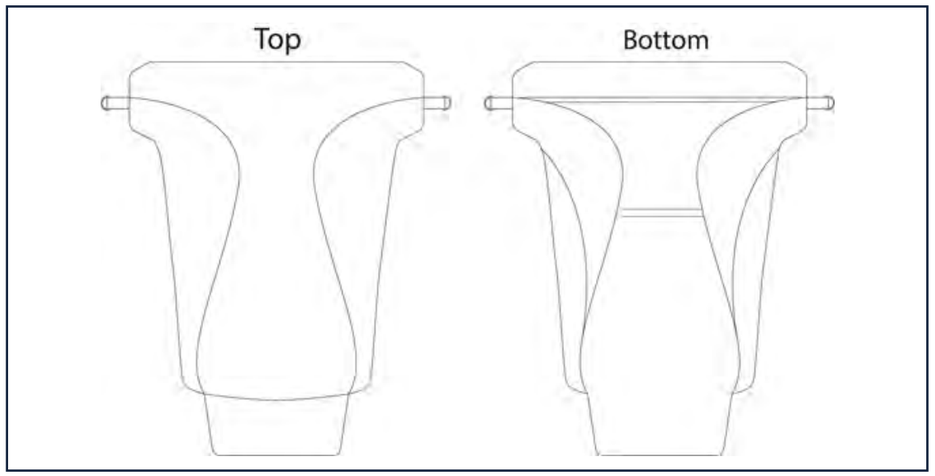
I also mounted both mats into different types of cars, to again address the various types of seats. The universal sizes I measured seemed to mount well in both the truck style and the sedan style cars.

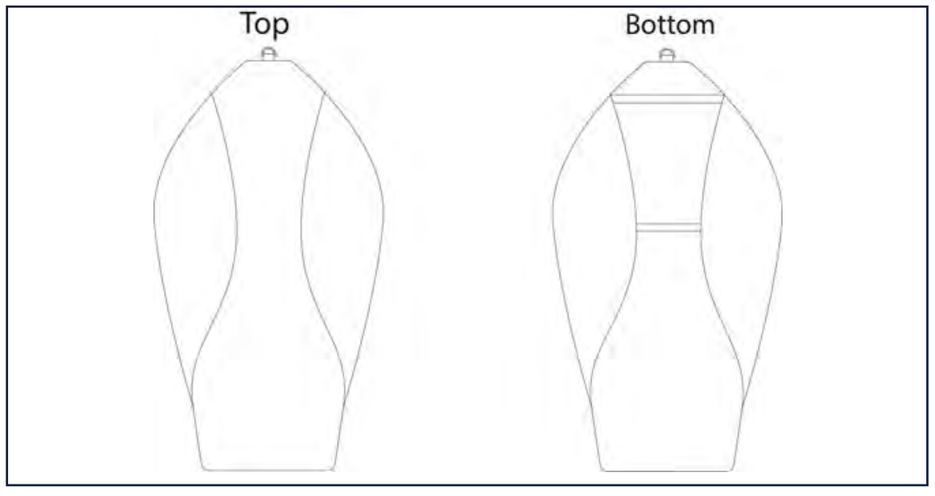
Some items were better held in one shape, than the other

The new strap had too long of side straps.

It was holding the objects better, now that it had actual hooks and loops.



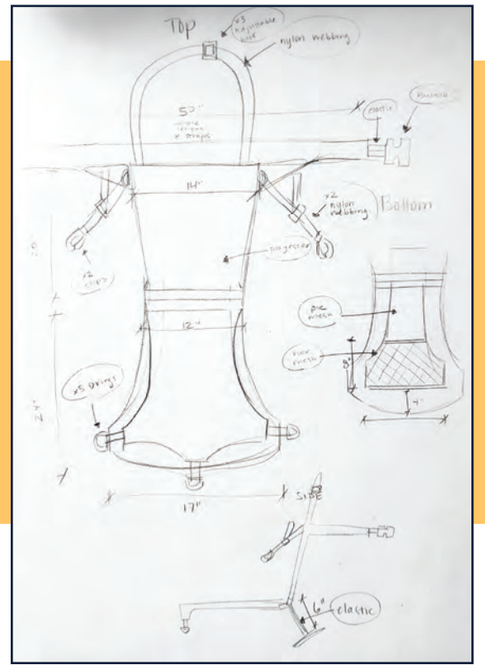




To simplify this design and really figure out the design, I had to draw this in Illustrator. This allowed for the design to take the front stage, and play around with color. Feedback brought up the unnecessary need to make this rubber and wired. I simplified this down to be all sewn, to make manufacturing straight forward.

Round 5

Unified Final



After the presentation before the final, I got feedback regarding to combine the two shapes together. This would allow for manufacturing of the mat to be streamlined. I took the feedback one step further and combined the mat and upper strap.

The template was made of paper before transferring to fabric

Final Design

The final test

Mounting the final to my car was still just as simple as the two separate pieces. Having the single constructed product made the adjusting to the seat more straightforward than the prototype with two separate pieces.

The lower part draped over the side so it wouldn't become uncomfortable to sit on

The upper part fit well with the adjustable straps.

When using the one loop at the top, the two side loops didn't sit very well.

The straps held the larger items very well, and secure.

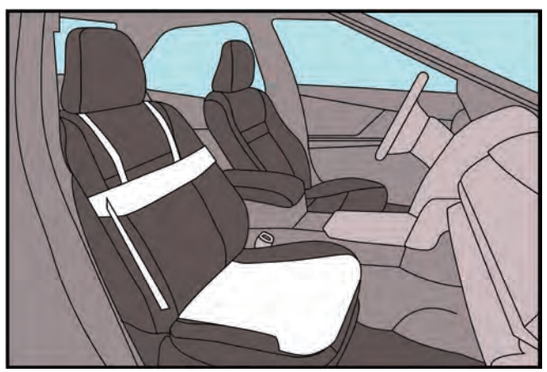
The pocket is designed for medium sized objects that also need to be secured down.

The lower disc would be injection molded ABS.

Storyboard for single passenger

For the user to understand the process of GRASP, this storyboard maps out how it will protect their items during the commute. Since it is a soft good, this is easily able to harness down items.

1. waiting to be used



2. User deploys mat & straps

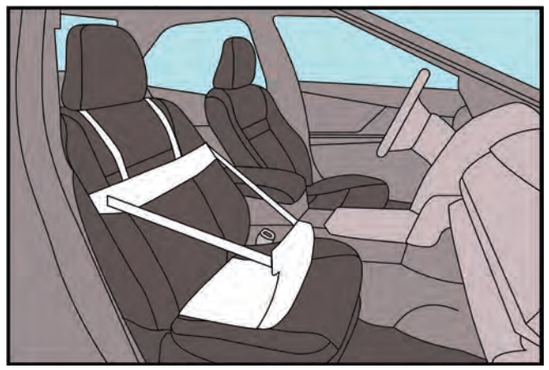
3. User drives as normal

4. User brakes suddenly

5. User continues to drive

6. User grabs bag to exit car

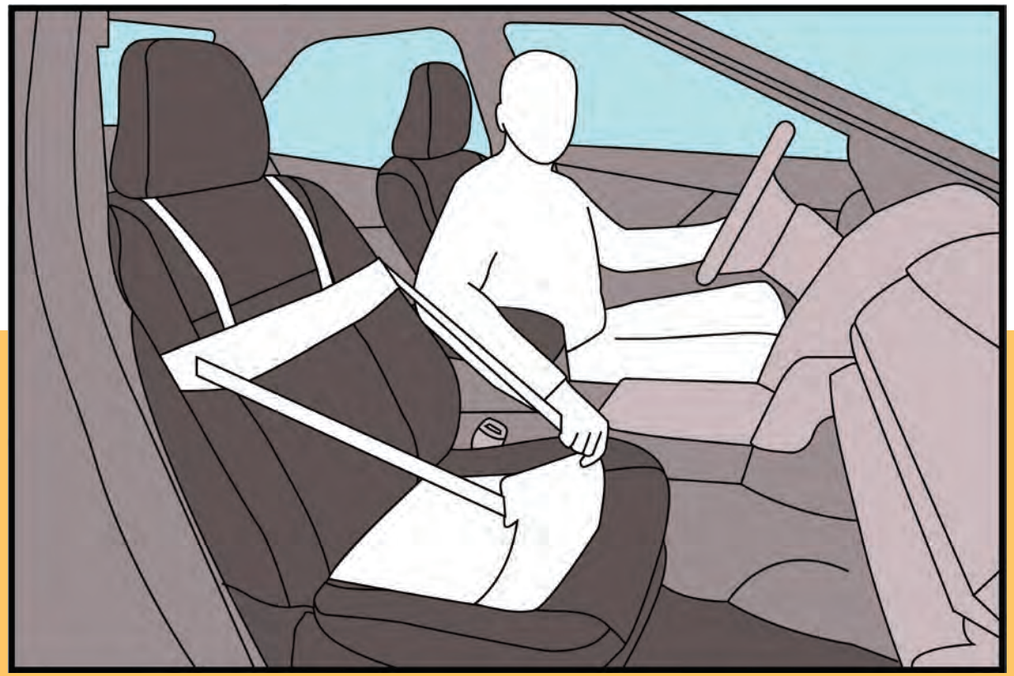
7. stays deployed for next time



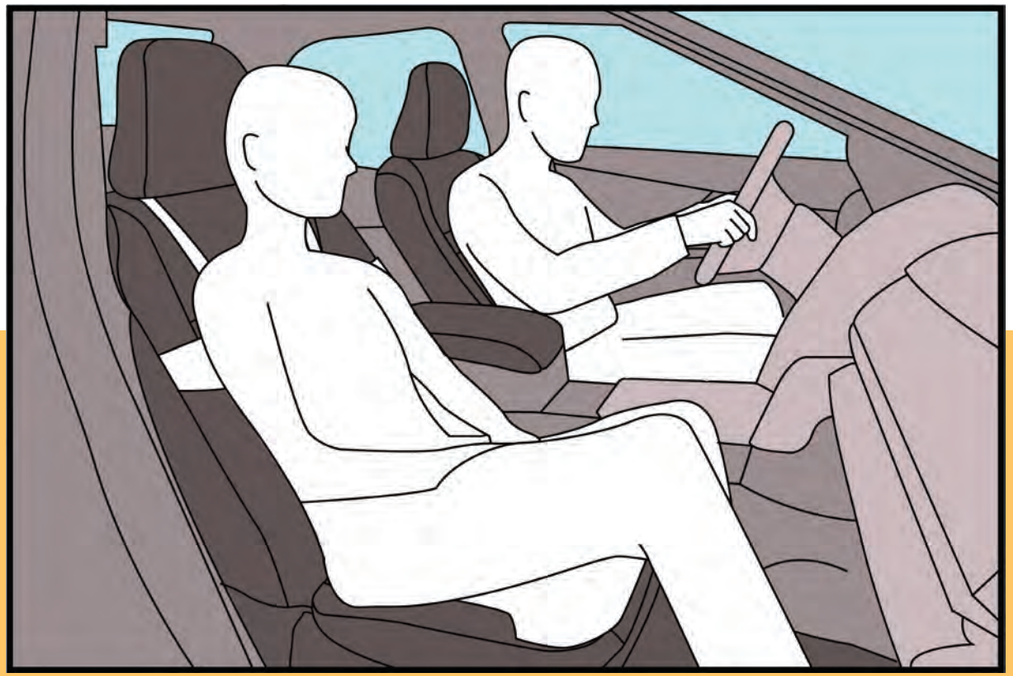
Storyboard for multiple passengers

Allowing for someone to sit ontop of this device was a challenge in itself. The storyboard allows for users to understand that this would be able to convert seamlessly back to a seat. Thus, making GRASP a non permanent structure in the car.

8. User unhooks & flattens mat



9. 2nd user can comfortly sit in passenger seat



Due to having two markets that heavily influenced GRASP, both markets had to be put into consideration for pricing. The first market was the car items organizers, specifically the hooks. Since GRASP has more than injection molded pieces, this would have to sit at a higher price range.

$6.99	$14.99
	
EldHus AB Ofspower	Heroway Magic Headrest Hooks

$16.99	$33.99
	
HIPPIH Collapsible Pet Booster Car Seat	Capti Dog Booster Car Seat

With the insight of the pet accessory market, the construction is heavily based off of this market. However, with less structured pieces, GRASP can fall on the lower price range.

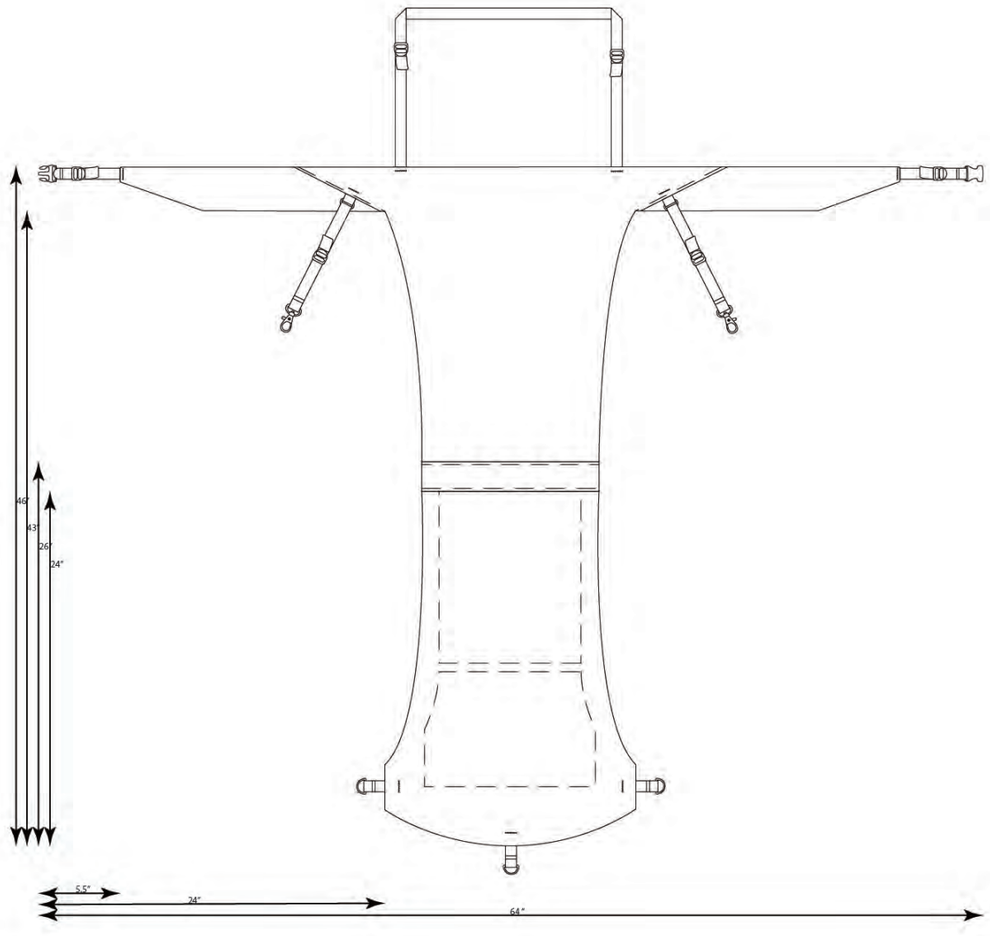
$15-16

This allows GRASP to be somewhere in the middle of both markets. It becomes a great investment for commuter's safety of themselves and their items.

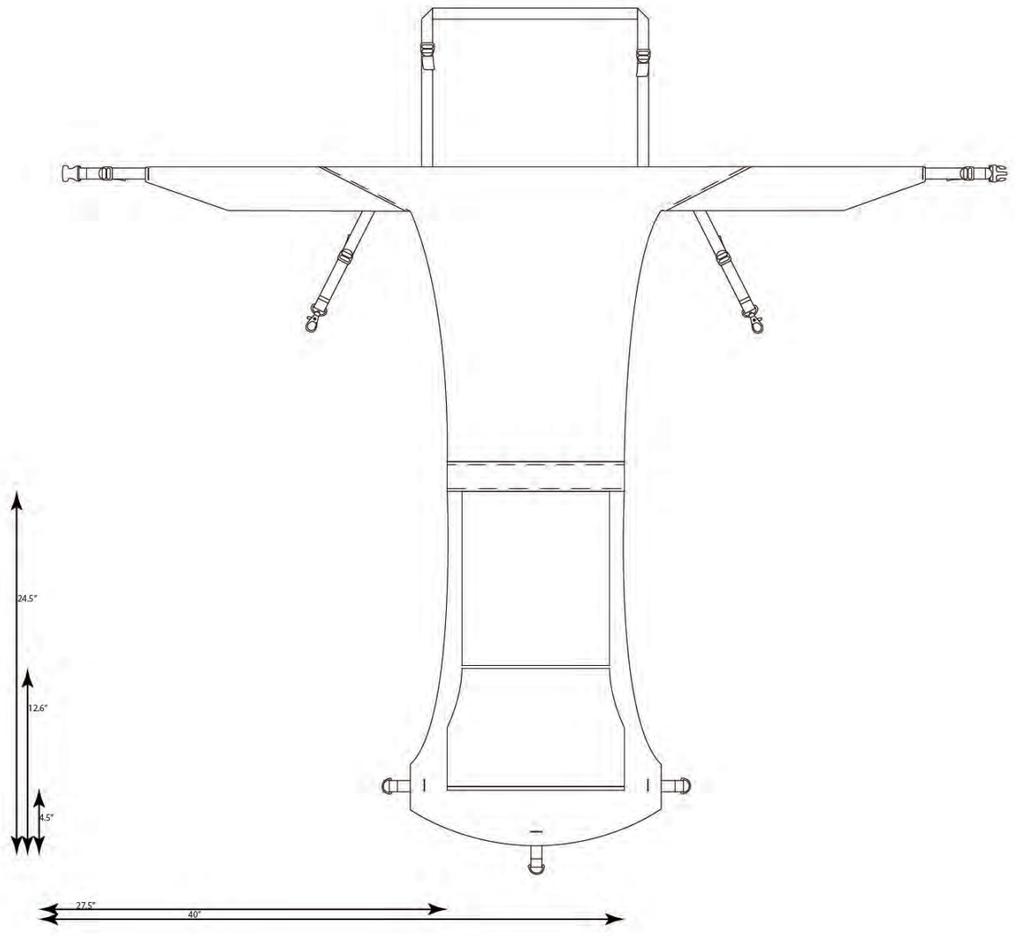
Dimensions of the tech pack

TOP VIEW

FRONT VIEW



BACK VIEW



Annex

NETWORK

Evan Fein

Designer at Yanfeng Automotive Interiors
PhilaU Alumni 2015

Gave feedback during round 2 & 3. He gave me insight to modern day auto designing, and what to look out for during this phase of the project.

Eric Sneider

Material & Processes Specialist
Professor at Jefferson University

During round 3 & 4, he gave insight to materials that would be spill proof, but also not uncomfortable to sit on. He also gave feedback on the design in round 2.

Becky Geiser

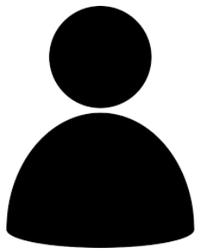
Fiance Manager for Subaru
Former salesperson for Subaru

She gave insight to the market of auto accessories between round 2 & 3. She explained how sales people recommend additional perks when leasing a car.

Todd Kramer

Soft Goods Specialist
Professor at Jefferson University
Founder of BlueKiwi

Gave feedback during all rounds of development. He gave insight to soft good manufacturing for round 4 & 5.



Ken Root

Former Car Interior Designer at Subaru
Professor at Jefferson University

He gave insight and feedback for round 1 & 2. He lead me into more research on how auto design was like, and gave references for me to start at.

Consumers

Various people that own and/or drive their own vehicles

Through a survey, and testing with commuters, the demographic gave feedback to all rounds of the project. This is also many insights were taken from, and conversations of the design developed.

SURVEY COMMENTS

My purse has fallen off the passenger seat and dumped contents out on the floor while driving more times than I am proud of

I used to keep things on passenger seat front but during sudden stops, contents of purse went flying so now it’s buckled in.

Hitting my breaks and all my sh** flies to the floor board.

Reponding to the comments

These comments were taken to found out the truth of what people do for situations to strap down items in their car. Many showed frustration to the problem, but no concern to trying to solve it.

My water bottle is to large for the cup holders in my car

Always buckle-in egg cartons.
Also, harness seatbelts are now made for dogs! This is not only safe for them but safer for drivers as well.

My backpack needs to be buckled in because I keep it on my passenger seat but it’s so heavy that the airbag alarm goes off!

One time I forgot I had my lunch in my passenger seat and I didn’t put it on the floor so when I hit the breaks my lunch went flying all over my car

Nothing like milk tipping over from taking the turn too sharp and then busting open. Have to love that soured milk smell weeks later.

My gallon water bottle goes flying unless I wedge it in the center console or pin it down with my backpack in the passenger seat

A car stopped pretty hard in front of me and happened to caused my backpack to fly forward because I hadn’t buckled it in. ever since then I have bucked in whatever I bring with me.

2020
Industrial Design