Project Deliverable E - Prototype 1 and Client Meeting

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Prototyping is the initial stage to the final design of a product or design concept. It allows you to turn all of your calculations and concepts into a physical form and test to see whether your concepts will actually work. Typically prototypes are not made of the same material as the final product will be, but a much cheaper and accessibility material instead. However in some cases, a prototype does not have to be in a physical form, rather just a virtual representation like a CAD model. In our design, it would be very difficult to create a prototype that is made of a weak material and easily accessible material because our project depends heavily on supporting a lot of weight, therefore our prototype will be a 3D CAD model made on Solidworks.

1.)

When we had our client meet, David was very excited to see our product concepts. For a lot of aspects of the design, we had a few ideas to present that we wanted David's opinion before making any final decisions.

Our idea to have a seat similar to the shape of a skateboard so that it could catch the user but they could also turn sideways to sit on the seat like a bench if they got tired. With our idea, the seat wouldn't have to be rotated like in David's prototypes to be able to sit on it like a bench. However, David pointed out that we could be sacrificing comfort. While using the seat as a bench, a longer width is ideal but while the user is skating, a thicker seat would be uncomfortable and could affect gait. Our challenge now is to find a way to easily make the seat width longer and thinner when desired. David liked our creativity but seemed more comfortable with a seat similar to his design.

David's prototype had a bar that went across the aid as a seat but it was hard ta adjust to different heights because the bar had to be completely removed and then put back in. Another idea that we presented was to have a type of gear shift for adjusting the height of the seat without having to remove the piece. We showed David how we planned on improving on his seat and he liked the idea of not having to remove the seat as frequently. Our plan is to develop this idea if the testing for our above seat doesn't reach the comfort and support requirements.

We presented David with another idea for if we decided to pursue the "skateboard seat." Our idea was that the front and back panels could be a U shape rather than an I. With the U shape, younger kids, and therefore shorter, would also be able to use the aid and be able to see ahead of them. David said that a toddler once wanted to use his aid to skate but the seat has too high and they would have only been staring at wood. With the U shape, shorter kids would be

able to see ahead but then the topic shifted to the minimum age/height that we should be accommodating for.

We asked David what he would like as the minimum height adjustments and if we would like for the aid to be usable by toddlers as well. He didn't have a definite answer and mainly said that it's a possibility that we could choose to further develop if we wished. This making the aid adjustable for small children such as toddlers isn't a main concern for David, so we don't necessarily need to change this part of our design, unless is we find that it takes away from a certain aspect. With a U shaped front and back, it would be difficult to make the width adjustable but David said that it wasn't aspect wasn't a necessity.

An idea that we presented for making the aid more compactable was having telescoping handles for taking up less space while the aid is transported. David's concern with the telescoping poles was that they could pinch the hands of the user so we will need to find a way to eliminate the risk of pinching. We also suggested using hockey sticks as handles which would eliminate the risk of pinching and contribute to the cool factor, which David liked. We will change our design to have hockey sticks as handles and start to collect sticks.

We discussed using several different materials for certain aspects of the design. We need to look into which parts of the design will bear little load so we can make them using lightweight materials instead of strong materials. We will try to 3D print those parts to reduce cost.

Overall, David was very open to our ideas and encouraged us to continue to develop them and test them out to come up with the best design possible.

2.)

The seat will be the first part tested to ensure that it's strong enough to hold the weight of a person sitting down on it. We will all apply a force to the seat and mock fall on the seat to test that it will catch us. We will all sit on the seat to test its comfort and then turn it into the bench and test its comfort there as well.

We are going to take our product to Minto and test it on the rink. Carolina is going to use it to be the test subject. Carolina doesn't know how to skate so this will test how accessible the product is for people who are new to skating and could have trouble with balancing on ice. This will also test how well the ice wheels slides along the ice. If it is hard to control the steering with four 360 degree direction wheels we will consider adding a runner improve the steering

In addition, we are going to walk with the product to the rink to test the wheels, and how easily it moves around during transportation. We will also check how easily it can be lifted and placed into the trunk of a car. We will all try to lift the product and fit it in individually to test to see if the product is light enough and if i

3.)

Our previous visits with David, have mostly involved our group and David elaborating different potential ideas for our design. Up until this point, we haven't explained to David a specific design that we want to pursue. At our next client meet with David, we plan to show him our finished CAD model of our design. This way instead of just presenting David with multiple drawings that could be very hard to understand and interpret from different angles, we will have an interactive model that David can play with. In addition to the CAD model, we will be presenting David with a formal part drawings that clearly map out each part of our design and the materials that going into building them.

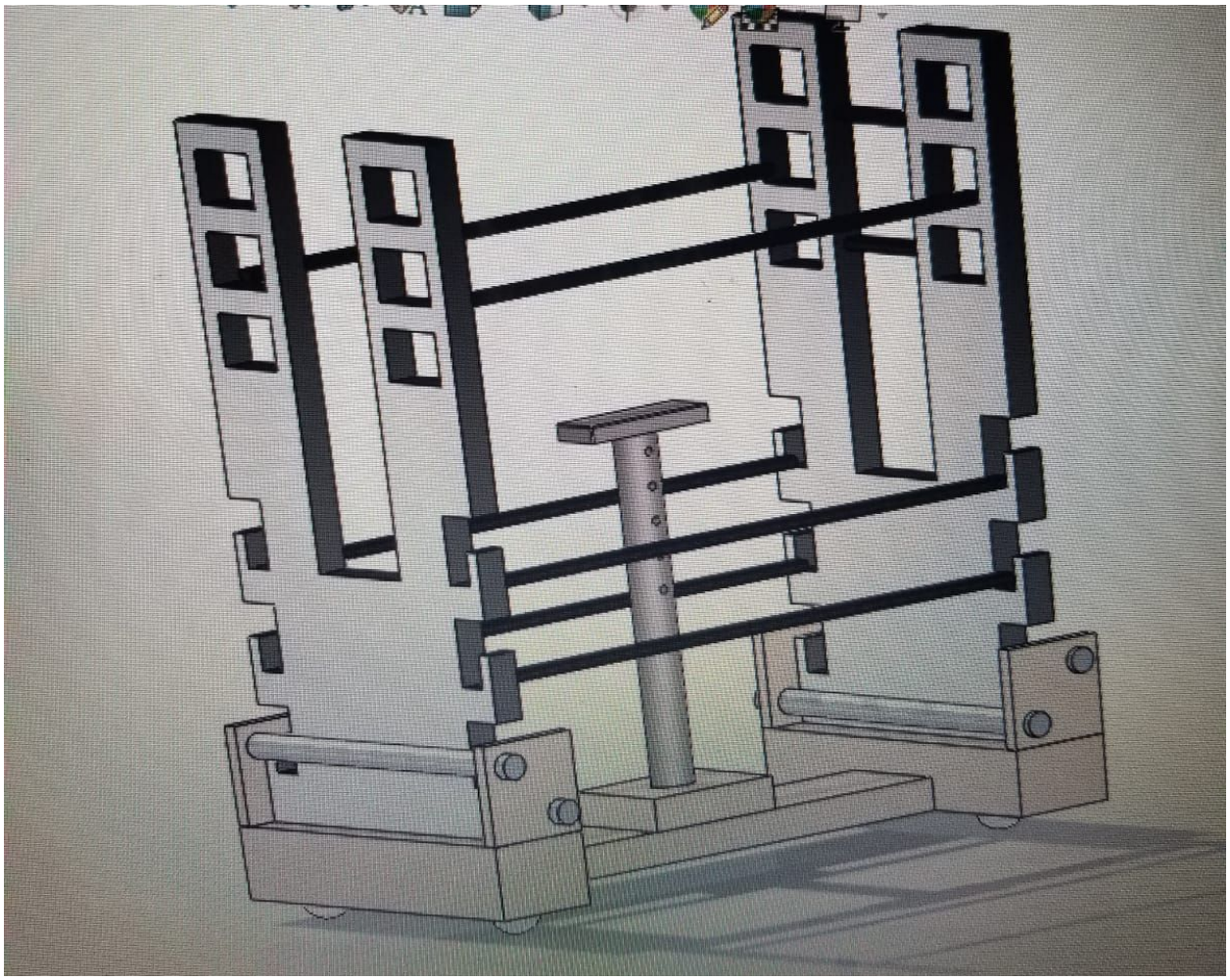
We also wish to have a considerable amount of our physical design finished (at least the base and seat) so that David can physically see our ideas rather than from a 3D CAD model. David was very encouraging towards us when it came to testing his prototype he made, so we would like to do the same and encourage him to test. Specifically we wish to have at least our overall structure done by this time so David can stand inside and get a feel for the shape of the design. By the time we have our next meet with David, we will already have ordered our materials and have started to build our support, so in the event that David does not like a concept in our design, we will have to first try and reason with him, but second try and adopt the current design to satisfy his wants.

We are assuming that Liam will not be there again, as our meetings occur while Liam is at school. Therefore we are not able to ask Liam questions about how he likes the design, and must assume that he will like what we have made, especially our cool factor we made especially for him. We also must assume based on David's previous prototypes that our design will fit Liam's height and weight since we are not able to measure his height and weight.

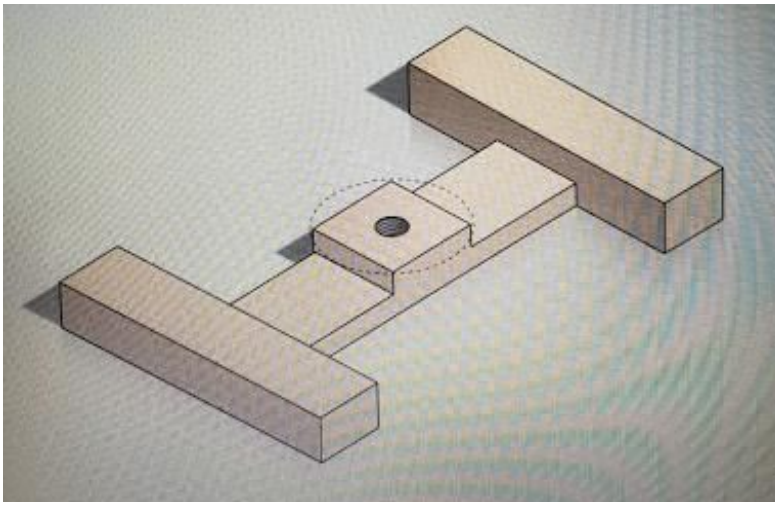
4.

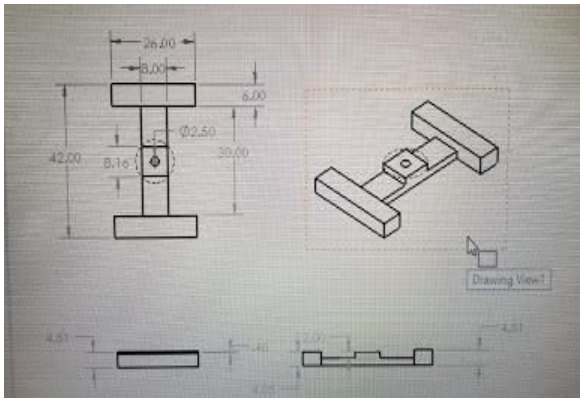
After see and experience with David's prototypes, we understood the main purpose and functionality of our product. Since we don’t have any room in our budget for materials for our prototype #1, we think a computer prototype is much more effective as we are able to test out different measurements without spending money. Furthermore, we are waiting to receive our materials to build the main structure of the product.

SolidWorks Prototype #1



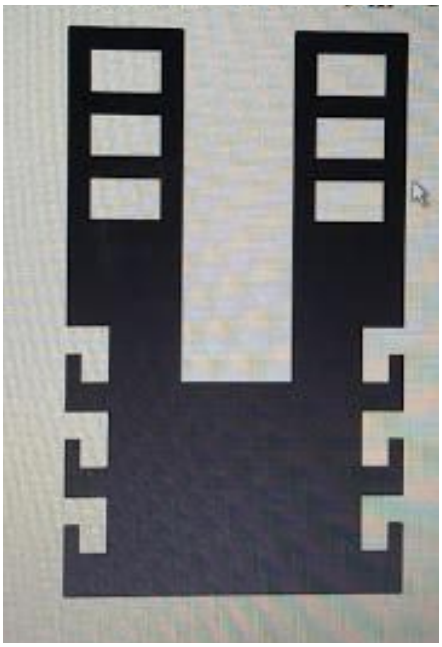
Base

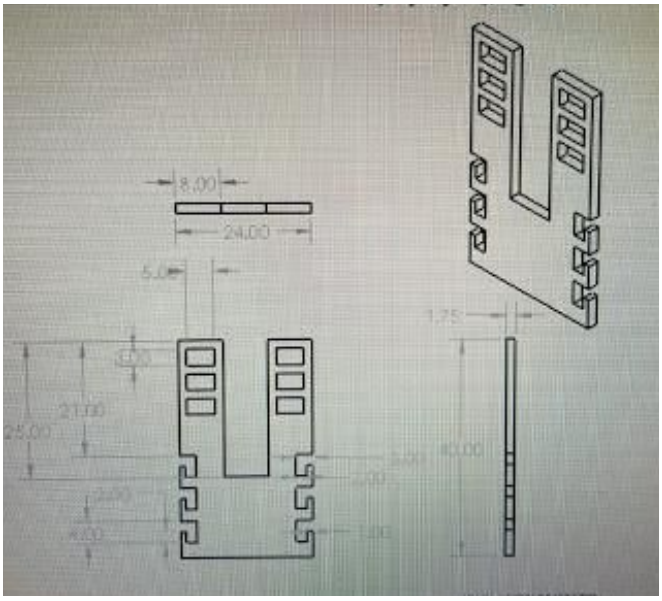




The product features include a base with a unique centre keel that prevents crossed ankles for some users with disabilities. The open base permits normal lateral skating stride, but can be closed to limit lateral stride if it's necessary using the side supports in the front/back supports panels.

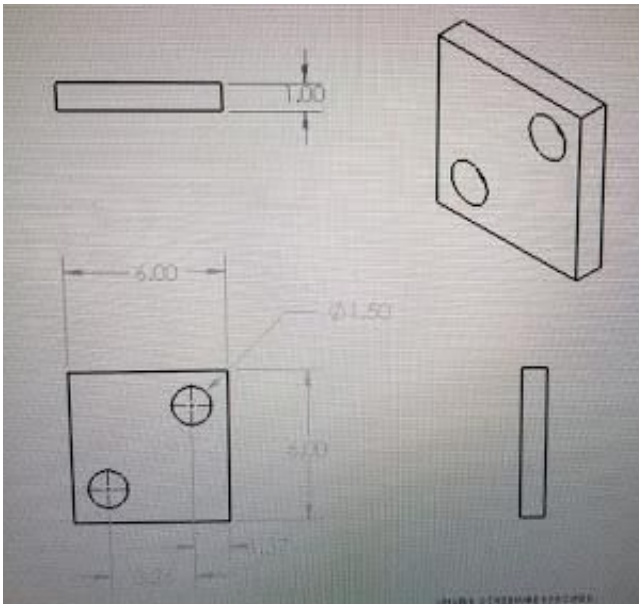
Front/Back Supports





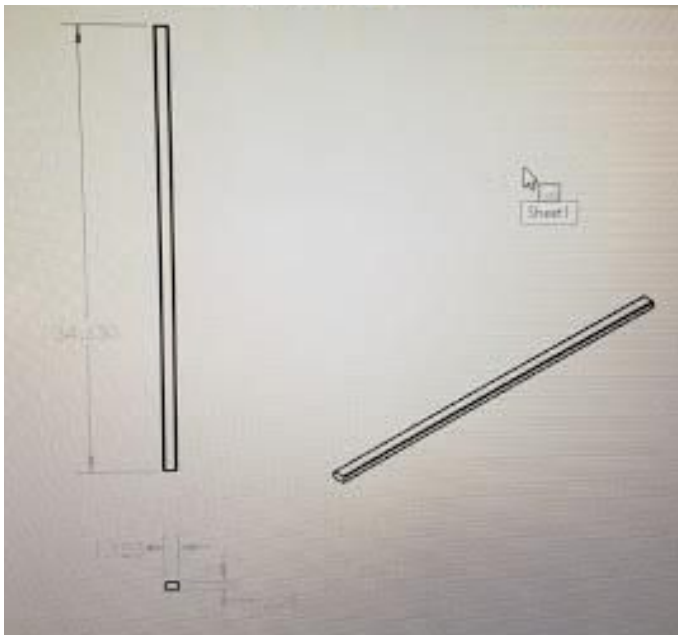
These panels with configurable side rails will permit adjust to multiple height and width settings. They surround the disabled skater protecting him from falls and collisions, and stabilize the user and attendant at the same time.

Panel Pole Supports



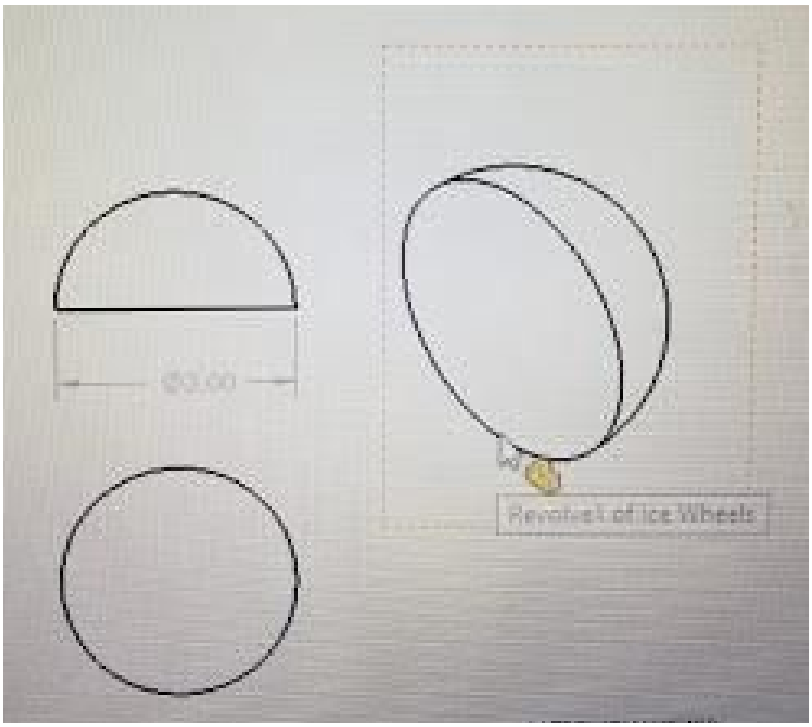
The panel pole supports are designed to support the front/back panels and allow them to rotate. Poles are inserted in it for this.

Side and Front Supports



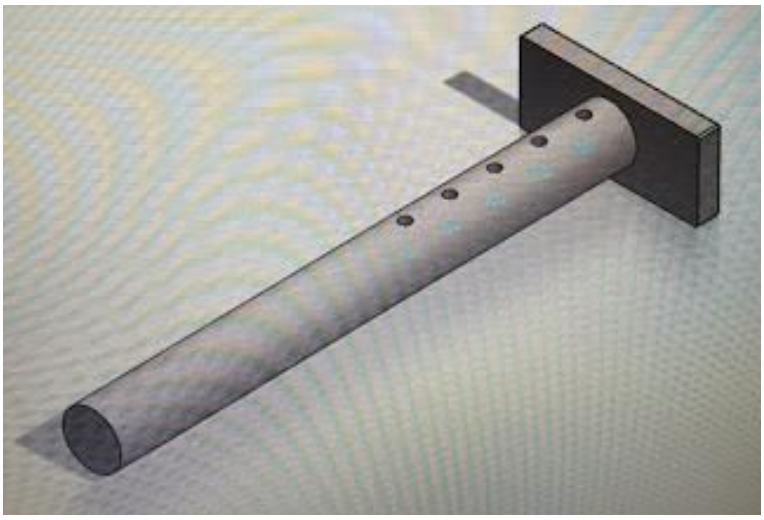
The configurable side rails let the user hand holds with the Side and Front Supports, that in our product will be hockey sticks. Hockey sticks are part of our cool factor and we tested that they are easier to grab than the poles in David's prototype, because these poles rotate too much and that decrease the support and stability of the user. They can be inserted in different side rails in order to adjust to the user height and width.

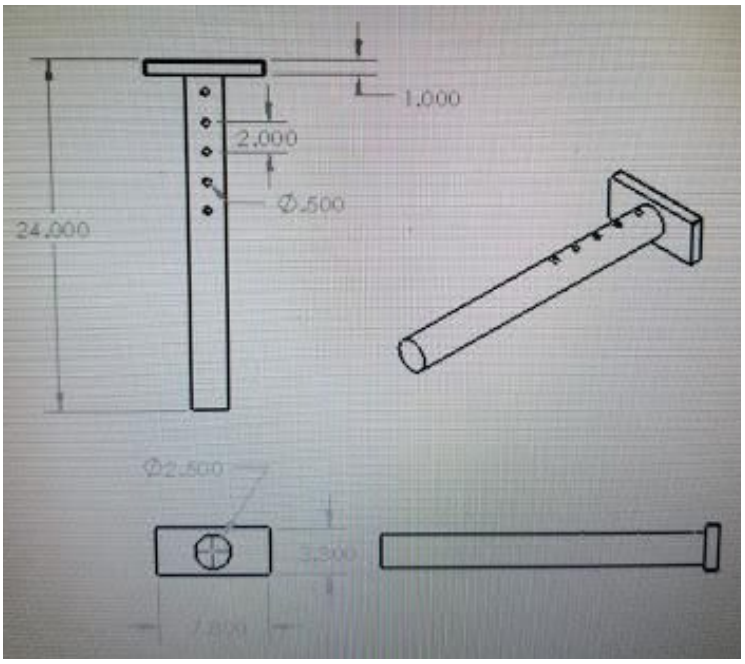
Ice Wheels



The wheels will be spherical to create a smooth movement for the product and allow to follow any direction, independently of the side of the ice cube.

Seat





Which functions are arrest falls, prevent injury to skater or attendant and convert into a bench to rest or change footwear. Also, takes physical load off attendant.

We had plenty of ideas to go off of already with David's two prototypes. David's ideas are useful and we incorporated them into our design but we also had our own ideas to improve the project. We presented our ideas and he gave us a lot of critical feedback that we will use to improve our design. From our Solidworks prototype, we plan to build and test our second prototype as we go. We have many tests set in place for our design and have alternate design plans set it place if our components don't meet our testing standards. We're looking forward to building our second prototype and eventually being able to watch Liam skate on the ice using it.