Deliverable I: **Prototype II**

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Now in the last stretch of our project we have some things to keep in mind as we build prototype II. In making our final product, it is important to consider the feedback from our client to ensure that we're making the best possible device for them. Even if our team feels like we have done great work and met the needs for the skating aid, in the end it's our client who has the final say if we were successful. To do so, we will define a design goal and determine how we will measure our success. We will present our final product to David and Liam and verify that we have attained our goal.

David's main concern with our first prototype was the seat. He wants the seat to dual as a means to catch the user if they fall and as a bench so he was concerned about the comfort that our initial design provided. The seat had to be thin enough for the user to comfortably skate with the seat between their legs but wide enough to provide more surface area for comfort once the user gets tired and wants to sit on the bench.

Our second prototype addressed this concern by having a part of the bench on a hinge that could be propped up with two rotating pieces moved into place. David liked that idea but was concerned about the length of the seat and if a user would potentially fall closer to the front or the back of the device and miss the seat. He stated that he would be more comfortable with a seat that went all the way across.

We considered switching our design to our plan B with a seat that came went from panel to panel instead of coming up from the keel. We decided instead to stick with our original seat idea but make a few adjustments. If we had switched to a seat across we would have needed to use stronger materials for our side panels. To make our panels lightweight but still strong, it would have made us exceed our budget. By using cheaper but strong material, we would use a heavier material (probably wood) which would not solve the problem of making a lighter aid than David's previous prototypes.

We plan to make the length of the seat almost the full length between the two panels so that users don't have to be concerned about falling at certain positions without a seat to catch them. With this adjustment we worried that only one support wouldn't be enough for the seat so we have modified our seat to have two supports spaced evenly on the keel.

David also voiced that for heavier users it would be best to have a support that goes from panel to panel when the seat is a bench. We will ensure that at a level of the seat a hockey stick will be at the proper height to allow for the bench to rest on it as well for extra support.

He also had concern with using a hockey stick as a support for the user to tie their skates up on. The concern is that the skate blades will over time destroy the hockey stick and it won't be usable as a handle. At this point, we are using hockey sticks to be a part of the 'cool factor' so we don't want to switch away from that idea unless if it's a safety hazard. We are trying to find a transparent material that could cover the hockey stick and make it more resistant to wear without taking away from the 'cool factor.'

Our design goal is to provide a prototype II that allows Liam to skate with confidence and without fear. We want him to feel happy and cool while using the skating aid and for David to be able to confidently help his son with the device without fear of injury to either of them. David told us at our first client meet that kids with disabilities are often fearful of trying new things and we want to ensure that Liam is able to overcome that fear while using the aid.

Our plan is to present a completed project, which is our comprehensive prototype, to David on design day. We want to verify that our goal had been achieved by watching Liam use the device to skate. Since the Canal will not be frozen by then, we will find a time for him to try it out on Minto ice. David is our client and we want to provide a product that he's happy with but the true approval that we need is Liam's. He will be the one using the device so even if David is comfortable with Liam using it, if Liam is afraid to go on the ice, even with some motivation, we'll know that we were unsuccessful. We will know that we were successful in completing our goal if we observe Liam skating down the ice on the aid with a smile on his face and his dad assisting him with confidence.

The purpose of the comprehensive prototype is to provide Liam with a cool skating aid that will allow him to skate without fear or risk of injury. It works by having a seat that would be able to adjust to the height of the user to be able to catch them if they fall. To assist with balance while skating, there are hockey sticks that reach from panel to panel to be used as handles and supports for the user. The transverse bars will be clamped to the panels allowing for the panels to fold down for easy transportation.

Figure 1: Side view of Prototype II

Figure 2: Orthographic view of Prototype II

Figure 3: View of front panel

Figure 4: Telescoping pole to hold the seat

Figure 5: Blocks to hold telescoping poles in place. Wood is being glued together in the picture.

Figure 6: Transverse poles to hold panels

Figure 7: Hockey sticks to be used as handles

As can be seen in the above pictures, we are still working on completing prototype II. Attached to the telescoping poles will be the seat and the panels will be completed with slots for the hockey sticks (handles) and filled with foam. The wheels for transportation on ice and on snow will also be attached.

Although there is still work to be done on the prototype, our team is eager to be able to show the completed project to David and his son. Our goal is to provide a prototype that they both feel safe using and that makes Liam feel happy and confident. The sight of Liam skating with joy on the ice will be enough for us to know that all of our hard work has been worth it.