GNG2101

Project Deliverable F

Submitted by

Group A2.5

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Abstract

Based on the feedback from the presentation and 3rd client meeting our team built the final prototype. We have created a bill of materials and target specs that the prototype should achieve and set up a prototype testing plan. Finally, we could make a prototype that satisfies the user needs we gathered during the client meetings and target specs.

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List of Acronyms

Acronym	Definition
kg	kilogram
ft	feet

1 Introduction

In this deliverable, we are going to summarize the client feedback from the 3rd client meeting, develop the prototype testing plan and set up the updated target specifications. And build the last prototype. We will have stress testing by simulations and the results will be compared with the target specs we developed

2 Client Feedback Summary

After presenting our product progress in project deliverable E, our team had confusion as to why our client was asking us to make a platform but had not given the same information to the other group. This resulted in our design being much more complex. We then spoke with TAs and the professor to come to the conclusion that we needed to speak without clients about how to proceed.

During our client meet 3, we had asked our clients why and if adding a platform was necessary. We also explained to them that we did not think that the platform would be safe or up to code based on the wheels and ramp size needed. The clients said that they thought the platform was cool based on a video they had watched and said it was not necessary. We then showed them a design where we connected the bike to wheelchair attachment to the safe attachment points on their wheelchairs and the clients had said they much preferred that design as it was the safest place to connect to and would remain up to code as their wheels remain on the ground.

3 Critical Product Assumptions

1. We assume that we will be able to deliver this product to the clients and that they will be satisfied with the results. We are almost done building the entire product and the end goal is extremely feasible.

2. We assume that we will have the same results when we use the clamp and attach it to the client's attachment point on their wheelchair. Although we tested using tape, we expect the same results as the metal bar is still being held at a fixed point

3. We assume that with all the purchases we still need to make, we will stay under budget. We still have to buy a clamp, screws, bolts, and other items for our presentation. We have been extremely strict with our budgeting and have always made smart purchases. We intend to stay under budget even with the rest of our purchases to be made.

4 Updated Prototype

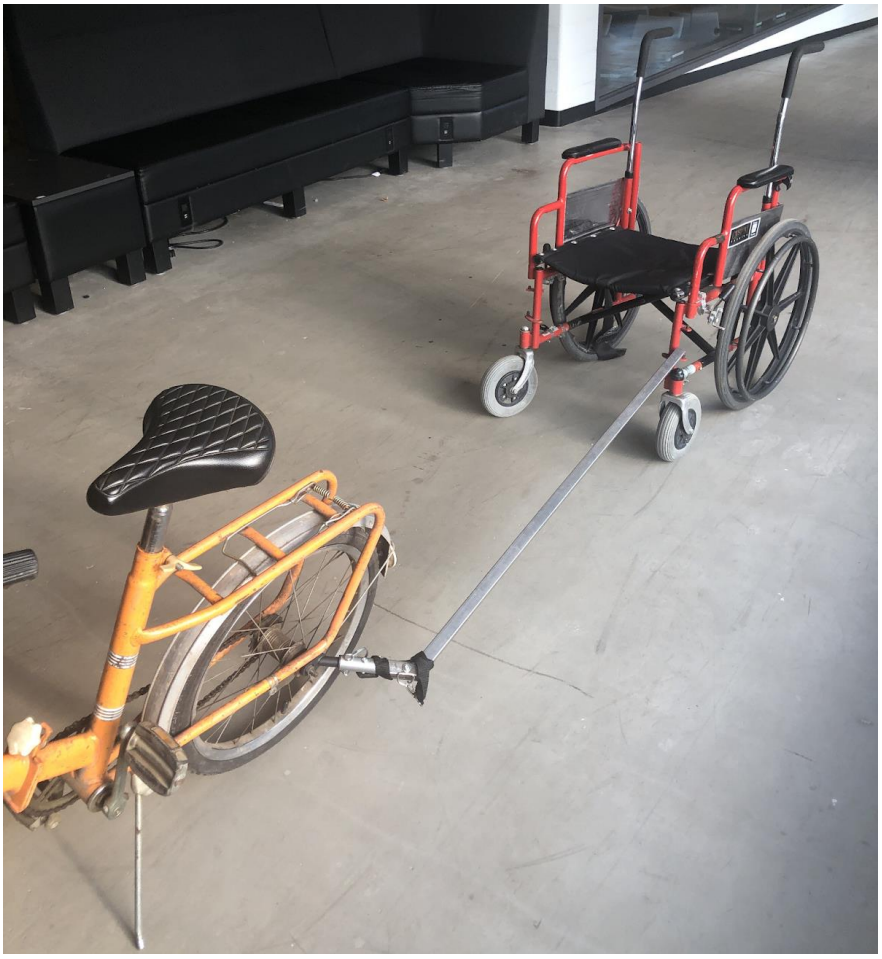

Figure 1 Updated Prototype Design

For this prototype, we wanted to test turning, the suspension in the bike part, safety features, and the overall size of our attachment. We then carried out prototype testing documented in the following section.

5 Prototype Testing

In this section, we carried out several tests to our prototype. Each test is explained alongside an image or video of the test being carried out. The full results are documented in a table compared to the target specifications we had deduced in project deliverable b.

5.1 Test For Turning

To test our prototype's turning radius, we first attached it to the bike via the suspender. We then simply held the metal bar with our hands as we did not have a clamp to attach the bar to the wheelchair. We found that it was impossible to judge the turning through our hand as the bar would still be able to move. We then decided to tape the bar to the side of the wheelchair to mimic the bar being held at a fixed point. Upon testing this, we found the prototype worked perfectly. The bike and wheelchair turned perfectly and were very easy to control.

Figure 2 Turning Test Setup

Figure 3 Taped Attachment

5.2 Test For Safety Features

To test if our prototype was safe, we attached it from the bike to the wheelchair and rode around site as well as outside on the pavement. We used a suspensions system that was attached to the metal bar via screws and attached to the bike. We tested how far we can bend the bar to each side, and we found that the bar never hits the wheelchair. There is always enough room to operate, even if someone was to extend their legs. We then decided to test out how well the suspension can hold itself during sharp turns and we had similar results. The only issue is that the client's wheelchairs have a larger footrest than the one we used for our testing. To combat this problem, we will eventually cut and weld the metal bar into a shape that will allow the clients more space.

Figure 4 Safety Feature Suspension Test

5.3 Test Size

We measured our prototype using a measuring tape to ensure it was the correct length to fit our size constraints. The size of the metal bar is 115cm long, 15cm wide and approximately 2.5 cm thick. We then measured the suspensions piece and found it to be 14 cm long and had a diameter of 2.5 cm. When testing size, we also wanted to include weight, so we set the piece on a scale to find that it only weighs 6 lbs., much less than we had expected.

5.4 Target specifications and Test result Comparison

Metric	Marginal Value	Ideal Value	Value from Testing	Unit
Size	100-110 X 55-65 X 85-95	105 X 60 X 90	115 X 15 X 2.5	cm
Cost	150-300	150	60	CAD
Weight	15-20	15	6	LBS

Table 1 Target Specs and Results

Our tests were more physical and did not have any actual simulated values. We felt we had a much better understanding of how our projects will work when we performed tests in real life, rather than through an online simulation. We proved that it was strong enough to withstand a high amount of force as steel is an extremely hard metal and our testing have come back with positive results. The prototype is well built, and we are confident in its ability to perform against high stress and to last a long time. For this we do not have any exact values to compare our tests to, but we know for sure that we exceeded our own expectations and have delivered an exceptional prototype.

6 Project Plan Update

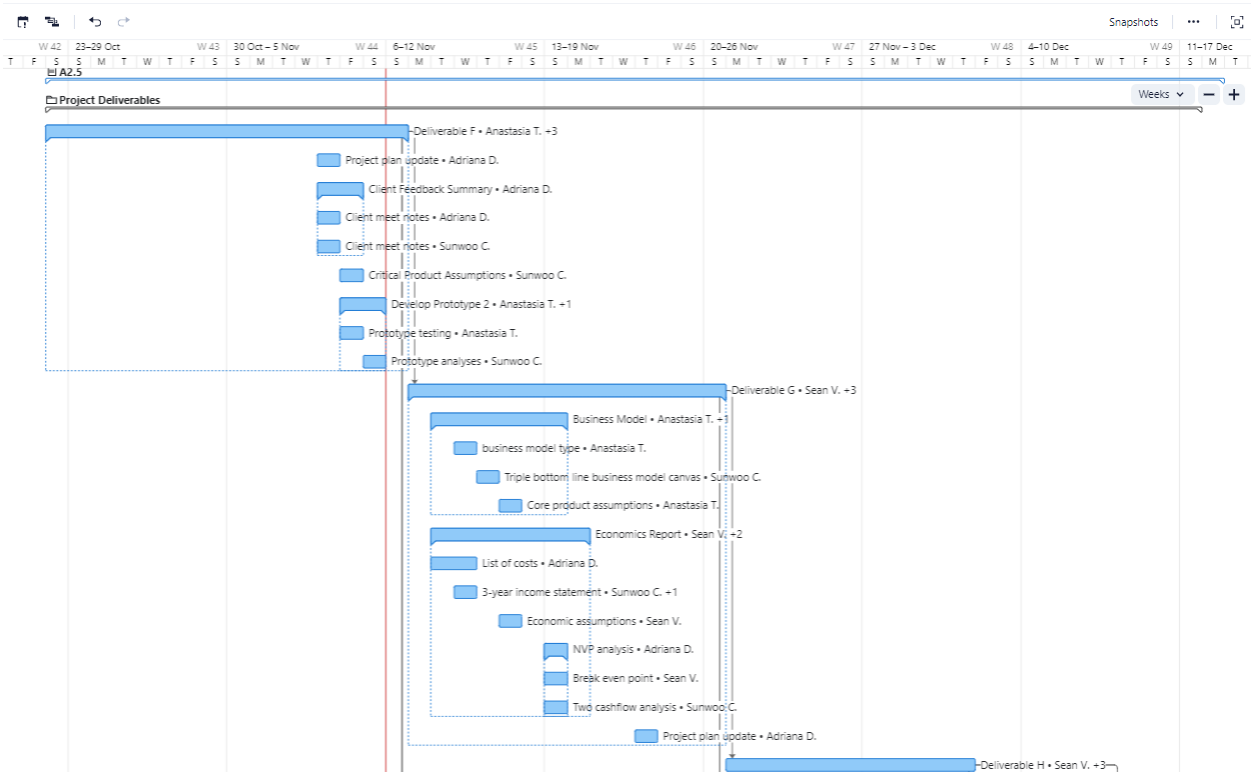

Figure 5 Wrike Update

7 Conclusions and Recommendations for Future Work

To conclude, from this deliverable, we have updated our project design based on client feedback, updated critical assumptions, and preformed tests on our prototype to compare with our target specifications. In the next deliverable we will be analyzing the economics of our prototype using information we have learned in class and our own skills from completing the assignments.

APPENDICES

No further information to be added to this report.