

GNG 2102 - A03

Inclusive Bike - Group 3

Deliverable D

University of Ottawa

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Introduction

We met with our clients this week to fully grasp what they require and desire from the product. These demands have been identified and arranged, and a concept design for our product has been produced. We'll set ourselves up for the initial prototype construction in this deliverable. To ensure our concept satisfies their needs, we must meet with the customer again in a few weeks. Before we begin planning, we will present our design to the customer and clarify any issues that arise. We will use this data to

determine the prototype's measurements and make a list of all the supplies we'll need to buy after that.

Summary of Client Feedback

The clients raised several intriguing comments once we presented them with our proposal during our meeting. Their most prominent criticism of our solution was that they would feel safer with a platform-based one. We must reconsider our design because safety is a significant concern for the project. We also discovered that we were envisioning the incorrect kind of wheelchair. The client's wheelchairs are significantly larger and heavier than we anticipated, despite the fact that our concepts would still theoretically function as planned. On the plus side, we now know what our design proportions should be based on. They also informed us that their wheelchairs already have seatbelts on them, there are several loops to secure the seat belt, and they must sit in front of the driver. We also discovered that the device would be kept outside in a shelter, where it should be able to withstand the cold. With this fresh feedback, we'll go back and do some of the previous phases to create a new design that satisfies their demands.

Client Meeting 2 Notes

- Explained prototype and pictures (drawings); the client did not comment.
- Using their larger, more complex wheelchair is a change compared to the previous standard mechanical wheelchair.
- The clients have asked for a ramp to be attached to the bike so they may load their wheelchair onto it. Initially, they gave us more freedom as to what we should create.
- The wheelchair will be stored in the client's shed.
- Specific latch spots on the wheelchair must be able to hook onto the ramp.
- Google the wheelchair online for more information (www.kimobility.com)
- Contact info of one of the clients was acquired (cbreausie@gmail.com)

The platform for the wheelchair is the main product assumption for a crucial project functionality and a significant update from the customer meeting. The initial concept presented to the client was an attachment that would have worked by fastening the bike's front wheel region to the back of the wheelchair. However, the client mentioned

that they were worried about safety once we presented our design to them. This required us to incorporate a platform into our design, which is now the most important part of it. The type of wheelchair that would be used with the project is another essential aspect; it is heavier and larger than a regular wheelchair. The platform will be the foundation of our ideas because it will need to be extremely strong and capable of supporting the wheelchair with the customer inside of it.

Prototypes

Initial Prototypes

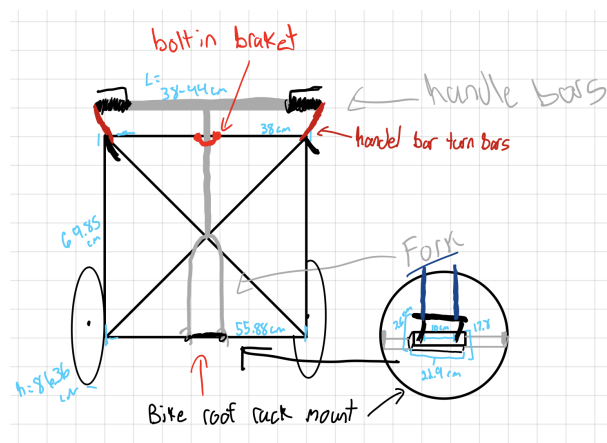


Figure 1.1 Back view of attachment

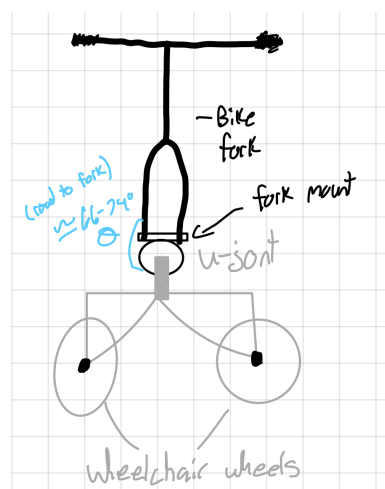


Figure 1.2 bike fork attachment

First Physical Prototype Before the Second Client Meeting

Before the second client meeting, we created our first prototype. We discussed different ways to create a physical prototype during our lab session. To create a mock-up of our ideas, we decided to bring in a bike and locate a wheelchair. To combine the two and see how we can attach them and what it will be like to turn. We found out that turning with the wheelchair attached would work just fine and came up with a few ideas on how to mount the bike to the wheelchair.



Image 1.1: Initial physical mockup

This image shows where we will attach the bike with the removed front wheel to the back of a wheelchair. It will attach from the bike's handlebars to the handlebars of the wheelchair. The bottle fort will be supported by a plate and bars at the bottom of the wheelchair.



Image 1.2: Back view of initial mockup

In this image, it shows a close-up of where we will connect the front of the bike to the wheelchair. The bottom of the front will be clipped onto a roof bar fork mount which will be bolted to a metal bar which will be connected to the back of the wheelchair's support bars.



Image 1.3: Alternate view of initial mockup

This is a top-down view of the angle at which the bike will be; it shows the bike will remain unaffected in terms of the rider angle and steering range.

Updated Prototypes After the Second Client Meeting

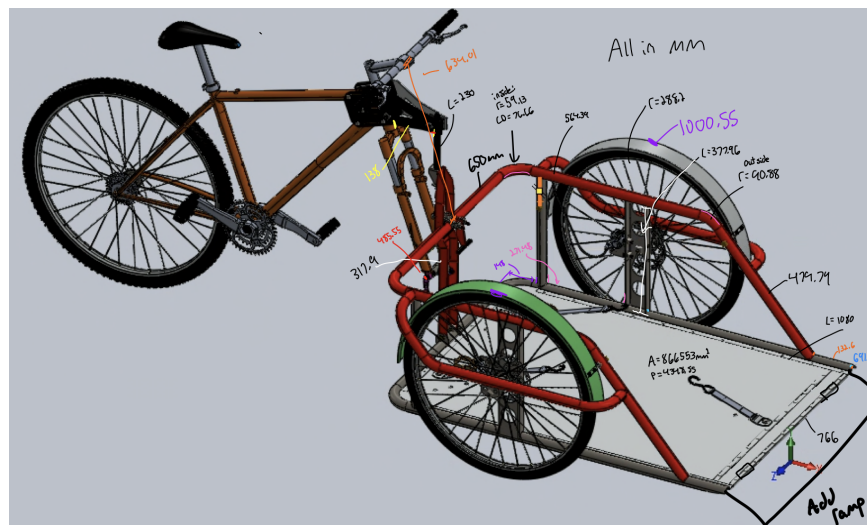


Image 2.1: CAD model of platform bike

We came up with this image after talking to our clients and learning that they would feel much safer using a wheelchair-accessible platform that is mounted to a bike. This prototype displays our final product's final appearance and provides basic line measurements. The plan is to keep the front wheel off a conventional bike and construct an adapter and front trailer to attach the client's wheelchair to. This prototype also helps us understand the materials and number of bolts, screws, joints, and other fasteners required to build the platform.



Image 2.2: Rendered model



Image 2.3: Rendered model side view

Testing

Before the customer meeting, we tested our first prototype to see how the turning would function when the front wheel was removed and held up to the location where the wheelchair attachment would be. We discovered that everything turns smoothly when someone pushes the bike while seated in a wheelchair. All that remains is to figure out a way to secure the front of the bike to the back of the wheelchair.

Our second prototype tested the overall appearance and functionality, making a 3D CAD model and drawings to show the clients our new vision.

For future testing, we need to test the weight limit of the ramp and hinges and the max load of the carriage. We also must test the turning radius, ease of connecting to the bike, and ease of strapping down the wheelchair to the platform.

Future Client Meeting

By the third client meeting, we want to present the revised design and finished physical prototype. The client's feedback regarding the need for a platform will be incorporated into this updated design. At our next customer meeting, we hope to get more feedback, which we will use to refine our design further.

Bill of Materials

Table 1: Bill of materials and parts for final prototype:

Highlight means needs to have

Item	Quantity	Need	Cost \$	Link
Fork attachment	1	To attach the bottom of the fork to platform	\$40	Swagman "The Claw" Fork Mount : Amazon.ca: Sports & Outdoors
Frame structure	Approx 25 feet	Steel tubing, to build the frame of the carriage	~\$50 Using scraps So free	https://makerstore.ca/shop/ols/products/round-tube-steel-per-inch/v/BF008-D3-4

Frame structure		Steel square tubing (or angle iron) to build the frame of the carriage	\$0.32 x 1 inchx48 =\$15.36	https://makerstore.ca/shop/ols/products/square-tube-steel-per-inch
Platform bottom sheet and ramp	1	For the bottom of the carriage 76x1080cm Ramp for the wheelchair to get on platform 61cmx77	\$60 Maybe find scraps	HDPE Plastic Sheet (5 Sheets) 12" x 24" x 1/4" - Black Marine Board - ProTech Plastic : Amazon.ca
Wheels	2	To support platform and allow it to role with the bike	\$64.99 x2 = \$129.98 have	Wheel Shop Alex Ace17/Formula FM-31 26-inch Rear - Bike Depot
26" tire	2	Tires for the wheels	\$26.99 x 2 = \$53.98 have	Vee Tire Co. Street - The Bike Shop
Wheel axles	1	Axles for the wheels	\$12.99 have	https://www.amazon.ca/Rowiz-Release-Bicycle-Hollow-Mountain/dp/B07KMTX4BP/ref=sr_1_7?crid=2WEUXA6GS0XT9&keywords=quick+release+axle&qid=1665365739&qu=eyJxc2MiOi0LjQwliwiXNhjoiMy41NSIsInFzcCI6IjluNzUifQ%3D%3D&sprefix=quick+release+axle%2Caps%2C144&sr=8-7

Bolts	25	For holding materials together	\$6.24	Everbilt 3/8 in.-16 x 1 in. Zinc Plated Hex Bolt (25-Pack) 800820 - The Home Depot !
Hinge	2	To attach the ramp to carriage	\$5.49 x 3 = \$16.47	https://www.lowes.ca/product/door-hinges/onward-full-mortise-butt-hinge-4-in-102-mm-brushed-chrome-1802773
Latches	2	To hold ramp up which riding	\$4.55 x 2 = \$9.10	Everbilt 3-1/2 in. Zinc-Plated Adjustable Staple Safety Hasp 15122 - The Home Depot
Straps	4	To hold down wheelchair to carriage	\$19.98	https://www.homedepot.ca/product/husky-1-inch-x-12-ft-ratchet-tie-down-4-pack/1001031415?eid=PS_GO_140203_ALL_PLA-526641&pid=1001031415
Bike Disc Brake Kit	1	For the carriage to be able to slowdown this the bike	\$46.99 have	RUJOI Bike Disc Brake Kit, Aluminum Front and Rear Caliper, Full Aluminum Alloy Bicycle Brake Lever, 160mm Rotor, Mechanic Tool-Free Pad Adjuster for Road Bike, Mountain Bike : Amazon.ca
Total Cost (including everything at full cost)			\$513.61	
New total cost			\$157.15	

Old price \$207.15

Updated price \$157.15

Getting free bikes from the profesor and hoping to find and use free/ cheap scrap materials, to save money.

We intend to purchase a cheap used bike to use its two wheels, two axles, and breaks because the materials we need to complete this project will cost much more than our modest \$100 budget allows. Buying a secondhand bike saves us a lot of money using used products instead of brand-new components. We will still need to purchase many items to make this product.

Conclusion

Our second client meeting, when we presented them with our initial design proposal, provided us with a wealth of knowledge. The client's desire for a platform for their wheelchair was the key takeaway from this meeting, forcing us to start over and rethink the project to match the client's requirements. As part of this deliverable for the third client meeting, we used Solidworks to produce a prototype. We organized our plans for the third client meeting to focus on what we would present to them and any additional questions we might have. As a rough estimate of the cost of our project, we generated a bill of materials. After the second client meeting, we received new information that required us to rework our concepts. To prepare for the third client meeting, we made a Solidworks prototype and a bill of materials.

Wrike Snapshot

<https://www.wrike.com/frontend/ganttchart/index.html?snapshotId=ErFdYlofXS1ouWmHZv3Sp7Ht0IIODpeM%7CIE2DSNZVHA2DELSTGIYA>