

# **Team Deliverable C**

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## Introduction

People all around the world face different types of disabilities which affect their day-to-day tasks. Currently there are existing and developing devices to help people with disabilities to not worry about their limitations and live a 'regular' life. However, there is always room for more improvements and innovations to ease daily tasks. The client is a company of occupational therapist that are looking to facilitate the lives of their clients. Currently, they are looking for an adaptive care tool to mitigate the difficulties of people with mobility limitations. This project will aim to aid people with mobility disabilities, specifically to allow them to take care of toddlers and children. Ideally, the stroller and walker combo will ease the user's life while being as discreet and efficient as possible. The tool will allow the user to navigate and complete their childcare tasks despite their limitations.

This report consists of 6 sections: client feedback, detailed design, skills and resources, project timeline, critical product assumptions and bill of materials. The client feedback section will provide a reflection on our most recent client meeting and highlight some of the main takeaways to be considered moving forward. Next, the detailed design section will present an updated detailed design of our concept in response to the feedback received in client meeting 2. This section will focus on highlighting the current features of our design, and any adaptations made in response to the client meeting. Afterwards, the skills and resources section will highlight some of the skills and resources we currently have at our disposal and mention any skills and resources we might need to obtain. Then, we will consider any critical product assumptions that may affect our ability to implement the design (eg. Acceptable values for a specification, availability of a material/component, critical functionality...). Finally, a preliminary bill of materials required for our final prototype will be provided.

## Client Feedback

During our most recent client meeting, we presented our detailed design to the client and highlighted some of the important aspects of our design. Feedback from the client was positive and will help guide us in the development of our prototypes moving forward.

During our client meeting, we presented our sliding chair design where the seated part of the walker can slide out of the way when not in use, as highlighted in Figure 1. The client praised the idea of seating beside the stroller, rather than behind the child and mentioned that this concept hadn't been brought up yet. In our meeting we were also able to highlight our 2-stage braking system, allowing the user to slow the system, or come to a complete stop based on the circumstance. Additionally, we pointed out the locations of storage (under the stroller and between the stroller and walker), and our added curb-lever... a step to help boost the system over curbs when necessary.

After discussing our design process thus far and presenting our detailed design to the client, we were able to ask some questions to ensure we proceed on the right track moving forward. When asked "How much of a priority storage was compared to the functionality of the

system” the client made it clear that storage was a necessity as parents need a place to store diapers, snacks, water, etc. when on the go. Further, we clarified with the client that a “multi-component” system would be ok (ie. Walker and stroller separate with a method of attachment), to which the client praised the idea of having a system that could be implemented on existing walkers or strollers that the user may already have. Additionally, we discussed the importance of discreetness with the client, to which they expressed that “a big concern parents have is being visibly identified as disabled” and that we should strive for a design that meets the functional needs, but also this implicit need to help promote confidence in the users.

Overall, the response from the client during our most recent client meeting was positive, assuring us that our design meets the project needs as we move forth in the design process. One main advice given from the client was to keep in mind mobility of the system (eg. Smooth turning, navigation of curves, uneven terrain) as we move forth in our concept development.

## Detailed Design





## Skills and Resources

When it comes to skill and resources are team have a good plain field of different engineers. Mechanical, Civil, Software and Computer, and Electrical engineering. This means that there is a lot of skill set in different fields but just because there is different expertise doesn't mean that we are inadequate in certain areas. This is a list of tables of resources we have at our disposal and assets we don't for the accessible stroller.

<b>Skills</b>	<b>Inability</b>
Structural design	Breaks
Walker	Adjustable Seats
Stroller	Foot lever
Suspension	
Safety	
Simplistic	

Comfortability	
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Table 1. Skills and Resources

There are 3 inability that must be researched. The first one is the break component. There are 2 different parts for the breaks. One where the breaks slow down the stroller and the other where the wheels are at a full stop. To do the first part we must research on breaks that slow down with time. For example, bikes, cars, etc. The second part of the break component would be like a parking brake and a lot of strollers have this designed already featured. This part of the brake creates a parking mechanism meaning looking at different parking mechanism would be ideal for the product.

The next step is adjustable seating. This step is important cause of the factor that when the stroller is parked the parent would want to sit beside their child. There are two different ways this can be approached. One with a sliding seat and two a foldable lawn chair attachment. The sliding door will need a lot of testing meaning there is not much information online and research that could help us out but theories, knowledge that we learned will help us out a lot. If the sliding seat component seems to be complicated, difficult or out of budget we will have to go with the attachment of the foldable lawn chair where this will be more simplistic to solve.

The last step would have to be foot lever this process would have to be to lift the front wheels for the curb. This feature is involved in walkers for the elderly. So, researching walker and how they lift will help bring the prototyping to life.

### Project Timeline

Each task is assigned the estimated required amount of time to complete it to a quality we are satisfied with. Dependencies are based on any previous tasks that affect the starting time of another task and are accounted for in our project plan. The owner of each task is responsible for most of the contributions to the project development.

Number	Task	Dependencies	Owner	Duration	Due Date
1	Detailed design (with detailed descriptions of materials required for each part)	Final Concept Evaluation	Natalia	7 days	Feb 10 <sup>th</sup> 2023
2	Walker stroller with lever low-fidelity Prototype	1	Deborah	4 days	Feb 14 <sup>th</sup> 2023
3	Folding/sliding chair low fidelity prototypes	2	Rejgar	4 days	Feb 14 <sup>th</sup> 2023
4	Hand brakes with wheels and foot lever low fidelity prototype	1	Natalia	4 days	Feb 14 <sup>th</sup> 2023
5	Walker and stroller attachment medium fidelity prototype (Auto-CAD model)	2	Ginger	14 days	Feb 17 <sup>th</sup> 2023
6	Hand brakes with wheels and foot lever medium fidelity prototype	5	Deborah	14 days	Feb 20 <sup>th</sup> 2023
7	Hand brakes/walker/stroller/lever integration prototype	6	Rejgar	20 days	Feb 27 <sup>th</sup> 2023
8	Hand brakes testing	7	All	5 days	March 5 <sup>th</sup> 2023
9	Full system medium fidelity prototype	7	Ginger	7 days	March 12 <sup>th</sup> 2023
10	Full system High fidelity prototype	9, 8	Natalia Rejgar	14 days	March 25 <sup>th</sup> 2023

11	Add storage basket to full system	10	Deborah	1 day	March 26 <sup>th</sup> 2023
12	Full system testing	11	Ginger	2 days	March 28 <sup>th</sup> 2023
13	Final System Presentation	12	All	2 days	March 30 <sup>th</sup> 2023

Table 2. Project Plan and Schedule

### Critical Product Assumptions

Critical Product Assumption	Effect on Design
Sliding Seat	Lots of testing
Handles	Material expense
Suspension	Material Expense
Steel	Material Expense
Breaks	Lots of testing
Storage	Weight capacity
Bassinette	Attachment issues
Shade Cover	Polarization material
Foot Lever	Lots of testing

Table 3. Critical Product Assumptions

### Bill of Materials

Walker:

Part #	Part Name	Description	Quantity	Unit Cost	Total Cost	Source
1	Aluminum piping for	OD16mm x ID14mm	5	8.98	44.9	AliExpress

	walker framework	Aluminum tube piping (16mm wall thickness)				
2	Silver welding Rod to connect framework	1.4mm x 500mm low temperature silver welding rod	1	N/A	N/A	Makerspace
3	Rubber feet for walker legs	Homend 10pc round rubber feet	1	9.79	9.79	Amazon
4	Bike handlebar grips for handles of walker	Bike Handlebar Grips (1 pair)	1	8.01	8.01	Amazon
5	waterproof round chair cushion (for seat)	45cm outdoor waterproof round chair cushion	1	10.28	10.28	AliExpress
6	Basket for storage	Folding rear bike basket	1	19.55	19.55	Amazon
7	UHMW plastic sheet to make seat	UHMW polyethylene plastic sheet ¼" x 12" x 12"	1	34.95	34.95	Global Industrial
8	Rugged Plastic Wheels	MroMax Stroller wheel 33mm x 130mm	2	23.50	47.0	Amazon
9	Bike brake	Hmseng V-brake bike brake set	1	25.99	25.99	Amazon
10	Foot lever to assist with curbs	Aluminum slab.. doorstop (short part connected to stroller)				

Total Cost	\$ 200.47
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Table 4. Bill of Materials for Walker

### Stroller attachments:

Part #	Part Name	Description	Quantity	Unit Cost	Total Cost	Source
1	Aluminum piping for Stroller framework	OD16mm x ID14mm Aluminum tube piping (16mm wall thickness)	6	8.98	54.0	AliExpress
2	Silver welding Rod to connect framework	1.4mm x 500mm low temperature silver welding rod	1	N/A	N/A	Makerspace
3	Rugged Plastic Wheels	MroMax Stroller wheel 33mm x 130mm	2	23.5	47.0	Amazon
Total Cost	\$101					

Table 5. Bill of Materials Stroller Attachment

### Conclusion

In conclusion, this deliverable highlights the various steps we took as a team to develop a bill of materials and details the skills and resources we require to construct our final concept. We also enumerated our projected tasks which considers dependencies and each team member's strengths. Furthermore, after discussion with our clients, we are confident that our final concept both meets the client's needs and adds design elements that will make our concept stand apart from other designs.