GNG 2101 Deliverable C

Deliverable C: Conceptual Design and Project Plan

Submitted by

GNG 2101 Lab Section Z2, Team Z7

Mohammad Ahsan Akhlaque, 8683392

Meghan Brown, 300039235

Wyse Ebbah, 300141935

Christopher Godwin, 8951529

Sandeep Sinha, 300166121

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1 Introduction

The project goal that was synthesized is to create a safe, universal braking system to stop the motion of a walker gradually while using minimal grip strength and a single user interface. In this report, a breakdown of the different functions and subfunctions of the proposed system is performed. Furthermore, this report explores different brake system concepts to achieve the targeted goal set in Deliverable B. By comparing the specifications of the different conceptual designs, a final conceptual design was chosen and compared to the original proposed target specifications. A project plan to implement this design concept is then presented in this report, along with its visual representation in the form of a Gantt chart.

2 Conceptual Design

This part of the deliverable will help the reader understand the design process of a walker braking system. First discussed is the functional decomposition of the walker braking system which broke the system down into different sections. The functional decomposition helped to guide the team's brainstorming session. After the functional decomposition was determined, each member of the team was challenged to come up with three concepts to satisfy the clients needs developed from the first Client meeting. Finally, an evaluation of each concept was performed, based on the clients needs, to help determine the final conceptual design.

2.1 Functional Decomposition

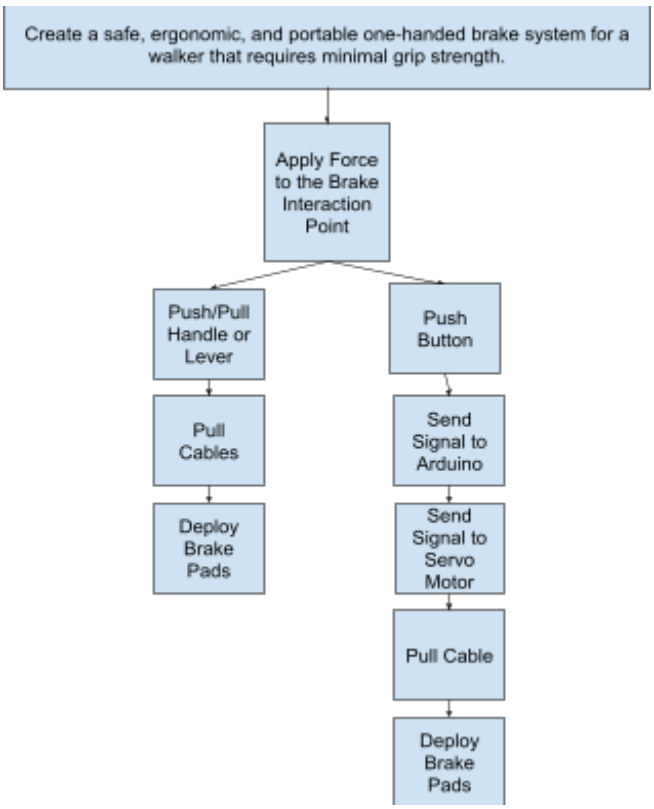


Figure 1: Functional decomposition of walker braking system design.

From the chart above, the walker's braking system was divided into subtasks based on how the braking system would perform.

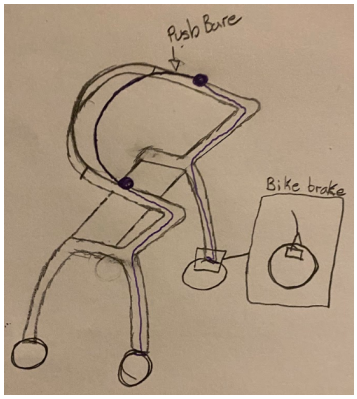
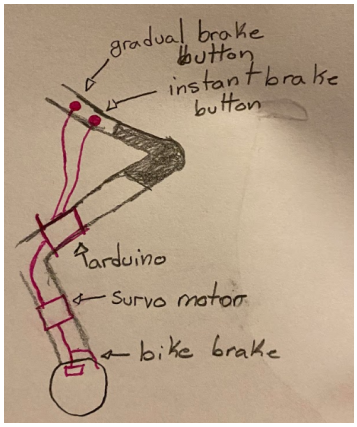
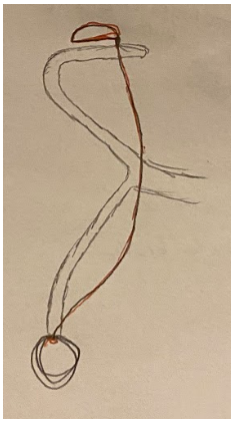
1. **The brake activation :** The brake activation must require low to no grip strength and must be located on one side of the walker. The user must be able to activate the walker using one hand.
2. **The brakes :** The brakes must allow the user to slow down and stop the walker gradually. Also, the brakes of the walker must be lockable or with a failsafe mechanism to guarantee the client's safety.

2.2 Product Concept

Each member of the team came up with three concepts for the walker braking system. These concepts will be used to create our final design for the walker braking system.

Meghan's Concepts

Table 1 : Concepts for braking system by Meghan

Image			
Brief Description	The brakes are activated by a push down bar. The brakes on the rear wheels are similar to a bike handbrake. They will apply pressure to the wheels. Can be a gradual or instant stop depending on how fast you press down on the bar.	The brakes are activated by the push of one of two buttons. The first button will bring the walker to a gradual stop and the second will bring it to an instant stop. When the button is pressed it will activate a motor which will activate the brake. The motor and the buttons will be controlled by an arduino.	Modifying the original walker brake system. Flip the handle, so the user could just push down on the brake.
Pros	- Requires no grip strength - Can be activated with one hand - Gradual and instant stop	- Requires no grip strength - Can be activated with one hand - Gradual and instant stop	- Would respect the walkers warranty - Gradual and instant stop
Cons	- Could require a decent amount of pressure - Requires regular maintenance	- Requires regular maintenance - It will need a failsafe, since it is electric	- Needs two hand to stop the walker

Ahsan's Concepts

Table 2 : Concepts for braking system by Ahsan

Description	➢ A joystick will be placed either on the left or right side, depending on the client's dominant hand. ➢ Joystick can be moved in any direction to set up the brakes gradually. ➢ Joystick will have a red button for locking both of the walker's brakes. ➢ Joystick will have a green button for releasing both or the walker's brakes. ➢ All 3 connections will be electrical for the activation and release of brake pads.	➢ 2 wires will be linked to either handle. ➢ Left wire will be pulled by the user to set up both of the rear brakes. ➢ Pulling of left wire activates a sensor which releases the brake pads. ➢ If the sensor malfunctions, then the right wire can be pulled by the user as an emergency backup. ➢ Right wire connected directly to brake pads. ➢ Requires 1 electrical and 1 mechanical connection.	➢ Brakes set up by 1 rotatable handle. ➢ Handle linked to a spring through cables. ➢ Pushed down a spring linked to brake pads. ➢ Brakes fully locked once the handle gets rotated to 360° angle. ➢ User cannot let go of the handle once he/she rotates. Otherwise the handle reverts back to its original position. ➢ Requires only 1 mechanical connection.
Pros	➢ Gradual brakes ➢ One-hand operation ➢ Safe and ergonomic ➢ No grip strength.	➢ One-hand operation ➢ Fail safe mechanism. ➢ Minimal grip strength. ➢ Safety guaranteed.	➢ Gradual brakes ➢ One-hand operation ➢ Cheap and foldable ➢ Waterproof
Cons	➢ Expensive. ➢ Interactive component may not be waterproof	➢ Possibility of the brakes being instantaneous. ➢ Slightly expensive.	➢ High grip strength for setting/locking brakes. ➢ Possibility of spring jam.

Wyse's Concepts

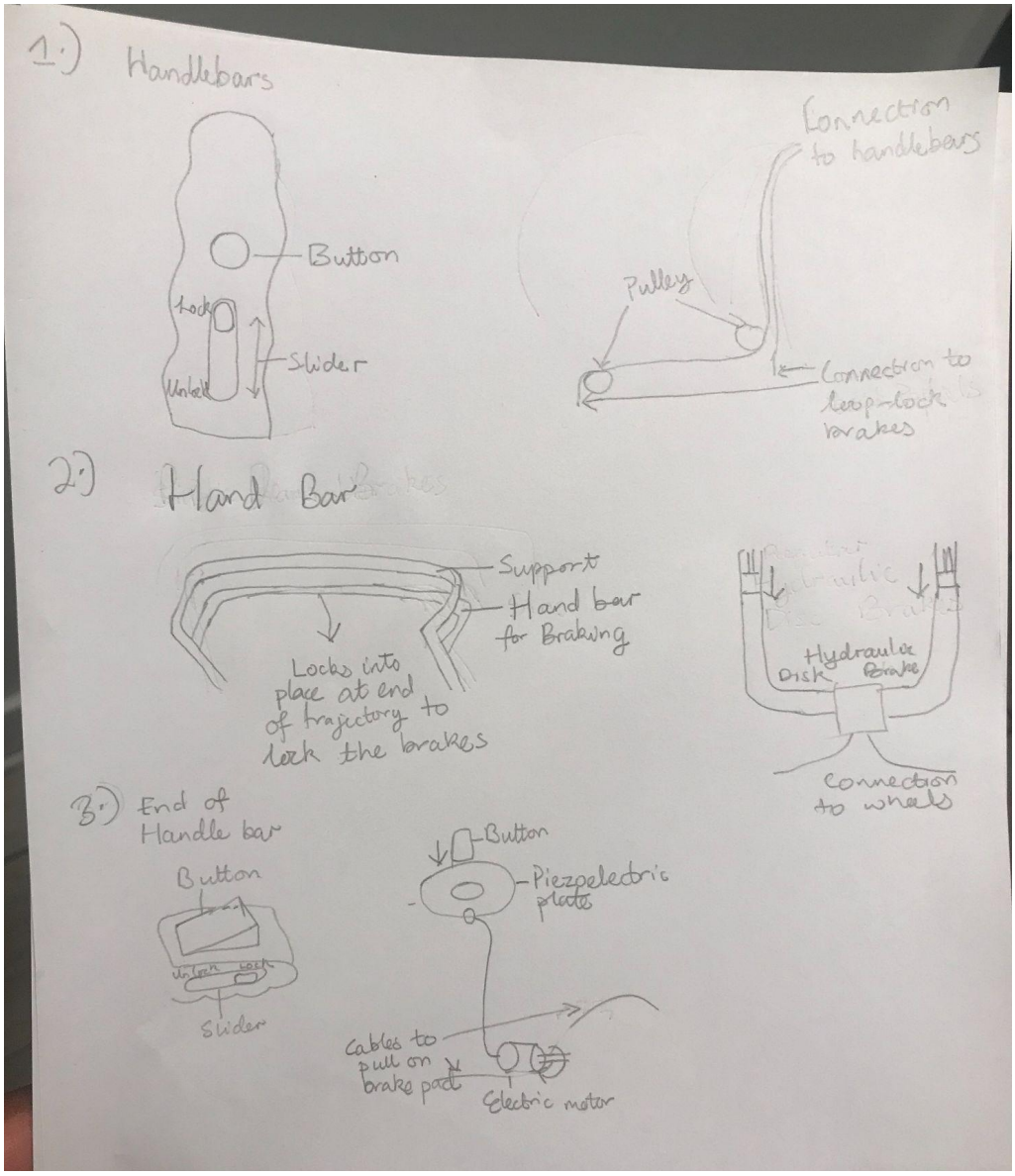


Figure 2 : Concepts for braking system by Wyse

Table 3 : Description, pros and cons for Wyse's concepts

Description	The handlebar is adjusted so that at the top, there is a button for braking and slider to lock the walker into place. There are two cables instead of one connected to the handlebar. One of the cables is then connected to the opposing wheel using a pulley system. Locking the slider on the other hand leaves the cable in a "pulled" position. In this manner, the system is able to imitate the standard loop-lock brake system used in walkers.	This concept makes use of a hand bar that stretches from end to end of the rollator. Leaning on the handlebar activates the brakes and at the end of trajectory, the handlebar snaps into place along with the brakes. The handlebar triggers a plunger that pushes down on hydraulic fluid to activate the hydraulic disk brakes that are then used to stop the walker. When the brakes are locked in place, the hydraulic system maintains pressure and the wheels remain stopped.	This handlebar concept is similar to the first one except the button has a large surface area, so it could be activated by leaning on it. The locking slider is located on the right of the handlebar. The walker works as pushing down on the button activates a piezoelectric plate, which releases a current that triggers an electric motor to pull on the brake pads.
Pros	● Not much change needed from the already available system ● Cheap	● Hydraulic disk brakes are "enclosed" and as such weather-resistant ● Intuitive design where the user interaction system is already available in the market. ● Few cables required	● Very responsive ● Requires the least amount of force to be used
Cons	● Button and slider are easy to mix up ● A lot of cables on the walker.	● Leaning on the handlebar might be awkward at first ● Hydraulics will require more maintenance	● Expensive ● Electric cables are prone to cutting

Christopher's Concepts

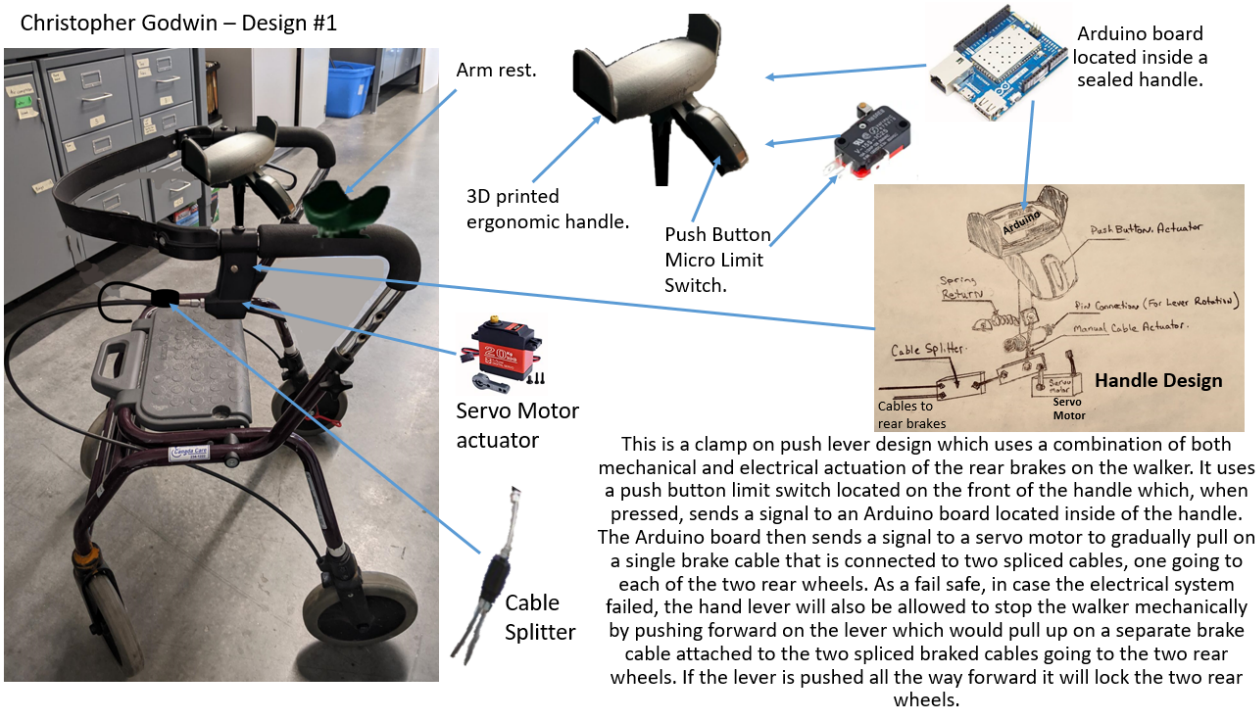


Table 4 : Pros and cons for Christopher's first concept

Pros	➢ Gradual braking ➢ One-hand brake operation (one interactive component) ➢ Ergonomic (joystick style) Handle ➢ No grip strength required ➢ Uses both Mechanical and Electrical brake actuation (Safer) ➢ Electrical brake allows for a quick stop option ➢ Includes a Mechanical fail safe for the Electrical system ➢ One touch button on handle to actuate brake (No force required) ➢ Arm rest added for comfort to support the wrist/arm when moving lever ➢ Can be relocated to either side of walker using a clamp ➢ Consistent braking to ensure safety ➢ Does not void manufacturers warranty as is clamped onto walker ➢ Will fit in a car
Cons	➢ Higher cost ➢ Slightly heavier ➢ May be harder to waterproof but is possible

Christopher Godwin – Design #2

This is a simple manual actuated hand lever that uses limited force and no grip strength. The Handle would be a clamp on design that can be mounted on either side of the walker.
The brakes are actuated by pushing the manual handle forward which pulls on both brake cables equally at the same time to stop both rear wheels. To lock both rear wheels, the handle can be moved all the way forward to engage park brake.

Manual Push Handle Design

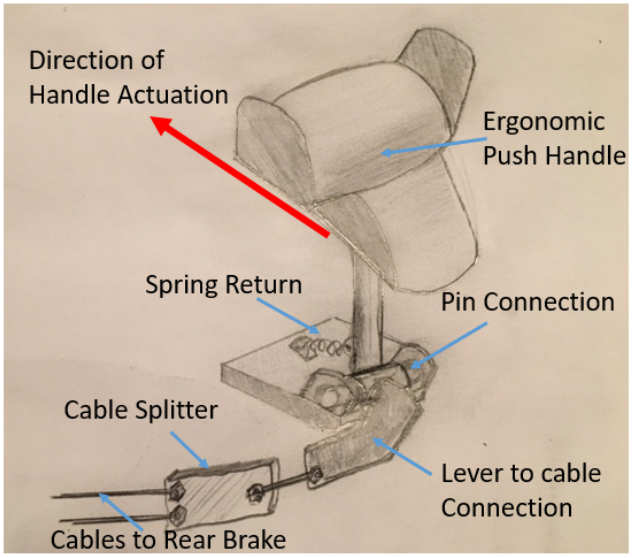


Table 5 : Pros and cons for Christopher's second concept

Pros	➢ Gradual braking ➢ One-hand brake operation (one interactive component) ➢ Stops both brakes with one handle ➢ Ergonomic (joystick style) Handle ➢ No grip strength required ➢ Waterproof design ➢ Arm rest to support arm when moving lever for comfort ➢ Can be relocated to either side of walker using a clamp (interchangeable) ➢ Lower cost ➢ Does not void manufacturers warranty ➢ light weight
Cons	➢ Requires more effort/force than an electrical push button ➢ Mechanical Locking of Brakes may be harder to design

Christopher Godwin – Design #3

This concept uses a manual push handle clamped onto the side of the walker arm. The lever is welded to a steel plate which is clamped to the original brake handle. As the handle is moved forward, the original brake lever moves up gradually activating the brakes. If the lever is pulled back the walker brakes will lock. The two brake cables are spliced so that only one side is needed to brake the walker. The plate that attached to the original brake lever will be hinged so that it can be attached to either side of the walker handle.

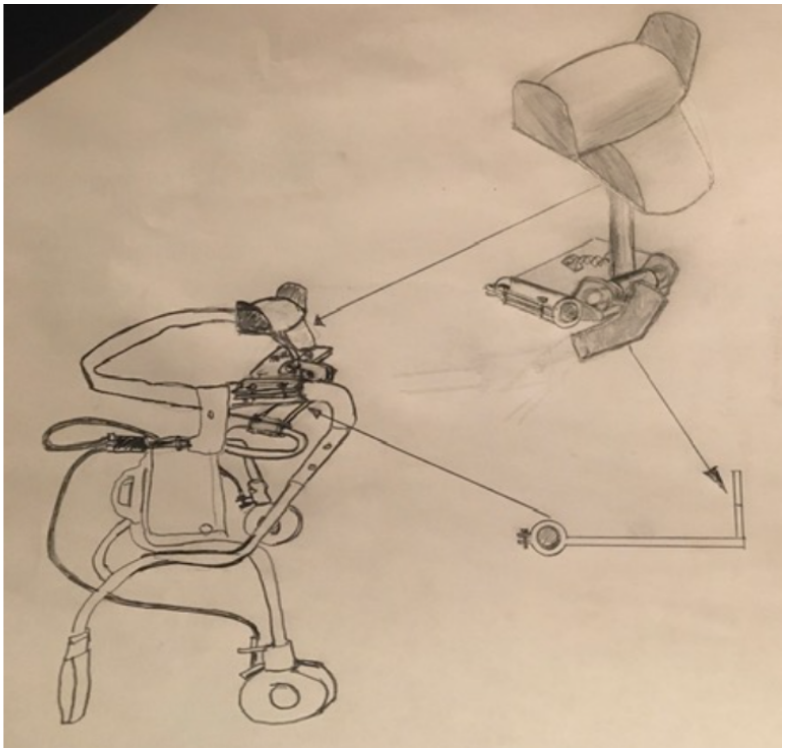


Table 6 : Pros and cons for Christopher's third concept

Pros	➢ Gradual braking ➢ One-hand brake operation (one interactive component) ➢ Ergonomic Handle ➢ No grip strength required ➢ Fits onto original brake handle for easy mounting/dismounting ➢ Uses original manufactures brake locking mechanism (Safety) ➢ Arm rest to support arm when moving lever for comfort ➢ Can be relocated to either side of walker using a clamp ➢ Does not void manufacturers warranty ➢ Walker can still be folded ➢ Waterproof
Cons	➢ If the original hand brake handle is plastic it could break with repeated use.

Sandeep's Concepts

Concept 1

- Walker uses a force based system with the users forearms applying the pressure to interact with the braking system.
- The braking system consists of compressed air(hydraulics) that will apply pressure on the brake pads of the walker.
- The speed of the walker stopping is directly proportional to the amount of force applied to the forearm pads.
- To lock the walker in place, the user needs to keep pressure applied to the forearm braking system.

Table 7 : Pros and cons for Sandeep's first concept

Pros	- Gradual stopping - Locking mechanism - No grip strength needed - Light weight - Safe
Cons	- Cannot change sides to accommodate - No failsafe

Concept 2

- A push button is the interactive component used to engage the brake pads.
- The push button then activated the pulley system inside of the walker legs in order to start the braking process.
- The walker will lock into place automatically if the button is pressed all the way down, and the walker can be released from this state by pushing the button again.

- Speed limit: 5 km/h walker will brake automatically if this speed is exceeded.

Table 8 : Pros and cons for Sandeep's second concept

Pros	- Gradual stopping - Can lock in place - No grip strength needed - Light weight - Safe - Can be placed on either side
Cons	- May not be waterproof, with all the "moving parts"

Concept 3

- A touchscreen is used to engage the walker's braking system.
- The user can set the speed of the braking system in the interface.
- Most of the basic walker functions can be controlled via this touchscreen such as, keeping the walker in place.

Table 9 : Pros and cons for Sandeep's third concept

Pros	- Gradual stopping - Locking mechanism - No grip strength needed - Light weight - Safe - All in one design
Cons	- Heavier due to more waterproofing and the screen component

2.3 Concept Evaluation

To properly evaluate everyone's concepts, we compared our designs to the needs of the client, which were determined in Deliverable B. We rated each concept on a scale of yes (Y) or no (N). Yes meaning the need would be satisfied by the concept and no meaning it wouldn't. If the concept was given a yes, it's points would be equal to the needs rating, if it was given a no, that concept would receive no points for that need. Our final concept will be based on the three concepts with the highest points.

Table 10 : Ahsan's Concepts Evaluation

ID	Need		Rating	Concept 1	Concept 2	Concept 3
1	The walker brake	has an interactive system that requires limited hand gripping strength.	5	Y	Y	N
2	The walker brake	system that has a low force threshold.	5	Y	Y	N
3	The walker brake	only has one interactive component needed to be able to stop both sides of the walker.	5	Y	Y	Y
4	The walker brake	comes to a gradual stop.	5	Y	N	Y
5	The walker brake	is waterproof/weatherproof.	4	N	N	Y
6	The walker brake	is foldable.	3	N	N	Y
7	The walker brake	is safe for client use.	5	Y	Y	N
8	The walker brake	is light and portable as possible.	4	N	N	N
9	The walker brake	has to fit in a car.	3	N	N	N
10	The walker brake	retains the structural integrity of the actual walker.	5	Y	Y	Y
11	The walker brake	has a failsafe mechanism.	5	N	Y	N
12	The walker brake	has ergonomic features (such as having a braking mechanism close to handle).	3	Y	N	Y

Total points with ranking applied:
Concept 1: 33
Concept 2: 30
Concept 3: 25

Evaluation of Ahsan's Concepts: None of the 3 concepts were chosen from this team member. This is because not most of the client needs were met as evident in the total number of points. The first and second concepts failed to meet the need of a waterproof system. Also, they may be heavier and not foldable to fit in a car. The third concept failed to meet the need of client safety and minimal grip strength. Similar to first and second concepts, the third concept wasn't lightweight or foldable, which creates difficulty for the client to transport the walker.

Table 11 : Meghan's Concepts Evaluation

ID	Need		Rating	Concept 1	Concept 2	Concept 3
1	The walker brake	has an interactive system that requires limited hand gripping strength.	5	Y	Y	N
2	The walker brake	system that has a low force threshold.	5	Y	Y	Y
3	The walker brake	only has one interactive component needed to be able to stop both sides of the walker.	5	Y	Y	N
4	The walker brake	comes to a gradual stop.	5	Y	Y	Y
5	The walker brake	is waterproof/weatherproof.	4	Y	Y	Y
6	The walker brake	is foldable.	3	Y	Y	Y
7	The walker brake	is safe for client use.	5	Y	Y	N
8	The walker brake	is light and portable as possible.	4	Y	Y	Y
9	The walker brake	has to fit in a car.	3	Y	Y	Y
10	The walker brake	retains the structural integrity of the actual walker.	5	Y	Y	Y
11	The walker brake	has a failsafe mechanism.	5	N	N	N
12	The walker brake	has ergonomic features such as having a braking mechanism close to handle.	3	N	Y	N

Total points with ranking applied:
Concept 1: 44
Concept 2: 47
Concept 3: 29

Evaluation of Meghan's Concepts: Only the second concept was chosen from team member Meghan. This is because the ranking of the second concept was in the top three. The second concept only didn't meet the requirement of a fail safe mechanism, hence why it was considered as a potential solution. The first concept didn't have a fail safe mechanism and ergonomic features that would maximize client's comfort. The third concept was discarded as it didn't meet the need of client safety at all and required a high grip strength.

Table 11 : Wyse's Concepts Evaluation

ID	Need		Rating	Concept 1	Concept 2	Concept 3
1	The walker brake	has an interactive system that requires limited hand gripping strength.	5	Y	Y	Y
2	The walker brake	system that has a low force threshold.	5	Y	N	Y
3	The walker brake	only has one interactive component needed to be able to stop both sides of the walker.	5	Y	Y	Y
4	The walker brake	comes to a gradual stop.	5	Y	Y	Y
5	The walker brake	is waterproof/weatherproof.	4	N	Y	N
6	The walker brake	is foldable.	3	Y	Y	Y
7	The walker brake	is safe for client use.	5	Y	Y	Y
8	The walker brake	is light and portable as possible.	4	Y	Y	N
9	The walker brake	has to fit in a car.	3	Y	Y	Y
10	The walker brake	retains the structural integrity of the actual walker.	5	Y	N	Y
11	The walker brake	has a failsafe mechanism.	5	Y	Y	Y
12	The walker brake	has ergonomic features such as having a braking mechanism close to handle.	3	N	Y	Y

Total points with ranking applied:

Concept 1: 45

Concept 2: 42

Concept 3: 44

Evaluation of Wyse's Concepts: None of the 3 concepts were chosen from team member Wyse. This is because the ranking wasn't in the top three as a few important needs were not met. The first and third concept failed to meet the need for a waterproof system. Also, the third concept wasn't lightweight or portable for the client. The second concept failed to retain the structural integrity of the walker. Also, the second concept required high applied force of the client.

Table 12 : Christopher's Concepts Evaluation

ID	Need		Rating	Concept 1	Concept 2	Concept 3
1	The walker brake	has an interactive system that requires limited hand gripping strength.	5	Y	Y	Y
2	The walker brake	system that has a low force threshold.	5	Y	Y	Y
3	The walker brake	only has one interactive component needed to be able to stop both sides of the walker.	5	Y	Y	Y
4	The walker brake	comes to a gradual stop.	5	Y	Y	Y
5	The walker brake	is waterproof/weatherproof.	4	Y	Y	Y
6	The walker brake	is foldable.	3	Y	Y	Y
7	The walker brake	is safe for client use.	5	Y	N	Y
8	The walker brake	is light and portable as possible.	4	N	Y	Y
9	The walker brake	has to fit in a car.	3	Y	Y	Y
10	The walker brake	retains the structural integrity of the actual walker.	5	Y	Y	Y
11	The walker brake	has a failsafe mechanism.	5	Y	N	Y
12	The walker brake	has ergonomic features such as having a braking mechanism close to handle.	3	Y	Y	Y

Total points with ranking applied:

Concept 1: 48

Concept 2: 42

Concept 3: 52

Evaluation of Christopher's Concepts: The first and third concepts were chosen from team member, Chris. The first concept met all of the needs with the exception of lightweight and portability. Hence, it was chosen as a potential solution. The third concept met all of the client's needs and was thus chosen as a potential solution. The second concept failed to meet the critical need for client safety, hence it was discarded.

Table 13 : Sandeep's Concepts Evaluation

ID	Need		Rating	Concept 1	Concept 2	Concept 3
1	The walker brake	has an interactive system that requires limited hand gripping strength.	5	Y	Y	Y
2	The walker brake	system that has a low force threshold.	5	Y	Y	Y
3	The walker brake	only has one interactive component needed to be able to stop both sides of the walker.	5	N	Y	Y
4	The walker brake	comes to a gradual stop.	5	Y	N	Y
5	The walker brake	is waterproof/weatherproof.	4	Y	N	N
6	The walker brake	is foldable.	3	Y	Y	Y
7	The walker brake	is safe for client use.	5	N	Y	Y
8	The walker brake	is light and portable as possible.	4	Y	Y	N
9	The walker brake	has to fit in a car.	3	Y	Y	Y
10	The walker brake	retains the structural integrity of the actual walker.	5	Y	Y	Y
11	The walker brake	has a failsafe mechanism.	5	N	Y	Y
12	The walker brake	has ergonomic features such as having a braking mechanism close to handle.	3	N	N	Y

Total points with ranking applied:
Concept 1: 34
Concept 2: 40
Concept 3: 44

Evaluation of Sandeep's Concepts: None of the 3 concepts were chosen from team member, Sandeep. This is because the first concept failed to meet the critical needs of safety and one-hand operation. The second concept failed to meet the need of a waterproof system and the crucial need of making the walker come to a gradual stop. The third concept failed to meet the needs of a waterproof system and portability. The third concept was also very expensive and thus not fit within our budget.

2.4 Final Concept Design

The final concept was chosen after evaluating the best 3 individual concepts. The first concept from a team member, Chris, was put aside. This is because it was thought among group members that even though the first concept met the need for a waterproof system, it would be difficult to implement such a system practically and realistically. In other words, the presence of electrical components would make it harder for the system to be waterproof and may be too expensive to implement. The second concept from Meghan was also later dropped for the same reason as the presence of too many electrical devices would not make the system perfectly waterproof . The third concept from Christopher was selected because it satisfied all needs of the client. It covers the most important needs. These include client safety, gradual stop, minimal grip strength, one-hand operation, portability, and waterproof.

Final Concept

This concept uses a manual push handle clamped onto the side of the walker arm. The lever is welded to a steel plate which is clamped to the original brake handle. As the handle is moved forward, the original brake lever moves up gradually activating the brakes. If the lever is pulled back the walker brakes will lock. The two brake cables are spliced so that only one side is needed to brake the walker. The plate that attached to the original brake lever will be hinged so that it can be attached to either side of the walker handle.

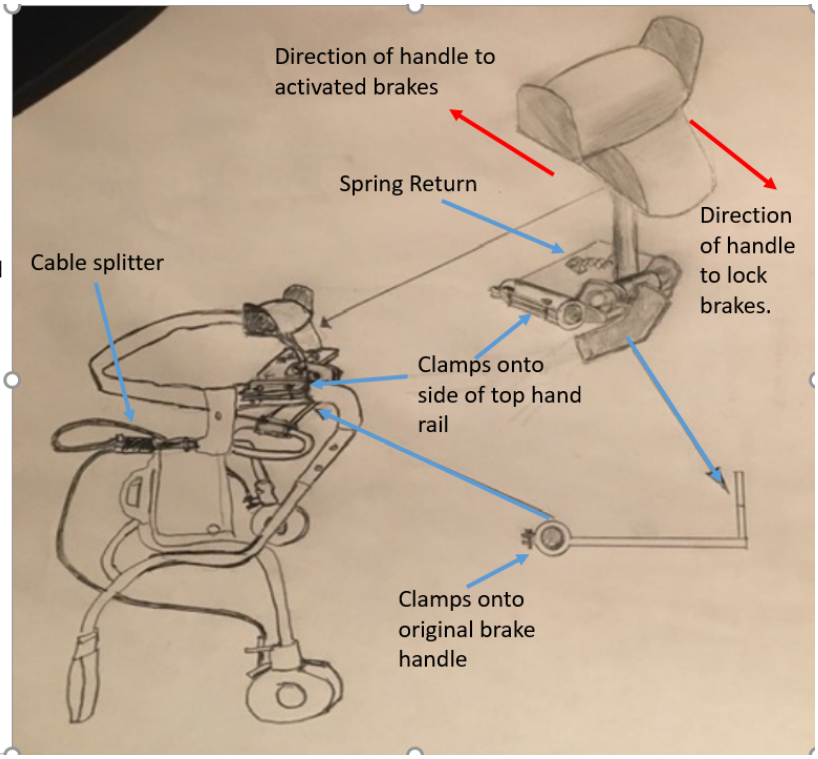


Table 14 : Pros and cons of the final concept

Pros	➢ Gradual braking ➢ One-hand brake operation (one interactive component) ➢ Ergonomic Handle ➢ No grip strength required ➢ Fits onto original brake handle for easy mounting/dismounting ➢ Uses original manufactures brake locking mechanism (Safety) ➢ Arm rest to support arm when moving lever for comfort ➢ Can be relocated to either side of walker using a clamp ➢ Does not void manufacturers warranty ➢ Walker can still be folded ➢ Waterproof
Cons	➢ If the original hand brake handle may possibly be plastic and it could break with repeated use. An evaluation of the walker brake handle would be needed. ➢ Mechanical cables are prone to cutting if they are not within a safety cylindrical rod.

After evaluating the chosen design, one potential concern that could arise when braking the walker is since the lever was originally designed to gradually stop the walker brakes by pushing forward on the lever, and is in the same direction of travel, this could cause an issue for the user to brake when going down a hill for instance. Since this could present a potential concern, other options that would be considered to counteract this is to have the user pull back on the lever instead of pushing forward or angle the lever to push in a downward direction.

2.5 Comparing Concept to Target Specifications

Our final concept scored 52/52 (100%) when evaluating it against the clients needs and then compared this concept to our target specification. After Deliverable B, the team received some information about the walker we would be modifying, therefore some of our target specifications were subject to change.

Table 15 : Comparison of Final Concept to Target Specifications

Metric ID	Need ID	Metric	Units	Marginal Value	Ideal Value	Final concept
1	8	Total weight of the walker	lbs	15	<17	Yes
2	6, 9	Dimensions of walker (l x w)	in	33 x 23	=	=
3	4	Stopping distance	in	-	12	<12
4	1, 2	Load exerted to brake	Low/High	-	Low	Low
5	11, 12	Size of braking mechanism	in	-	<33 x <23 x <31	=
6	N/A	Cost	$CAD	-	<100	<100
7	3, 12	One-hand interaction with brake	Yes/No	Yes	Yes	Yes
8	5	Weather resistance / Waterproof	Yes/No	Yes	Yes	Yes
9	7, 10	Safe for client use	Yes/No	Yes	Yes	Yes
10	6,9	Height of handles	in	31	31.5	33

Skills Required from Previous Work to Arrive at Final Concept

The table of needs as well as the target specifications from previous Deliverable B were very useful in helping the team select the most feasible and appropriate concept. For example, research was conducted for the size and the weight of the brake mechanism in the final concept of a manual push handle. The ideal value of the weight was to be less than 17 pounds. The ideal value for the braking mechanism was <33 x <23 x <31 inches. This concept of a manual push handle met these target specifications after conducting thorough research. This was mainly done to ensure that the walker with brake attachment is foldable, so that it can fit inside a car. This also helped in determining if the walker will be lightweight and portable for the client. Additionally, careful consideration of the budget and the stopping distance was taken. The total system must not exceed the total cost of $100 and the ideal stopping distance of less than 12 inches. The brake handle must be ergonomic according to the list of needs from Deliverable B. That includes the handle not being out of the client's reaching range. In the target specifications, the marginal and the ideal values of the height handle were chosen to be 31 and 31.5 inches, respectively. After research, the height of the push handle was found to be 33 inches. This helped the team in knowing that the final concept of the manual push handle will give the client a lot of comfort as the handle itself will be close within the client's reach. The table of needs from Deliverable B made it clear that the brake must be one-hand operated, safe, waterproof, and require low force as well as slim to no grip strength. The final concept of manual push handle satisfied all these important client needs, hence why it was selected as the best design idea.

In these ways, referring to Deliverable B was crucial for the team to work its way deeply through concept evaluation and final group concept generation.

3 Project Plan

3.1 Breakdown of Tasks in Project Plan

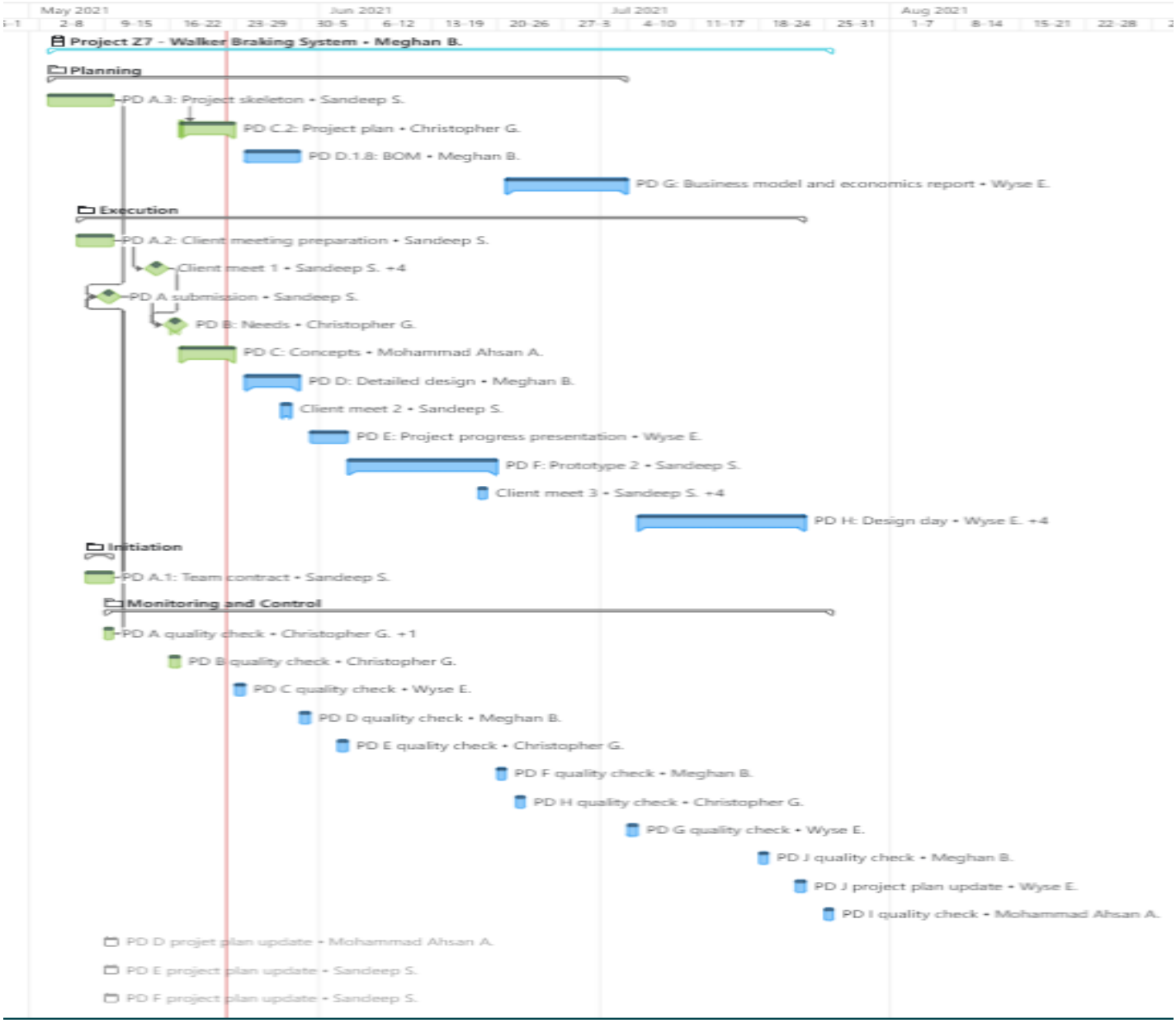
Table 16 : Project Plan Task Breakdown

ID	Task Name	Task Owner	Dependencies	Completion Deadline
1	C.2 Project Plan - Subtask Update Gantt Chart for Deliverable C, D and Client Meeting 2	Christopher	N/A	05/22/2021
2	PD C: Concept / Conceptual Design	Ahsan	Deliverable B	05/21/2021
3	Three individual Design Concepts	Wyse	Funct. Decomp	05/21/2021
4	Three individual Design Concepts	Meghan	Funct. Decomp	05/21/2021
5	Three individual Design Concepts	Christopher	Funct. Decomp	05/21/2021
6	Three individual Design Concepts	Sandeep	Funct. Decomp	05/21/2021
7	Three individual Design Concepts	Ahsan	Funct. Decomp	05/21/2021
8	Functional Decomposition	Christopher	Deliverable B	05/21/2021
9	PD C: Quality Check	Wyse	Deliverable C	05/23/2021
10	PD D: Detailed Design	Meghan	Deliverable C	05/29/2021
11	Client Meeting 2	All	Deliverable C	05/28/2021
12	Prepare Interview Questions for Client Meeting 2	Sandeep	Deliverable C	05/27/2021
13	Prepare PowerPoint Presentation of Conceptual Design	Wyse	Deliverable C	05/27/2021
14	Conduct Interview	Sandeep	Deliverable C	05/28/2021
15	Interview Note Taking/ Listening to Clients Feedback on Conceptual Design	Christopher	N/A	05/28/2021
16	Interview Note Taking/ Listening to Clients Feedback on Conceptual Design	Ahsan	N/A	05/28/2021
17	Interview Note Taking/ Listening to Clients Feedback on Conceptual Design	Wyse	N/A	05/28/2021
18	InterviewNote Taking/ Listening to Clients Feedback on	Meghan	N/A	05/28/2021

	Conceptual Design			
19	Prototype 1	Sandeep	Deliverable C	05/29/2021
20	Subtask 1 related to prototype 1	Ahsan	Deliverable C	05/29/2021
21	Subtask 2 related to prototype 1	Christopher	Deliverable C	05/29/2021
22	Testing	Wyse	Prototype 1	05/29/2021
23	Develop BOM for Design	Christopher	Prototype 1	05/29/2021
24	PD D Quality Check	Meghan	Deliverable D	05/30/2021

3.1 Gantt Chart

The Gantt chart below outlines the tasks, the duration of tasks, deadlines, and the team members responsible for each task. The link to the Gantt chart has also been posted to access the chart directly.



Link to Gantt Chart:

https://www.wrike.com/frontend/ganttchart/index.html?snapshotId=8XIb9T3F9ybVitCMAp3czLgKcjhm9JNH%7CIE2DMMZRHAYTALSTGE3A

4 Conclusions and Next Steps

In conclusion, after coming up with and evaluating fifteen different concepts, a final concept for a one handed walker braking system was chosen. On Friday, May 28th, 2021, the team will meet with the client for the second time. During this client meeting, the team's final concept will be presented to the client for feedback on the design. After gaining feedback on the team's conceptual design, the team will begin work on a detailed design of the final concept and the first prototype.