GNG 2101

Project Deliverable B: Business Model Canvas and DFX

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C.1 Problem Definition

1) Converting Client Statements to Needs

No.	Client Needs Statement	Priority
1	The remote is compatible with Xbox and PC	5
2	The remote is comfortable for floor level play	4
3	The remote is adapted to first person shooters and racing games	5
4	The controller is easy to use	4
5	Buttons are easily accessible	4
6	The controller is simple/doesn’t have lot of buttons	3
7	Controller is comfortable to utilize	5
8	The controller is adapted to the tremors	3
9	The controller is cheap	4
10	The controller is safe to use	5
11	The controller is sturdy and well built	4
12	The controller’s buttons can be remapped	3
13	The controller is ergonomic	4
14	The controller is stationary while being used on the floor	4

Ranking system:
5 - critical
4 - highly desirable
3 - good but not necessary
2 - unimportant
1- undesirable

There are some things that would be clearer if we were able to see the client while gaming. We would be able to clearly understand how he plays right now, what are the difficulties he faces while playing and, see his setup.

2) Problem Statement

The problem is that our client, who has cerebral palsy, faces challenges while playing Xbox games, particularly racing and shooter games like Call of Duty. His condition limits his ability to use a standard Xbox Elite controller effectively, as he cannot hold it due to limited hand dexterity. Additionally, he has

trouble in aiming precisely and executing micro-level actions in the game. To address this problem, we need to design and create an adapted controller that accommodates his physical limitations, enhances his aiming capabilities, and offers an array of input controls for a more inclusive gaming experience.

“Design an accessible controller with adaptive buttons for disabled gamers who have difficulty holding a controller “

3) Establish Metrics and Units, Benchmarking and Target Specifications

Establish metrics and units linked to the client’s needs.

Metric #	Needs #s	Metric	Imp	Unit
1	2, 7,14	Ergonomics	4	N/A
2	2,7,14	Size (Dimensions)	4	mm
3	9	Cost	3	CAD
4	10	Safety	5	N/A
5	2,4,7	Ease of usage	4	N/A
6	2,5,7,13	Accessibility	4	N/A
7	3	Compatibility with games played and gaming platform	5	N/A
8	6,8,12	Modularity and customization of button implementation	5	N/A
9	11,15	Controller weight	4	Kg
10	5,8	Shape and size of buttons	5	mm^2
11	1	Compatibility with gaming platform	5	N/A

Benchmarking of existing products

Metric #	Needs #s	Metric	Unit	Project Leonardo for PS5	Onpoint Precision Joystick
1	2, 7,14	Ergonomics	N/A	-	-
2		Size (Dimensions)	mm	Approx. 141 x 191 x 39	No dimensions mentioned
3	9	Cost	CAD	119.99	795.00

4	10	Safety	N/A	-	-
5	2,4,7	Ease of usage	N/A	-	-
6	2,5,7,13	Accessibility	N/A	-	-
7	1,3	Compatibility with games played	N/A	-	-
8	6,8,12	Modularity and customization of button implementation	N/A	-	-
9	11,15	Controller weight	Kg	0.322	-
10	5,8	Shape and size of buttons	mm^2	-	-

Figure 1: Project Leonardo for PS5

Figure 2: Onpoint Precision Joystick

Assign Marginal and Ideal Target Values for Target Specifications

Metric	**Unit**	**Marginal values**	**Ideal Values**
Ergonomics	N/A	Comfortable to use	Really comfortable to use
Size (Dimensions: L x W x H)	mm	350-500 x 200-300 x 80 – 100	250-350 x 150-200 x 60 – 80
Cost	CAD	100	>100
Safety	N/A	Safe to use	Safe to use and compliance to safety for gaming controllers
Ease of usage	N/A	Fairly easy to use	Extremely user friendly
Accessibility	N/A	Accessible to the user	Really accessible to the user
Compatibility with games played	N/A	Only works well one game	Works well on all games.
Modularity and customization of button implementation	N/A	Able to customize some button layout	Fully customizable button layout
Controller weight	Kg	3-5	<3
Shape and size of buttons	mm^2	1250	3000
Compatibility with gaming platform	N/A	Works on Xbox/PC	Works on any gaming platform

Target Specifications

Metric	Unit	Value
Ergonomics	N/A	Comfortable to use while gaming
Size (Dimensions: L x W x H)	mm	350 x 200 x 75
Cost	CAD	100
Safety	N/A	Safe to use
Ease of usage	N/A	Easy to use
Accessibility	N/A	Fairly Accessible to the user
Compatibility with games played	N/A	Works with both games played
Modularity and customization of button implementation	N/A	Able to customize the actions buttons layout
Controller weight	Kg	4
Shape and size of buttons	mm^2	2000
Compatibility with gaming platform	N/A	Works on Xbox/PC

Ergonomics relates to how comfortably and efficiently the client can use the product. The size is the actual dimensions of the final concept and is based on the previous attempt made by the previous group and on the dimensions of existing products as well. The budget is a maximum of $100 but we will try to be as cost efficient as possible. Product should be safe to use. Easy of usage and accessibility is necessary since the client has limited mobility and will be taken into consideration while making a final solution. Compatibility with games played and gaming platform is important for a smooth gaming experience. Modularity and customization of the action buttons such as combining two controls into one button like aiming and shooting and being able to remap the buttons as well are essential to meet the client's needs.

C.2 Concept Development

In this section each figure represents a sketch of the possible prototype, based on the problem statement, that will be considered for the final prototype, with some adjustments. Some figures might be more detailed than others and some might have labels, since these are only rough ideas it is not critical for each figure to be incredibly specific.

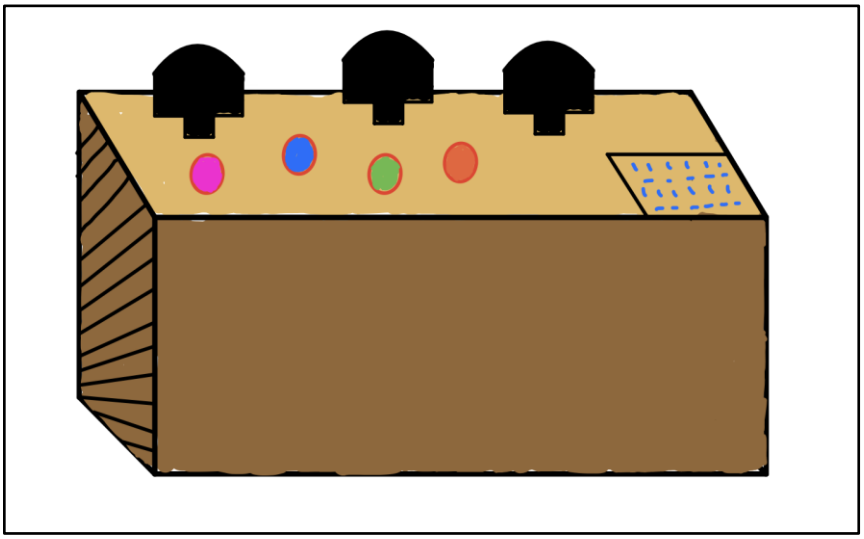


Figure 3: Box Job

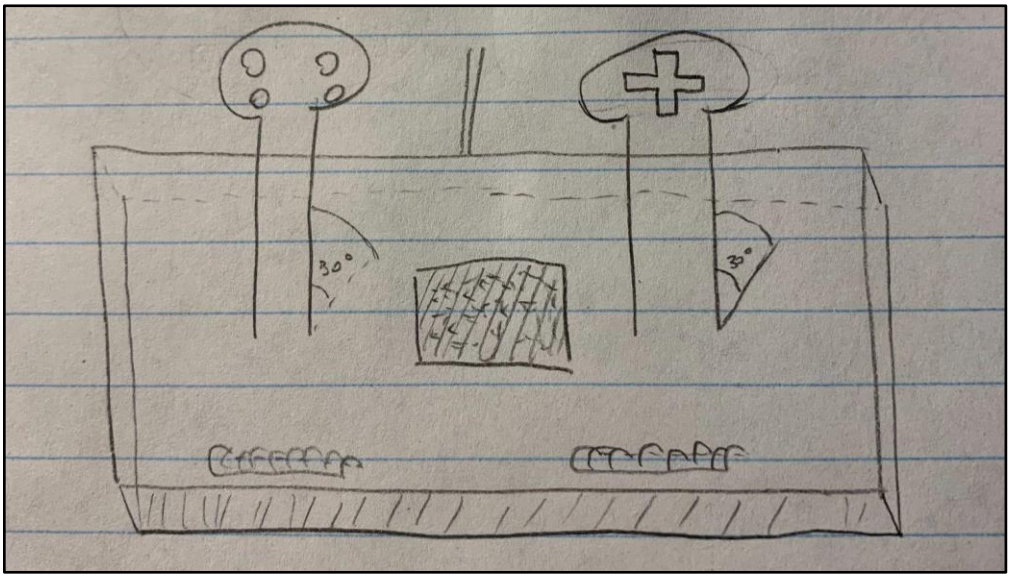


Figure 4: Incline Joystick

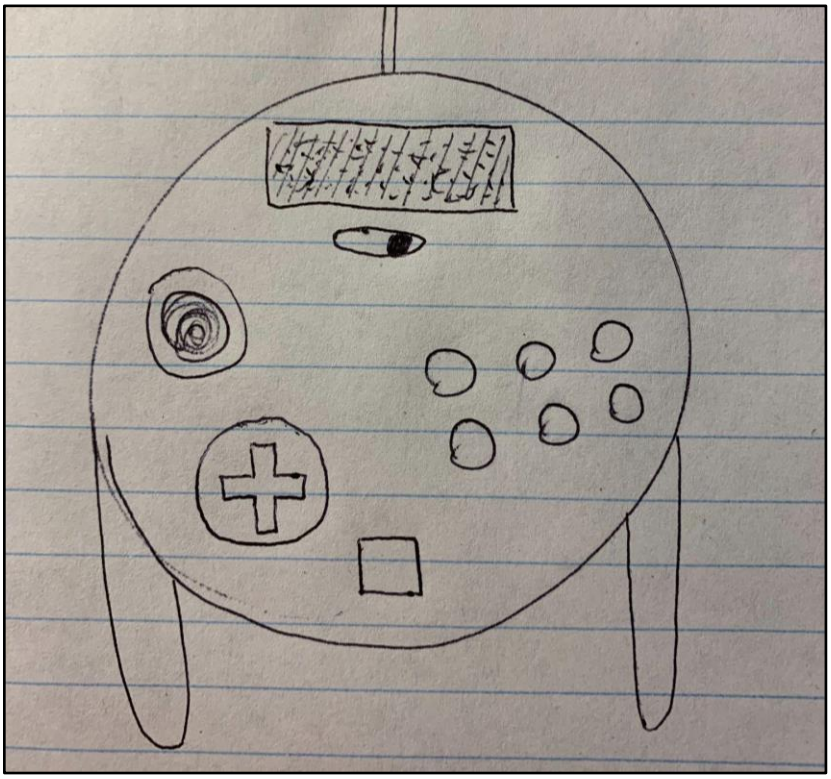


Figure 5: Wheel Model

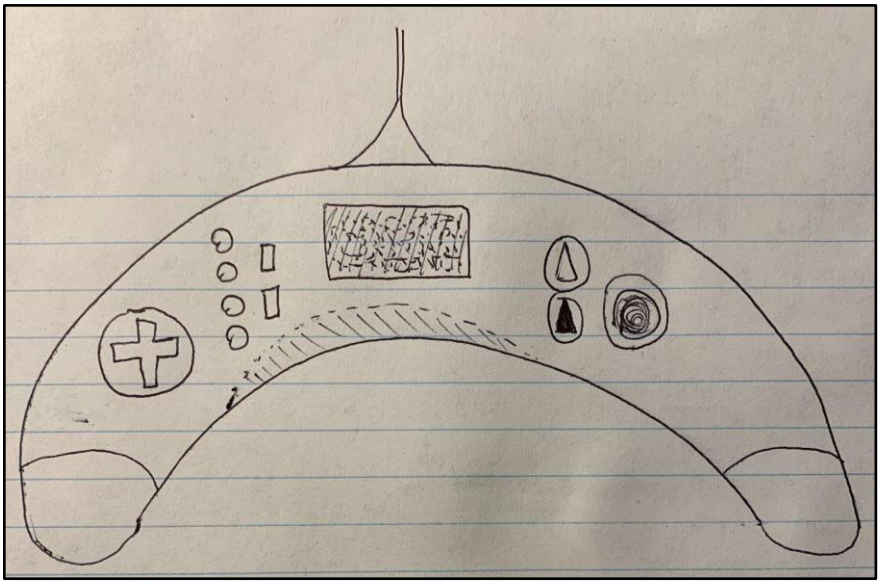


Figure 6: Boomerang

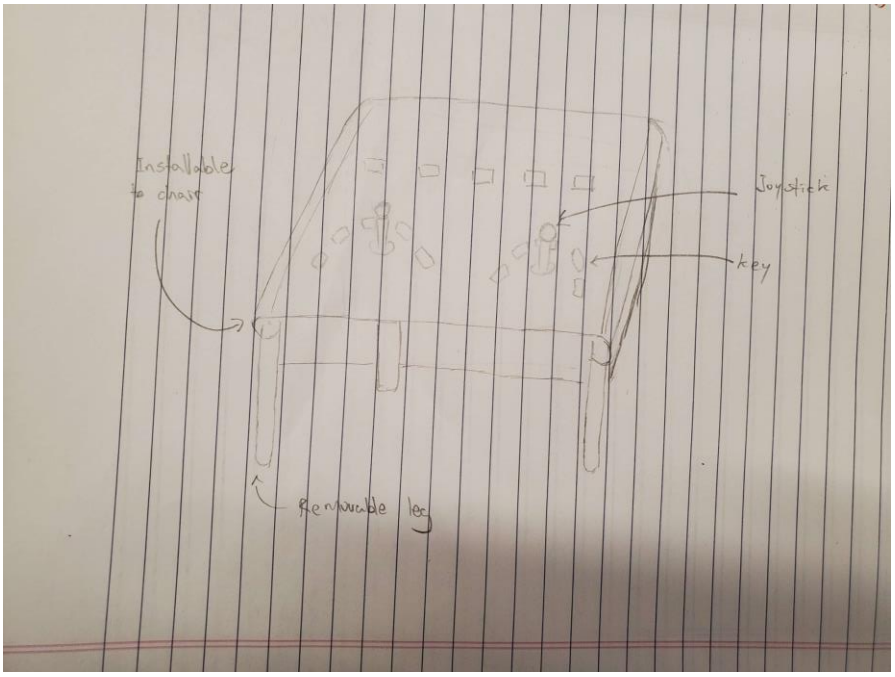


Figure 7: Xtable

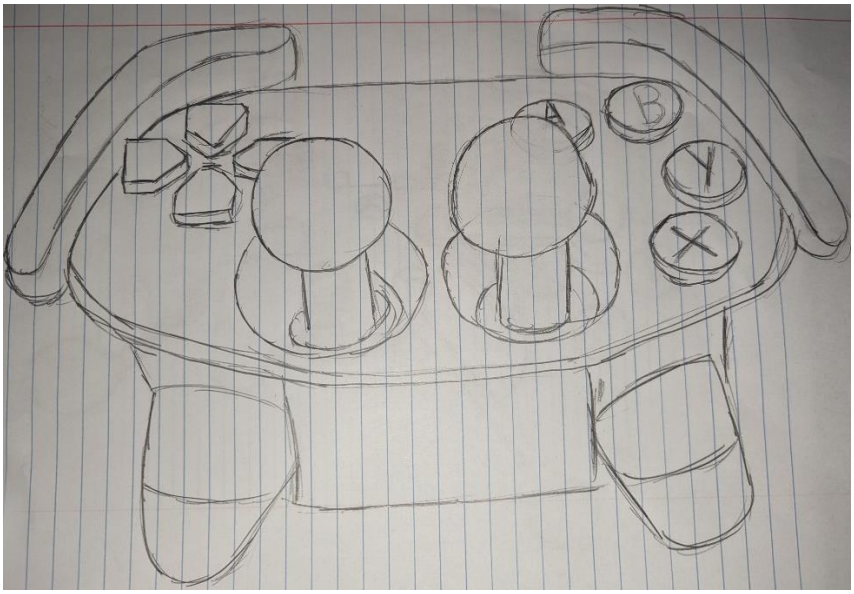


Figure 8: Xbox Adaptable Case

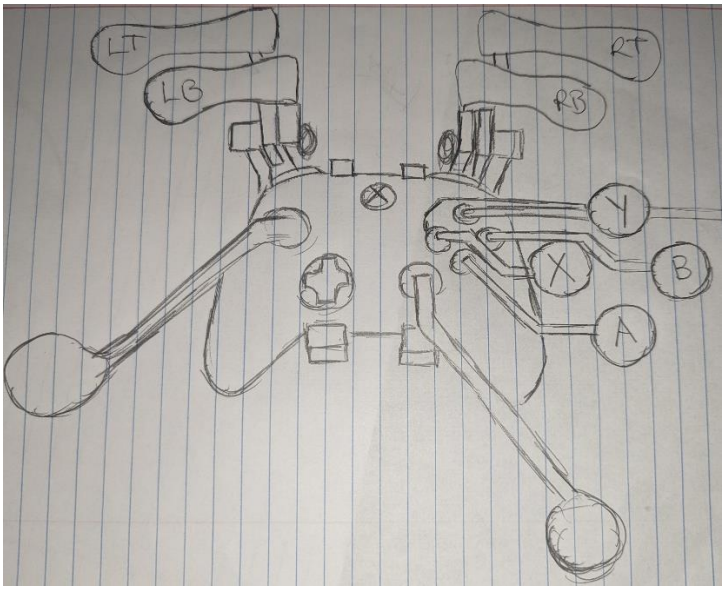


Figure 9: Top-down play of the controller

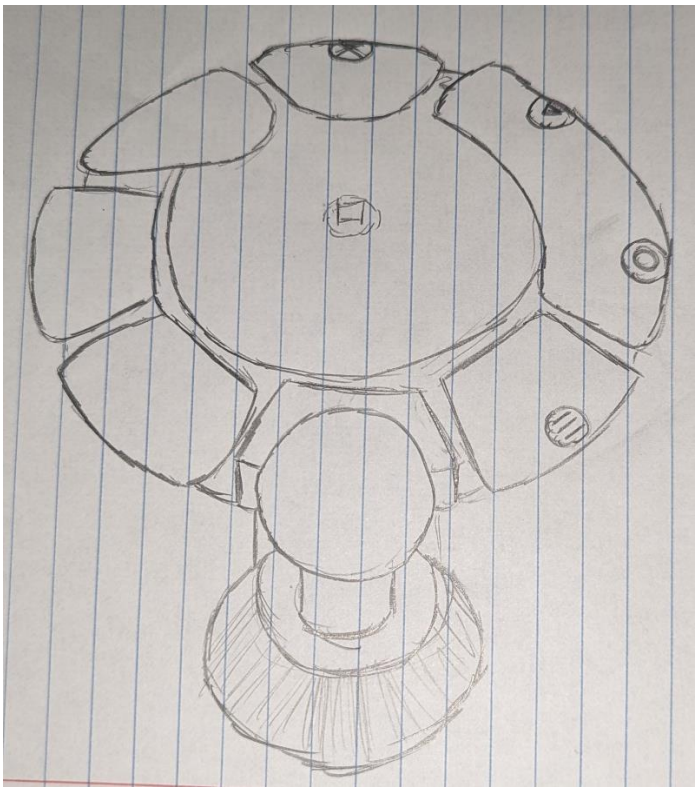


Figure 10: customizable accessibility controller kit

Selection of Final Concept

Metric / Concept No.	1	2	3	4	5	6	7	8
Ergonomics	4	4	3	2	3	4	3	4
Size (Dimensions: L x W x H)	4	4	2	2	3	3	4	2
Safety	3	3	4	4	3	4	4	4
Ease of usage	4	4	2	2	3	4	3	4
Accessibility	4	3	2	2	2	4	2	4
Modularity and customization of button implementation	4	3	2	2	4	4	2	2
Shape and size of buttons	4	4	3	2	4	2	2	3
Total	27	25	18	16	22	25	20	23

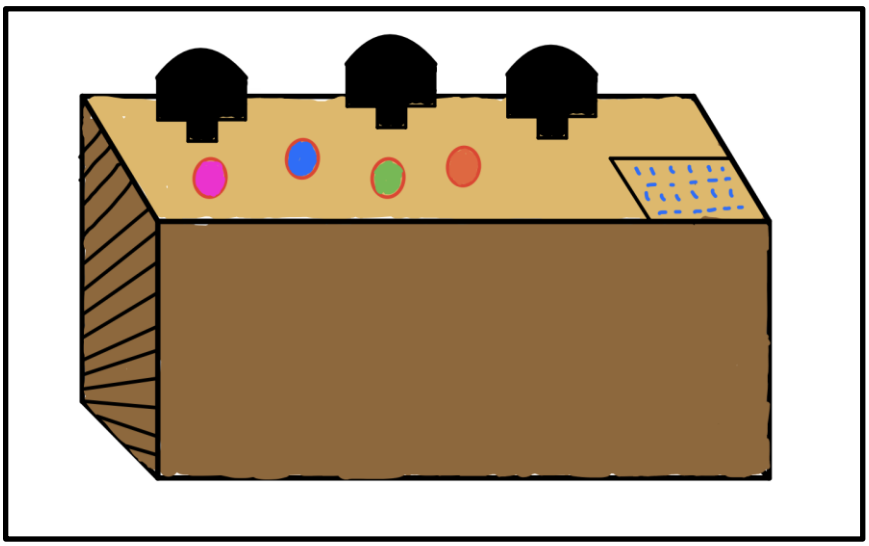
Ranking system:

1 - Poor
2 - Fair
3 - Good
4 -Very Good
5 - Excellent

A decision matrix with the target specifications was used to evaluate the concepts and choose a suitable final concept. The assumptions made for ergonomics were based on the shape and predicting how comfortable it would be for the client. Size was estimated by concept depending on what the concept was trying to implement and how close it would be to the target specifications. Safety was based on the shape of the concept like sharp corners and how safe it would be while using the product. Ease of usage and accessibility was also evaluated by assuming the client was using the product. Modularity and customization of button implementation was calculated on how each idea could reconfigure the buttons. The shape of size of buttons were estimated while analyzing each concept.

Concept 1 was chosen since it had the highest points.

Final Concept



This concept aligns closely with the target specifications as it prioritizes accessibility to our client with limited hand movements. By placing the controller on the ground, it maximizes stability and ease of use for the client, ensuring they can comfortably interact with the device.

Benefits:

Enhanced Accessibility: The ground-based design accommodates users with limited hand movements, providing a stable platform for interaction.

Customizability: The customizable buttons and joysticks allow tailoring the controller to the specific needs and preferences of each individual client, ensuring a personalized gaming experience.

Inclusivity: By addressing a niche demographic, the adaptable controller promotes inclusivity in the gaming community, allowing a wider range of players to enjoy gaming.

Drawbacks:

Learning Curve: Some users may require time to adapt to the new controller setup, particularly if they are accustomed to traditional handheld controllers.

Space Requirements: The ground-based design may require more space in the gaming environment, which could be a consideration for users with limited room availability.

Prototype Development: Creating a fully functional and reliable prototype may pose technical challenges, potentially requiring extensive testing and iterations.

Overall, our chosen concept shows great promise in meeting the needs of clients with limited hand movements, offering a more inclusive and adaptable gaming experience. With thorough testing and refinement, this prototype has the potential to significantly enhance accessibility in the gaming industry.

C.3 Project Plan

11	Group Meeting (Virtual)	Completed		04/10/2023	
12	Deliverable C	In progress	29/09/2023	06/10/2023	
13	C1 Problem Definition	Planned	02/10/2023	02/10/2023	
14	Points 1 & 2 @Isam	Planned	29/09/2023	02/10/2023	
15	Points 3 & 4 @Oob...	Planned	29/09/2023	02/10/2023	
16	C2 Concept Developm...	Planned	03/10/2023	04/10/2023	
17	Points 1 & 2 @ever...	New	29/09/2023	04/10/2023	
18	Points 3 & 4 @ever...	New	29/09/2023	04/10/2023	
19	Points 5 & 6 @Luel	New	29/09/2023	04/10/2023	
20	C3 Project Plan	In review	05/10/2023	06/10/2023	
21	Plan Team Meeting...	In review	29/09/2023	06/10/2023	
22	Wrike @Viktor	In review	29/09/2023	06/10/2023