Project Deliverable K: Final Presentation

GNG2101 : Introduction to Product Development and Management for Engineers
Faculty of Engineering - University of Ottawa

Adaptive Row - Group C2

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Introduction:

- Regular rowing machines at the gym cannot be used by people in wheelchairs because they cannot sit on the machine and strap their feet into the foot pads.

Problem Statement

Convert a rowing machine, using a detachable adapter, to make it wheelchair-accessible for people who suffer primarily from lower-body disabilities

Key Components of Project Deliverables to Date

Customer Needs

Some of the most important needs include:

1. The design is easily and independently used.

2. The design remains secure, rigid, and stable for the user throughout the exercise.

3. The design is cost-effective.

4. It is safe to use.

5. The design is compatible with different sizes, weights and types of wheelchairs.

BENCHMARKING

Adapt2Row

A lightweight rowing machine adapter that can be easily installed and used by people in wheelchairs.

Keiser Cardio M Series M7i Wheelchair-Accessible Total Body Trainer

A total body trainer that can be used with any mobility device or wheelchair.

SciFit PRO1 - Upper Body

An upper body trainer that can be used while people are seated or standing. It has a wheelchair platform and a removable seat.

Target Specifications

- Developed based on the key metrics and the specifications of the benchmarking products.
- Ideal value was determined based on the benchmarking products.
- Marginal Value is the more realistic specification.

Some of the developed target specifications include:

Total mass
- Ideal: <15 kg
- Marginal: <20 kg.

Time to assemble/dismantle
- Ideal: 0 seconds (already built in)
- Marginal: <30 seconds

Unit manufacturing cost:
- Ideal: <$761.25
- Marginal: <$100

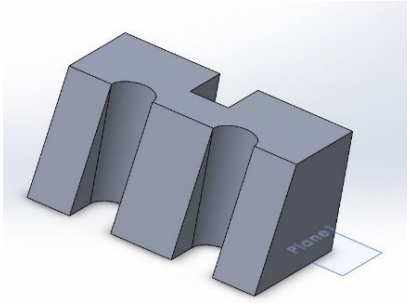
Number	Metric	Unit	Marginal Value	Ideal Value
1	Total mass	kg	<20	<15
2	Time to assemble/dismantle	s	<30	0
3	Unit manufacturing cost	$	<100	<761.25
4	Actions that need to be performed by a staff member	list	<3	None
5	Size of wheelchair that can be accommodated	cm	>70	any
6	Expected functioning duration	yr	>1	>3
7	Space taken up in storage	m^3	<0.100	<0.0742
8	Safety features	list	>2 features	>4 features

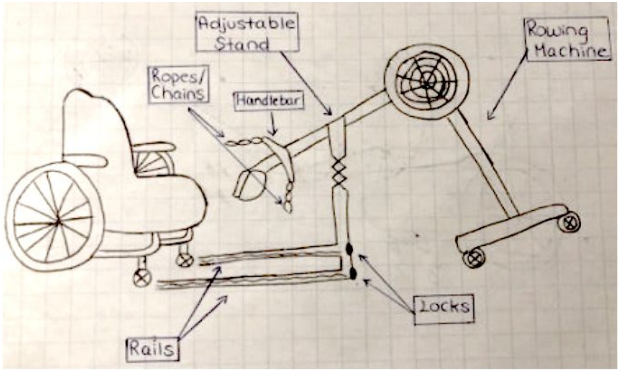
Decision Matrix

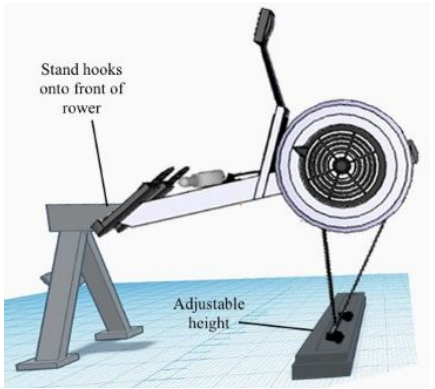
- The weight of each target specification was determined based on its importance.
- Each team member assigned a score for each of their concepts
- The sum of these values equalled the total score of each concept

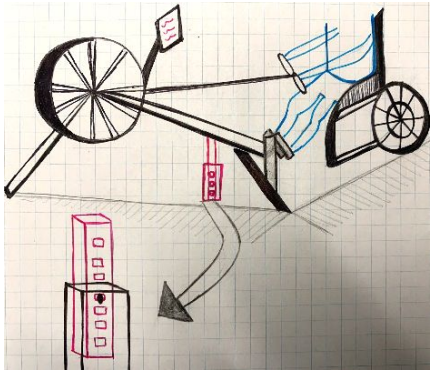
Target Specifications/ Selection Criteria	**Weight**	**Concept A**	
Total mass	0.09	5	0.45
Time to assemble/dismantle	0.09	3	0.27
Unit manufacturing cost	0.2	3	0.6
Actions that need to be performed by a staff member	0.2	3	0.6
Size of wheelchair that can be accommodated	0.15	4	0.6
Expected functioning duration	0.05	3	0.15
Space taken up in storage	0.02	5	0.1
Safety features	0.2	1	0.2
	Total Score		2.97

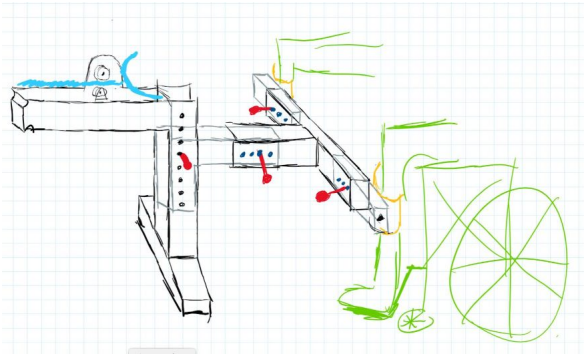
Individual Concepts

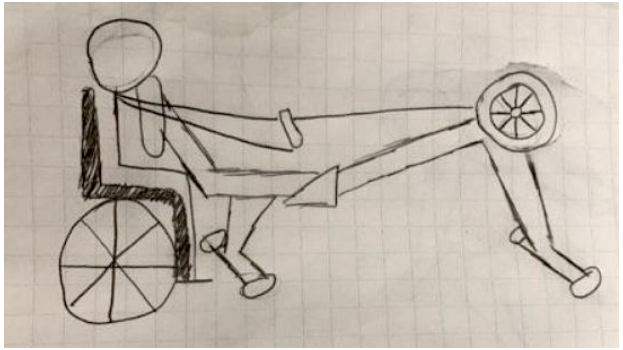






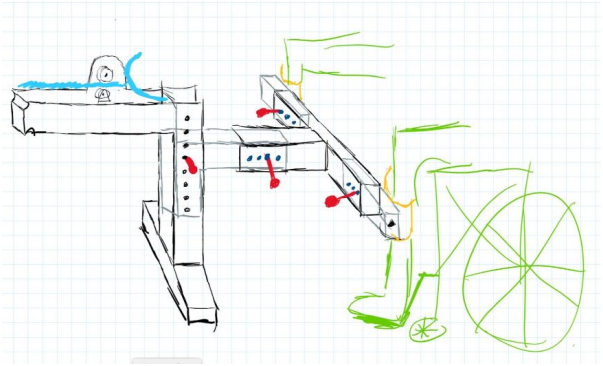




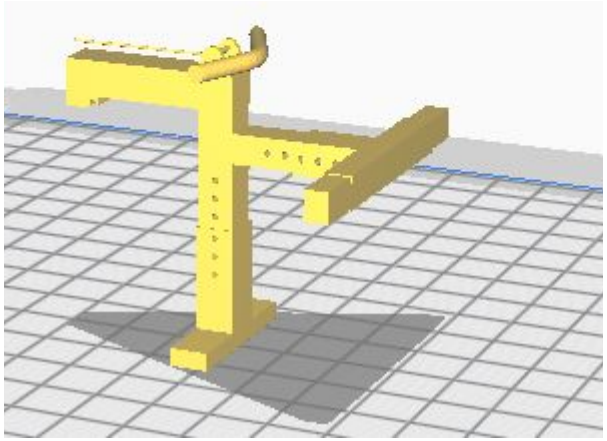


Concept Selection

- Best concept selected based on overall score



- Concept P had a total score of 5.42 - the highest



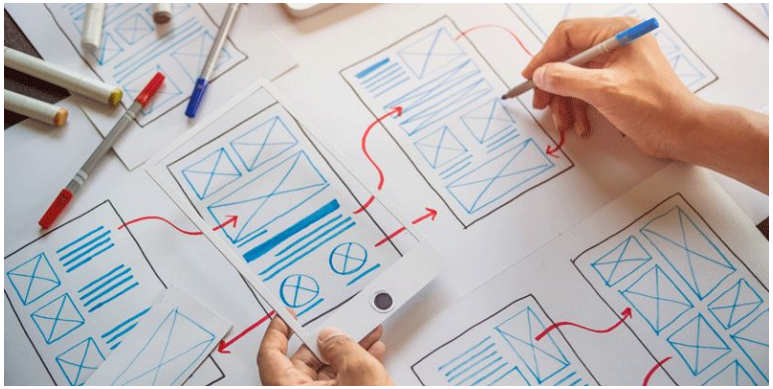
- The concept selected fit the above criteria the best

Prototype 1

- Used to test the part that clips onto the rowing machine

What We Learnt from the Prototypes/Decisions Made

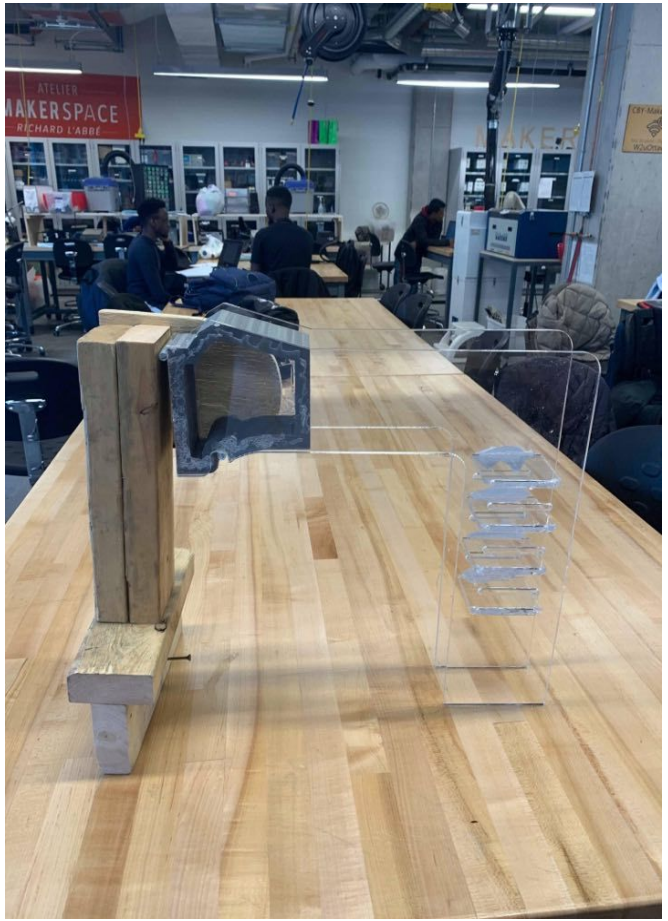
Prototype 1:



- Dimensions were perfect.
- 3D printed material was strong enough.
- The height of the adapter must be carefully considered (should not touch the chain of the handlebar).

Prototype 2

- A better representation of the product

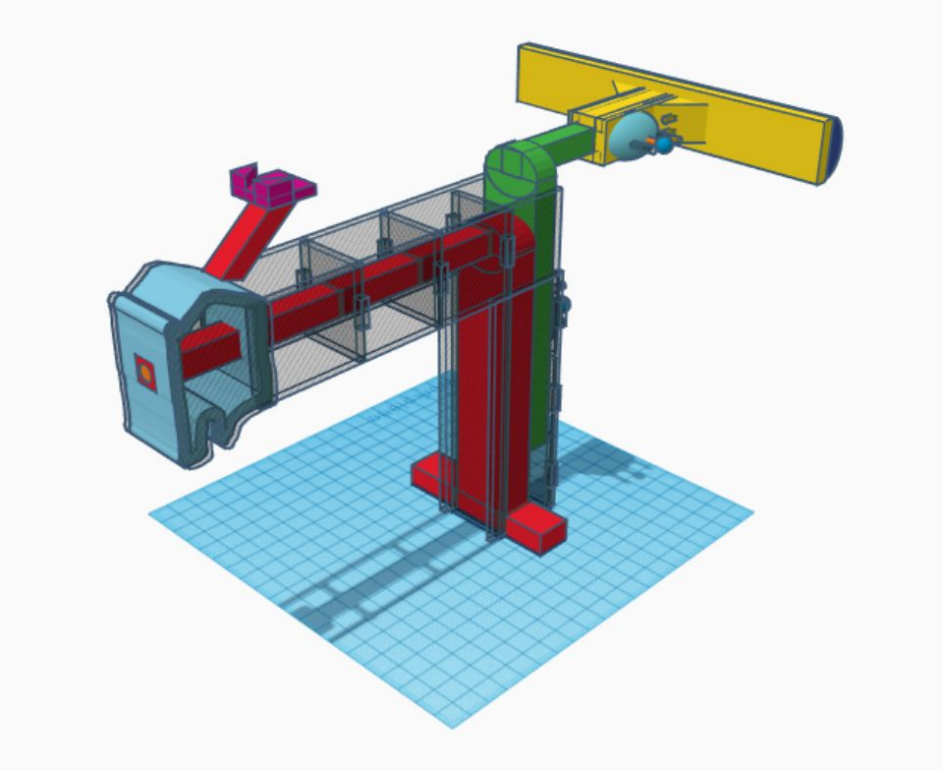


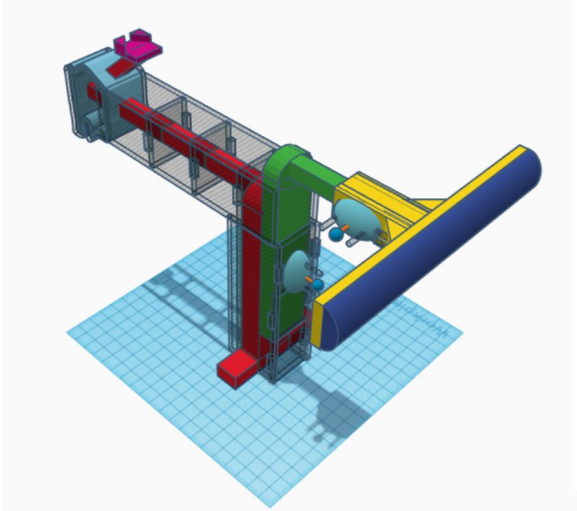
What We Learnt from the Prototypes/Decisions Made

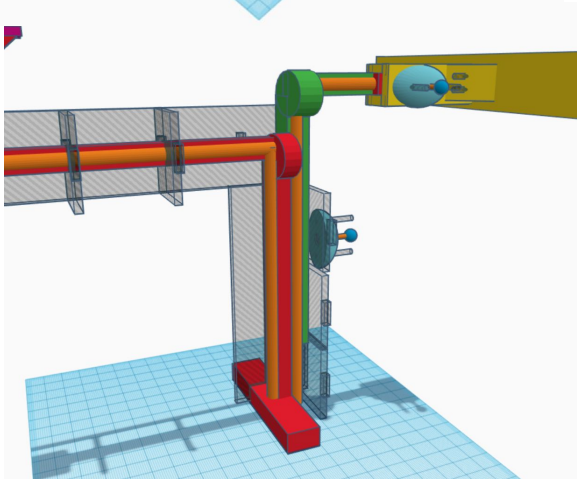
Prototype 2:

- The adapter has to be slightly greater in height and shorter in length.
- The final product needs to be more strong and stable - bare acrylic sheets were not strong enough.
- We decided that it would be quite difficult to make the adapter adjustable in width.

Final Concept







Feasibility Study

Based on TELOS Factors:

1. Technical:

- 3D printers and laser cutters

2. Economic:

Business Model

- “Direct Sales Business Model”
- Product targeted for wheelchair-users

Business Model Canvas

Desin for:	Design by:	Date:
Adaptive Rowing Machine	Adaptive Row Team	February 23, 2020

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
- Richcraft Recreation Complex (Client) - University of Ottawa - Gym Owners	- Designing and Building Rowing Machine Adapters - Product Development and Management - Customer Outreach **Key Resources** - Skilled Manufacturing Team - Technology - Access to Machine Shops and Manufacturing Centres	- Wheelchair-users can exercise comfortably on rowing machines with the adapter - Prices are less than competing accessible gym equipment - Almost all sizes of wheelchairs can be used with the adapter - Wheelchair-users can exercise independently - High Quality Product	- Customer Service - Social Media - Promotional Offers - Regular Communication (email, video calls, etc.) - Physical meetings **Channels** - Face-to-Face (Direct Sales) - Social Media	- Wheelchair-users - People with lower-body disabilities - Gym owners who want to have accessible rowing machine

Cost Structure	Revenue Streams
- Raw Materials and Equipment - Overhead Costs - Product Development - General and Administrative - Transportation	-Product Sales -Advertising -Product Licensing

Income Statement - All 3 Years

Sales (Revenue)		$1,200,000
Cost of Goods Sold		$371,250.69
Gross Profit		$828,749.31
Operating Expenses		
Marketing Expenses	$90,000	
General and Administrative Expenses	$711,153.1861	
Depreciation	$1500	
Total Operating Expenses		$802,653.1861
Operating Income		$26,096.1239
Interest Expenses		-
Earnings Before Tax		$26,096.1239
Income Tax		-
Net Income		$26,096.1239

The net income is positive overall, which indicates that the potential company will be successful if the assumptions are valid.

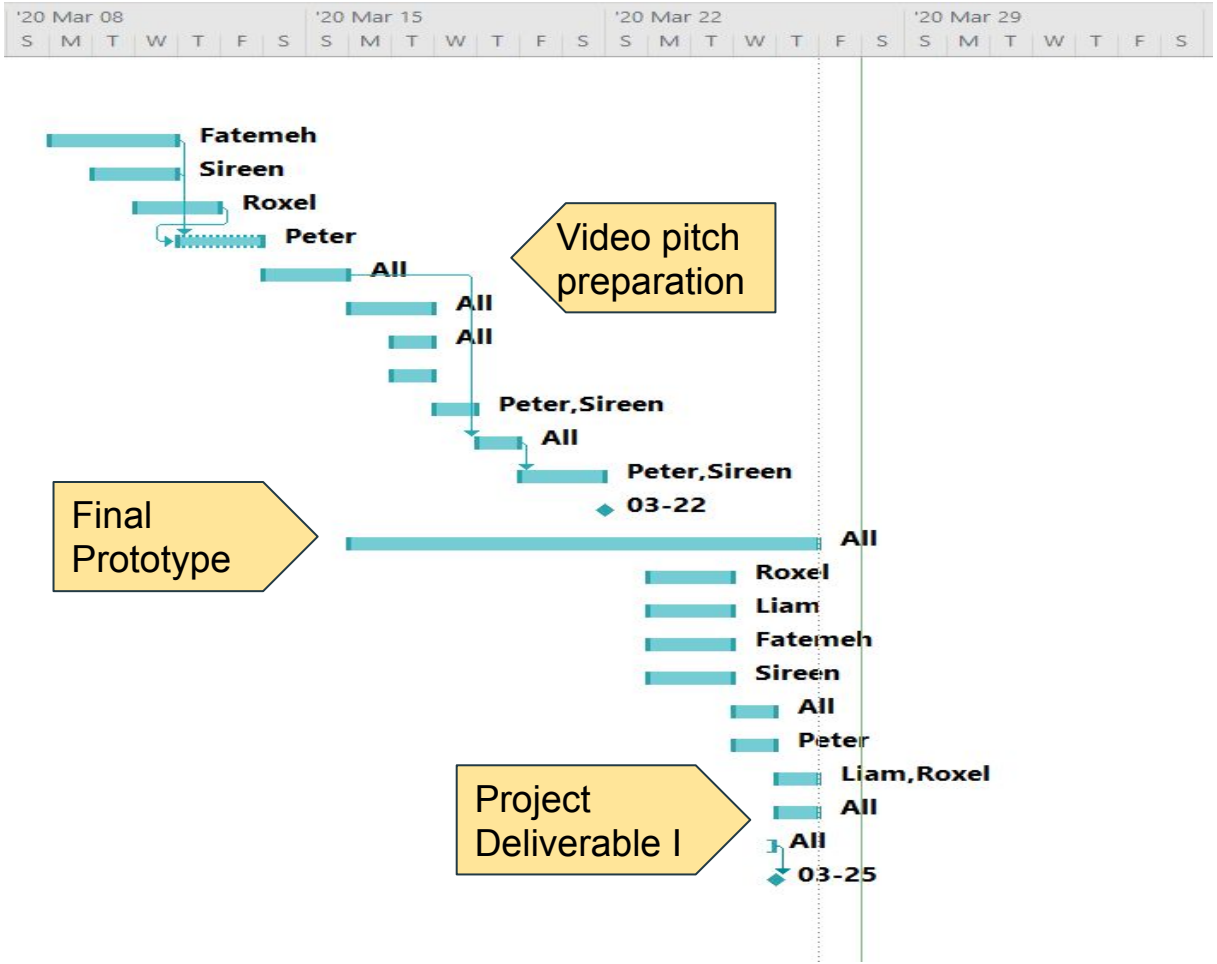
3. Legal:

- Injury is a possible liability
- May infringe on existing patent designs

4. Operational:

- Relatively simple to assemble and use
- No additional costs

5. Scheduling



Future Work/Lessons Learned

Lessons Learned

- Make a plan ... stick to it
- Be proactive and adaptable
- Have more than one idea
- Keep it simple

Future work

- Improved handle holder (accidental let go)
- More compact storage

Thank you!

Any Questions?