

Deliverable G

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Introduction

Due to the increasing need for students to have access to technology, people with impairments that limit their motor skills are put into a more difficult situation. Our team has taken on the task of designing a camera cover. The user will be a 12-13-year-old boy named Oliver who uses an eye-gaze camera to verbally communicate through a Tobii I12+ device as it reads his eye movements. The user also has to rely on other devices for school work and electronic communication, as well as a power wheelchair. The program he uses requires the software to track the movement of a dot on his forehead in which the camera will pinpoint the position, translating it to words, then sentences. Furthermore, Tobii I12+'s eye gaze light interferes with other devices he uses. The team was able to extract valuable information from the client, allowing us to design a potential solution to the problem.

This document presents a potential business model for our product, the eye gaze camera cover, and an economics report that would guide the team in predicting the development of our business in the next 3 years.

Business Model

Business Model Type

The business model chosen was “click and mortar”, which is an electronic variation of the “bricks and mortar” model. This business model is ideal for our company since we are selling physical products in both online and physical stores.

Business Model Canvas

Camera Cover				
Key Partners Tobi Wheelchair manufacturers Metal plate manufacturers	Key Activities Awareness of brand	Value Propositions Eliminate interference from Tobi Help people at hospitals Make everyday technology use simpler Allow people with disabilities to be less restricted	Relationship Social Media In-person meet ups to evaluate personal needs	Customer Segments Wheelchair and Tobi users Hospitals
	Key Resources 3D printing Filament Electrical Components Warehouse		Channels Website Sales Warehouse pickup	
Cost Structure Marketing and Sales Salaries Equipment		Revenue Streams Reduced rate from bulk orders Personalized orders		

How?

We should partner with wheelchair manufacturers, Tobii, or the company which puts metal plates on the back of the wheelchairs to attach the buttons to. Partnering with these companies will get us more brand awareness and potentially more resources to make more Camera Covers.

Our business needs to find more clients through marketing, campaigns and through social media. Every new business needs to have some sort of social media awareness to engage others into buying their product. Partnering with other companies or getting noticed by social media platforms can help us get more coverage to potential customers. Once we get the clients to order/preorder or product, we will need mass manufacturing to supply for our demand. This will include material such as more 3D printers, 3D printer filament, electronic components, etc. To manufacture our products, we will need to rent a warehouse to give us more space and storage to be more organized with our orders.

What?

We are the only company that manufactures a button for someone's head which then covers a camera on their Tobii device. With our product, the interference that Tobii brings to other devices is eliminated. The clients will be able to use other face tracking devices on their phone or tablet with no interference coming from their Tobii giving them a seamless experience. Customers will love us as we have finally fixed a problem that has been long stressed in this community.

Who?

We would be creating value for anyone who uses a wheelchair and a Tobii device who encounters problems with the interference their Tobii releases. We wish to help anyone in need of this problem the best we can through our customer service. On our website, customers will be able to customize exactly where they want their button to be located on their wheelchair as well as other customization options. If they have any questions or concerns, we will have a line they can call any day of the week. Since our customers are a very specific group of people, we don't expect to have too many. This gives us more of an opportunity to communicate with our existing customers to ensure they get exactly what they paid for and more. We will be delivering their packages through the mail in an easy-to-set-up way with step-by-step instructions explaining how and where everything goes. If the customer is in the Ottawa area, we will also offer a pickup option. If the customer needs help setting up their product, we will offer an additional service to come to their homes and assemble it for them.

How much?

Fixed:

Warehouse: \$0.85 per square foot, (600 sq. ft) → \$510/ month

Salaries: \$5,000/

Marketing: \$3,000/ year

Unit Cost

Table 1.1: Mechanical Part Costs

Part	Cost	Quantity	Total Cost
ABS Filament	\$16.95/1000g	290g	\$4.92
Servo Motor	\$0.89/each	1	\$0.89
M4 Screws	\$10.86/100	4	\$0.4344
M4 Nuts	\$10.29/100	4	\$0.4116
Button	\$1.29	1	\$1.29
Aluminum Rod	\$2.50	1	\$3.50
Total Mechanical Cost			\$10.45

Table 1.2: PCB and Component Costs (@1000pcs each)

Part	Cost (each)	Quantity (Transmitter)	Quantity (Receiver)	Total Cost (transmitter + receiver)
SAW resonator (433mhz)	\$0.1026	1	0	\$0.1026
SMD capacitor	\$0.0029	2	10	\$0.0348
SMD resistor	\$0.0005	2	16	\$0.0090
RF transistor	\$0.0146	1	1	\$0.0292
Transistor	\$0.0048	1	1	\$0.0096
Air core inductor	\$0.0590	2	2	\$0.2360
USB Connector	\$0.0187	1	1	\$0.0374
PIC10F220T Microcontroller	\$0.3460	1	1	\$0.6920
LM 358 Dual Op Amp	\$0.0108	0	1	\$0.0108
Carbon film resistor (1W)	\$0.0140	0	1	\$0.0140
Mosfet	\$0.0109	0	1	\$0.0109
PCB	\$0.0643	1	1	\$0.1286
Board Assembly	\$0.125	1	1	\$0.2500
Total Board Cost				\$1.56

Total Parts Cost: \$7.95 + \$1.56 = **\$10.45**

Core Assumptions and Feasibility

Assumptions

In order to create the Business model and the Economics report, we assume that:

- Only users of eye trackers as well as hospitals and other health institutions that have patients that use this type of device are considered as customers of the company. This reduced number of customers is used to calculate the amount of items that would be sold each year.
- Sales would be done only in Canada.
- The location used for producing the camera cover would be 600 square feet since the number of pieces manufactured each month and the size of machines used are small.
- Employees would be hired by the hour of service.
- Employees are assigned to the tasks of managing inventory, buying parts if needed, assembling the final product and shipping.
- The design and components used for the final product do not change during the period analyzed
- A marketing company would be hired to develop the website and produce the content used in social media.
- The eye gaze camera cover is the only product that the business will offer. Possible customization related to colour and size will be available for the client to define when buying it.
- The shipping cost is not added to the cost since the money paid for it would be sent directly to a shipping company.

Feasibility

Our product is currently unique in attending to the needs of the client that was previously explained since no other product is able to solve the problem in an accessible and efficient manner. Since there is no competition until this point, the camera cover has wide market demand. The cost of production can also be considered an advantage. It is relatively low since the components can be bought in large quantities, which reduces the individual price of each piece.

A survey was conducted to obtain concrete information about possible customers in the University of Ottawa community. The survey occurred between March 19th and March 21st and was answered by 170 people. 3.5% of the respondents use or know someone that uses an eye gaze camera and more than half of the general answers indicated contact with people that have mobility constraints. One of the questions was related to the price that would be charged for our product. 140 people would buy our product for the price we previously stipulated, which shows that the price is reasonable.

A disadvantage of the product is that the number of possible clients in a specific region is small since it targets a very specific slice of the market and it is unlikely that the same user will buy more

than one product or that it will be replaced in a short amount of time. This factor is shown in the survey since only less than 5% of all of those who answered the survey use or know people that use the eye gaze camera. These disadvantages can be overcome by expanding the sales area. In our case, it is possible to start selling the camera cover in other countries.

Table 2: Survey Results

Question	Yes	No	More than one
Do you have or know anybody that has mobility constraints? (wheelchair, prosthetics, etc...)	43.9%	45.6%	10.5%
Do you or do you know anyone who uses an eye-gaze camera to control a device?	3.5%	96.5%	N/A
If you have (or know someone who has) motor constraints would you think it's justifiable to purchase an electronic product for 150\$ if it would make your day to day life easier?	86.5%	13.5%	N/A
Do you think it is worth it to spend a large amount of money on advertisements on a product that is made for a specific demographic?	71.4%	28.6%	N/A

Considering the points analyzed, the team decided to go with the developed business plan.

Economics Report

The following section describes the income and expenses of the business over the next few years. We have estimated that the company will be selling about 10 items each month for the first year, 15 a month for the second and 20 per month for the third year. This increase in sales is expected because the reliability of our brand and its name will become more well known throughout the years. The price of our product will stay the same throughout the 3 year period as we assume we will be buying in bulk. With our estimated operating cost, and compared to other Tobii accessories we have decided to charge \$150 per cover.

Cost List & Classification

Table 3: Cost Classification

	Cost Type	Classification
Warehouse/Rent	Operating Cost	Fixed, Indirect
Salaries	Operating Cost	Fixed, Direct
Inventory	Operating Cost	Variable, Direct
Equipment	Operating Cost	Fixed, Direct
Electricity	Operating Cost	Fixed*, Indirect
Overhead	Operating cost	Fixed, Indirect
Depreciation	Operating cost	Fixed, Direct
Marketing	Non-operating cost	Fixed, Indirect

* We assumed that the electricity is fixed as there will be a constant amount used monthly

3-Year Income Statement

**Camera Cover Co.
Income Statement
For the years 2021, 2022, 2023**

Revenue	<u>2021</u>	<u>2022</u>	<u>2023</u>
Sales	\$18,000	\$27,000	\$36,000
Cost of Goods Sold	<u>(1,254)</u>	<u>(1,881)</u>	<u>(2,508)</u>
Gross Profit	16,746	25,119	33,492
Expenses			
Salary Expense	(5,040)	(7,560)	(10,080)
Rent Expense	(6,120)	(6,120)	(6,120)
Equipment Expense	(10,700)	(100)	(100)
Electricity Expense	(1,200)	(1,200)	(1,200)
Marketing Expense	(3,000)	(3,000)	(3,000)
Depreciation Expense	(1,070)	(1,080)	(1,090)
Overhead Expense	(1,200)	(1,200)	(1,200)
Total Expenses	<u>(28,330.00)</u>	<u>(20,260)</u>	<u>22,790</u>
Total Profit	<u>\$-11,584</u>	<u>\$4,859</u>	<u>\$10,702</u>

Calculation of Operating/Non-Operating Costs

Year 1

Total Revenue = (# of wireless camera covers sold) · (price per camera cover)

Total Revenue = (120) · (150)

Total Revenue = 18 000\$

Operating Cost

*Inventory = \$1,254 = (10.45 * 10 * 60) Equipment = \$10 700*

Overhead = \$1200 Warehouse/Rent = \$6120

Electricity = \$1200 Salaries = \$5040

Depreciation = \$1070

Total Operating Cost = 5040 + 6120 + 10 700 + 1070 + 1254 + 1200 + 1200

Total Operating Cost = 26,584\$

Operating Profit

Operating Profit = Total Revenue – Total Operating Cost

Operating Profit = (18,000) – (26 584)

Operating Profit = – 8,584\$

Non-operating Cost

$$\text{Marketing} = \$3000$$

$$\text{Total Non - operating Cost} = \$3000$$

$$\text{Profit} = \text{Operating Profit} - \text{Total Non - operating Cost}$$

$$\text{Profit} = (-8,584) - (3000)$$

$$\text{Profit} = -11,584\$$$

Year 2

$$\text{Total Revenue} = (\# \text{ of wireless camera covers sold}) \cdot (\text{price per camera cover})$$

$$\text{Total Revenue} = (180) \cdot (150)$$

$$\text{Total Revenue} = 27\,000\$$$

Operating Cost

$$\text{Inventory} = \$1,881$$

$$\text{Equipment} = \$100$$

$$\text{Overhead} = \$1200$$

$$\text{Warehouse/Rent} = \$6120$$

$$\text{Electricity} = \$1200$$

$$\text{Salaries} = \$7560$$

$$\text{Depreciation} = \$1080$$

$$\text{Total Operating Cost} = 7560 + 6120 + 100 + 1080 + 1881 + 1200 + 1200$$

$$\text{Total Operating Cost} = 19,141\$$$

Operating Profit

$$\text{Operating Profit} = \text{Total Revenue} - \text{Total Operating Cost}$$

$$\text{Operating Profit} = (27\,000) - (19\,141)$$

$$\text{Operating Profit} = 7,859\$$$

Non-operating Cost

$$\text{Marketing} = \$3000$$

$$\text{Total Non - operating Cost} = \$3000$$

$$\text{Profit} = \text{Operating Profit} - \text{Total Non - operating Cost}$$

$$\text{Profit} = (7,859) - (3000)$$

$$\text{Profit} = 4,859\$$$

Year 3

Total Revenue = (# of wireless camera covers sold) · (price per camera cover)

Total Revenue = (240) · (150)

Total Revenue = 36 000\$

Operating Cost

Inventory = \$2,508

Equipment = \$100

Overhead = \$1200

Warehouse/Rent = \$6,120

Electricity = \$1200

Salaries = \$10,080

Depreciation = \$1090

Total Operating Cost = 10080 + 6120 + 100 + 1090 + 2508 + 1200 + 1200

Total Operating Cost = 22,298\$

Operating Profit

Operating Profit = Total Revenue – Total Operating Cost

Operating Profit = (36,000) – (22,298)

Operating Profit = 13,702\$

Non-operating Cost

Marketing = \$3000

Total Non – operating Cost = \$3000

Profit = Operating Profit – Total Non – operating Cost

Profit = (13,702) – (3000)

Profit = 10,702\$

NPV Analysis

Year 1

Break Even Point

$$BEP = \frac{\text{Fixed cost}}{(\text{sales per unit} - \text{variable cost per unit})}$$

$$BEP = \frac{(5,040 + 6,120 + 10,700 + 1,200 + 3,000 + 1,070 + 1,200)}{(150 - 10.45)}$$

BEP = 203 units

In order to break even from our fixed costs in our first year, we will need to sell 203 units. However, in our second and third years we plan on selling more while lowering our fixed costs by a large

amount. This will keep us from needing to sell more units and instead we are just saving on our costs.

Year 2

Break-even point

$$BEP = \frac{(7,560+6,120+100+1,200+3,000+1,080+1,200)}{(150-10.45)}$$

$$BEP = 145 \text{ units}$$

This year we spend more on salaries to sell more units, but we did not need to pay nearly as much for equipment this year making our BEP a lot smaller.

Year 3

Break-even point

$$BEP = \frac{(10,080+6,120+100+1,200+3,000+1,090+1,200)}{(150-10.45)}$$

$$BEP = 164 \text{ units}$$

This year we did the same as the previous. We increased production of our product causing us to hire more part-time workers allowing us to sell more units this year.

Total

Break-even point

$$BEP = \frac{(28,330+20,260+22,790)}{(150-10.45)}$$

$$BEP = 512 \text{ units}$$

Since we estimate to sell 120 units in our first year, 180 units in our second year, and 240 units in our third year, we would be past our break-even point somewhere within our third year.

Assuming the default annual interest rate of 2% obtained from the [website of the Bank of Canada](http://www.bankofcanada.ca), it is possible to calculate the net present value using the following formula:

$$NPV (\text{net present value}) = \frac{\text{net cash flow at time } t}{(1+\text{discount rate})^{(\text{time of the cash flow})}}$$

$$NPV = \$ - 11,584 + \frac{\$4,859}{(1+0.02)^1} + \frac{\$10,702}{(1+0.02)^2}$$

$$NPV = \$3,466.15$$

Task Plan Update

The next step for our project is to make a summary of our product to give to the judges and prepare a presentation to be performed on Design Day, which is on April 8th. The presentation should include the description of the final product and some time dedicated to answering questions from the classmates, professor and judges. A demonstration of the functionality of the project would also be included in the presentation time. The following link contains our schedule for the next two weeks:

<https://www.wrike.com/frontend/ganttchart/index.html?snapshotId=BF0YAbDlHAdzUDXmkwPljZ1aUVytX5zs%7CIE2DGNJSGE2TCLSTGE3A>

Conclusion

From the information obtained on the Business Model and Economics Reports, it is possible to conclude that the business is feasible and would start generating a profit in the second year of activity. The demographic for the product is quite small but can be profitable after the first three years with room for growth. From calculating the income statement, net profit analysis and break even point we were able to analyse all aspects of our business model and were able to get a rough idea of how much it would cost to start up our business. By using a survey we were able to get some public opinions on the basics of our business model which allowed us to refine it to a greater extent. In the future we will be looking to optimize our product to be as economically friendly as possible.