**Deliverable G: Business Model**

GNG 2101 - Intro to Product Dev. and Mgmt. for Engineers

*Group C3.2 - Power Grabber*

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*Company Name:*

**PowerAdapt Inc.**

**March 20, 2022**

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## **G.1 - Business Model**

PowerAdapt Inc. is a Canadian start-up company, debuting with the launch of our battery-powered grabber stick which allows people with limited limb mobility to grab objects.

Our business model is a **direct-to-consumer sales model** through our website: [www.poweradapt.com](http://www.powerable.com). We estimate around 70% of our sales are being driven through our website sales. We will also use a network of established medical distributors and suppliers to reach as many of our target customers as possible.

### Key Partners

* Suppliers:
* Polymaker
  + Supplies us PLA and PC 3D-printer filament for all our 3D printed components
* Creality
  + Supplies us with 3D printers
* SmallRig
  + Supplies specialized carbon fiber rods originally meant for photography equipment
* McMaster-Carr
  + Supplies misc manufacturing equipment and hardware
* DigiKey
  + Supplies us with electronics components
* Panasonic
  + Supplies us with 18650 batteries
* Distributors:
* National Medical
  + Canada-wide distributor of medical equipment
* McDonalds HHC
  + Distributor of medical equipment in British Columbia
* Amazon Inc.
  + Warehousing and fulfillment solutions
* Operations:
* Shopify Inc.
  + Responsible for our online storefront and order fulfillment.
* Canadian Western Bank
  + Holds liquid assets.
* Advertising:
* Facebook
* Google Advertising

### Key Activities

* Manufacturing and sales of electro-mechanical grabber sticks for use by people with limited mobility.
* Research and development of other powered adaptive devices and specialized equipment for use by the disabled.

### Value Propositions

* Promote independence for the disabled person.
* Make life easier by enabling someone to reach objects where they could not normally reach without assistance.

### Key Resources

* The PowerGrab Mk.I: a physical device our customer will be buying for use to grab objects with the assistance of a powered-claw mechanism with push-button activation.

### Customer Relationships

* Self service chatbot on our website.
* 3-year limited warranty on all our products.
* 24/7 outsourced call-center support for returns and warranty support

### Customer Segments

* Facebook Users
* Disabled persons, including but not limited to those with the following medical conditions, these conditions may limit the individual’s range of movement and mobility necessitating the use of a stick to grab objects out of reach:
  + Paraplegia, quadriplegia, hemiplegia.
  + Parkinson’s
  + ALS
  + MS
  + Arthritis
  + Osteoporosis
  + Dwarfism
  + Musculoskeletal disorders
* Elderly
* Able-bodied people who just want a grabber stick to their customization.

### Channels

* Our Shopify-enabled website processes all of our sales.
* Field sales at trade shows such as the Chicago Abilities Expo
* External Distributors across North America

### Cost Structure

* Web hosting costs
* Marketing and sales
* Product manufacturing
* Product research & development
* Raw material costs
* General and administrative
* Distributor charges
* Warehousing costs

### Revenue Streams

* Product Sales
* Custom manufacturing projects

### Core Assumptions

* Disabled people who can’t reach objects in inaccessible areas exist in the market

## 

## **G.2 Economics report**

### Costs

| Cost | Amount $/year | Variable/fixed | Direct/indirect |
| --- | --- | --- | --- |
| Materials | 100 unit cost x 4,000 sales  = **400,000** | Variable | Direct |
| Equipment | **100,000** | Fixed | Indirect |
| Advertisement | 500/month  = **6,000** | Fixed | Indirect |
| Power | 500/month  = **6,000** | Semi-variable | Direct |
| Labor | 5 employees average 40,000 yearly income  = **200,000** | Fixed | Indirect |
| Rent | 1,000/month  = **12,000** | Fixed | Indirect |
| Interest expenses | 200,000 \* 0,05  = **10,000** | Fixed | Indirect |
| Total costs | **634,000** |  |  |

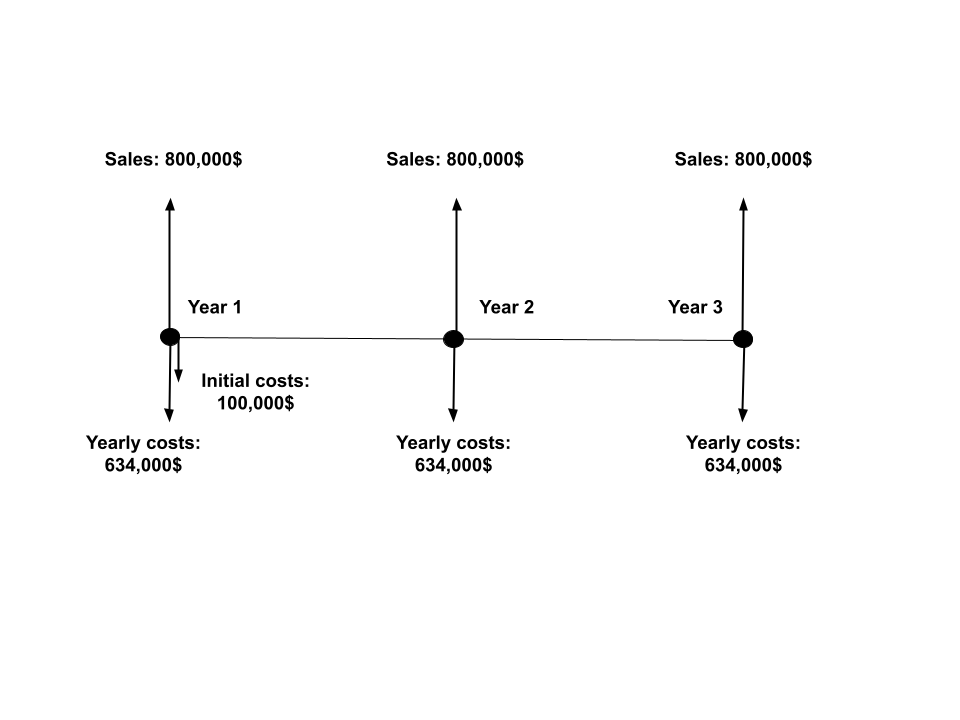
### 3-year Income Statement:

| Sales (Revenue) | 12,000 sales \* 200 unit price  = **2,400,000** |
| --- | --- |
| - | - |
| Cost of goods sold | 100 unit cost x 12,000 sales  = **1,200,000** |
| = | = |
| Gross profit | **1,200,000** |
| - | - |
| Operating expenses | (6,000 + 6,000 + 200,000 + 12,000) \* 3years + 100,000  = **772,000** |
| = | = |
| Operating income | **428,000** |
| - | - |
| Interest expenses | 200,000\*(1+0.0.5)3 - 200,000  = **31,525** |
| = | = |
| Earnings before taxes | **396,475** |
| - | - |
| Income taxes | 396,475 \* 0.27  =**107,048.25** |
| = | = |
| Net income | **289,426.75$** |

### Break-even Point

Inflation rate = 5% yearly

#### NPV for Expected Sales

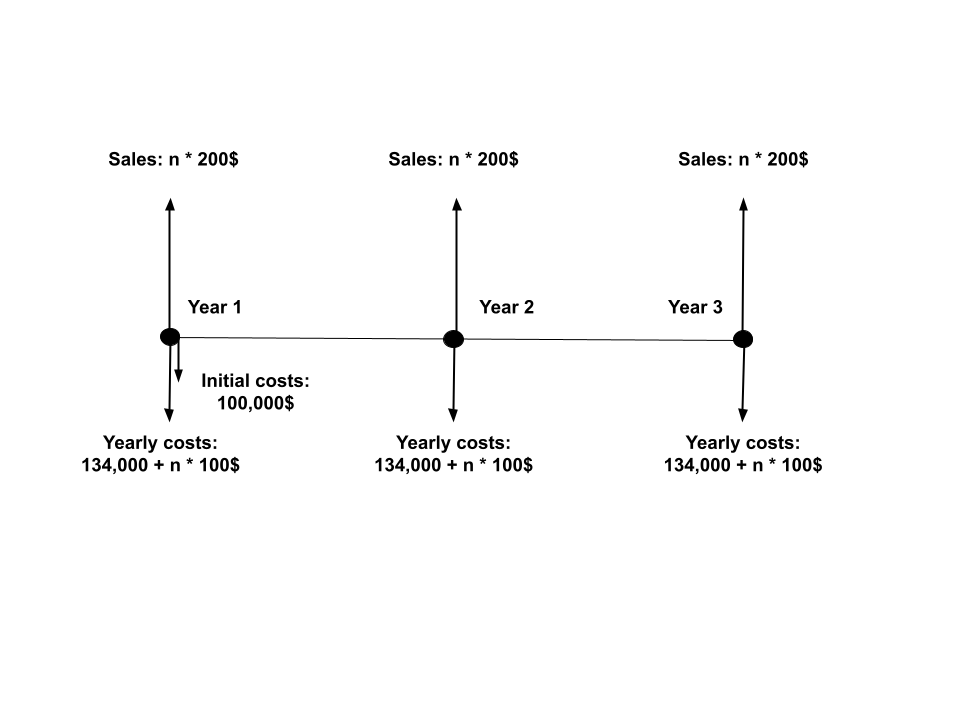
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(800,000 - 634,000 - 100,000) + (800,000 - 634,000)\*1.05 + (800,000 - 634,000)\*1.052

= 66,000 + 174,300 + 183,015

= 423,315

#### NPV for Break-even Sales

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Total revenue - Total costs = 0

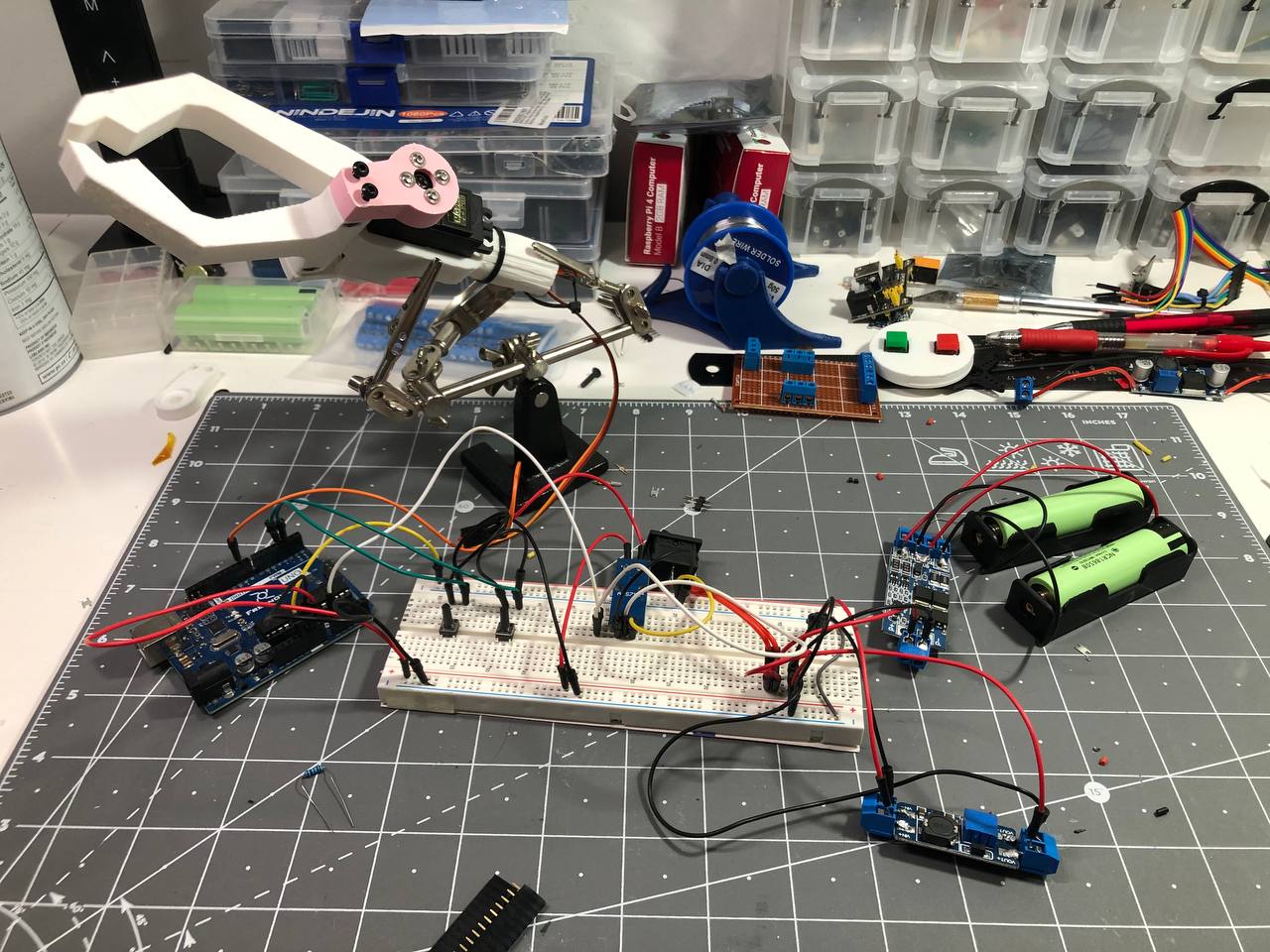
(200n - 134,000 - 100n - 100,000) + (200n - 134,000 - 100n)\*1.05 + (200n - 134,000 - 100n)\*1.052 = 0

315.25n - 522,435 = 0

n = 1657.21

Therefore, we must sell 1658 units yearly for the next 3 years to break even.

## **G.3 Project Update**



### Brief

The electronics system, including the new battery management system and charging circuit, are being tested on breadboard.

A redesigned part is also experimentally printed in pink per the user's request.This part is redesigned so that it can provide a stronger connection between the servo output shaft and the claw finger.

Previously planned pressure sensor for controlling the force of the claw has been replaced with a current sensor measuring the current used by the servo. This change is made because it might give more reliable reading than a physical force sensor.

The firmware for the grabber is also being tested to ensure user-friendliness and safety.

The issue we are facing right now is that the USB power delivery protocol is too difficult to control without using a custom-made PCB. A redesign of the power source might be required.

### Tasks

Complete the firmware and hardware testing.

Redesign the handle and arm support part

Redesign the charging circuit.

Print all the parts in pink for the final product