

# Display Augmentation System



**DAEDALUS**  
Technologies

[Contact Us](#)

[Daedalus-tech.comeze.com](http://Daedalus-tech.comeze.com)

P. 778-388-3751/[Daedalus-tech@googlegroups.com](mailto:Daedalus-tech@googlegroups.com)

# Presentation Outline

## Meet the Team

## Introduction

- Motivation
- Problem Overview

## Engineering Aspect

- System Overview
- Mechanical System
- Electrical System
- Software System
- Specification

## Business Aspect

- Product Overview

- Market Research
- Pricing Strategy
- Market Strategy
- Risk Analysis

## Wrap Up

- Timeline
- Feedbacks
- Future Improvements
- FAQ
- Acknowledgement

## Q&A

## Demo



# Team Breakdown



[Contact Us](#)

[Daedalus-tech.comeze.com](http://Daedalus-tech.comeze.com)

[P. 778-388-3751/Daedalus-tech@googlegroups.com](mailto:P.778-388-3751/Daedalus-tech@googlegroups.com)

# Meet **The** Team



**Larry Zhao**

- Managing overall team dynamics and progress
- GUI development
- Software & System Integration
- Mechanical System Design



**Jordan Anguelov**

- Firmware Design
- Electronic System Design
- Mechanical System Design
- System Integration

# Meet **The** Team



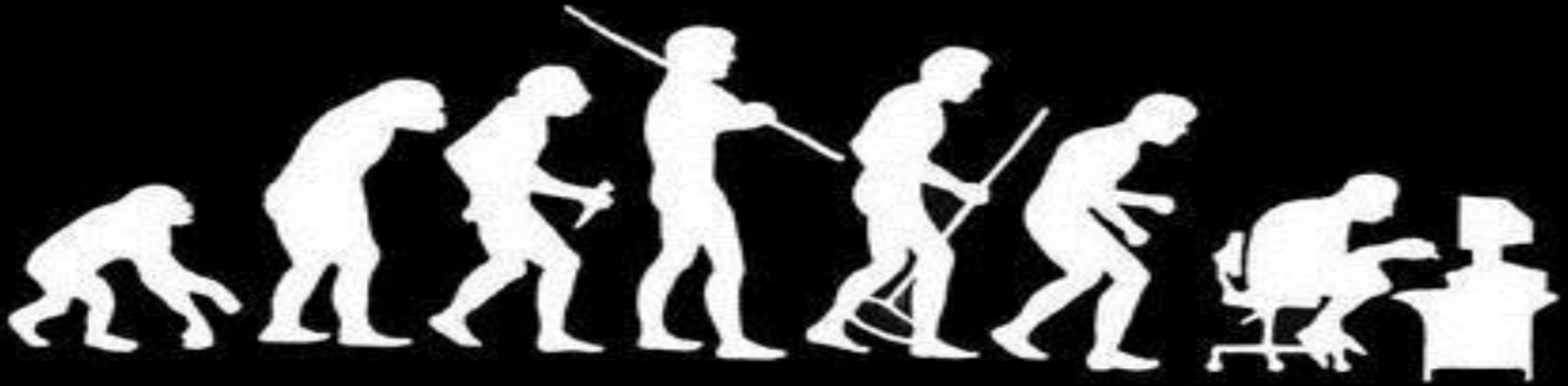
**Ian Brown**

- Finances
- Face-Detection enhancement
- GUI Development
- System Integration and Testing



**Calvin Ho**

- Implementing Face detection Algorithm
- Image Processing
- Software System Integration
- Database Maintenance



Something, somewhere went terribly wrong

# Introduction



[Contact Us](#)

[Daedalus-tech.comeze.com](http://Daedalus-tech.comeze.com)

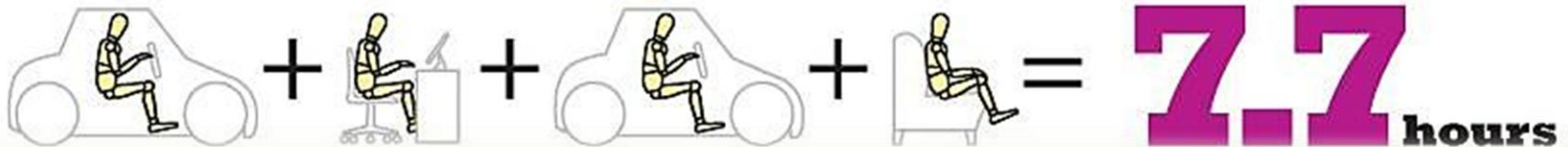
[P. 778-388-3751/Daedalus-tech@googlegroups.com](mailto:P.778-388-3751/Daedalus-tech@googlegroups.com)

# Motivation

## Sitting Disease by the numbers

Our modern sedentary lifestyles,  
both at home and in the workplace,  
are costly for us and for our employers.

Average hours of seated commute  
+ average hours of seated homelife = too much sitting!



# Problem Overview

- Normal monitor stands are inefficient
- Normal monitor stands are not ergonomic
- Normal computer workstations visibly contribute to repetitive strain injuries



**Our Solution:** Automated Monitor Stand that self adjust its position according to the user





# Engineering Aspect

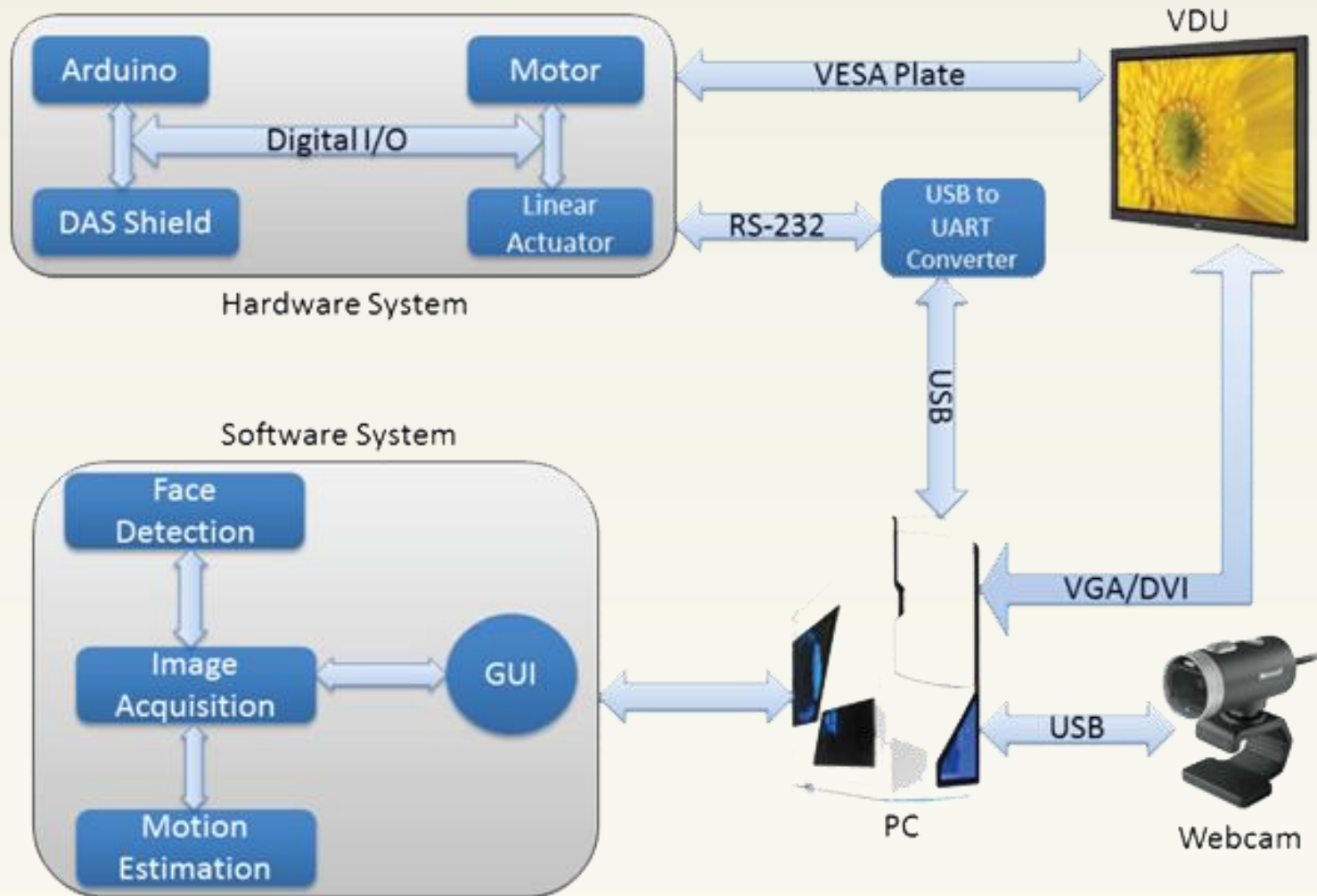


Contact Us

[Daedalus-tech.comeze.com](http://Daedalus-tech.comeze.com)

[P. 778-388-3751/Daedalus-tech@googlegroups.com](mailto:P.778-388-3751@Daedalus-tech@googlegroups.com)

# System Overview



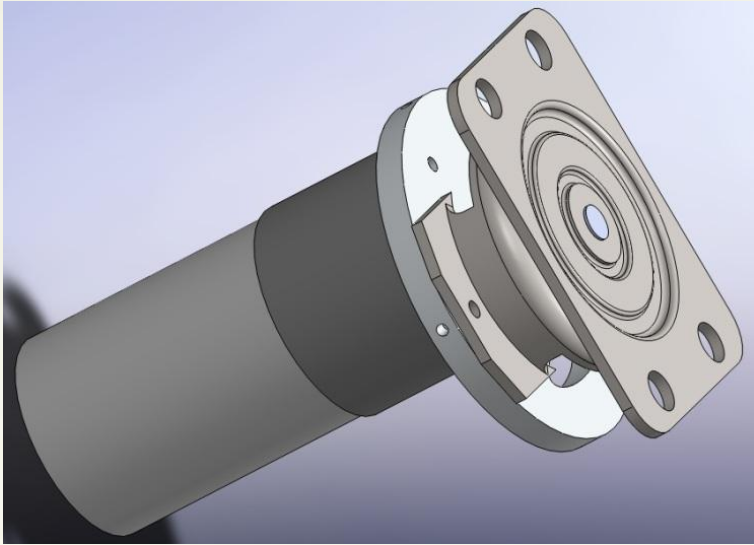
# Mechanical System

## Components:

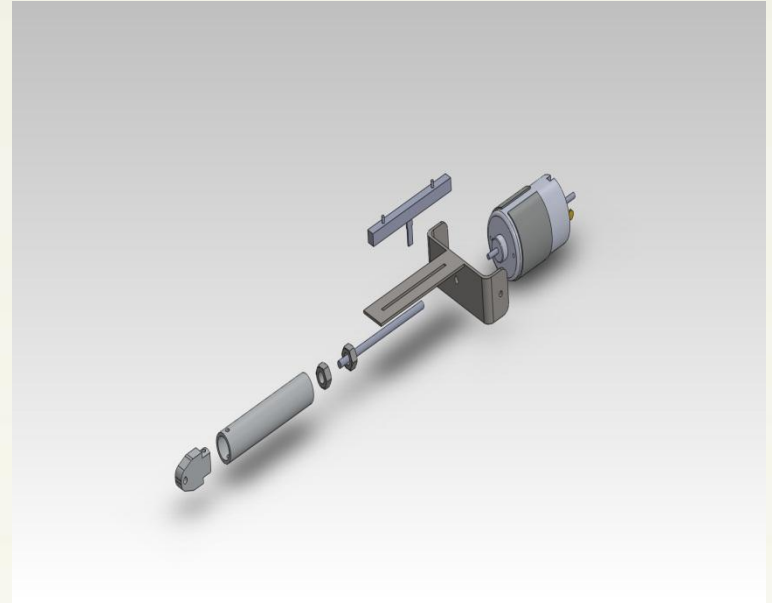
1. VESA plate
2. Nacelle
3. Linear actuator
4. Stand
5. Base



# Mechanical System



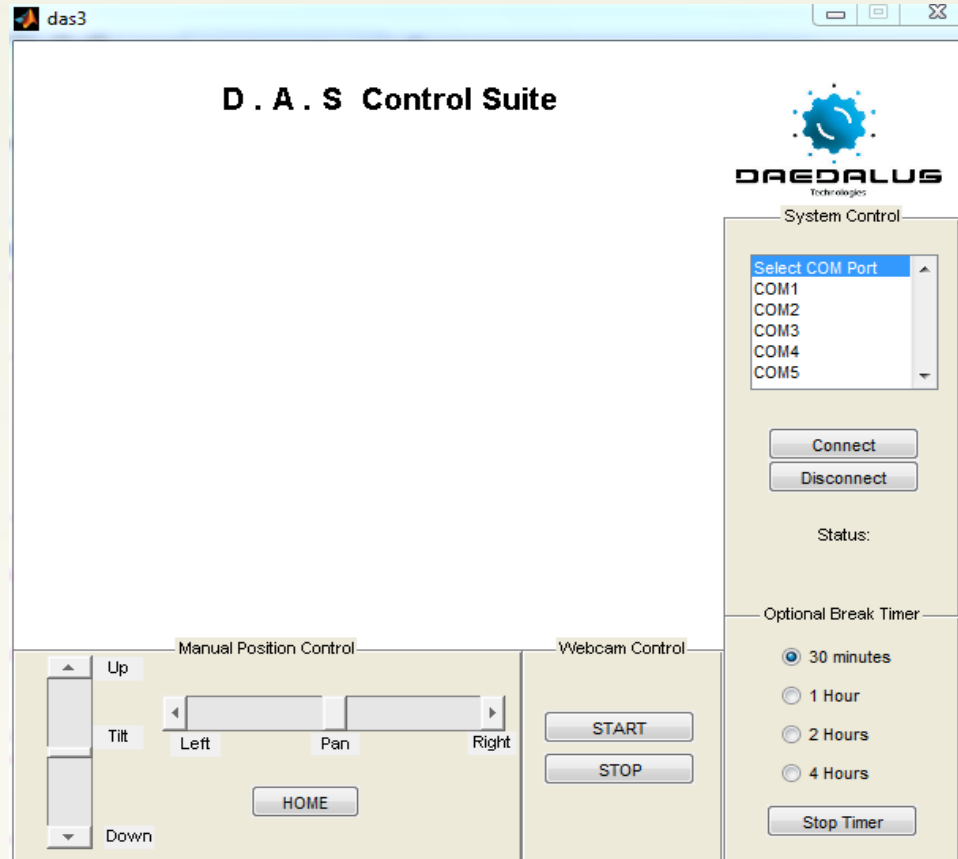
Pan Actuator



Tilt Actuator

# Software System

## DAS Control Suit



# Software System

## DAS Control Suit Features:

- Ergonomic Feedback
- Optional timer
- Face detection
- Manual position control

# Software System

## Software used to implemented **DAS** Control Suit:

- Windows XP SP3 32bit
- Matlab R2011a
  - Image Acquisition Toolbox
  - Instrument Control Toolbox
  - Matlab Compiler - Deployment Toolbox
- OpenCV v2.1
  - Viola-Jones object detection framework

# Software System

## Microsoft Webcam

- Capture image for the GUI to process
- 73 degrees Field of View
- Universal attachment base
- Easy device setup



Microsoft LifeCam Cinema



# Electrical System

## Arduino Mega Microcontroller System

- Communicate with the GUI
- On Board debugger
- User friendly SDK

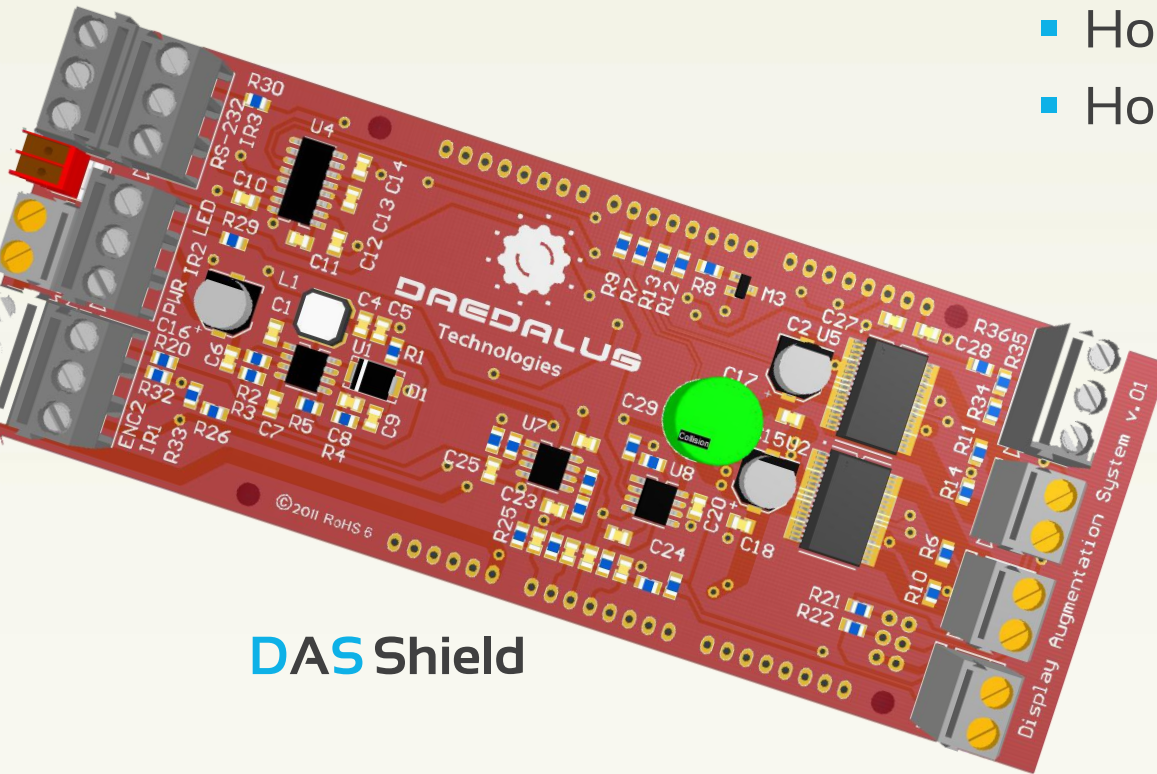


Arduino Mega 2560

# Electrical System

## DAS Shield

- System IO
- House motor drivers
- House RS-232 level shifter



DAS Shield

# DAS Specification



## A.I.T

Artificial Intelligence Tracking



## WEIGHT CAPACITY

Support up to 15 kilograms



## LCD Size

Supports displays size up to 24 inches



## TILT MOVEMENT

Movement from 0 to 60 degrees



## PAN MOVEMENT

Movement from 0 to 180 degrees



## VESA SUPPORT

Video Electronics Standards Association support for MIS-D/E/F mounting holes



# Business Aspect



**DAEDALUS**  
Technologies

[Contact Us](#)

[Daedalus-tech.comeze.com](http://Daedalus-tech.comeze.com)

[P. 778-388-3751/Daedalus-tech@googlegroups.com](mailto:P.778-388-3751@Daedalus-tech@googlegroups.com)

# Product Overview

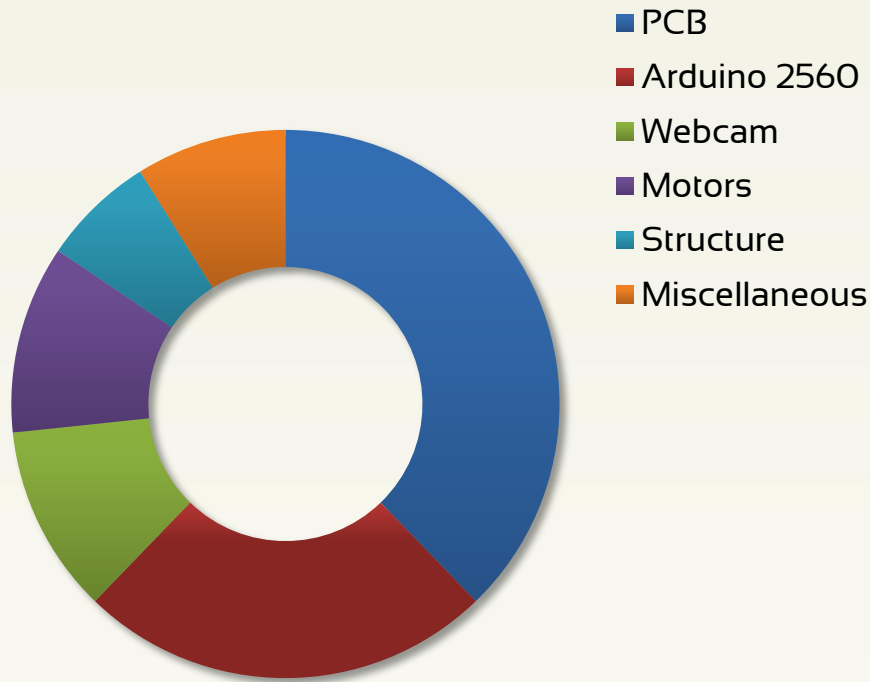
## Target Market

Focuses mainly on various sections of the service industry:

- Office
- Education
- Government
- Home
- Health care

# Product Overview

## Cost:



Component	Cost
PCB	\$170
2x Arduino 2560	\$110
Webcam	\$50
Motors	\$50
Structure	\$30
Miscellaneous	\$40
<b>Total:</b>	<b>\$450</b>
<b>Projected Cost:</b>	<b>\$800</b>

# Product Overview

## Competitive Edge:

- A.I.T
- Automation
- Ergonomic Feedback

## Market Acceptance:

- Compatibility
- Innovation
- Reliability
- Consumer needs

# Market Research

## Competitor: Ergotron



- Variety of products offered
  - Stands, wall mounts, workstations
- Price range from \$130 - \$450
- Several other competitor exist
  - Display2Go
  - LCD arms
  - EZIO



# Market Research

## Market Demand:

- Ergotron's net profit for 2010 is **\$190** million[1]
- **210** million units of computer monitors sold in 2012[2]
  - Canada project to sell 7 million units
- **\$103** billion market by 2015[3]
  - **\$25** billion market for computer monitors[3]

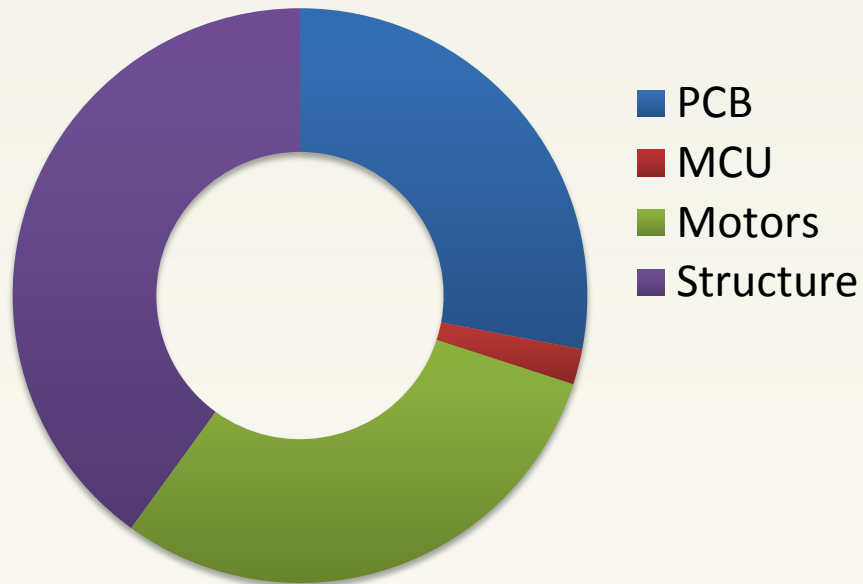
[1] <http://www.ergotron.com/tabid/95/ItemID/184/default.aspx>

[2] [http://www.prweb.com/releases/computer\\_monitors/CRT\\_LCD\\_monitors/prweb1569054.htm](http://www.prweb.com/releases/computer_monitors/CRT_LCD_monitors/prweb1569054.htm)

[3] <http://www.electronics.ca/presscenter/articles/1406/1/Global-Flat-Panel-Displays-Market-to-Reach-US1028-Billion-by-2015/Page1.html>

# Pricing Strategy

## Mass Production Model:



Component	Cost
PCB	\$14*
MCU(onboard)	\$1*
Motors	\$15*
Structure	\$20*

**Total Cost: \$50\***

\* Estimated based on 10,000 units purchased

# Pricing Strategy

## Before Retail :

- Extensive User Research
- Invest in evaluation products for retailers & distributors

## Aggressive Pricing :

- One of the kind
- User friendly
- Environmental friendly

# Pricing Strategy

## Comparison:

- **Ergotron: Extended LCD Arm \$130**
  - \$40 profit\*
  - \$65 manufacturing cost (material + labor)\*
  - \$25 Overhead expenses\*
- **Display Augmentation System \$150**
  - \$65 profit
  - \$50 manufacturing cost
  - \$35 Overhead expenses

\* Assuming minimum 30% profit and 50% manufacturing cost

# Market Strategy

## Promotion:

- **Distribution Channels:**
  - **Local Retailers:** Memory Express, NCIX, A-Power
  - **Regional:** Future Shop, Best Buy, London Drugs, Staples
  - **Direct Sales:** Online Marketing
  - **Government Agencies:** Hospitals, Libraries, Banks
  - **Large National Cooperation**

# Market Strategy

## Marketing:

- **First Stage:**
  - Start at local & regional level
    - Cost benefit analysis
    - Timely market feedback

# Market Strategy

## 3 years sale volume forecast:

2013

•1000 units

2013

1,000  
Units

2014

•2,500 units

2014

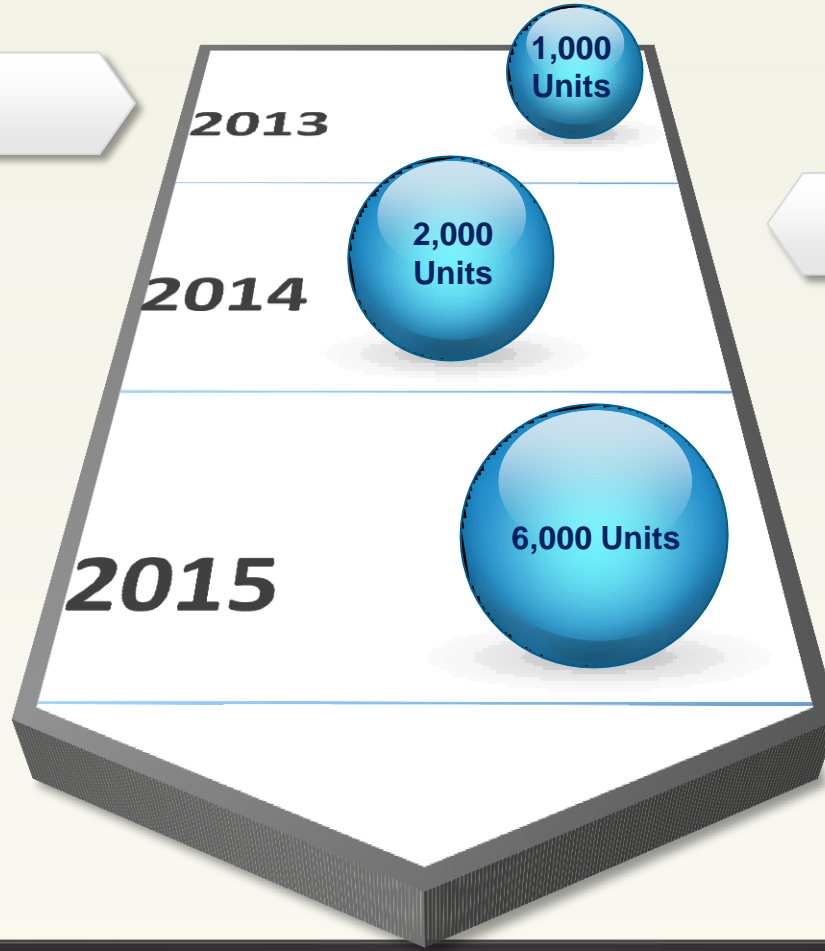
2,000  
Units

2015

•5,000 units

2015

6,000  
Units



# Market Strategy

## Marketing:

- Second Stage:
  - National Distributors
  - Too early to forecast
  - Additional research required



# Risk Analysis

- **Market acceptable risk**
  - Too Advanced?
  - Manufacturing cost too expensive?
  - Retail price too high?
- **Design Deficiency**
  - Motor noise bit high
  - Not very Aesthetically pleasing



# Wrap Up



[Contact Us](#)

[Daedalus-tech.comeze.com](http://Daedalus-tech.comeze.com)

[P. 778-388-3751/Daedalus-tech@googlegroups.com](mailto:P.778-388-3751/Daedalus-tech@googlegroups.com)

# Timeline

ID	Task Name	Start	Finish	Duration	Sep 2011			Oct 2011				Nov 2011				Dec 2011				
					11/9	18/9	25/9	2/10	9/10	16/10	23/10	30/10	6/11	13/11	20/11	27/11	4/12			
1	Proposal	12/09/2011	22/09/2011	1w 4d																
2	Research	12/09/2011	10/10/2011	4w 1d																
3	Functional Spec	23/09/2011	13/10/2011	3w																
4	Design Spec	13/10/2011	18/11/2011	5w 2d																
5	Original Implementation	26/10/2011	21/11/2011	3w 4d																
6	Actual Implementation	21/10/2011	30/11/2011	5w 4d																
7	Original Final Integration	21/11/2011	02/12/2011	2w																
8	Actual final Integration	29/11/2011	05/12/2011	1w																
9	Original Debugging/Testing	26/10/2011	05/12/2011	5w 4d																
10	Actual Debugging/Testing	01/11/2011	09/12/2011	5w 4d																
11	Original Software Research	30/09/2011	20/10/2011	3w																
12	Actual Software Research	03/10/2011	21/11/2011	7w 1d																
13	Original Hardware Research	15/09/2011	12/10/2011	4w																
14	Actual Hardware Research	16/09/2011	03/11/2011	7w																
15	Original GUI Development	03/10/2011	24/10/2011	3w 1d																
16	Actual GUI Development	03/10/2011	02/12/2011	9w																
17	Original Face Tracking Development	03/10/2011	03/11/2011	4w 4d																
18	Actual Face Tracking Development	03/10/2011	29/11/2011	8w 2d																
19	Original Stand Development	28/09/2011	24/10/2011	3w 4d																
20	Actual Stand Development	27/09/2011	10/11/2011	6w 3d																
21	Original Electrical Development	10/10/2011	15/11/2011	5w 2d																
22	Actual Electrical Development	10/10/2011	18/11/2011	6w																
23	Original Software Testing	21/10/2011	06/12/2011	6w 3d																
24	Actual Software Testing	28/10/2011	08/12/2011	6w																
25	Original Hardware Testing	10/10/2011	08/11/2011	4w 2d																
26	Actual Hardware Testing	17/10/2011	02/12/2011	7w																

# Feedbacks

- Innovative and unique idea
- Interesting combination of technology
- Adaptable platform
- Great for home or business
- Very marketable
- Would buy

# Future Improvements

- Add help section to the software
- Handles all possible errors
- Multiple operating system support
- Quieter motors
- Smaller, sleeker, more universal appealing design
- Include optional IR sensor

# Future Improvements

## Designing For Scalability:

### Category A: Tilt | Pan

- Center monitor on user using preset target position
- Reduce glare and reflection

### Category B: Lift | Tilt | Pan

- Adjusts to various environments and movements
- Continues to provide the benefits of Category A

### Category C: Stand Alone

- Incorporates A and B without the need for a computing unit

# Future Improvements



A photo of the operating room of the future (ORF) at Massachusetts General Hospital in Boston. The monitors will show a comprehensive look at the patient's physiology during surgery, among other details.

# Future Improvements



# F.A.Q

# Acknowledgements

## › Thanks to:

Dr. Andrew Rawicz

Mr. Mike Sjoerdsma

Dr. Ivan Bajic

ESSEF Funding

Dr. Ash Parameswaran

T.As

## › Special Thanks to:

Henry Huang

Jordan's Dad



# Questions



**DAEDALUS**  
Technologies

[Contact Us](#)

[Daedalus-tech.comeze.com](http://Daedalus-tech.comeze.com)

P. 778-388-3751/[Daedalus-tech@googlegroups.com](mailto:Daedalus-tech@googlegroups.com)

# Demonstration



**DAEDALUS**  
Technologies

[Contact Us](#)

[Daedalus-tech.comeze.com](http://Daedalus-tech.comeze.com)

P. 778-388-3751/[Daedalus-tech@googlegroups.com](mailto:Daedalus-tech@googlegroups.com)

# THANK YOU



**DAEDALUS**  
Technologies

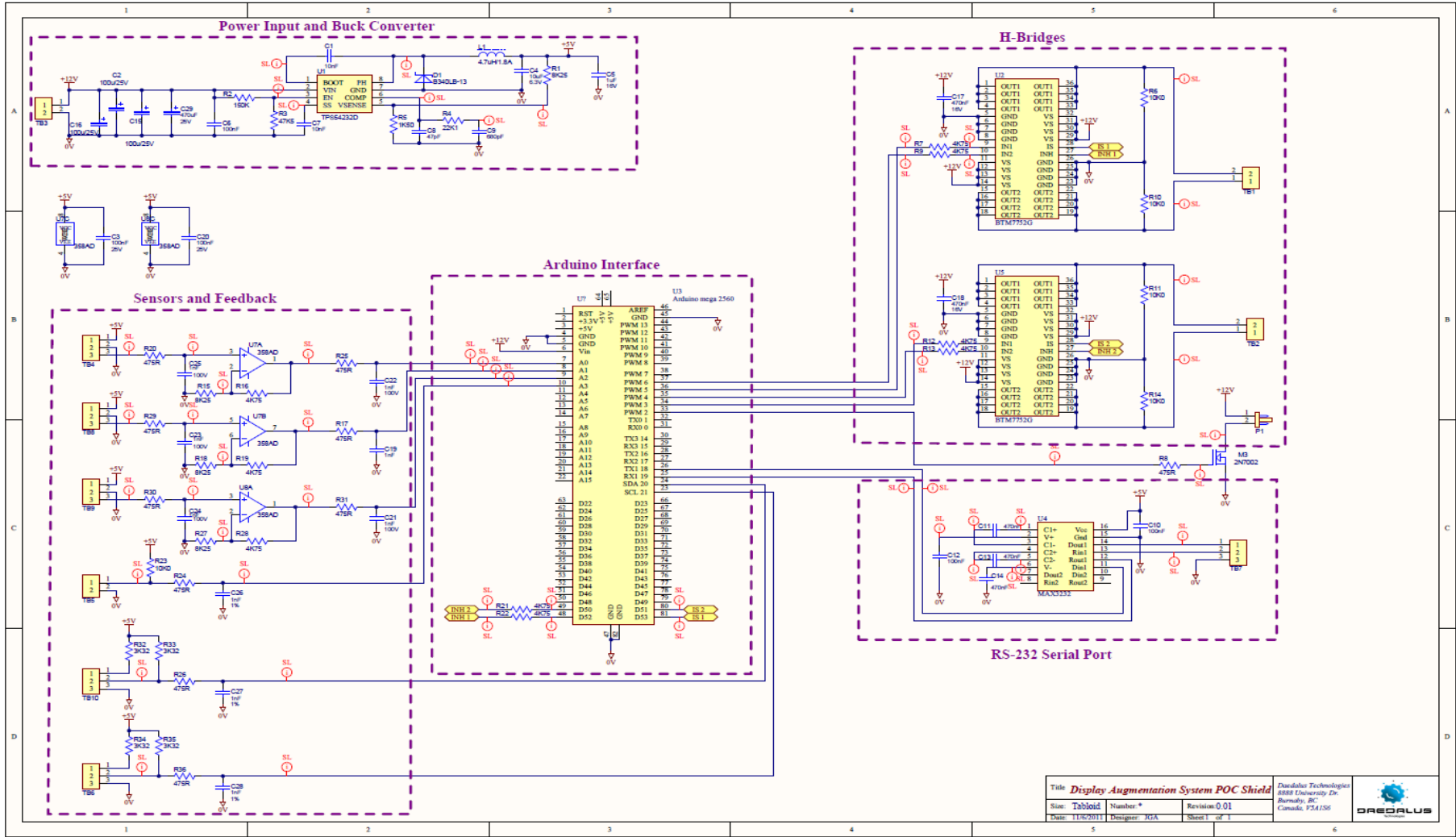
[Contact Us](#)

[Daedalus-tech.comeze.com](http://Daedalus-tech.comeze.com)

P. 778-388-3751/[Daedalus-tech@googlegroups.com](mailto:Daedalus-tech@googlegroups.com)

# Extra (backup demo)

# Extra



Title: <b>Display Augmentation System POC Shield</b>			Daedalus Technologies 8888 University Dr. Burnaby, BC Canada, V2A1S6		
Size: Tabloid	Number: *	Revision: 0.01			
Date: 11/6/2011	Designer: RJA	Sheet: 1 of 1			



# Extra





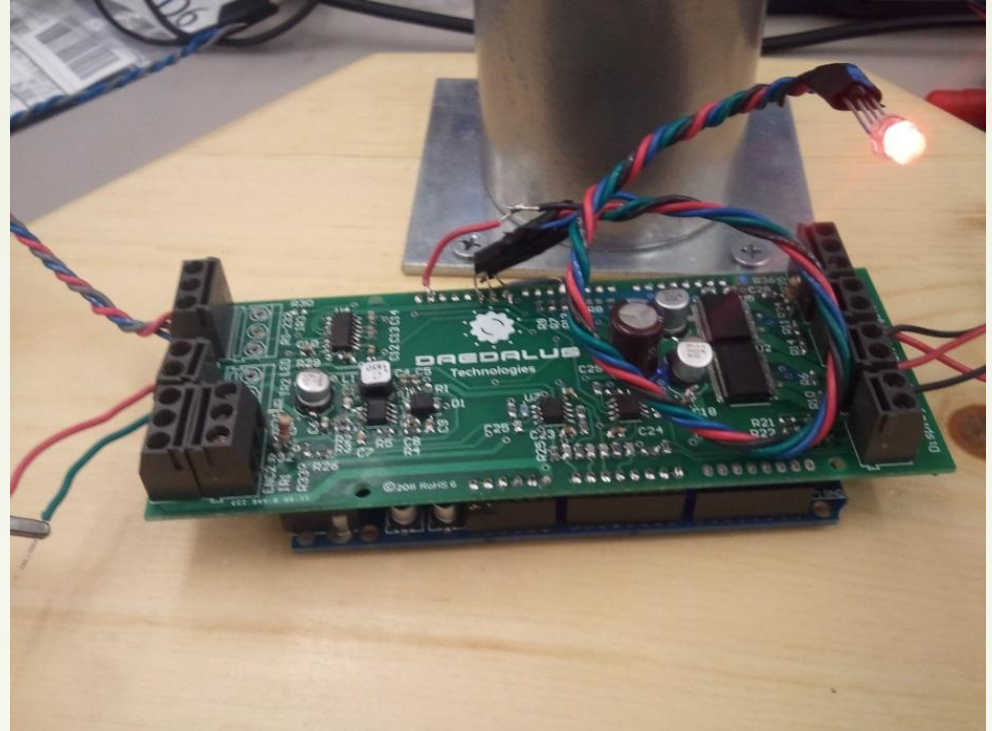
# Extra



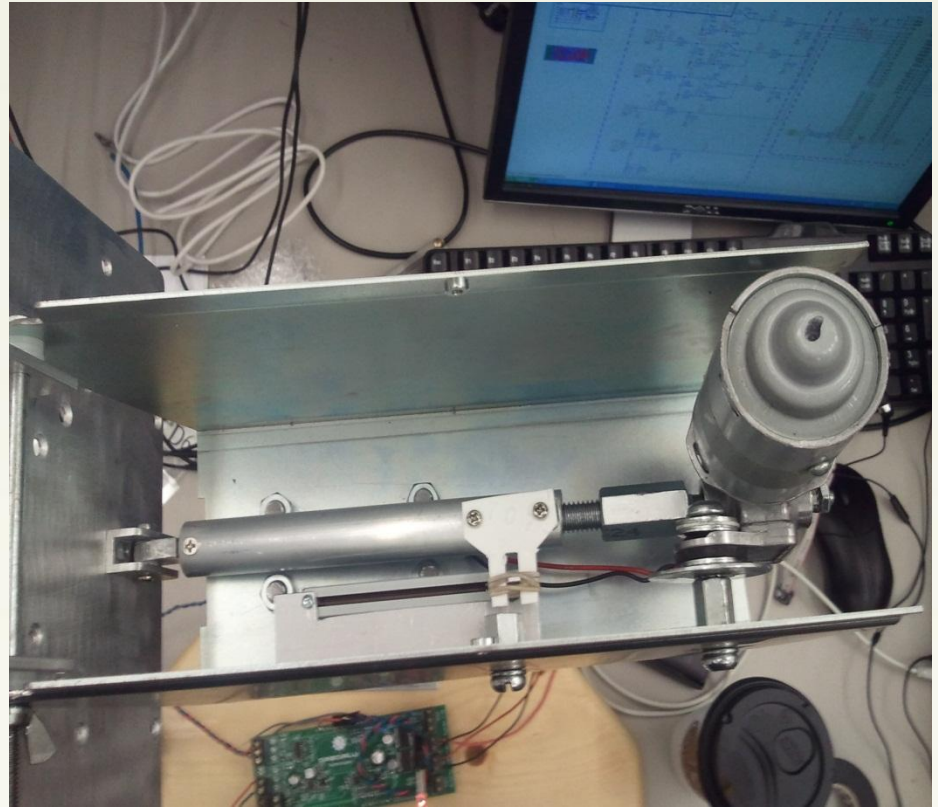
# Extra



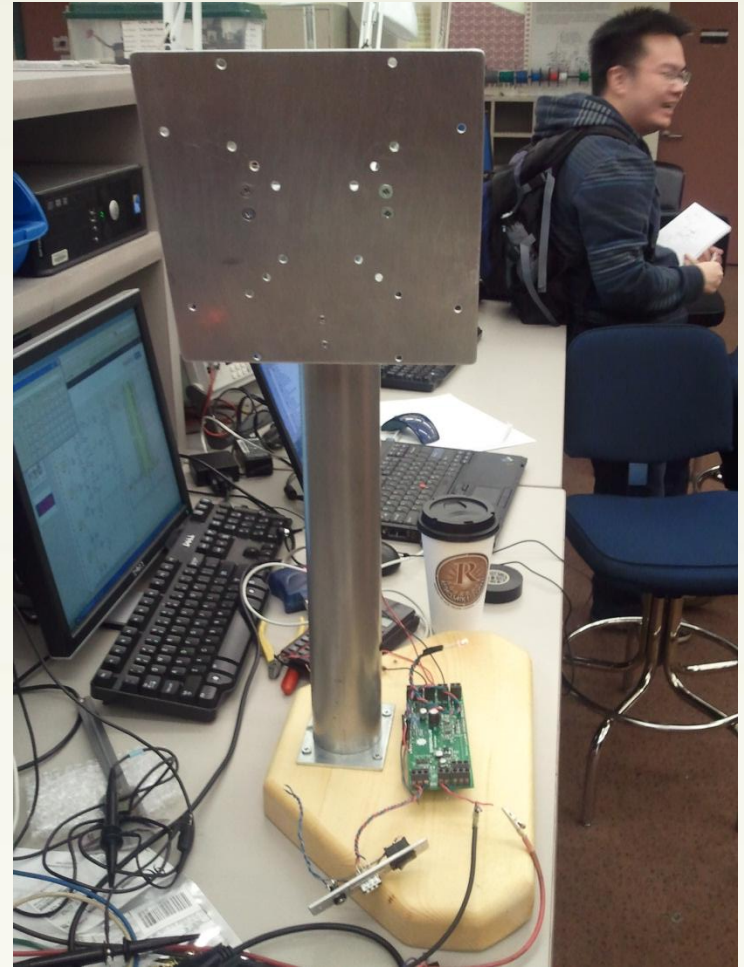
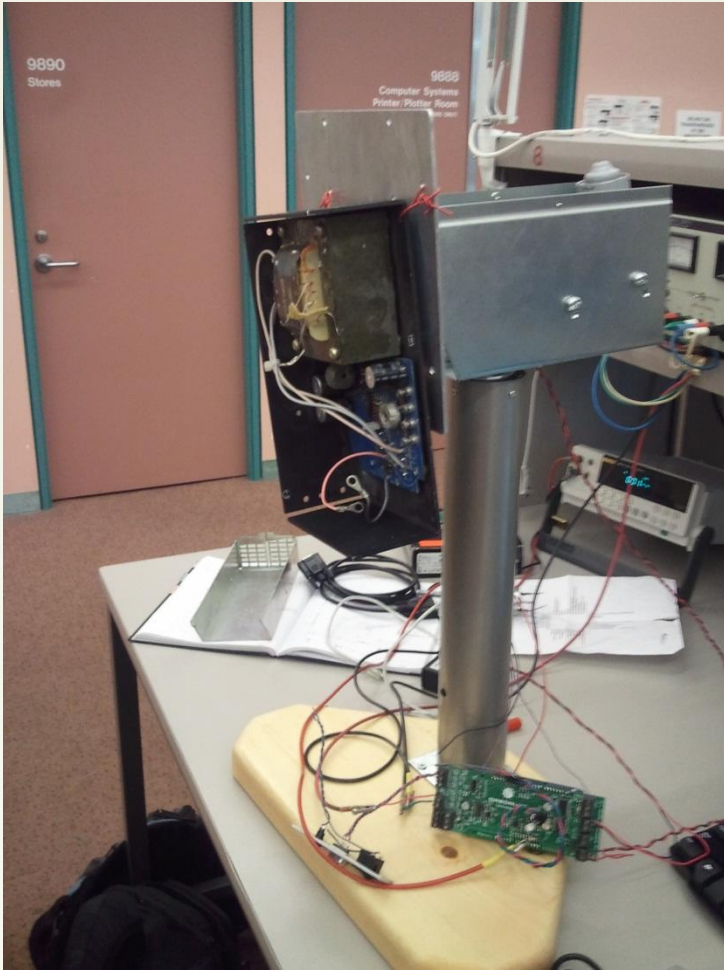
# Extra



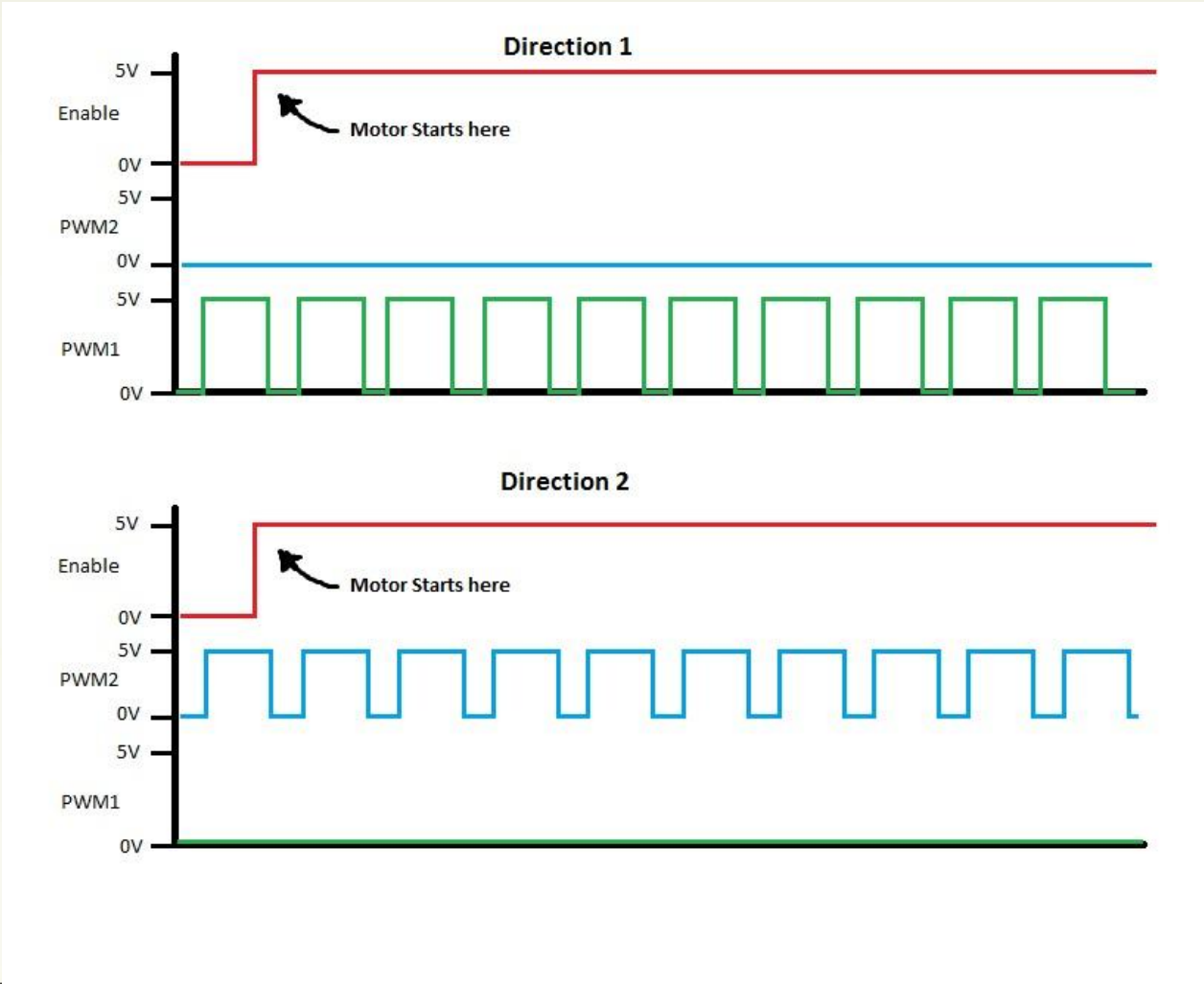
# Extra



# Extra



# Extra



# Extra

