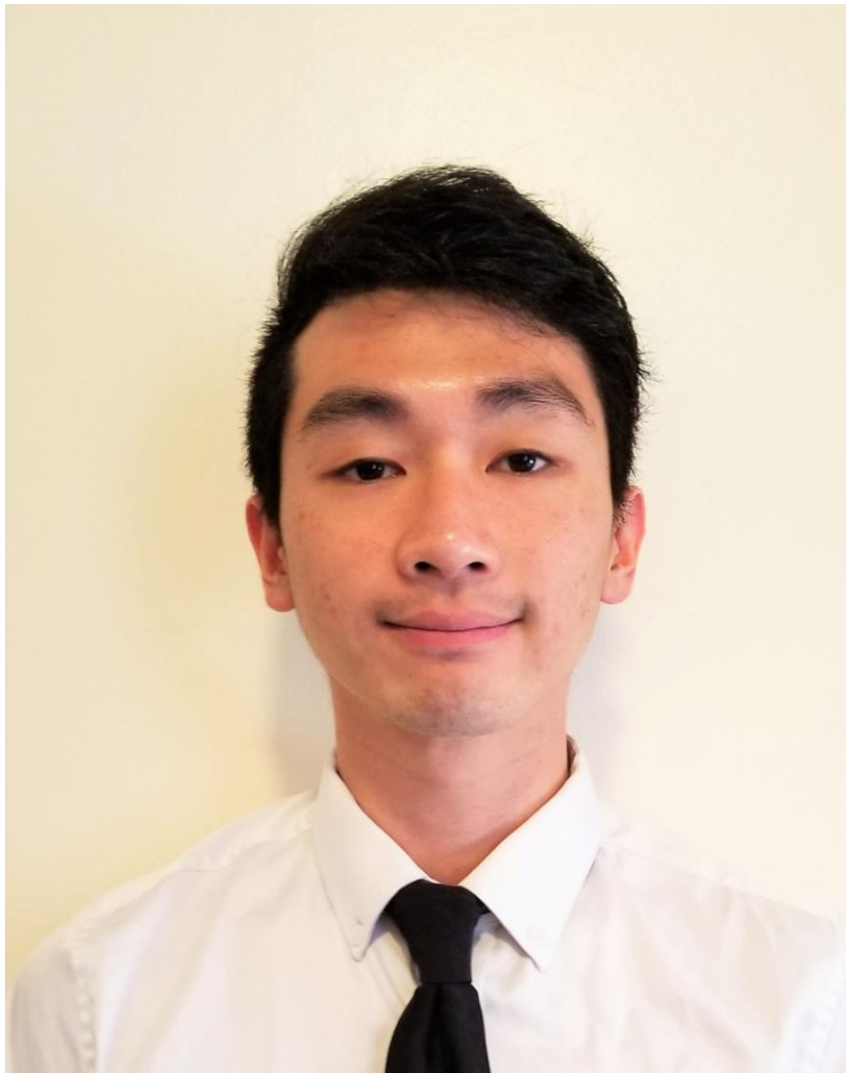

Cody Ger Portfolio

EMAIL: CODYGER1996@GMAIL.COM

PHONE NUMBER: 857-272-5799

LINKEDIN: HTTPS://WWW.LINKEDIN.COM/IN/CODY-GER-7609B3115/

WEBSITE: HTTPS://CODYGER.WEEBLY.COM/

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Professional Summary

Everyone is always constantly looking for ways to improve their life. I believe technology is the most effective way to do so and every time a new invention or product emerges, I try to understand it myself in hoping that it will improve mine.

After graduating from Northeastern University, it is suddenly my turn to create new designs not only for me, but for the people around me as well. With two Co-Ops (professional 6 month work experiences) and several projects under my belt, I have been molded into a goal driven, hardworking, curious, and adaptable individual, ready to take on the next challenge.

I am currently looking for a full-time engineering position that will challenge me to not only develop my engineering craft, but also as a person as well. I aim to work for a company whose goal revolves around creating a tangible product that will improve people's lives.

I thank you in advance for your interest and taking time to look through my portfolio.

Education

University

Northeastern University, Boston, MA

Bachelor of Science in Mechanical Engineering

September 2014 – My 2019

Three Internships

- NxStage Medical, Inc.
- MBTA (Massachusetts Bay Transportation Authority)
- YEH-TON Water Technology Company Ltd.

Engineering Experiences

NxStage Medical, Inc.

Time:

July 2018 – December 2018

Role:

Disposables Engineering R&D Co-OP

NxStage Medical, Inc. is a medical device company that creates and manufacture products for end-stage renal disease and acute kidney failure

At NxStage, I had the opportunity to be part of the engineering team were I could help design, prototype and test their upcoming cartridges that is designed to drastically improve renal treatment

NxStage Medical Inc. Main Project

Background/Problem Statement:
Filter clotting/clogging in long duration renal treatment will inevitably interrupt the process. Filter would then need to be taken out and the patient will have to restart the treatment

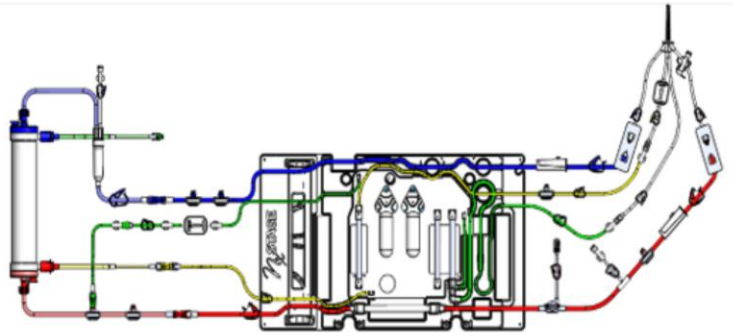
Task:
Understand, design, prototype and a cartridge that allows the patient to swap out clogged filter with a new one without having to stop the treatment.

Steps:
1.Used SolidWorks to modify previous designs of an existing cartridge and incorporate a stand alone filter
2.Prototype the design
3.Verified with engineers and nurses and redesign any problems found
4.Verified with contractors and manufacturing companies to verify molding size of minor parts
5.Maintained an organized bill of material and presented to managers an updated project tracking document each week
6.Performed Drop/Shock/Vibration tests on the prototypes

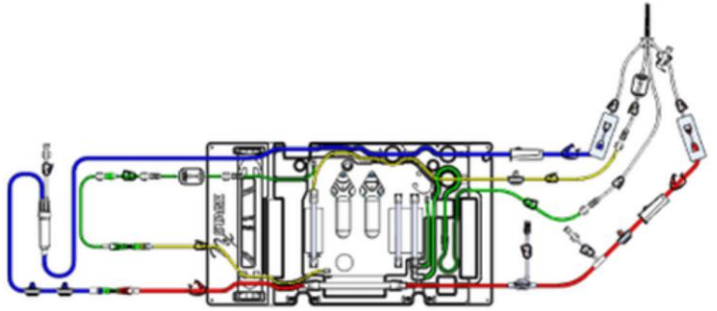
Skills Developed:
Instron Machine, Shaker Table Testing, Drop and Shock Vibration Test, Thermal Chamber Incubation Experiment, Project Management, Product verification and minor parts testing, Teamwork and communication, Material Selection and Part ordering

Major Design changes
–Modified and tested venous line tubing's length multiple times
–Modified arterial line tubing's length from until it fits comfortably with the dialysis machine
–Added an air chamber to the new cartridge to filter out any air from going into the filter

Minor design changes
–Flipped the roller-clamps on the venous and arterial line
–Implemented green shipping connectors into design



Initial cartridge before any modifications were made



New cartridge after the modifications

MBTA
(Massachusetts Bay Terminal Authority)

Time:
July 2016 – December 2016
Location:
Somerville, Massachusetts
Role:
Assistant Mechanical Engineering Intern

The MBTA is a public agency responsible for operating most, if not all the public transportation services in the Boston. At the MBTA, I had the opportunity to work with other engineers to learn about the locomotives responsible for taking us around the city.

MBTA Main Project

Task:
Create a cost analysis project for engineers to evaluate optimal manufacturing options for locomotive's steel wheel break
Steps:
1.Conduct thorough investigations of spent brakes at different locomotive shops
2. Identify the difference between a usable and an unusable brake
3. Perform stress tests on SolidWorks with different material and types of stresses to find the amount of time it takes to spend a brake
4. Determine whether the investigated brakes were thrown away prematurely
5. Write a report on how many usable breakes were scraped away and complete a cost-anaylsis spreadsheet on the potential resource saved
6. Present to head engineers about the project

Skills Developed:
Long term investigation, Teamwork and communication, SolidWorks, Project management

A new unworn brake for the locomotive

Spent shoe

Yeh-Ton Water Tech, Inc.

Time:
July 2017 – August 2017

Location:
Kaohsiung City, Taiwan

Role:
Assistant Mechanical Engineering Intern

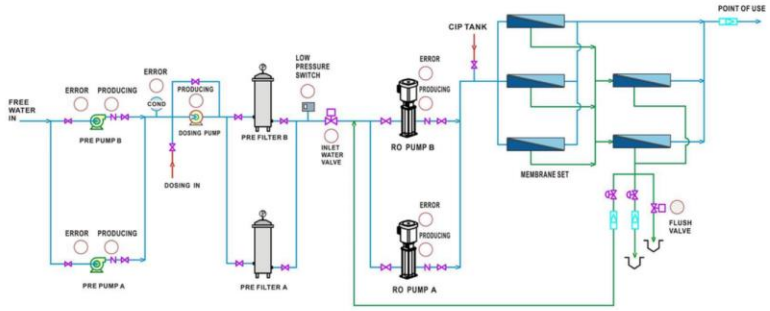
YEH-TON Water Technology Company Ltd. is a water filtration company that specializes in cutting edge reserve-osmosis filtration systems. They design, create and manufacture filtration systems for both small and large scale infrastructures and has given me the opportunity to be part of the engineering team where I could help create and test built water filtration systems so that it meets the end user's needs.

業東水科技股份有限公司
水處理設備

Yeh-Ton Water Tech, Inc.

Main Role:
Update all existing CAD drawings of filtration systems for more efficient equipment assembly, machining and installation.

Task:
Model and make water filtration systems according to consumer's needs.
Steps:
1.Used SolidWorks to modify previous designs of existing water filtration systems and change them according to consumer's needs
2.Simulate the design on ANSYS and fix any outstanding problems presented in the analysis
3.Build the prototype
4. Perform leakage and heat test.
6.Performed Drop/Shock/Vibration tests on the prototypes
7.Go on site and built the water filtration system
Skills Developed:
Instron Machine, Shaker Table Testing, Drop and Shock Vibration Test, Thermal Chamber Incubation Experiment,Leakage test, Project Management, Product verification and minor parts testing, Teamwork and communication, Material Selection and Part ordering, Metal welding



Schematics for large scale RO filtration system

A picture to display the schematic's system (schematic from above)

Project: Circadian Shade

Circadian Shades

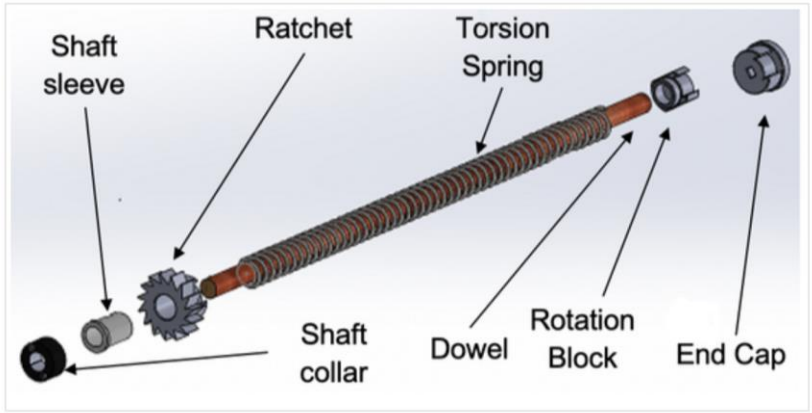
Background:
People with Circadian Rhythm Disorder often find it challenging to fall asleep and wake up on a natural sleeping cycle. People with Circadian Rhythm Disorder require a completely dark environment to fall asleep and a natural bright environment to wake up. The current demand is for a less expensive product that can create a fully dark environment for sleep. This product will improve quality of life for those suffering from Circadian Rhythm Disorder. Finally, this product is also viable for people with normal sleep cycles that prefer a dark environment and waking up to natural light.

Design Objectives:
The main goal of this project is to create an automatic opening window shade to combat the effects of Circadian Rhythm Disorder at a low cost to consumers. The product needs to be robust and create a completely dark bedroom environment for the consumer.

My Role and skills demonstrated in this project:
Brainstorming and concept ideation
Initial Calculations
Component assembly/component interface CAD
Prototyping and machining of parts of the shades
Rapid Prototyping (ABS and SLS 3-D printing)
Conduct FEA analysis on parts made
Final presentation poster
Final report and presentation
Project management and communication

Main Design Goals:
Low Cost
Creates a blackout environment by blocking sunlight
Passive (Timer-based semi-automatic opening)
Silent when unraveling

Design of Circadian Shades



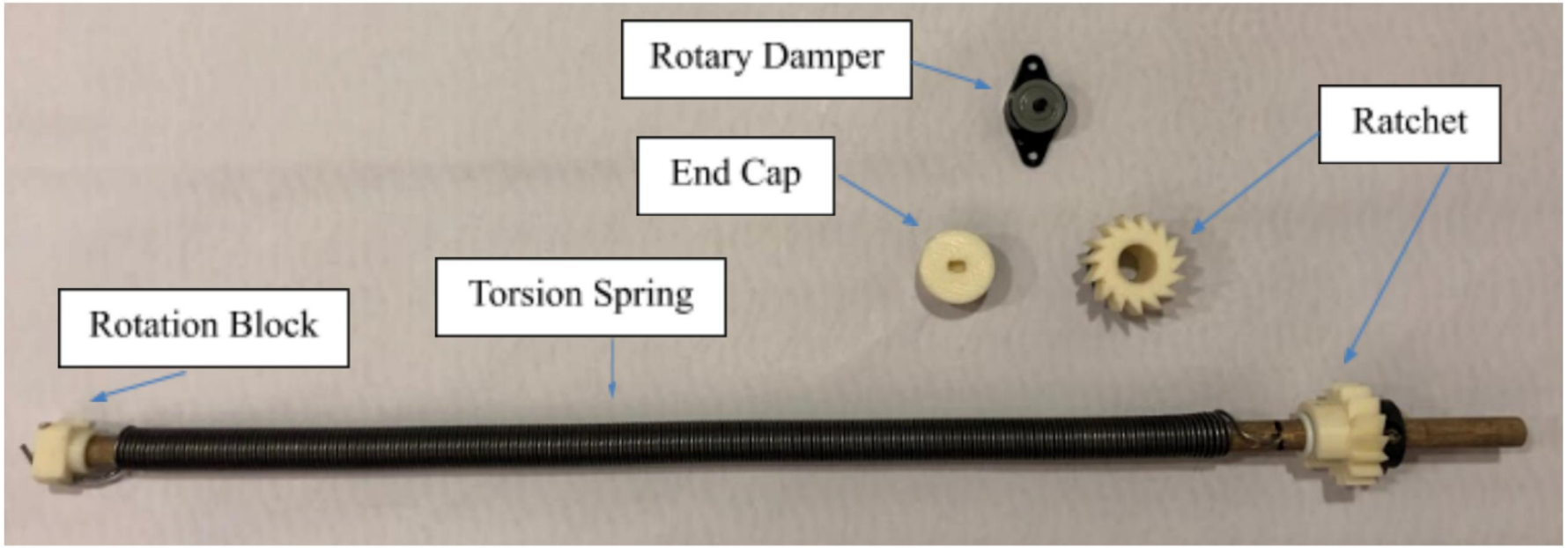
The Circadian Shades design consists of several key parts listed below

- Blackout shade fabric
- Aluminum housing tube
- Rotation block
- Torsion Spring and Dowel
- Ratchet and Pawl
- Servo Motor and Control System
- Rotary Damper
- End Cap

Design:
We developed three potential designs, one of which is the most functional. The difference in designs was the way energy was stored. The first being a counterweight system. However, this design was not chosen since reloading the counterweight after each use will be challenging to automate and may require the end user to pull the shade manually.
Another design considered is utilizing a power screw to roll the shade up and down. However, one drawback from this design is that the shade cannot be deployed down at intermediate heights. The latch-locking mechanism would only engage when the shade was fully deployed which would limit the versatility of the design. The long linear motion of the spring and subsequent rotation of the power screw would require lubrication and potentially periodic maintenance.

The final design considered includes a blackout shade that unravels from a spool. Inside the spool, a torsion spring and damper is attached to the spool that acts as a the power source to bring the shade up. When the shade is pulled down, the spring stores potential energy that is later utilized to rotate the housing tube and raise the shade. This design proves to be much better than other designs since not only does it create a completely blackout environment by extending all the way, but also would require a lot less work from the consumer.
Thus, we chose our final design that involves a spool.

Design of Circadian Shades



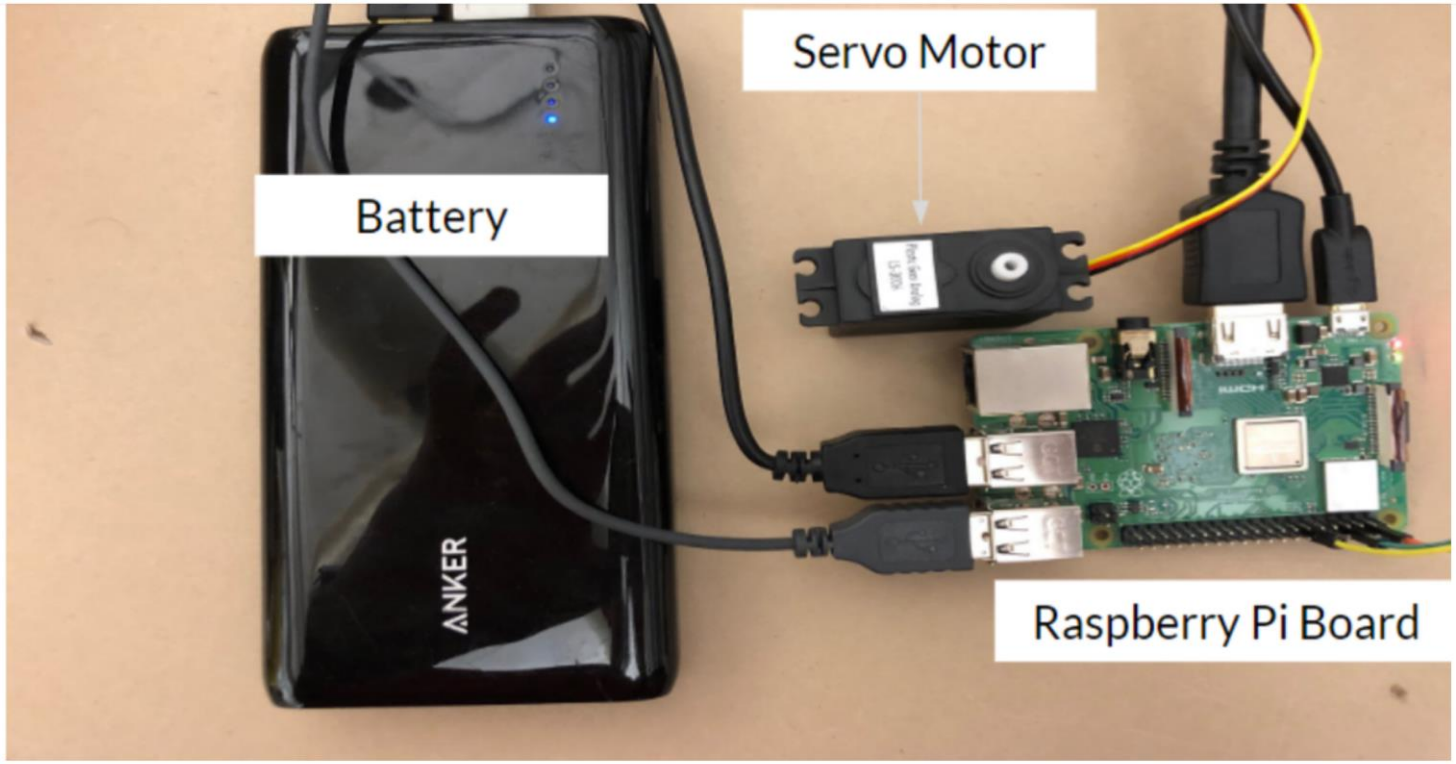
Each part contributes to one of three key design aspects including, creating a blackout bedroom environment, providing autonomous power, and a timed opening mechanism. As discussed in the background section, creating a blackout environment is vital for this products target market. The material being used allows little to no light to pass through by utilizing a vinyl backing with a tight weave black fabric exterior. To test the validity of this material a bright flash light was placed directly behind the fabric to see if light would pass through. After testing the fabric was validated and put into use.

Design of Circadian Shades

The torsion spring was custom made through a set of parameters detailed in the design. The torsion spring was mounted with a dowel through the center to provide and anchor point to build spring potential energy. To apply the energy to the shade, the rotation block was mounted to the free end of the spring. This rotation block was design to fit inside the aluminum tube and apply rotational force through the notch shown. This design idea was derived from how a manual pull down projector screen works. When pulled down the torsion spring builds energy that can be applied to roll the shade up when desired.

The final key design component is the timed opening mechanism. The shade has a ratchet gear attached to one end which rotates freely with the shade when pulled down, but is impeded in its motion by a pawl when the shade starts to move up. This mechanism will hold the shade closed, but can be opened from the control system which utilizes wireless connection to the user's cell phone over the Wi-Fi network. Before going to sleep, the user will close the shade, and set the timer for the desired amount of sleep time. When the timer hits zero, the phone will notify the Raspberry Pi board on the blind that activates the servo motor to rotate the pawl out of the position that impedes the ratchet gear. This creates a freely rotating shade which can rise to let sunlight into the room and wake the user. Additionally, the user will be able to open the shade at any point without setting a timer by pressing an override button on their phone.

Design of Circadian Shades



The key decisions that went into choosing the torsion spring design centered on the simplicity of the build. All three initial design ideas incorporated a stopper mechanism similar to the servo motor activated pawl in the torsion spring design, so that was not a key factor in the decision making process to start. With the torsion spring idea, it was extremely easy to house the energy inside the tube. This makes it difficult for the consumer to come in contact with the spring and potentially injure themselves.

Thank you.