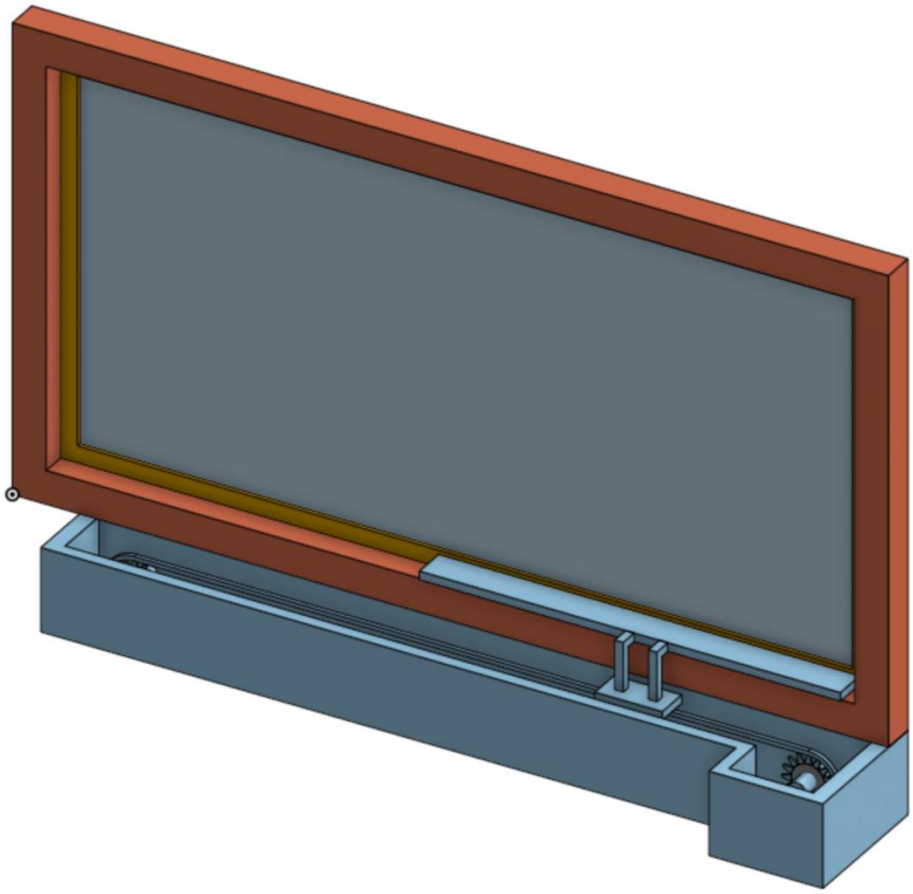
Deliverable D

Feedback and Detailed Design

During the second client meeting, we talked about the different ideas that the group members came up with and clarified some important information that we wanted to know. The main thing that we got from this client meeting was that the app that was to be developed would be Bluetooth-based since there is no ethernet cable near the window to supply a Wi-Fi route. The other thing was with the mechanical part of the design was that our idea 1 was not very attractive and we had to make it more appealing to the eye. Also with the mechanical part, we found out that the component attached to the window will need to be removed since the window gets cleaned frequently. So, the most important things that we would have to change with the design are to make it more attractive, have a higher importance on safety when the window is closing, and how to integrate the app to be Bluetooth or compatible with other apps that the client already has.

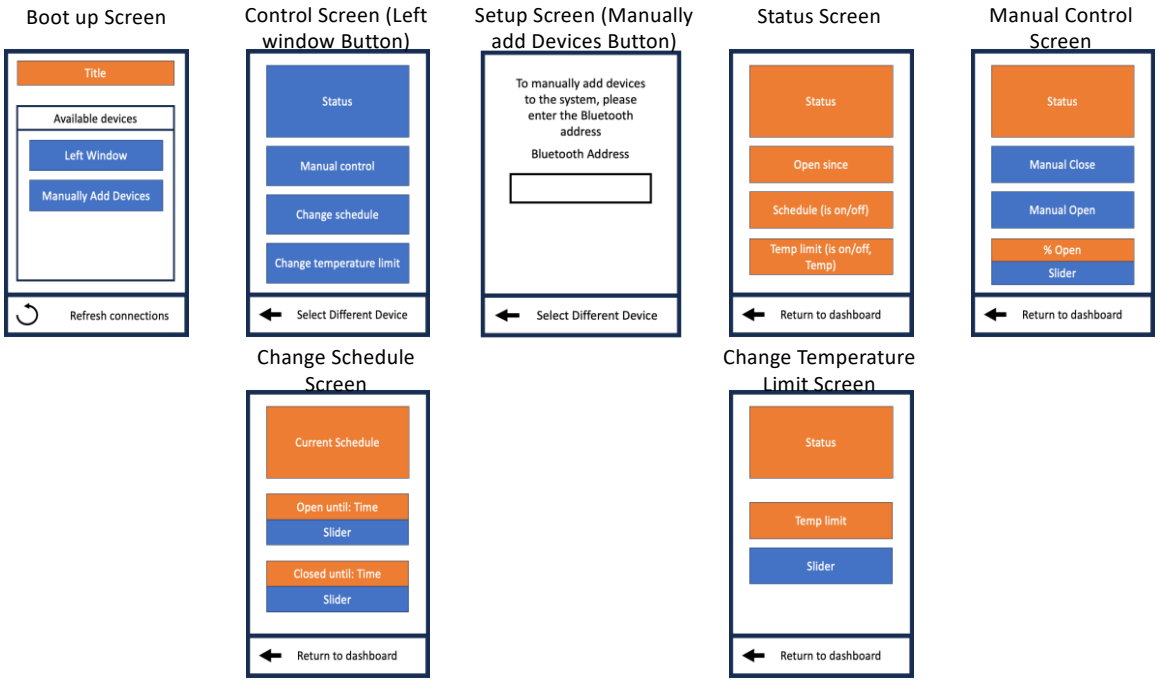
Hardware:

Our design as seen in **FIGURE X** features a chain spinning around two gears horizontally across the window. A platform will be welded to the top of the chain and from it, two arms will also be added to then connect to the window to make it open and close. There will be a spacer attached to the window which the arm can attach to securely and reliably so that the client does not need to worry about it. There will also be a mechanism to be able to disconnect the arms from the window for when the window needs to be cleaned. Lastly, electrical components and a motor will be inserted in the extra piece extruding from the casing which will be used to power the whole mechanism.



Software:

Our design for the software consists of two key parts. The first is an app on the client's phone and the second is an Arduino which controls the unit. The two systems interact using the built in Bluetooth on the client's phone and Adafruit Bluefruit LE Shield connected to the Arduino. The Arduino will be connected to the motor through a linear Voltage Regulator. Below is the interface of the app.



Management: Skills, Resources Time and Critical Assumptions

Some of the skills that the team have that can contribute to creating a design are:

Welding: This is needed to mount the metal part like the gears to the chain of the system

Metalworking: This is needed to be able to manipulate the metal pieces to fit on the system

Woodworking: This is used to build a box around the chain system

Coding: Needed to program the app in which the client will use daily to operate the window

CAD designing: for testing purposes of the mechanical portion of the project

Etc

There are no missing parts for this project due to team members already having backgrounds in all the fields needed. As well as the school also provides all the machinery, we need to be able to perform these tasks.

1. Time needed to make the design

A generalized timeframe based on the information currently available to us would be about: 8 Hours left of designing, 6 Hours in construction, 3 Hours in material acquirement, 3 Hours in coding and electrical construction.

Each member has 4 hours during the weekdays free as well as 4 hours during the weekends.

2. Define any other critical product assumptions that could affect your ability to implement your design.

The biggest obstacle that will get in the way of the completion of the project is the $100 budget. Another critical product assumption is that we will be able to develop an app for iPhone, right now this is uncertain if we will be able to accomplish this part of the project. If we are not able to create this app for the client, then we have to find another way to achieve our goal of making the device able to open and close the window from a distance. Considering the client doesn't have an android and only has an iPhone this could become a very difficult challenge.

If the window requires more force to open, then considered this would create a problem if we have already purchased the motor. We need to ensure the motor we get will work with a heavier window just to ensure the product works effectively.

We need to ensure that the product sits below the window frame or off to the side as we found out at our last client meeting that they remove the window for cleaning every so often. We were unaware of this as we were not informed of this during the first meeting. So, we now need to consider how to design the product to account for this.

3. Bill of materials (BOM)

Item	What it is?	Amount	Cost ($)	Source
1	Arduino Uno	1	15.25	Makerstore
2	Gears (2.5 inches in diameter)	2	13	Amazon
3	Chain (1 meter bike chain)	1	18	Amazon
4	Brushed Motor (18V)	1	25	Amazon
5	Wires (1 meter red 1 meter black)	2	10	Amazon
6	Bluetooth Chip	1	13	Amazon
7	Screws (self-tapping hardware screws, 2.5 in)	4	14	Amazon
8	Wood sheets (3x3 foot)	2	9	Amazon
9	Metal Sheets (2x2 foot)	1	20	Amazon

10	GoPro Mount	1	15	
Total			174	

1- https://www.amazon.ca/ARDUINO-A000066-Uno-DIP-1-5/dp/B008GRTSV6/ref=asc_df_B008GRTSV6/?tag=googleshopc0c-20&linkCode=df0&hvadid=292998575882&hvpos=&hvnetw=g&hvrand=128280296473905594 2&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9000668&hvtarg id=pla-457497319401&psc=1&mcid=a7f044f5ad36394899b45545a06ea9b4

2- https://www.amazon.ca/CNBTR-Brass-Wheel-Diameter-Modulus/dp/B07G54YQL4?ref_=Oct_d_otopr_d_11850886011_1&pd_rd_w=RwiDM&content-id=amzn1.sym.a7e32360-e793-4626-8be6-0e726ac90cbb&pf_rd_p=a7e32360-e793-4626-8be6-0e726ac90cbb&pf_rd_r=Q1QAKRSMHN04APG3BKCH&pd_rd_wg=Ci3V4&pd_rd_r=e1e1aa5 5-8f9c-4788-b60e-574fb36b169f&pd_rd_i=B07G54YQL4&th=1

3- https://www.amazon.ca/ZONKIE-Single-Speed-Bicycle-Chain-Links/dp/B078HRX7QS/ref=sr_1_1_sspa?keywords=bike+chain&qid=1707413638&sr=8-1-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1

4- https://www.amazon.ca/Goolsky-Original-Performance-Brushless-Fixed-wing/dp/B0799HRLGZ/ref=sr_1_10?crid=7ILVVIYLYTPY&keywords=brushless+motor&qid=1707413668&sprefix=brushless+motor%2Caps%2C113&sr=8-10

5- https://www.amazon.ca/EDGELEC-Breadboard-Optional-Assorted-Multicolored/dp/B07GD2BWPY/ref=sr_1_1_sspa?crid=1YCNY663Q4NQO&keywords=wires&qid=1707413714&sprefix=wires%2Caps%2C161&sr=8-1-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&th=1

6- https://www.amazon.ca/Development-Wireless-Bluetooth-Module-ESP32-D0WDQ6/dp/B07KTV2RRM/ref=sr_1_3_sspa?crid=BJMM9ZF741RK&keywords=bluetooth+chip&qid=1707413751&sprefix=bluetooth+chip%2Caps%2C118&sr=8-3-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1

7- https://www.amazon.ca/Mr-Pen-Assortment-Phillips-Assorted/dp/B092LP684Q/ref=sr_1_1_sspa?crid=229KQ9BU31VZP&keywords=screws&qid=1707413789&sprefix=screws%2Caps%2C160&sr=8-1-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1

8- https://www.amazon.ca/200x100x1-5mm-Unfinished-Natural-Basswood-Airplane/dp/B09FY7PX2P/ref=sr_1_6?crid=3IHN2E4ITTQKE&keywords=wood+sheet&qid=1707413840&sprefix=wood+sheet%2Caps%2C112&sr=8-6

9- https://www.amazon.ca/AIYULE-Aluminum-Protective-Treatable-Rectangle/dp/B0BLNL4GNT/ref=sr_1_2_sspa?crid=20U92OOP9KRU3&keywords=metal+sheet&qid=1707413886&sprefix=metal+sheet%2Caps%2C132&sr=8-2-spons&sp_csd=d2lkZ2V0TmFtZT1zcF9hdGY&psc=1

Project Plan Update:

https://uottawa-my.sharepoint.com/personal/etrai055_uottawa_ca/_layouts/15/guestaccess.aspx?share=EasZRpdAgZlIjK4nFhJKJn0BN_HTIq0AY5FYi-M5B0DcxQ&e=svqkY2

The link above will bring you to an Excel sheet with our gnatt chart. Within the gnatt chart you'll be able to see our subtasks and timeline for the upcoming deliverables, and the upcoming client meeting 3 milestone. For reference the deliverable and tasks are purple and the milestones are pink.