Our 2 Month Algae Infested Journey

The Beginnings of Our Toaster

Presentation Brought to You By: Team A10 - Zong He, Danny Ho, and Huanyu Liu

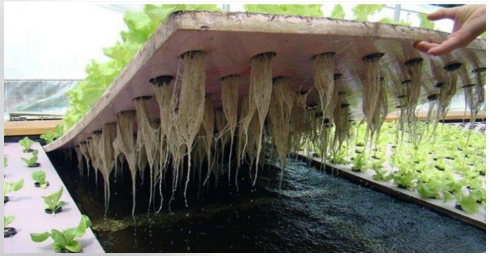
Introducing an Algae Infestation...

Problem was issued around the 20th of September, 2022:

1

LABOUR INDUCING

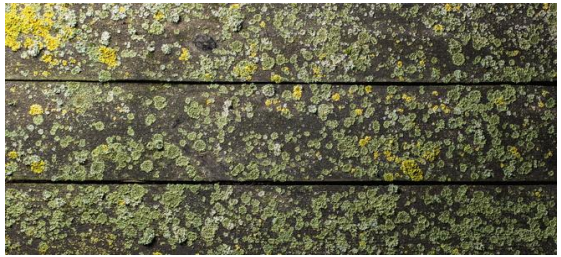
- 6-8 hours a day out of the 30 hours a week cleaning boards
- 2 pound boards (roughly 82 in a facility)
- Regular scrub and sanitol used



2

ALGAE AND BACTERIA

- Algae buildup
- Bacteria affecting roots
- Strong chemicals are not recommended to remove algae because it may harm the plants



3

CLEANABILITY

- Needs to be visibly clean (pretty difficult considering it is algae)
- Water can not be on the board since algae spreads through that contamination
- All sides of the board must be clean

Our Developed Metric and Design Specifications

Characteristic	Unit	Process
1. Length of the method	Inches	Read the product details on the web page.
2. Width of the method	Inches	Read the product details on the webpage.
3. Height of the method	Inches	Read the product details on the web page.
4. Cost	Canadian dollars	Look at the price on the webpage.
5. Cleanability	Stars	Read the user's ratings or comments on the webpage.
6. Clean Efficiency	Square feets per hours	Search the data of the product on google and do some simple calculations.
7. Level of automation	1. Humans need to do everything. (Traditional cleaning method) 2. Require humans during the cleaning process 3. The method does every thing.	Read the user's manual and measure the level of automation.
8. Training time	Minutes	Test the time needed to read and understand the product's instructions. Then take the average time spent by the teammates.
9. Durability / Quality	Years	Check the product warranty period and policy on the webpage.
10. Safty	1. Low: people need to pay attention and get injured easily. 2. Moderate: people need to pay little attention. 3. High: people do not need to pay any attention.	Read the user's ratings or comments on the webpage.

Characteristic #	Plan A	Plan B	Plan C	Plan D	Prefer	Relation	Target Value
1	14.5	25	17	10	Lower	<=	72
2	13.5	24	6.69	14	Lower	<=	48
3	33.9	35	2.75	20	Lower	<=	96
4	229	485	69	17	Lower	>=	100
5	4.4	4.0	4	4.8	Higher	>=	3
6	100	52	34	40	Higher	>=	30
7	2	3	2	2	Higher	>=	2
8	12	16	14	10	Lower	<=	20
9	2	1	2	1	Higher	>=	2
10	2	3	2	2	Higher	>=	2

Solution Options

1 High-pressurzied water

2 Electrical Scrubbers

3 Chemicals

Advantages vs Disadvantages

High-pressurzied water

Adv: High cleaning efficiency

Disadv: Cannot be used indoor

Electrical Scrubbers

Adv: High cleaning efficiency

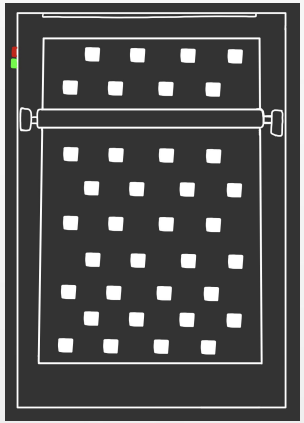
Disadv: Hard to clean the corner (need to change the brush)

Chemicals

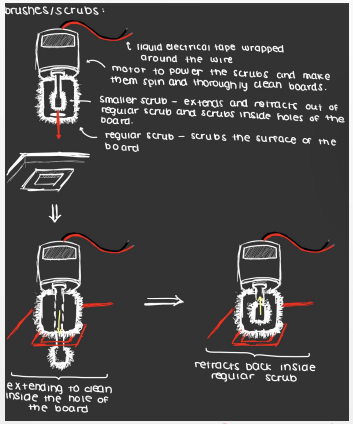
Adv: The algae will not back for long time

Disadv: Chemicals may distroy the plants

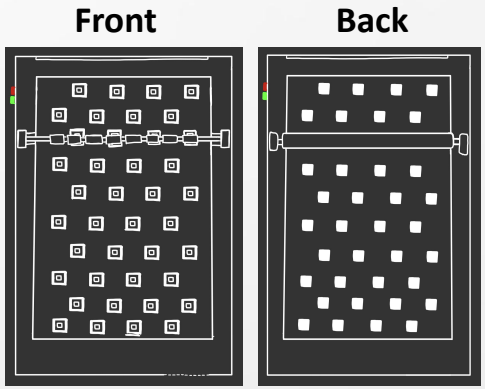
Design Thinking Process



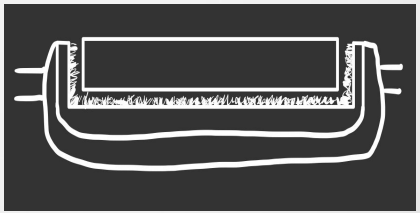
Clean one surface



Clean one surface with holes



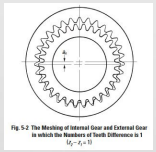
Clean both surfaces



Clean the sides

Based on automatic car wash system

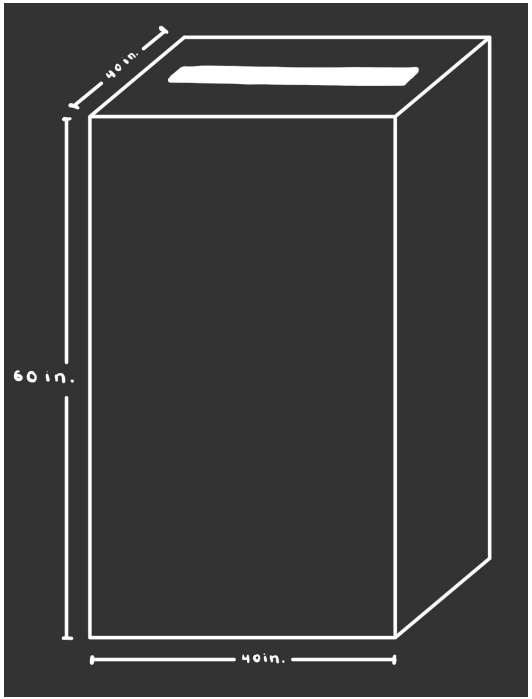
Based on gears & motors
Small scrubber - nomal gears
Big scrubber - internal gears



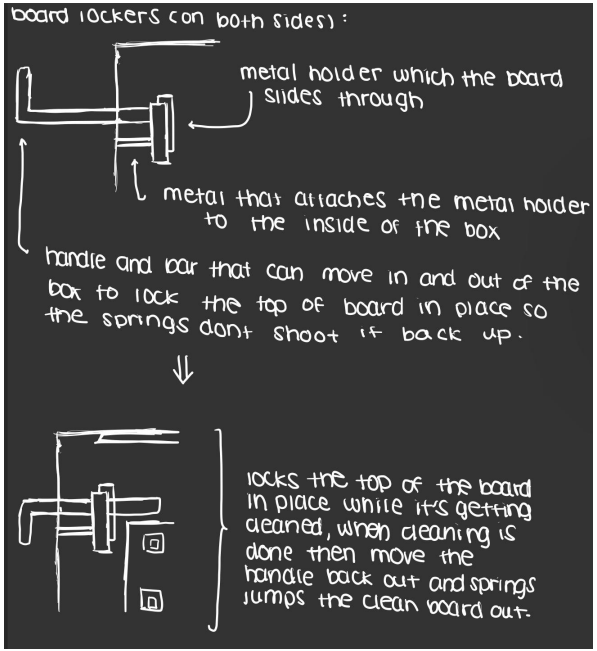
Move the clean one surface brush to the back

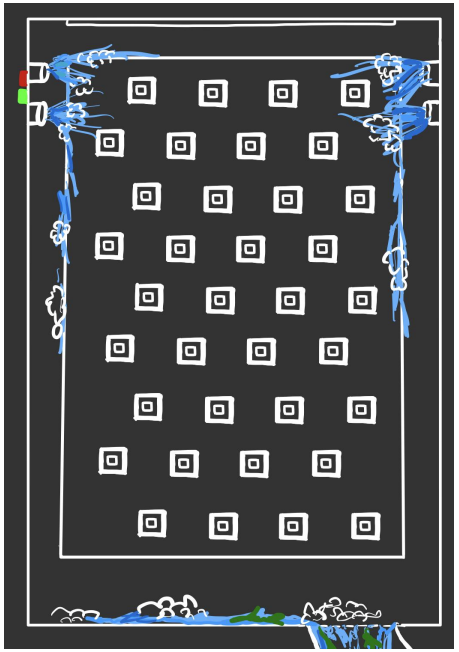
Add 2 brushes at the side of the board to form a **C** shape with the back brush

Size and Installation



Method of Fixing the Board

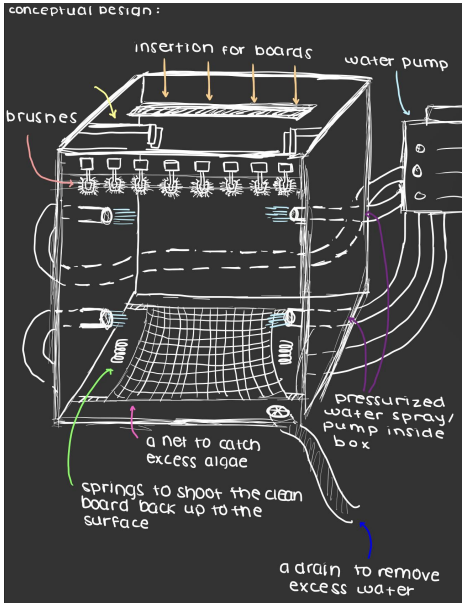




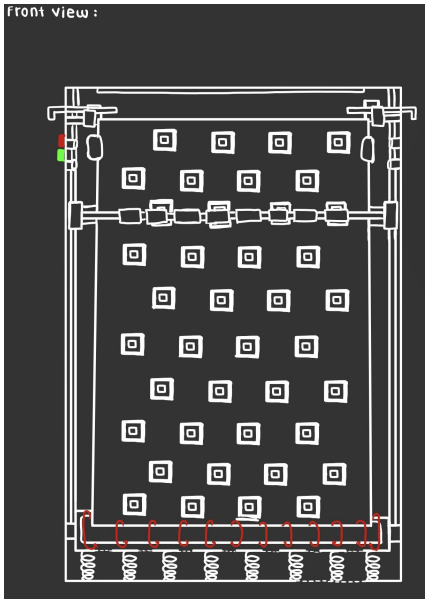
Rinsing and Filtering the Algae

We also considered

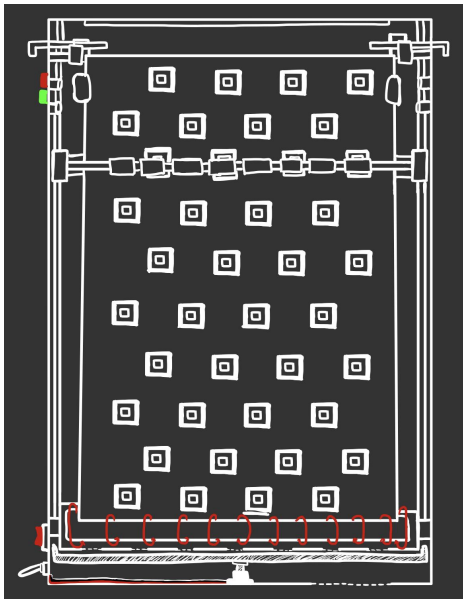
First Edition



Second Edition



Third Edition



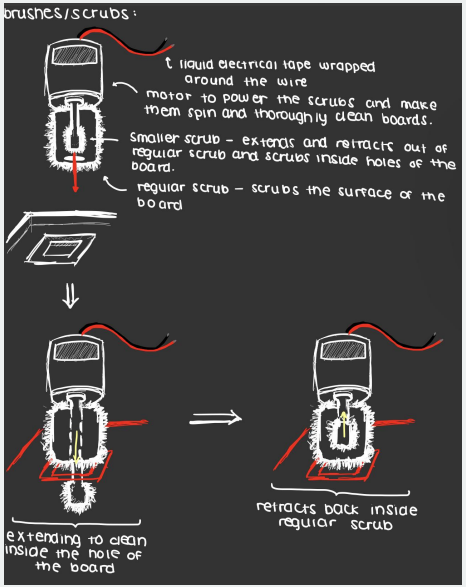
Full Design

We changed the springs to an electric push rod to lift up the board after the cleaning process is complete.

Prototype I

Physical Focused Prototype

- The front scrubs are the most important part
- To ensure the design works for both flat surface and holes on the board
- Provides an obvious result
- Clearly shows the design concept of this part

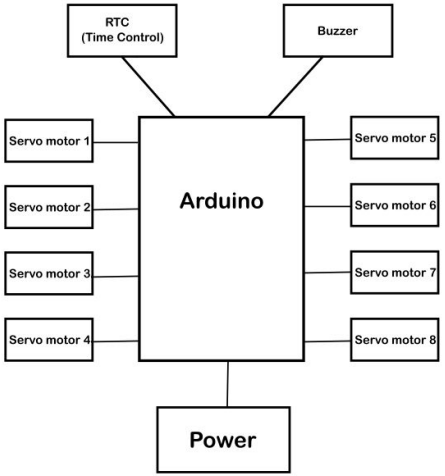


But...

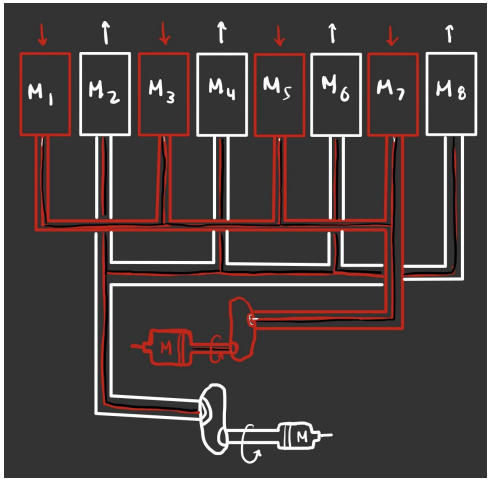
This prototype could be better if…

- We have more people in the team (we are only 3).
- We have more time.
- We have more knowledge of mechanical

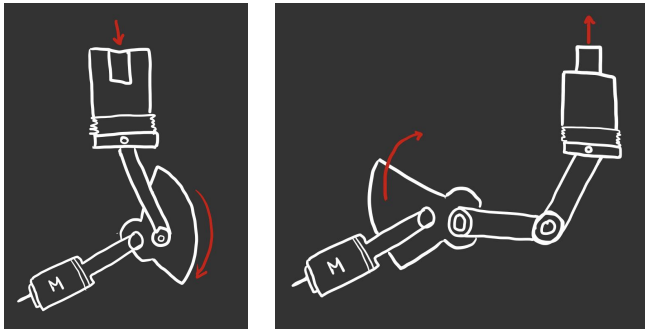
Prototype II



Flow chart of the circuit



Top view



Side View

Physical Focused Prototype

- Verifying the flow chart and construct the circuit
- To connect all motors together
- Ensuring that all the motors work
- To ensure the mechanical structure moves the 8 motors following the expectations

But…

We do not finish this part because…

- Heavy work load of other courses
- Lack of labors
- Shipping delay
- BOM problem

Lesson Learned

From this project and teamwork that what we learn...

1

exposed problems

2

How to work as a team

3

How to solve these questions

Future Work

- ★ Always Meet the needs of more users
- ★ Make lots of mistake on project requirement
- ★ Do not leave the work on last day
- ★ Two people can work the same difficult part
- ★ Feedback is important

Conclusion

- ★ Concept
- ★ Function needs to be improved

Danny, Zong and Huanyu