3-01 "Pool Filtration System" Inventors' Log

Done by:

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20 Jan 2020 (Monday): BRAINSTORMING FOR PROJECT IDEAS

- Our first meeting with our mentor
- We shared our first idea to our mentor
- First idea: An app that allows the patient to self-diagnose at home with the help of a doctor using a video call function
- The idea does not work as there is already an app (DoctorAnywhere) in place and this is under the category of InfoComm

29 Jan 2020 (Wednesday): SHARING OF PROJECT IDEAS + DISCUSSION

- Our second meeting with our mentor
- We shared our second idea to our mentor
- Second idea: An app that allows users to easily order their food by sending their order to the shop owner and then receiving a code. They will be sent a notification when their food is ready and they will self-collect the food after showing the shop owner the code
- The idea does not work as people may find it more convenient to manually order and it was under the category of InfoComm

18 Mar 2020 (Wednesday): MORE SHARING OF PROJECT IDEAS + DISCUSSION

- Our third meeting with our mentor
- We each came up with 2 ideas for an invention each and shared them to our mentor
- Our ideas:

	Ryan	Cheung See	Yu Teng	Kaven
Idea 1	A bag that comes with all your camp necessities (Including foldable tent and others)	A device that is able to clean up the leaves in the water/pool	A dustbin that has multiple plastic bags in it. Each time you pull one another comes out .	A water bottle/cup that catches leaking water
Advantages	Reduces the number of things that you have to carry when you are	There will be two parts, one that blows current towards one side of the pool,	This way you will not have to keep changing and this provides convenience	It will reduce the chances of staining anything near the bottle if the liquid inside

	camping	where the second part will be placed, a device that sucks the leaves. This allows the cleaners to have an easier job and they need not clean up the leaves		the bottle is not water
Disadvantages	It might not be used often since the user only needs it when he or she goes camping	It might not suck in all of the leaves	It is not exactly an invention and therefore it might be a waste of time making it	Similar inventions exist and therefore it might be a waste of time making it

	Ryan	Cheung See	Yu Teng	Kaven
Idea 2	A machine that creates and dissolves cutlery using 3D printing technology	A conductive like material that is like a mitten but used to fit different types of bowls with a elastic strap	A strap in the pants that keeps your shirt tucked in	A hole puncher that allows the user to see and align the holes
Advantage	Decreases the amount of cleaning up you have to do and the space that the cutlery takes up	With this material, people will be able to hold the bowls and need not use a tray and it is easier for them to transport their food from one place to another	This way, your shirt would not keep coming off (many people have this problem during PE lessons)	Allows the user to see through and align with another hole better instead of having to peek in between the upper and the lower section of the hole puncher
Disadvantage	It is expensive to create such a machine and we do not have the knowledge to build one	It might not be used very often as the user only needs it when holding a hot bowl and therefore it might	It might not be used very often as the user only needs it when conducting vigorous exercise and	Existing solutions might be better than this one and therefore it might be a waste of time making

		be a waste of time making	therefore it might be a waste of time making	

In the end , we decided to do the pool cleaning device as it was the most feasible. Also, not many inventions have tried to do so and floating leaves are often difficult to remove since they keep drifting away to the center of the pool.

THE BEGINNING

We started off by creating slides to do and sent surveys to see the needs analysis of our project idea.

31 Mar 2020 (Tuesday): DATA AND RESOURCE COLLECTING

- We worked together on our slides
- We collated our research that we did in our spare time and typed it into the slides
- We collected the responses from our survey and typed it into the slides.

2 Apr 2020 (Thursday): IMPROVEMENTS FOR OUR PROJECT IDEA

- Our fourth meeting with our mentor
- We discussed the invention we chose.
- Our mentor gave us constructive feedback on our prototype and how to improve it

13 Apr 2020 (Monday): REFINING OUR SLIDES AND PROJECT IDEA

- Our fifth meeting with our mentor using google meet
- We presented our final slides to our mentor via google meet and he gave us his feedback
- We discussed how to improve our slides and changes that need to be made
- We discussed our prototype and our mentor advised us on how to work on the next few phases of our project

20 July 2020 (Monday): UPDATING CERTAIN PARTS OF THE PROJECT BASED ON UPDATED RUBRICS

- We had a meeting via zoom to continue working on our project
- We worked on the slides and updated it according to the rubrics

- We continued our research online to find out which material is the best suited for the hardware of the system

21 July 2020 (Tuesday): UPDATING PROTOTYPE UPON FINDING FLAWS IN THE PROTOTYPE

- We had a meeting via zoom to continue working on our project
- We did more research and started on the new version of the prototype
- We also added the information from the research we did into the slides

22 July 2020 (Wednesday): FINALISING OUR SLIDES AND STARTED PREPARING FOR THE FINAL EVALUATION

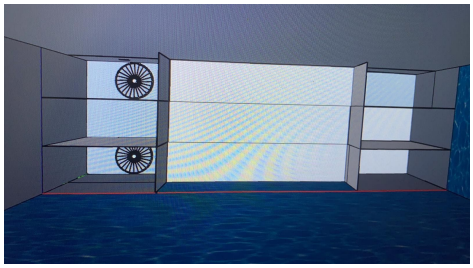
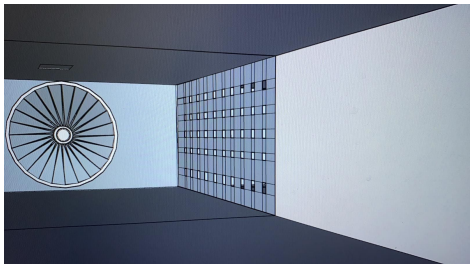
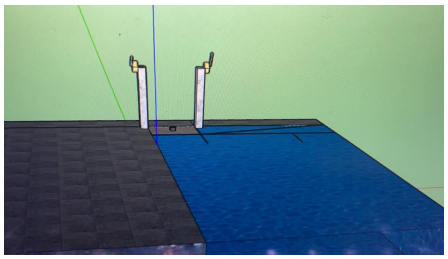
- We had a meeting via zoom to finish our project
- We finalised the prototype and the slides
- We started typing out a script for the final evaluation

28 July 2020 (Tuesday): FINISHED PREPARING FOR THE FINAL EVALUATION

- We showed our mentor the final slides
- We also practiced our script for the final evaluation

It was difficult to create such a device in a real life swimming pools as pool managements would unlikely give us the pool to test the invention. It needed much more costs and construction and so we used a 3D virtual prototype instead.

Our first prototype:

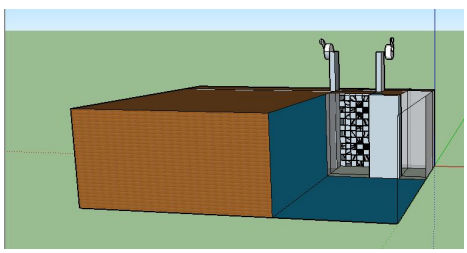




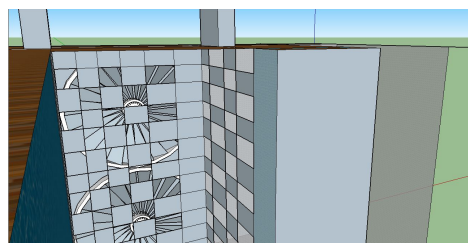
- First stage: It used to be two turbines underwater, one that blew leaves to one end and the other sucks leaves to another. However, we realised that most leaves floated on water so our idea was redundant.

- Second stage: We stuck on the same concept but we decided to add a compartment that contained all the leaves but we removed it as it was too costly.

- Third stage: We decided on 2 turbines, one near the surface of the water and one near the bottom of the pool. This would maximise the amount of leaves and debris that are sucked in by the turbines, thus reducing the number of leaves left after one round of filtering.

Our second prototype:(the final design)





- We thought that the turbines were more towards one side of the pool, which resulted in less water being sucked in, therefore it will be inefficient
- Thus, we decided to shift the 2 small turbines to the longer end of the pool, so that more leaves can be sucked in
- We also added gridded wall in front of the turbines to avoid leaves being sucked in the turbines

Materials

After comparing 5 different materials, we found that stainless steel is the most suitable for both the turbine and exterior of the system as it is

- Cheapest to reduce costs
- Strongest to withstand tension
- Is waterproof
- Least flexible

Below are the comparison tables of the different materials:

Materials	Strength	Waterproof	Flexibility	Cost
Polycarbonate	9500 psi	Yes	345000 psi	1.70-2.00 per pound
Stainless Steel	31200 psi	Yes	Least	0.35 per pound
Polypropylene	7980 psi	Yes	464 psi	12.47 per pound

Materials	Tensile Strength	Waterproof	Flexibility	Cost
Polycarbonate	9500 psi	Yes	Yes (under pressure)	1.70-2.00 per pound
Stainless steel	31 200 psi	Yes	No	0.35 per pound
Aluminium alloy 1100 Annealed (O Temper)	13 000 psi	Yes	No	0.50-1 per pound

Breakdown Cost

Breadth of pool x 0.35 per pound + 0.35 per pound x exterior of area of turbine

References:

This are the references on how we found our material's strength and properties.

https://www.curbellplastics.com/Research-Solutions/Materials/Polycarbonate
http://asm.matweb.com/search/SpecificMaterial.asp?bassnum=MQ304A
https://www.desertcart.com.kw/products/86494719-tedlar-air-gas-sampling-bag-pvf-film-sample-bags-with-double-polypropylene-valves-1-l
https://www.substech.com/dokuwiki/doku.php?id=wrought_aluminum_alloy_1100