Hwa Chong Institution
Project Work
Category 3 Inventions Log Book

Title of Project: Eco Air Cooler Filter
Group Name: Eco Air Cooler Filter
Group Members: 1. Seow Chee Heng (Leader) 2. Chua Wei Jun 3. Isaac Wong 4. Loy Ji Xuan Kyler

1. Problem Finding

(The beginning…)

Identify a problem you would like to solve. You may want to brainstorm for problems using different approaches eg thematic, survey or general brainstorming etc.

1 A Document a list of problems you have identified. Your documentation should show clearly how your group came up with the problems.

My group thought about the problem of air pollution. Air pollution as when harmful or excessive quantities of substances including gases, particles, and biological molecules are introduced into Earth's atmosphere. It may cause diseases, allergies and even kill humans; it may harm other living organisms such as animals and food crops, and may damage the natural or man-made environment. Both human activity and natural processes can generate air pollution.Indoor air pollution and poor urban air quality are listed as two of the world's worst toxic pollution problems in 2008. Air pollution in 2012 caused the deaths of around 7 million people worldwide.

My group also thought about the problem of global warming.Global warming is a long-term rise in the average temperature of the Earth's climate system, an aspect of climate change shown by temperature measurement and by multiple effects of the warming. The term commonly refers to the mainly human-caused observed warming since pre-industrial times and its projected continuation, though there were also much earlier periods of global warming. In the modern context the terms global warming and climate change are commonly used interchangeably, but climate change includes both global warming and its effects, such as changes to precipitation and impacts that differ by region. Many of the observed warming changes since the 1950s are unprecedented in the instrumental, and in historical and paleoclimate proxy records of climate change over thousands to millions of years.

1 B You should have selected a problem based on some considerations. Identify and justify these considerations.

1) The time taken to solve the problem.
2) How direct the problem have an impact on us.

3) The significance of the problem over time.

1 C List some problems your group would like to solve. List also the considerations for selection of problem in the evaluation grid below. Score the considerations, against the problems, with points 1 (least significant) to 4 (most significant). Sum up the total points for each problem. Identify that problem you would like to solve.

Problem Evaluation Grid

*add more columns and rows where necessary

Considerations for Selection	Problems		
	#1 Air Pollution	#2 Global Warming	#3
Consideration 1 **The time taken to solve the problem.**	3	2	
Consideration 2 **How direct the problem have an impact on us.**	5	3	
Consideration 3 **The significance of the problem over time.**	3	5	
Total Score	11	10	

2. Define the Problem

(This is one…)

Now that the problem has been identified. It is important to gather information on the extent of the problem and/or evaluate the usefulness of existing solutions based on *some criteria*. You may need to conduct surveys and research on existing solutions.

2 A Extent of problem (Research and discuss the problem and write down the problem statement)

1) Air pollution in countries who are living in poverty have caused the death of half a million people every year and the human population in these countries would drop drastically over the years.
2) Acid rain is precipitation containing harmful amounts of nitric and sulfuric acids. These acids are formed primarily by nitrogen oxides and sulfur oxides released into the atmosphere when fossil fuels are burned.

2 B Compare and contrast the existing or similar solutions.

Air cooler

- Cannot cool without humidification
- Can cause dry skin
- Can cause breathing problems

Air purifier

- Some releases ozone gas that can cause harm to the cells in the lungs and airways which can lead to shortness of breath, chest pain and cough

3. Your BIG IDEA#

(Developing the idea….)

Write down your proposed invention and why you want to do it. State also how you think your proposed invention is better.

3 A Describe your proposed invention.

Our idea is an Eco Air Cooler Filter. It uses algae to filter the air through photosynthesis.Since algae grows in water we will use lavender oil to repel mosquitoes from the algae and this way the air filtered from the Eco Air Cooler Filter will have the lavender oil smell and can repel mosquitoes in the room the Eco Air Cooler Filter is in. Since Eco Air Cooler Filter uses a blade, there will be a solar panel to convert light energy to electrical energy.

3 B Explain the purpose of your proposed invention and the potential benefits to users.

The purpose of our proposed invention is because annually, there will be haze in Singapore so we would need a cheaper Air Filter to prevent diseases and allergies.

The potential benefits to users are stated below.

The Air Filter in the market are expensive. Since we are using algae for filtering the air, it will be much cheaper as we can find algae almost everywhere in Singapore. Furthermore, algae can photosynthesise in artificial light especially in LED light. Plants respond favorably to specific wavelength specific light spectrum. In contrast, LED have the ability to produce wavelength specific light. There are also other types of light source for growing algae are LED, fluorescent, Incandescent, sunlight so this product will work since most people use the type of light above. For the lavender oil, it can repel mosquitoes and is not harmful to humans. Lavender oil is completely natural and fragrant.

3 C In what ways would your proposed invention be different and/or better than existing solutions, if any?

It is a combination of an Air Cooler and an Air Filter. It is also a cheaper option.

3 D What are some problems you expect in the course of your proposed invention?

1. **There will not be enough algae**
2. **The algae may die and give off a smell**
3. **The ability to make a suitable size for the filter to make a significant impact**

3 E What and when are the major milestone (project timeline) in your invention?

Date of major milestone	**Major milestone**
6th June 2019	First design of prototype 1
10th June 2019	Making of prototype 1
12th June 2019	Test of prototype 1 (failure)
15th June 2019	Designing process of prototype 2
17th June 2019	Making of prototype 2
19th June 2019	Test of prototype 2 (success)
23rd June 2019	Design confirmation of final product
26th June 2019	Making of final product
28th June 2019	Testing of final product

#must be able to be constructed based on current / emerging technologies, must not violate the laws of Science or go against the laws of nature.

4. Construction <u>or</u> Modelling Process*

(This first… then that…)

You are now onto the fabrication of your prototype/ product. You need to select material and understand how to put them together so that your prototype/ product can perform its function.

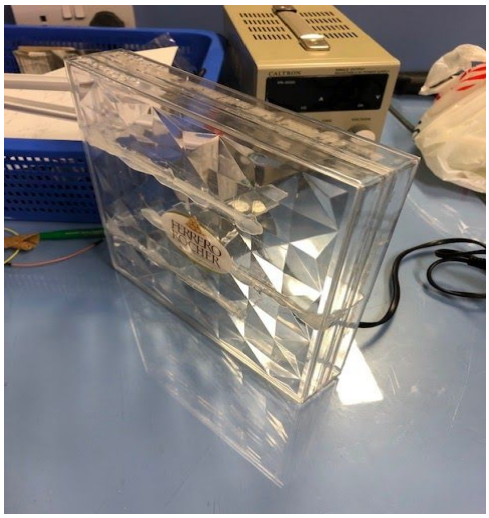
4 A Explain how and why the materials were chosen for the prototype/ product of your invention.

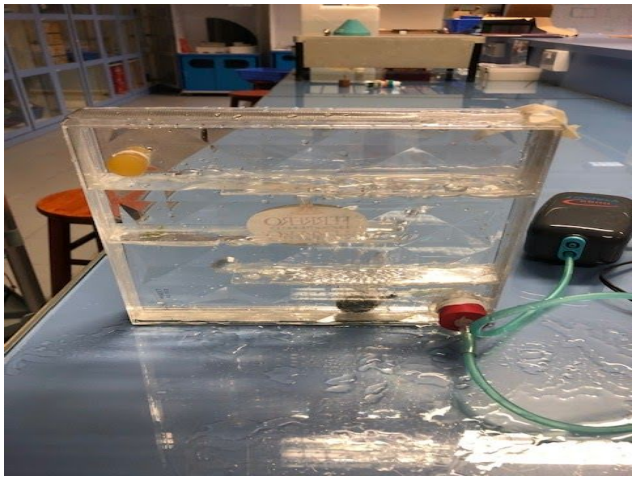
In our invention, we used mainly acrylic as it was transparent. Transparency was important for our invention to work.

4 B Explore these considerations that may guide the construction of your prototype/ product.

It would be easier for us to observe the growth of algae in our product and know how it would affect the significance of the impact of our product.

4 C Document the prototype/product development stages. You may use drawings, photographs or videos.





OR

If construction of the prototype is not possible, then you have to create an animation / as a proof of concept that it can be applied in a bigger scale.

4A Explain why construction of a prototype is not possible and the proof of concept is needed in your case.

NIL

4B Briefly explain how the video / animation can effectively show how your invention will work and the different considerations.

NIL

Warning:

- *Video / animated simulation only if prototyping is absolutely no possible.*
- *Video / animated simulation must be logical and convincing that the invention works.*
- *Constraints must be clearly included in the logbook or the project will be heavily penalized.*

5. Modification and Evaluation

Upon the completion of your prototype/ product, you would need to see if it is working the way you want it to work. Check if your product has met the identified purpose and the user's need**;** and implement necessary modifications and improvements. This process may take several rounds.

5 A Write down your prototype/ product test criteria and check against it if it works. Identify areas of weakness for modification. Indicate the test iteration and date of test.

Test Iteration: To find out what are the factors that will affect the impact that the prototype will make.	Tick			Remarks
Test Date: 30th June 2019	Pass	Fail	Potential Failure	NIL
Test Criteria 1: Does the algae photosynthesise under the light?	✓			The algae photosynthesise under the presence of our blue LED lights which resulted in an increase in oxygen level.
Test Criteria 2: Does the water in the filter leak out easily?	✓			Our Eco Air Cooler Filter is glued with acrylic glue, silicone and hot glue to prevent any water from leaking out.
Test Criteria 3: Are the acrylic planks in the filter sturdy enough to withstand the weight of the algae water?			✓	The planks are quite sturdy to withstand the weight of the algae water. However, we are concerned that in the long run, the acrylic glue used to hold the planks together might dry up and therefore the planks

				are unable to withstand the weight of the algae water.

*Add more rows for more criteria
** Repeat table for next test iteration

OR if you are creating an animation / video to show how your invention will work, write down the different possibilities / outcomes (success or failure) if a full-scale prototype is to be constructed.

(NIL)

6. References

Read http://www.bibme.org/citation-guide/apa/ on how to cite references.

6 A Cite the references you have used for your project work. Your source of reference should come from different types (eg books, magazines, websites, journal articles, interviews, photographs, product brochure, reviews etc.)

Website	CItation
https://go-clair.com/blogs/news/18475719-air-purifier-power-consumption	● URLhttps://go-clair.com/blogs/news/18475719-air-purifier-power-consumption ● Website TitleGo ● Article TitleAir Purifier Power Consumption ● Date AccessedJuly 03, 2019
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