

Hwa Chong Institution

Project Work

Category 3 Inventions Log Book

Title of Project: Ultra-Mesh
Group Name: So Called Engineers
Group Members: 1) Matthias Ong 2P124 2) Leroy Cheng 2P117 3) Cheng Min You 2P103

1. Problem Finding

(The beginning...)

Identify a problem you would like to solve. You may want 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.

-The theme of our invention was problems faced in the garden, so some problems we came up with was that:

- **Elderly can't bend down while gardening.**

We knew that the elderly's bones may be weaker and they are not able to balance their body as well due to old age.

- **Weeding is tedious and requires a lot of energy.**

We asked several of our friends and did some surveys; and one common thing they did not like about gardening the most was weeding

- **Youths are not interested in gardening.**

Due to the advance in technology, there are many gadgets available to play games. As such, youths are glued to their screens and dislike doing troublesome activities which gets their hands dirty.

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

- **It must be a worldwide problem.**

We would want to be able to solve problems that are frequently faced by people all around the globe as the impact would be greater

- **It must be a long-term problem**

This will allow for easier gardening in the future.

- **It must ignite people’s passion in gardening.**

We want more people to take up an interest in gardening.

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		
	Elderly can't bend down while gardening	It is tiresome to weed	Youths are not interested in gardening
Affects all age groups	1	4	2
Long-term problem	3	4	3
Deters people from gardening	3	4	4
Total Score	5	12	9

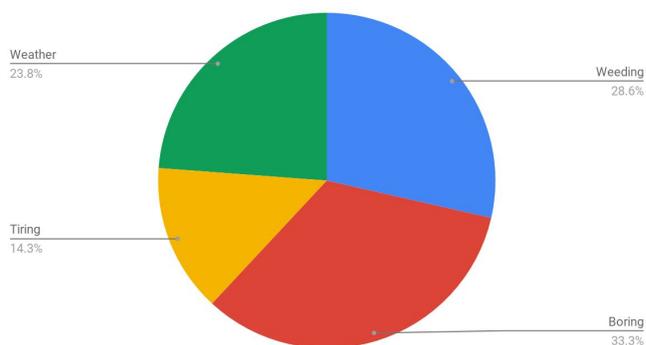
2. Define the Problem

(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)

Points scored



The chart above is a summary of the results we got from doing an online survey, and it shows that over half of the respondents did not enjoy gardening as it was boring and they needed to weed. In the world, there are hundreds of species of weeds and they are found everywhere where there's soil.

2 B Compare and contrast the existing or similar solutions.

1. <https://www.arbico-organics.com/product/weedguardplus-weed-inhibitor/weed-control-and-prevention> (WeedGuardPlus)

This product is an eyesore and it is quite expensive. You also cannot let your own plants grow. It also does not last very long as it hence very costly as people would need to repeatedly buy the product.

Our product is inexpensive and does not need to be repeatedly bought.



2. <https://www.arbico-organics.com/product/avenger-weed-killer-d-limonene-concentrate/weed-control-and-prevention> (Avenger Weed Killer)

This is a chemical which can harm life in the soil as well as the plants' roots if the chemical seeps into the soil.

Our invention does not harm any lifeforms as we do not use chemicals.



3. https://en.wikipedia.org/wiki/Landscape_fabric (Landscape Fabric/ Weed Cloth)

This product is not porous and allows only a tiny bit of water to seep through. With no openings, microbes and earthworms cannot reach the surface for air.

Our invention has many tiny holes which make it very porous, thus allowing life below the ground to still continue surviving.



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 product is a mesh-like metal sheet that users can place around their plants to prevent weeds from growing in its surroundings.

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

Our invention will prevent weeds from growing and will allow users to not have to weed! This product is very durable, which prevents the need for users to repeatedly buy the product. As such, everyone can focus on the more exciting and entertaining activities, without having to care about weeding.

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

Our invention is durable, and so it does not have to be repeatedly bought unlike other products. This invention also does not kill important life in the soil as air and water can still pass through easily. In addition, there are no chemicals used in our product, and so the plants and wildlife will not be harmed.

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

We have to scout around on where to find the metal sheet, and have to get the correct hole size such that weeds cannot grow through.

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

We hope to be able to find the right material before Mid-Term Evaluation and fix most, if not all of the flaws in our invention around 1 week before final evaluation.

#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 or 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

After much research, we decided to mainly use galvanised steel. Galvanised steel does not rust, but is cheaper and as durable as stainless steel, which means that it is able to withstand many damages without breaking.

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

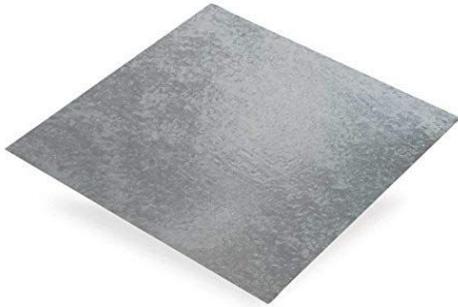
- The product must be resistant to rust
- The product must, of course, prevent weed growth
- The product must be very durable
- The product must be cheap
- The product must not harm the environment

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

1. For our very first prototype, we could not find any steel sheets that could be easily and quickly bought, and so we just decided to use a plastic(hard one) board that was wrapped in aluminium foil. This was honestly not a good idea at all as the plastic could be easily broken and the holes were way too small for water to flow through.



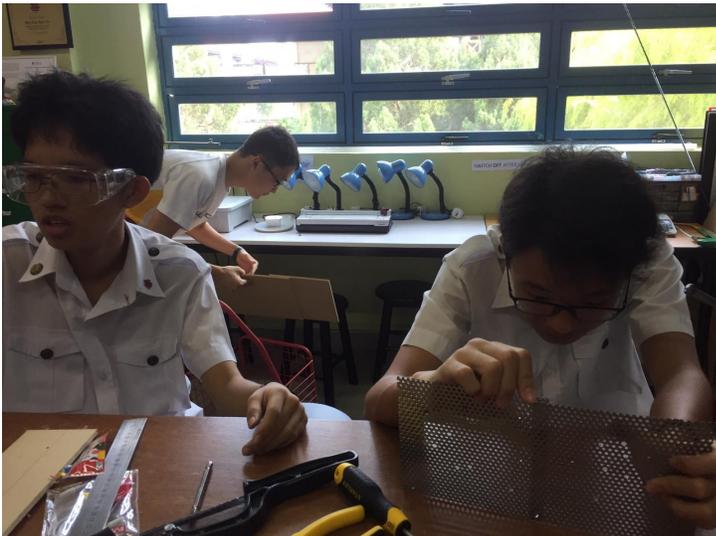
2. Since our previous prototype could not function, we had to spend a lot of time going to different places in search of stores that sell metal sheets as the delivery time when ordering online was too long. We are sorry as we forgot to take a picture of what the original product looked like, but the image below is what it should've been like.

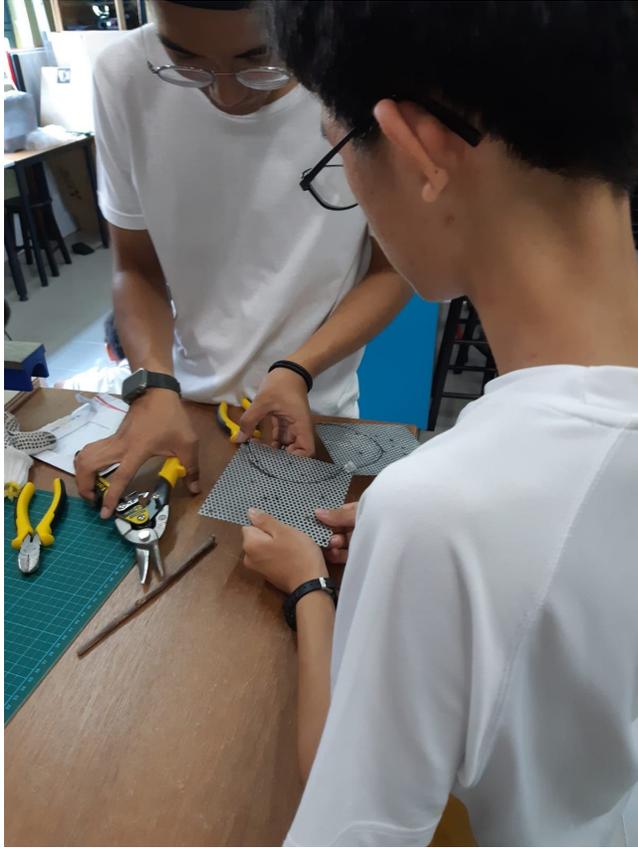


3. Next, we had to visit the makerspace to drill holes in the metal sheet. This was also not easy at all as we wanted to make the holes nice, straight, uniform and aligned. With the help of the provided drill and assistance from the helpers in makerspace, we were able to drill relatively nice looking holes, albeit some of them were a bit bigger as we could not control the drill properly.



4. Next, we broke the metal sheet into two pieces so that a hinge/ movable component could be inserted to allow the mesh to be opened in half and closed again. Right after that, we chose a tree to perform tests on and cut a circle in the metal sheet according to the tree's diameter.





5. By the end of this session, our prototype was working quite well as all of its parts were functional.



6. However, one major flaw we found with this version was that the product was just lying on the ground, and anyone who was careless enough could just kick it and send it flying away from its intended place. As videos cannot be inserted here, please click on https://drive.google.com/open?id=1XvxDroP6DAMrfsDQWMhz0zsl_UO7gcZo to see the video.

7. As such, as part of our last modification, we decided to add sharp prods to each side of the sheet so that it can be fixed and wedged into the soil. Once again, as videos cannot be embedded in here, kindly click on https://drive.google.com/open?id=18EMjaOa_F6okheXdcqhNQSWTDQ8AxGKZ to view the video.



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:	Tick			Remarks
	Pass	Fail	Potential Failure	
Test Date: 3 July 2019				-
Must let water seep through fluidly/easily		✓		Water seeps very and too slowly
Must be sturdy and not break easily		✓		Bends very easily
Must be rust-resistant/not disintegrate			✓	Outer coating will disintegrate easily
Must be able to be opened in half		✓		Not included in prototype
Must not move from original location		✓		Not included in prototype

Test Iteration:	Tick			Remarks
	Pass	Fail	Potential Failure	
Test Date: 20 july 2019				-
Must let water seep through fluidly/easily	✓			Many tiny holes which allow water to flow through easily
Must be sturdy and not break easily	✓			Made of metal which does not break easily and is very durable
Must be rust-resistant/not disintegrate	✓			Made of galvanised steel
Must be able to be opened in half			✓	The part holding both metal sheets together may come off
Must not move from original location		✓		Not included in prototype

Test Iteration:	Tick			Remarks
	Pass	Fail	Potential Failure	
Test Date: 5 July 2019				-
Must let water seep through fluidly/easily	✓			Many tiny holes which allow water to flow through easily
Must be sturdy and not break easily	✓			Made of metal which does not break easily and is very durable
Must be rust-resistant/not disintegrate	✓			Made of galvanised steel
Must be able to be opened in half	✓			The screw holding the metal sheets together was changed and reinforced with a washer and hot glue
Must not move from original location	✓			Nails/prods included in prototype to prevent product from moving

*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.

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, magazine, websites, journal articles, interview, photographs, product brochure, reviews etc.)

- Ewald Weber, Daniel Gut. A survey of weeds that are increasingly spreading in Europe. *Agronomy for Sustainable Development*, Springer Verlag/EDP Sciences/INRA, 2005, 25 (1), pp.109-121.
- More Information on Weed Prevention and Control. (n.d.). Retrieved from <https://www.arbico-organics.com/category/weed-control-and-prevention>
- Frequently Asked Questions. (n.d.). Retrieved from <http://www.weedguardplus.com/faqs>
- Avenger Weed Killer Concentrate - Questions & Answers. (n.d.). Retrieved from <https://www.domyown.com/avenger-weed-killer-concentrate-questions-pq-4052.html>
- How many calories do you burn during Weeding, cultivating garden? (n.d.). Retrieved from https://www.fitday.com/webfit/burned/calories_burned_Weeding_cultivating_garden.html
- Organic Standard Weight Rolls. (n.d.). Retrieved from <http://www.weedguardplus.com/standard-weight-organic/organic-standard-weight-rolls-i-fran009724000000250-group>