

Hwa Chong Institution

Project Work

Category 3 Inventions Log Book

Title of Project: Transbrella
Group Name: Transbrella
Group Members: <ol style="list-style-type: none">1) Elliot Chang (Leader)2) Chung Wei Hong3) Lu Junjie4) Wong Zhi Wei

1. Problem Finding

(The beginning...)

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

Before coming up with a list of problems, the theme “Home and school life” was used to narrow the search of our problems. The problems of a **disorganised bag**, **the trouble of waking up** and **umbrellas that do not work in both weathers**.

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

The problem of umbrellas that do not work in both weathers was chosen to work on. Transparent umbrellas are almost obsolete when you use it as a shield against the blazing sun as the light coming from the sun can pass through. On the other hand, an opaque umbrella is a much better alternative to use under the sun. Unfortunately, using an opaque umbrella during a heavy storm becomes a hazard as you cannot see where you are going with the opaque umbrella over your head and you might injure yourself. While on the other hand, using a transparent umbrella, you will be able to see clearly and the chances of you hitting an object will be lower. Most transparent umbrella tend to be lighter than opaque ones too.

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

Considerations for Selection	Problems		
	#1	#2	#3
	Umbrellas that do not work in both weathers	Disorganised bag	the trouble of waking up

Consideration 1 Cost	3	2	2
Consideration 2 Demand	3	1	2
Consideration 3 Feasibility	3	3	1
Total Score	9	6	5

2. Define the Problem

(This is one...)

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

Through various online articles, we found out that transparent umbrellas are gaining popularity at a fast rate, as specially in modernised countries like Japan. This is due to the fact that it has a great aesthetic design. However, it has a huge downside- it cannot be used effectively in under the sun. Even though the Singapore government has introduced many sheltered walkways, it is nearly impossible to shelter every inch of Singapore, hence proving that umbrellas are still important. Opaque umbrellas can block up to 90% of the sun's UV rays while Transparent umbrellas can block up to 40% (J.A.M.A Dermatology, Umbrellas are good shields from sun and rain, 2013) Thus, these prove that umbrellas are still relevant in modern society and are used widely by people.

2 B Compare and contrast the existing or similar solutions.

While researching for existing solutions and alternatives, we found two solutions that came close to our invention. The first one was an umbrella found on amazon. It was called the 'Yuelove Portable Transparent Sakura Mushroom 3-fold Umbrella', is semi-transparent and claimed to be able to shield you from Ultraviolet rays. However, it has a few disadvantages. Firstly, it may only cost US\$9.73 but add on the cost of shipping and the price will rise significantly. Additionally, the Ultraviolet protection will not be as effective as actual opaque umbrella. Finally, this umbrella does not even ship to Singapore.

Secondly, we also found a similar product by NanJing university which has yet to be constructed. It transforms a transparent umbrella to an opaque one using a special transparent liquid that reacts when placed under light. However, we also found some major flaws with this. Firstly, the liquid needs to be placed in between the umbrella and will be very costly. Additionally, the ink might not always be transparent. Finally, it is just a design and is unavailable to the public

3. Your BIG IDEA#

3 A Describe your proposed invention.

Our proposed invention is an extension of an umbrella that can transform it into an opaque umbrella at will. It can be used on multiples weathers and works by using nylon covering and a series of clips and hooks to secure it in place. It can also be folded easily to fit into pockets or bags.

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

With this proposed invention, there will be no need to carry an opaque and a transparent umbrella to use in both weathers as it is inconvenient. It will be significantly cheaper, lighter and smaller compared to bringing two umbrellas on average and should be able to fit into most bags.

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

Our invention would be much cheaper than existing solutions that block ultraviolet rays but not sunlight and it can allow the user to be able to look around in all angles instead of just a small hole. There would also be no need to buy a new umbrella.

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

One big problem is that we might not be able to fit the extension onto the head of our umbrella and it may not be able to fold smoothly. The extension may not be a perfect fit to the umbrella too. Also, fitting it into a pocket or bag will be a problem

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

It will start from late May, whereby we will start the prototype creation. Then in approximately mid June, we plan to start the modelling process and in August this year, we will finish the written report. By the first of August, we will have completed our 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 or Modelling Process

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

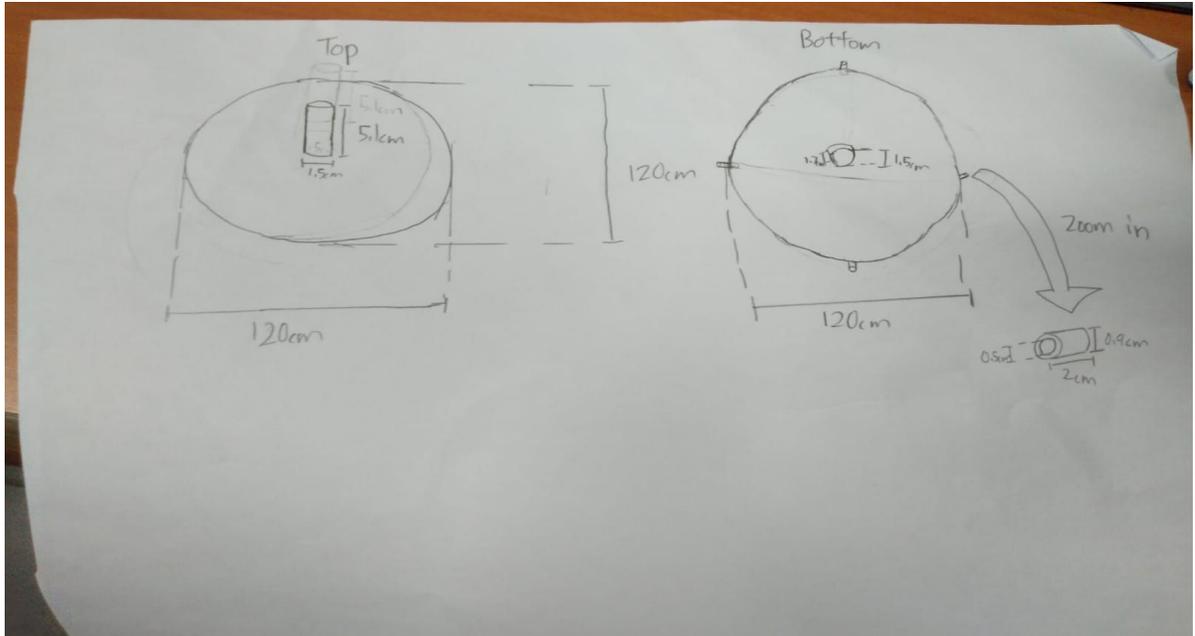
Our group has decided to use aluminium to hold of our prototype together and nylon as the fabric. As for Nylon, we researched using other options such as polyester and microfibre as they had some waterproof properties. However, both options failed as they were unable to be fully waterproof, an essential criterias for an umbrella. Polyester is heat resistant, elastic but not very strong as the fabric not woven tight (Polymer Database, Properties of Polymer, 2015) Hence Nylon was proved to be the next best option.

We chose aluminum to hold our prototype together as it is light. With a density of only 2.9g/cm³, a third of steel's density (World Atlas, What is the Density of aluminum, 2017), it is very light which makes it suitable to carry around

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

Before the construction, we came up with a few initial guidelines. It must be compact, light and secure. For the initial prototype, we were unable to make it fold to make it compact, even relative to its size. Thus we used different methods of folding our prototype

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



Picture 1: Final drawing of our prototype



Picture 2: Prototype 1 (scaled down)



Picture 3 and 4: Materials for product



Picture 5: Completed prototype



Picture 6: Final product (modified from prototype by using hooks to secure it to umbrella)

5. Modification and Evaluation

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.

Final product

Criteria	Fail	Pass	Remarks
Not time consuming?		yes	It is not too complicated

Strong and secure		yes	It could be secured easily but it could not last for long
Cheap and affordable		yes	Total cost is about \$4
Does it tear easily/waterproof?		Yes	Nylon is strong and waterproof
Can be folded down small (relative to its size)		Yes	It can be folded to about 5 times smaller
Easy to put on umbrella?		Yes	It takes less than 20 seconds to put it on
Can it block U.V rays?		Yes	Black colour can absorb most U.V rays

Test dates: 29 and 30 July 2019

Prototype 2

Criteria	Fail	Pass	Remarks
Time consuming	Yes		It took quite a while to make the 2nd prototype
Strong and secure?		Yes	The 2nd prototype was able to withstand being pulled on its sides
Cheap and affordable		Yes	The total cost was \$3
Does it tear easily/waterproof?		Yes	Nylon is strong and waterproof

Can it be folded down small (relative to size)		Yes	Removal of the rods enable simpler folding
Easy to put on umbrella?	Yes		You have to open it all the way just to put it on
Can it block U.V rays?	Yes		It is not the best, but nylon stills shields some

Test dates: 1 and 2 July 2019

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, interviews, photographs, product brochure, reviews etc.)

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