Hwa Chong Institution

Project Work Category 3 Invention Log Book

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Title of Project: EZumbrella
Group Name: 3-10
Group Members: 1) Cheng Kai Yue Elliot (leader) 2) Mark Russell Teo 3) Benjamin Tay Tze Min 4) Ho Keng Hin

1. Problem Finding

(The beginning…)

Identify a problem you would like to solve with your intended invention. You may want brainstorm for problems using different approaches e.g.s 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.

1. Some plant pots are very heavy and huge (larger than the safe lifting weight), and they can be hard to transport, even with a trolley. We noticed this problem from the plant pots around Hwa Chong, and thought the people that had to move the plant pots could have problems trying to do so. We want to help buyers of flower pots to be able to lift pots up easily and move them without injuring themselves or having any problems.
2. When walking to get to places, we would notice that when elderly or people with temporary walking aids drop something on the floor, they would have trouble bending down to pick the thing up since elderly usually have back problems and people with walking aids will have trouble using one hand to use the walking aid to balance while the other hand tries to reach for the thing that they have dropped. This might cause the elderly or people with temporary walking aids to fall.Wouldn't it be nice if the a automatic picker could be attached and detached from the walking aid to help the user pick the object up with one hand and using the other to lean on the walking aid.
3. When we go for holiday, no one will be at home to care for the plants.The plants will die without care and it is a waste of money to keep buying and replacing the dead plants. Thus, there is a need for an auto plant watering system/self-sustaining system to help water the plants if our neighbors forget to.We want to help buyers to be at ease not having to worry about their plants while they are overseas.
4. Mothers have difficulty holding a umbrella while pushing a pram/trolley and the baby/ groceries will get wet along with the mother. It would be nice to have an umbrella big enough to cover the trolley/pram and the pusher.
5. Crumbs, dirt and dust will fall into the small holes in a keyboard and after awhile, the dirt will accumulate and the keyboard will be very dirty. It would be nice to have a long nozzle that can suck the dirt from the keyboard as well as below the keys.
6. When people want to unstack chairs, the chairs sometimes get stuck with each other and people would have difficulty unstacking them.
7. Some people get tired easily while holding an umbrella for somebody taller/shorter than them.(Parents and children)
8. When people drink soup or any liquid, the utensils will fall into the soup and when picked up, our hands will get dirty/sticky.
9. Smart flower pot: would it be nice if pots are smarter such that they can roll around and feed themselves.We won't have to worry about our plants,hence the plants will not die even if we neglect them.

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

1. Can the problem be solved?
2. Does the solution help a high number of people?
3. Is the solution effective and cost-effective?

Problem	Solvable	Impact (useful to whom?)	Effective and cost-effective?
4. Pram with umbrella	Yes	Mothers, children, maids,elderly	Yes, it possible to create a cheap add on feature to existing prams / trolleys
9. Smart Flower Pot	Yes	Buyers of plants(not many and not often)	No

1 C List some problems your group would like to solve. List also the considerations your selection of the problems 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.might

Problem #1- The umbrella is designed for one person and the umbrella will be too small and thus, the user will get wet and the groceries/baby will also be wet.

Problem #2- People need to open the umbrella easily while pushing a pram or trolley. We need a 1 hand operation umbrella

Problem #3- Umbrellas are only one fixed length

Problem #4- forget to bring umbrella

Problem #5- elderly gets tired walking through the rain with groceries and needs to a short time out to sit down and catch their breath

Problem Evaluation Grid

Problem	Considerations			
	Solvable	Scale of problem	Unavailability of solutions	Total
Umbrella big enough for 2	4	1	1	6
Ability to be integrated with pram/trolley	3	4	3	10
Height and direction adjustability of umbrella	**3**	**4**	**4**	**11**
1-handed operation	2	4	3	9

*add more columns and rows where necessary

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.

Include in-text citation where appropriate.)

There are no umbrellas that are 1-hand operated, can attach to prams/trolleys, is adjustable easily and is large enough to cover both the pram/trolley and the user.

2 B Compare and contrast existing or similar solutions with your invention. Include in-text citation where appropriate.

There have been a few inventions that have an umbrella attached to the trolley but the umbrellas were all too small as they have been made to shelter only one person.We want to have an umbrella that can shelter two people.We also want an umbrella that can have adjustable length.

3. Your BIG IDEA

(Developing the idea….)

Describe your proposed invention and why you want to do it. State also how you think your proposed invention is better than existing solutions. Include in-text citation where appropriate.

3 A Describe your proposed invention.

A trolley that can be operated with one hand, big enough to cover both the pram/trolley, has adjustable height and is integrated with trolley/pram

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

- To allow adults and the elderly to use umbrellas easily while pushing a trolley/pram especially when it suddenly rains.
- To allow users to use the umbrella single-handedly and cover up the prams/trolleys with adjustable height.

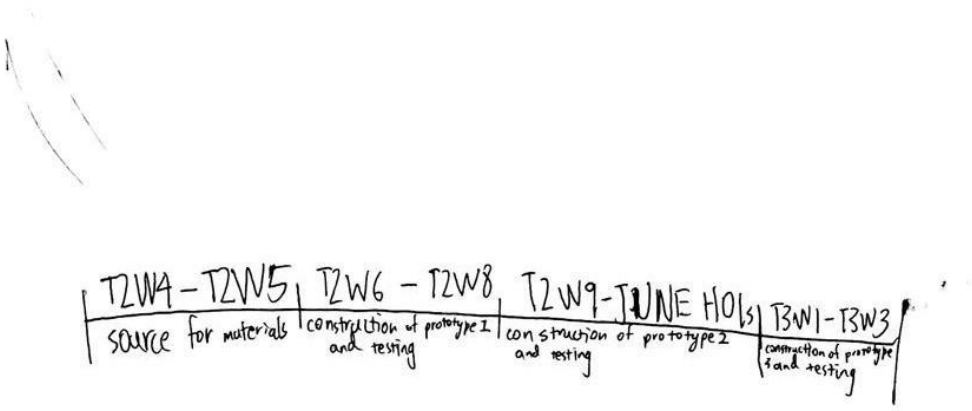
3 C In what ways would your proposed invention be different and/or better than existing solutions, if any?

Thus far, existing solutions only have umbrellas that shelter either the baby or the user, whereas our proposed invention can shelter both.
We also want to make the stroller have a one-handed operation, something most of the solutions thus far do not have.
Our solution also has an adjustable umbrella height, something most of the solutions existing now do not have.

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

One of the bigger problems is to make an umbrella big enough to cover the pram/trolley and the pusher.
The big umbrella may also be heavy, thus the stroller may be easily toppled.
Sourcing for resources and materials may be difficult as we would need to try and make an umbrella that is not only big but light and portable. Also, we would need a pram to build our prototype and prams are very costly.

3 E What are the major milestones (project timeline) in your invention process



4. Construction Process

(This first… then that…)

You are now onto the fabrication of your prototype/ product. You need to select materials and decide 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.

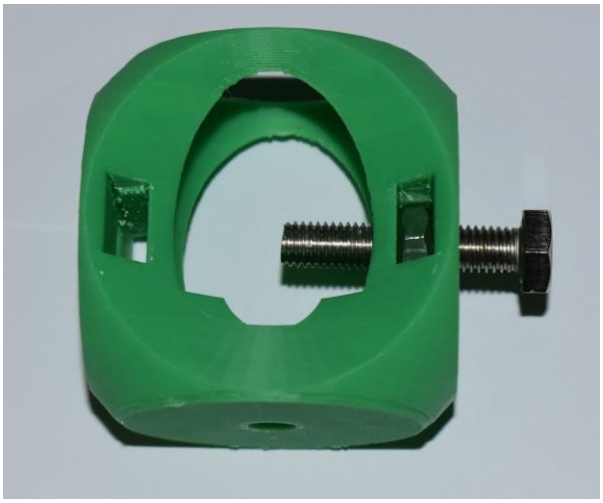
We decided to use plastic as the makerspace had a 3d-printer and also because wood would not only be too heavy and also difficult to get into the shape we want.

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

1. We want umbrellas of different handle shapes/sizes to be able to fit into our prototype.
2. The umbrella must be able to stand and not slip out of place.
3. The set-up process of the prototype should be quick and efficient.
4. The prototype should allow the user to focus on using the trolley with both hands without having to worry about the weather.

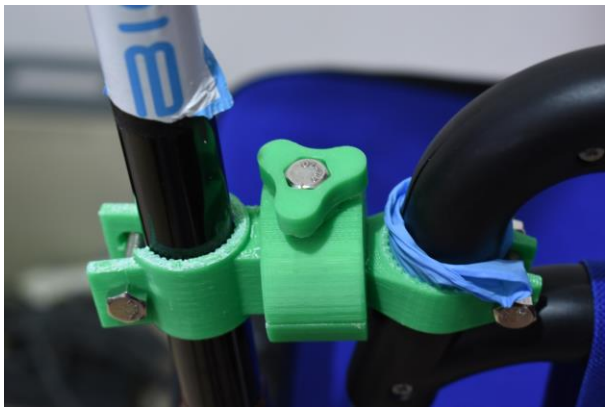
4 C Document the development stages of your invention. You may use drawings, photographs or videos (insert a link of the video / animation).

Our first prototype consisted of 3 parts. A trolley clamp, a umbrella holder and a P-shaped extension rod.



Afterwards, we changed the parts due to the fact that the previous prototypes could not properly hold an umbrella and that the force on the screw at the bottom of the P-shaped extension rod would cause it to break soon.

As such, we came up with a new clamp for the umbrella and trolley and we also used a walking stick extension rod as it was easier to use.



5. Modification and Evaluation

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

5 A Create your prototype/ product test criteria to help you assess the functionality/effectiveness of your prototype. Identify areas of weakness and suggest modification(s) for improvement. Indicate the test iteration and date of test.

Iteration:	Tick	Remarks (suggest possible modification(s) for improvement)

Test Date:	Pass	Fail	Potential Failure	
Height of umbrella adjustable?			✓	Prototype extension rod is not steady, a sturdier model extension rod is needed
Invention workable?	✓			
Umbrella stable?		✓		The invention could not be stable at most heights

*Add more rows for more criteria

** Repeat table for next test iteration

Iteration:	Tick			Remarks (suggest possible modification(s) for improvement)
Test Date:	Pass	Fail	Potential Failure	
Height of umbrella adjustable?	✓			-Proper extension rod needed for better functioning but otherwise works well.
Invention available?	✓			
Umbrella stable?			✓	Would slant sideways when the height is near the maximum height, clamps need to be more sturdy.

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 in APA format. Your source of references should be varied (e.g. books, magazine, websites, journal articles, interview, photographs, product brochure, reviews etc.)

Mulac, J. (2017, February 11). Rack and Pinion Hand Cranked Drive by 3DPRINTINGWORLD. Retrieved June 15, 2018, from https://www.thingiverse.com/thing:2102703

Brandon, L. (2017, February 11). Rack and Pinion Hand Cranked Drive by 3DPRINTINGWORLD. Retrieved June 15, 2018, from https://www.thingiverse.com/thing:2102703