

Hwa Chong Institution

Project Work

Category 3 Inventions Log Book

Title of Project: The Back Pain Solver (We changed our group's name to "The Back Pain Killer" to "The Back Pain Solver" during Mid-term Evaluation)
Group Name: 3-01
Group Members: 1) Tan Shiuan Kai Jayden, 1A1 2) Zong Zichao, 1A1 3) Jin Zixiang, 1A1 4) Feng Wenqian, 1A2

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.

We decided to focus on people face in their daily lives. The first problem we have identified is that it will be hard and inconvenient for the elderly and people with back problems to pick up items which had been probably dropped onto the floor. **(General Brainstorming)** The second problem we identified is the fact that students find it hard to do homework and sometimes need help. **(General Brainstorming)** The third problem we have identified is the fact that there are long queues and shoppers have to wait for a quite a long period of time in order to pay for their items. **(Survey)** The last problem is the fact that in some shops, items on the shelves are unorganised and shoppers take forever to find what they need. **(Survey)**

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

The considerations behind the problems are **the number of people that are affected by the problem, the consequences brought about by the problem and the feasibility of the problem.** We want to focus more on elderly and the people who have back problems, thus we decided to focus more on problem #1. The elderly and people who have back problems might not be able to pick up the items on the floor, thus making it inconvenient for them. Furthermore, people with back problems might hurt their backs further if they were to bend down and pick up the items which they have dropped and this might result in a more severe consequence. To solve this problem, we think this problem can be solved quite easily and yet can help to bring us a lot of benefits.

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: Tough for elderly to pick up items from the floor	#2: Student find it hard to do their homework	#3: Long Queues	#4: Items on shelves are unorganised
Consideration 1: Number of people affected	3	2	4	4
Consideration 2: Consequences brought about by problem	4	2	3	1
Consideration 3: Feasibility of the problem	3	4	1	2
Total Score	10	8	8	7

Problem: Inconvenient for elderly and handicapped to pick up items which have been dropped on the floor

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)

The problem that we have identified is the fact that it is very inconvenient for the elderly and people with back problems to pick up dropped items from the floor. Some of the symptoms of back pain include, **a lot of aching and stiffness along the spine sharp pain in the neck, upper back or lower back and chronic ache in the middle or lower back**. Nowadays, elderly folks are at higher risks of

getting back problems and the more they bend their backs, the higher chance of them getting back problems and this might be very problematic for them if they're living alone. This will refrain them from doing things that they do regularly such as going to shop or doing chores at home and they would have to rest regularly because their backs would have been hurt and this would bring even more inconvenience for them.

2 B Compare and contrast the existing or similar solutions.

One existing solution is the use of grabbers. However, this equipment is not very useful as it can be only used for small items. Even some small items like coins would not be able to be picked up easily by a grabber. If it is used to pick up heavy items such as an irregular shaped bottle of oil, it will be very hard for the elderly to pick the item because they are very old and might not have the strength to do so. In addition, if it is used to pick up fragile items, there is a risk of the items being crushed.

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 proposed invention is a prototype which can help the elderly or anyone pick up the items on the floor much easier. This is very similar to using a broom and a dustpan. Firstly, the person would have to use a strong broom to sweep the item/items into a basket. Then, they would have to pick the basket up by the string to a height in which the user prefers. Then, the person would just have to pour out all the items onto a table (preferably) and he/she would be able to obtain the item more easily.

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

The purpose of our invention is to help the elderly and people with back problems to have an easier time and use less effort when picking up items from the floor. They would not have to bend their backs to pick up the items and thus, their backs would ache less often. This would also be convenient to others who are using our prototype, as it can help others pick up items from the floor easily.

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

Our proposed invention will be much more convenient than using the grabbers. The material that is used for the basket will be very strong and yet light and it will be able to withstand the weight of all the items. Many items can also be placed into the basket at once so it will be easier and less time consuming than using the grabbers to pick up multiple items.

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

One of the problems that we expect is the fact that the string attached to the basket might not be firm and might be loose. This will result in inconvenience as we have to find a way to secure the strings to our invention.

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

We would start thinking on how do we improve on our invention. Then, we hope that by mid-June, we would be done 3D modelling our design and would start printing and adding strings and wheels along the way. By end of July, we would have gotten our prototype ready and we would be filling up the logbook along the way.

#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

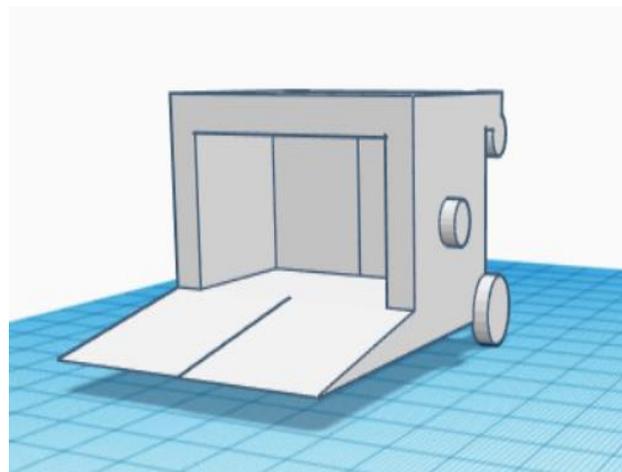
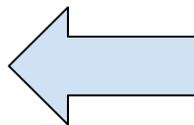
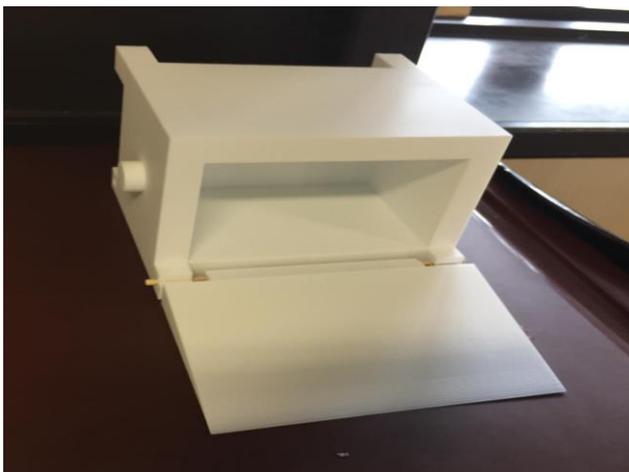
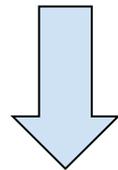
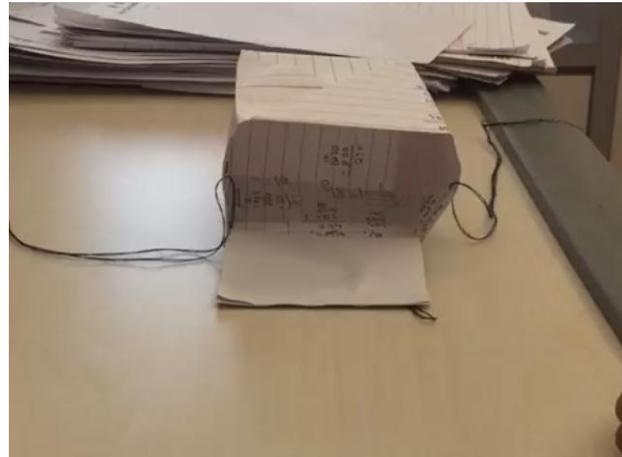
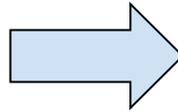
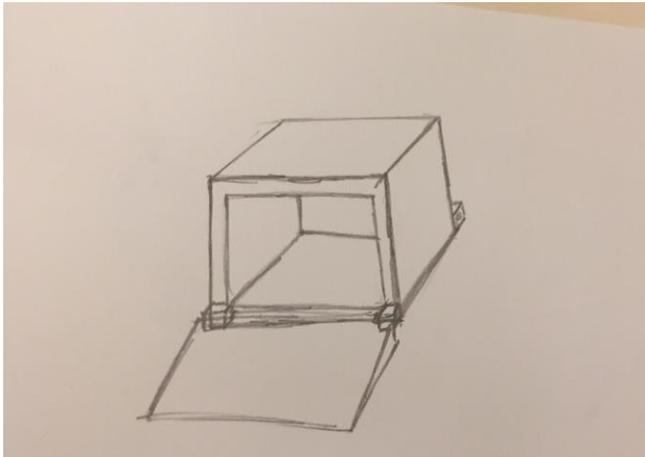
The material we chose for our prototype is plastic, because it is durable and cheaper than other materials. It is also strong and quite light. It is easy to make and it is also resistant to water.

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

The material has to be light and waterproof, considering that the basket that we are making, is supposed to be able to pick up many different types of items from the floor. If the material is not waterproof, such as paper, it would damage the basket and as a result, would not be usable anymore. Also, since we have a fixed budget, if we had used metal, it would be more expensive.

However, with plastic, the condition of the basket would be similar, and might even be better. Thus, these are the considerations that helped us guide the construction 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.

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

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
Test Date:	Pass	Fail	Potential Failure	
Test Criteria 1		✓		Our invention is not very convenient as it has to be dragged around on the floor and it is a bit heavy. It would be better if we added wheels to the back of the invention. (Lack of Mobility)
Test Criteria 2			✓	After adding wheels, we tested our invention again. However, we identified another problem. The strings we have attached to our invention might be loose and come off. In addition, for the invention to work, the strings have to be placed somewhere high among the person's waist level so that it will be easy to pick up and use our invention. If not, the person would have to bend down and this would result in him/her hurting his/her back even more.
Test Criteria 3	✓			Our invention works and we found a way to solve the problem stated above. Firstly, we could use a wall hook and paste it against a wall and then hang the strings up so that they won't drop down and it will be convenient for people with back problems. Also, we added wheels for it to be moved conveniently. In order to make the strings secured to our invention, we used more tape to secure the strings and make sure it isn't loose.

*Add more rows for more criteria

** Repeat table for next test iteration

The picture below is an example of the wall hook.



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.)

1. Back Pain After Sitting? Symptoms of Low Back Pain. (n.d.). Retrieved March 26, 2019, from <https://www.webmd.com/back-pain/understanding-back-pain-symptoms>
2. Miller, J. T. (2017, December 07). How to Find the Best Reacher Grabber Tool. Retrieved August 3, 2019, from https://www.huffpost.com/entry/how-to-find-the-best-reac_b_5663705
3. Organizelt. (n.d.). Wall Mount Coat Hook - Bronze. Retrieved August 3, 2019, from <https://www.organizeit.com/wall-mount-coat-hook-bronze.asp>