

Hwa Chong Institution

Project Work

Category 3 Inventions Log Book

Title of Project: Pull, Hang, Go!
Group Name: 3-04
Group Members: 1) Tan Ding Xun 2) Xie Yuxuan 3) Yaw Chur Zhe 4) Yeh Shih Perng (L)

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.

Chee chong fun cutter

Different type of hanger

Charger that stops charging when its fully charged

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

Chee Cheong Fun cutter

- Saw the seller using bare hands (wearing plastic gloves) to serve chee cheong fun
- Burned hands
- Solve the problem by inventing a device to minimise harm to self

Hanger

- Troublesome to hang clothes
- Time-consuming
- We want to make the hanger user friendly

Charger that stops charging when the phone is fully charged

- Sometimes forget to unplug the charger before going out
- Might cause phone to explode
- Invention to solve people's worries

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	#2	#3
	Chee chong fun cutter	hanger	

			Charger that stops charging when the battery is full
Consideration 1 practicality	2	3	1
Consideration 2 The percentage of people the invention can help	1	3	2
Consideration 3 cost	3	2	1
Total Score	6	8	4

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)

Have to slot the hanger through the bottom of the shirt which is troublesome

Not able to slot or remove the hanger through the top of the shirt (through the collar) for example, shirts with tight or narrow necks.

People find it troublesome to fit the hanger through the bottom of the shirt

it is also time consuming to hang clothes in bulk

72.7% of the people who did the need analysis felt that an invention was needed to solve this problem, showing that a large number of people felt that an invention was necessary.

2 B Compare and contrast the existing or similar solutions.

There are three other existing products, the clip hanger, the single rod hanger and the snap hanger.

Clip hanger

Benefits: Easy to hang clothes, Remove the problem of slotting hangers through bottom of shirts

New problem: The clip leaves marks of the fabric, Looks untidy, Would defeat the purpose of ironing as it still leaves marks, There will be prints, marks and folds.

Single rod hanger

Benefits: Shirt can be slotted through the top easily, Remove problem of slotting hanger through bottom of the shirt.

New problem: Can be easily removed from clothing, Support on only one side, Imbalance in weight can cause improper positioning..

Snap hanger

Benefits: Inspired by mechanism of scissors, Easy to hang clothes(close 2 hooks together so the 2 rods would open up and secure itself)

New problem: Hanger can be easily broken, Break when too much force is used to snap it (only one hinge), unstable (hinge lock will loosen over time), will retract if clothing is too heavy

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 invention is named "pull, hang, go." It is an invention of a hanger that is user friendly

We focused on the problem of being troublesome when hanging clothes

We were inspired by the mechanism of pulley

When the hook is pulled upwards, the gears turn to expand the rods, which secures themselves underneath the shirt.

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

Household chores are a gruelling task, thus we hope our invention can help ease the load while hanging clothes and reduce time and effort taken to hang clothes. It is also not troublesome to use the hanger and is very convenient. It helps to save time, and as the saying goes "Time is money."

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

Our hanger firstly does not cause damage to the clothing, secondly, the hanger is not easily removed from the clothing, and lastly, our hanger is durable.

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

It may be hard to create mechanism in a physical form

The choice of correct materials for thee hanger may be a bit hard.

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

Early Feb - Feb 18: Brainstorming of Ideas, Sketching of Mechanism & Choosing of Mentor

Feb 18: Approval of Project

Mar: Preparation of Presentation

Apr 2: Proposal Evaluation

Early Jun: Building of Cardboard Prototype, Preparation of Presentation

Mid-Late Jun: Building of Actual Product, Preparation of Presentation

4 Jul: Mid-Term Evaluation

Mid-July: Changing of design

End July: Building of Final Product

End-July to early Aug: Preparation for presentation

7 Aug: 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

We had several materials in mind, but we felt the most suitable one was Polypropylene (PP) Plastic as it is strong, waterproof and durable. However, we found a 45cmx45cmx1mm PVC Forex Board available for 55cents, so we bought it. The PVC Forex Board has similar properties to PP, but more bendable, so we added multi-layered some parts to make them more firm.

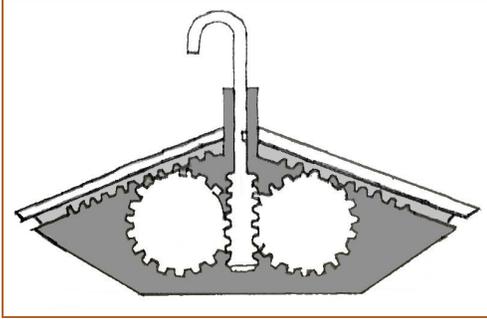
4 B Explore these considerations that may guide the construction of your prototype/ product.

Waterproof or absorbent - the material of the exterior cover of the hanger should be waterproof, as when hanging wet laundry, the hanger should not absorb water and stay sturdy.

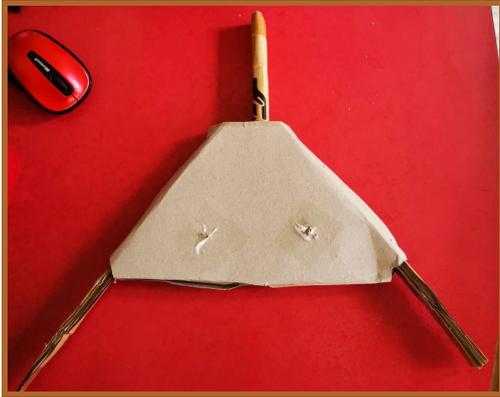
Strength - The hanger needs to be strong too. If the laundry is heavy, the hanger should be strong enough to hang the clothes without breaking or bending.

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

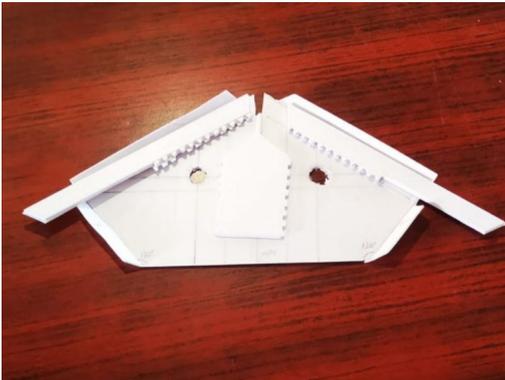
1. Idea Sketch



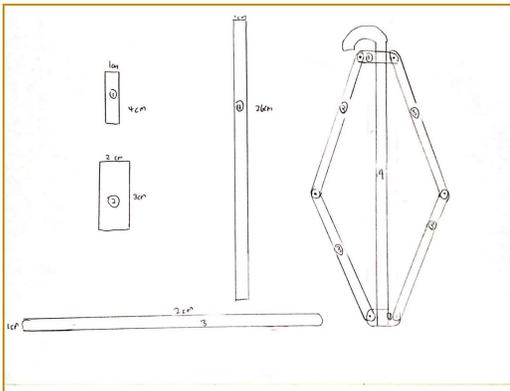
2. Cardboard Prototype



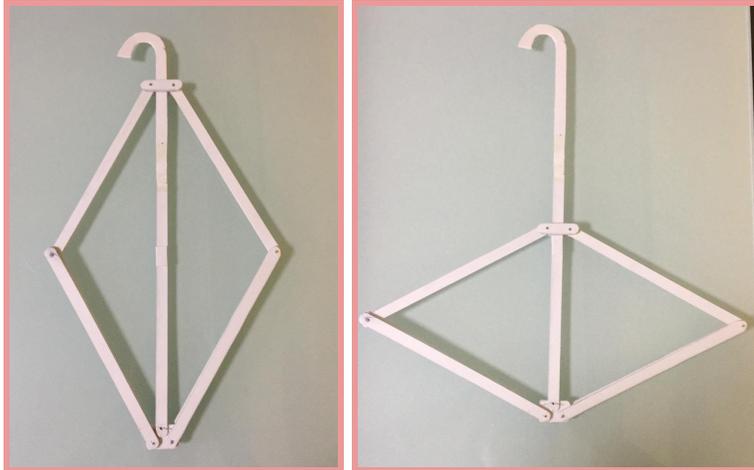
3. PVC Forex Board cut-outs for rods and hanger exterior



4. Change of design



5. Final Prototype



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.

We realised that the hanger that we made was not as easy to produce. The gears could not catch onto each other and this causes the arms to be stuck at times. Hence we came up with another type of hanger which uses hinges and is much easier to produce and the material even costs lesser as it uses lesser material. We also have decided to thicken the arms and make it sturdier and use a thicker plastic.

Furthermore, we need not spend extra money to purchase gears, as our new design only requires the pvc board and nothing else.

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: 21 June 2019				
Test Criteria 1 Able to support clothes	✓			PVC foam is resistant to many solvents including styrene and most fuels, yet is compatible with most adhesives and laminating resins. PVC foam is closed-cell and has very low moisture absorption. It is self-extinguishing and will not rot. Other inherent properties are excellent fatigue life and good bond strength with common adhesives and resins. This shows that PVC foam is very strong.
Test Criteria 2 Rods extend	✓			The gears are able to turn.
Test Criteria 3 Rods are long enough	✓			Rods are short at first, and not long enough to support the full structure of the shirt and causing it to be sloppy.

*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.)

Home Stratosphere. (2019). *29 Different Types of Clothes Hangers*. [Blog].

Available: <https://www.homestratosphere.com/types-of-clothes-hangers/>

Jeong Yong. (2011). *Snap Hanger*. [Blog].

Available: <https://jeongyong.com/Snap-Hanger>