

Hwa Chong Institution
Project Work
Category 3
Inventions Log Book
(Revised for 2021)

Title of Project: Rubbish Disposal
Group Name: Rubbish Disposal
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1. Problem Finding

(The beginning...)

Identify a problem you would like to solve. You may want to brainstorm for problems using different approaches e.g. 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. Different rubbish of different materials were found in different trash bins. This makes it much harder to separate them and to recycle them. Not only that, this will require a lot of manpower. Even with so much help to separate and recycle the rubbish, it might not even end up being successful due to the amount of rubbish being mixed up with other materials. On top of that, the current recycling bins are very ineffective for recycling as many people still throw non recyclable items such as food into them, contaminating everything inside. This makes the recyclable items dirty and can cause inconvenience.
2. Another issue is the fact that many workers get injured when trying to collect the rubbish. When they go and collect it, rubbish will just drop onto their head and hit them. Sometimes, if it was light, it would be fine. However, if it is something heavy, it might cause serious injury to the worker, it might even cause deaths if it is something sharp such as glass shards or knives.
3. When people walk past the rubbish chute, it might give off a very smelly smell which is very unpleasant. This is due to the lack of ventilation in the rubbish chute. This makes this a very unpleasant experience for the workers who have to collect the rubbish. It also affects the people living near the rubbish chute as the smell might linger around and it will not be a good experience smelling the smell of the rubbish in your everyday life.
4. A lot of electricity is wasted despite being extremely important in our lives, we use it for our electronic devices such as computers, laptops and light bulbs. Without electricity, our lives will be vastly different as we will not have many light sources(light bulbs) and entertainment(computer games).
5. The use of Tracetogther on our phones is very troublesome and can cause many people to not check into places. This may create difficulty when trying to trace covid-19 cases and identify who might have been in contact with an infected person or who might have been in a cluster of cases.

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

We chose Problem 1,2 and 3.

Problem 1 : We chose this problem because there is no instant punishment such as bills or fines when people do not recycle, and therefore, many people do not recycle unless it is very convenient. However, as time passes, the amount of resources we have are decreasing quickly, and recycling would definitely help to prevent wastage of them.

Problem 2 : We chose this problem as it can easily be solved by making a system where the doors of the different rubbish bins for different materials can be closed by pressing a button. When the workers retrieve the rubbish, they can just simply press the button to ensure that no rubbish falls on them when they retrieve the rubbish.

Problem 3 : Despite being a small problem, we chose this problem as it can provide inconvenience to people using recycling bins, which may affect their willingness to recycle. This problem can also be easily solved.

We did not select problem 4 as it can be easily solved by just turning off electrical appliances when not in use. On top of that, most people already practise these habits due to there being electrical bills.

We did not select problem 5 as there is already a product that can provide convenience known as the Tracetgether token.

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

Problem Evaluation Grid

*add more columns and rows where necessary

Considerations for Selection	Problems		
	#1 : Different rubbish found in different rubbish chute	#2 : Workers getting injured	#3: Smell of the Rubbish
Impact	4 (Workers are more willing to retrieve rubbish as they do not need to spend much time on separating the rubbish of different materials from one another and focus on	2(Workers are already wearing helmets when retrieving rubbish)	3(Makes it a much more pleasant experience for workers as they do not need to breathe in the smell of the rubbish in the chute)

	removing the trash bins.)		
Pricing and amount time required for the Invention	2(Requires a period of time for the building of the designed rubbish chute. A lot of money is also needed to build the chute.)	2(systems have to be put in place in every single chute in order for it to be effective in protecting the workers)	3(Plants and air purifiers can be placed near the rubbish chutes to help to make the smell of the rubbish not so noticeable.)
Feasibility	2(It requires a lot work as coding and building of the rubbish chute and might take a very long time before it can be used)	2(System is easy to be built in as there are many open and closed systems on the market and little time is needed to implement it)	3(Solution is not difficult, materials are easy to find.)
Total Score	8	7	8
		Since we have a 2 way tie, why not just solve both of these problems with one idea?	

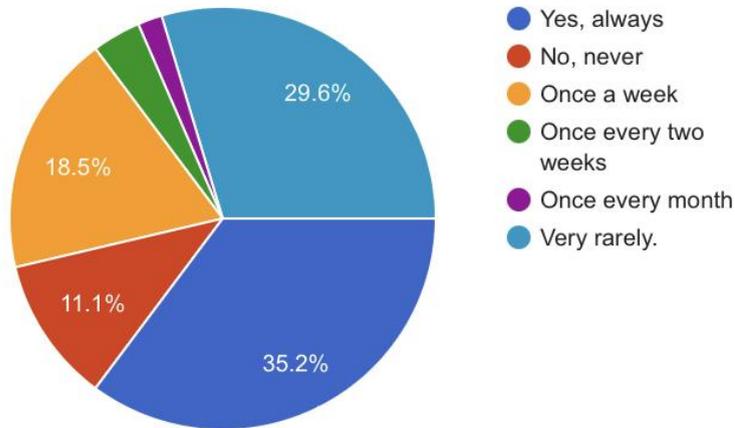
2. Define the Problem (This is one...)

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)

Do you recycle?

54 responses



Only about 35.2% of people recycle. This means they throw rubbish of different materials down the chute. This makes it more difficult for workers to retrieve the rubbish of different materials as they would have to separate the rubbish with their bare hands. This can also take a lot of manpower if many people do not recycle. Sometimes, the stench from the rubbish chute might be too unbearable, the stench and the environment might also cause insects and pests to breed. This makes recycling a not so pleasant experience.

2 B Compare and contrast the existing or similar solutions.

Our rubbish chute

- Is much more effective and requires less manpower
- Less need for maintenance
- Does not give out too intense of a foul smell.
- Is a cheaper alternative to other solutions.

Other methods:

- Can be expensive
- Can still give out a little foul smell
- If one part of the solution is broken, the whole thing cannot function.

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.

A chute that sorts rubbish based on recyclable or non-recyclable. Plastic bags of different colours will be distributed to residents regularly. When the bag of recyclable materials (green) reaches the bottom of the chute, a colour sensor will detect that it is green and tilt the plate of metal to the left, into the recycling bin. The top of the chute will also have a fan that sucks up the "smelly air" from the chute while fresh oxygen from plants will enter from outside through a vent. The insides of the chute will be coated with NaOH which will deter cockroaches from climbing up and into apartments, gassing the chutes will also be no longer needed

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

This invention encourages people to recycle so as to decrease the rate of global warming. Recycling is made easier as people can not do it through the same rubbish chute instead of going and finding recycling bins at the void deck. This will also improve the residents' lives as cockroaches will not be entering their apartments through the chutes and no gassing will be needed (another problem solved: excessive use of pesticides).

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

This invention would be simple to make as the mechanisms needed are not expensive or hard to maintain. This not only improves the lives of the residents, but also decreases the manpower needed to sort recyclables from non recyclables.

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

People might try to throw many trash bags at once, causing the machine to be unable to sort.

When the machine breaks down, people will have to dispose their trash themselves

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

19th January: PW group is formed and we meet up with Mr Rong to consolidate our idea for the rubbish chute.

Mid February: Starting to fill in the Logbook about our PW and started making our slides for the presentation

April: Finished the presentation slide and updated logbook on the progress being made.

Mid May: After PW evaluation, we read the comments about our presentation, and started working on our slides and continued to fill up the logbook, also start planning for our prototype

30th May: 1st Prototype is being made

15th June: 1st Prototype is finished and being tested, improvements are made up to try to make it as realistic as possible.

End of June to End of July: Filling up the logbook, updating the slides and taking pictures of the prototype

August: Finalising everything, preparing for 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. Proposed 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 used lego for the building as it resembles the bricks that stacks on top of one another and eventually stacks up into a tall structure that resembles a chute. We also used the buttons of a microbit (image shown below) and wired it to move the metal plate that we made using cardboard , to simulate the buttons of the actual chute.



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

-Must be realistic such that when constructing the actual chute, you can refer to the prototype

-Must use affordable materials

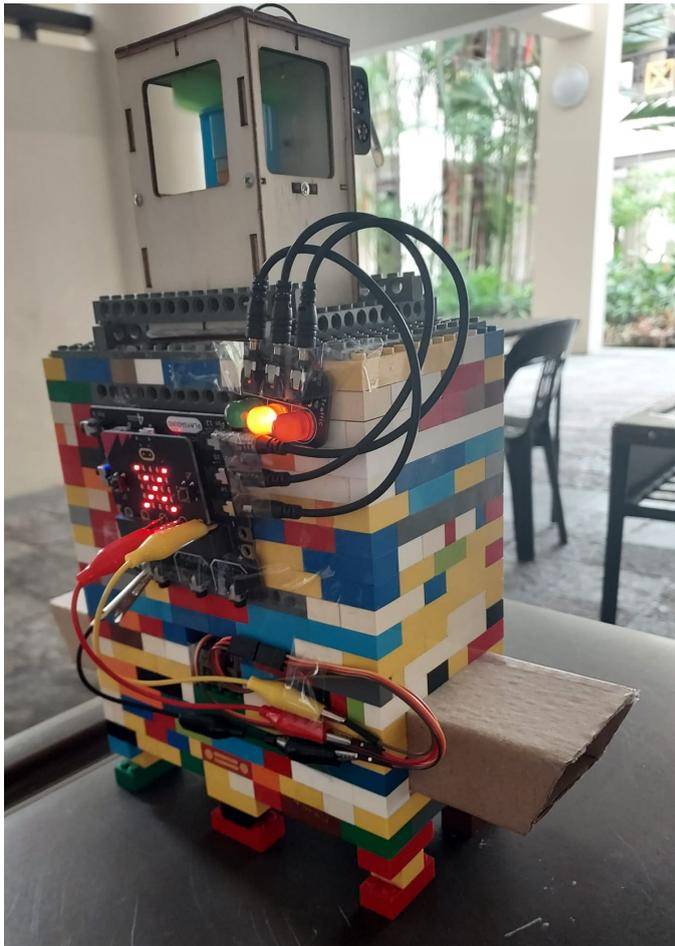
-Must be compact

-Must be environmentally friendly

4 C Propose how the prototype/ product will be constructed or developed. You may use drawings and photographs.

We have used some lego to create the rubbish chute structure. We then used microbit for its buttons and used it as a door too. We also wired it to a servo and lights similar to the actual design. We used a small fan at the top similar to the filtering fan at the top in our design. We

used some cardboard attached to the servo and also used it for the shaft.



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.

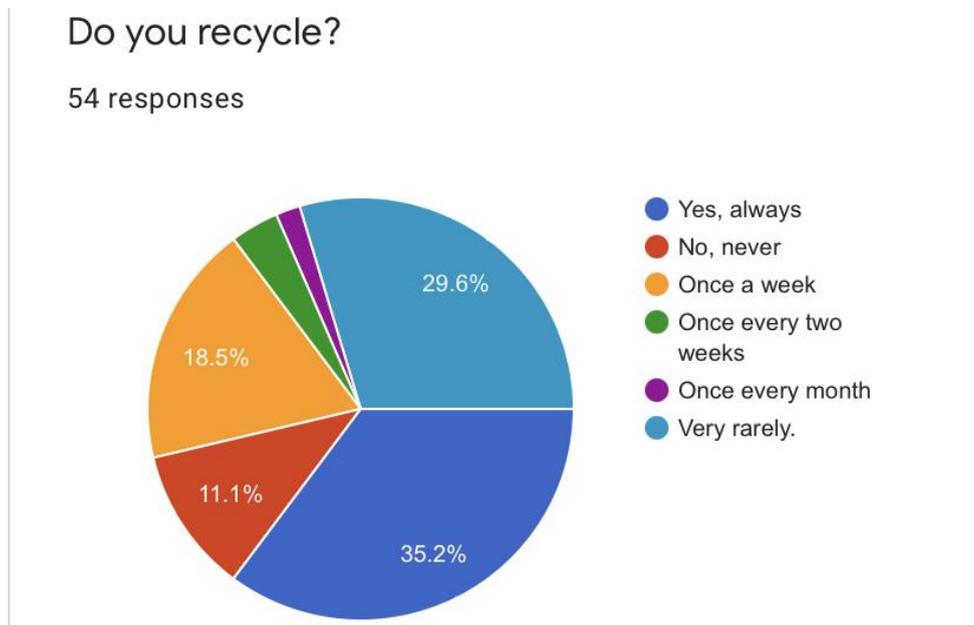
Warning:

- Video / animated simulation only if prototyping is absolutely not 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. References

Read <http://www.bibme.org/citation-guide/apa/> on how to cite references.

5 A Cite the references you have used for your project work. Your source of reference should come from different types (e.g. books, magazines, websites, journal articles, interviews, photographs, product brochure, reviews etc.)



-The new paper: Residents complain that the stench coming out from the rubbish chute is unbearable and flies would fly out when they open the chute. (Jun 29, 2016 06:00 am)

-(Retrieved 14/8/2021)

Link: <https://www.tnp.sg/news/others/residents-cry-foul-over-choked-refuse-chute-new-hdb-block>

-CNA (Channel News Asia): Workers share their work experience, including the problems that we were talking about. (23 Dec 2017 06:53 AM)(Updated: 04 Jan 2021 03:08 PM)

-(Retrieved 14/8/2021)

Link:<https://www.channelnewsasia.com/singapore/job-heartland-waste-collector-rancid-repulsive-and-sobering-experience-988706>

- **ArmorThane-Protectingyourworld(Youtube):** Many of the aging concrete refuse chute hoppers in Singapore high rise flats are falling into disrepair as they begin to spall and crack. Bacteria growth, foul odors and cockroaches threaten the living standards of residents.(5 April 2013)

-(Retrieved 14/8/2021

Link:<https://www.youtube.com/watch?v=YGzj1mwSKEU>