

**Hwa Chong Institution**  
**Project Work**  
**Category 3**  
**Inventions Log Book**  
**(Revised for 2020)**

Title of Project:

**Project pooppy scoopy**

Group Name:

3-38

Group Members:

2A1

- 1) Wang Bing QI 29
- 2) Wang Peng Ju 30
- 3) Seow Chee Heng 25
- 4) Andreas Tan 26

# 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.**

Dog owners have a heavy responsibility caring for their dogs and we wanted our project to focus on creating a more convenient life for them. Thus, we thought of 3 problems that dog owners face, the danger of dogs getting lost easily, the hassle of having to walk their dogs frequently and the inconvenience of having to pick up dog litter. For each of these problems, we came up with a possible solution that could help ease their burden. Firstly, we thought of a device to help prevent dogs from getting lost. Secondly, we thought of a way to help walk dogs and to address the last problem, we came up with a device to help owners pick up dog litter.

For the first problem and solution, as our group had many members who had friends that were dog owners, after hearing their troubles, we decided to focus our project on making dog owners' lives more convenient. A problem we first thought of after seeing news of stray dogs being put in homeless shelters was to invent a device to prevent dogs from getting lost so that there would be a decrease in dogs abandoning their homes and getting possibly abused. We considered the second problem as we have heard some of our friends who were dog owners complain about having to walk their dogs everyday. They might not have the time to do so due to homework and exams but their dogs still need to be taken for a walk. We thought we could try to design a contraption which could allow dogs to be walked without their owner. The last idea we came up with was a device to help dog owners pick up dog litter more conveniently. Based on a few of our group members' first hand experiences, we have noticed some irresponsible owners leaving their dog's litter on the ground without cleaning it. We found this to be very disgusting for the people living in the neighbourhood and thought we could design something to ensure that it is more convenient for dog owners to pick up dog litter. We believed that this would help to reduce the chances of owners leaving dog litter behind.

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

When we were selecting the problem, we decided to base it off the feasibility of the idea, the need for a new solution, and the severity of the problem. We had to consider the feasibility of this idea. In order for us to come up with a solution to any of the problems, we had to ensure that the solution would be feasible for us to make. This is such that the solution would be realistic and not overly complicated. We also had to consider the need for a new solution to the problem. If this was not a common problem faced by many, or if there were already existing products that could solve the problem, we would not have wanted to focus on it. Lastly, we considered the severity of the problem. We also wanted to decide on the problem by comparing their severity, if it was only a rather minor problem, it might not need much time and effort to be solved or even to be solved at all.

**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		
	A device to help prevent dogs from getting lost	A way to help walk dogs without the owner	A device to help owners pick up dog litter
Feasibility	2	2	5
Need	3	2	3
Severity	5	2	3
Total Score	10	6	11

## 2. Define the Problem

Many people face the problem of improperly disposing of dog litter. We identified the root cause of the problem and realized that it was due to dog owners not being responsible which was due to them feeling that it was inconvenient for them to pick their pet's litter up. Thus, we wanted to create a solution, a device that was really convenient for dog owner's to use such that it would not trouble them much, making them more inclined to dispose of their dog's litter.

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)

A study published in the Journal of Applied Psychology observed people who pick up and leave behind dog poop. The study divided the owners into two groups, those that pick up the poop and those that don't. They found that owners picked up after their dogs slightly more than 60 percent of the time. The study also concluded that those who don't pick up after their dogs also frequently lie about it.

As of 2016, the dog population of Canada was about 7.6 million. That equals over 2.5 million kilograms of dog poop created a day, and over 924 million kilograms a year. That's a ton of poop, which leads to a lot of plastic poop bags being used.

This shows that almost 40% of dog owners leave their dog poop on the ground, which is a very large amount as they feel that it is inconvenient for them to dispose of the dog litter and it would cause extreme inconvenience for people who stepped on it.

### 2 B Compare and contrast the existing or similar solutions.

#### Poop Scooper



Although the poop scooper was easy to use and clean up the dog litter, it could not hold more than one round of droppings without dropping the original content. Some of these

types of poop scoopers can also be lined with plastic bags for the user's convenience but it is wasteful and can only use specific kinds of plastic bags due to the irregular shape required.

### **'Piqapoo' The Dog Poop Collector**



This poop collector is convenient for the user as it can be directly attached to the dog, which removes the need for the dog owner to pick the poop up, and thus, it is more hygienic. However, it may be uncomfortable for the dog as it is not 'one size fits all' and the use of plastic bags is also bad for the environment.

### **Dog poop rake and pan**



The dog poop rake and pan is really easy to operate and also very durable as it is made out of metal. However, it is very big and bulky and would be very inconvenient for the dog owner to carry around.

## **3. Your BIG 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 device is a poop scooper meant for dog owners to scoop up dog waste conveniently. Its outer form is a box like structure for the scoop, and a handle attached to it. This handle can be extended or retracted when necessary. When the user is not using the device, it can be retracted, when the user is using it, the handle would be extended longer. The box like structure is actually the scoop. Its primary function is to scoop up the poop. It can be opened with a string pulley system we designed which would be better shown in the 3D animation we did below. After the poop is scooped in, the user can rotate the device upside down so the poop will fall through a triangular lever into a poop storage compartment. The triangular lever acts like a stopper for poop to fall into the storage and remain inside. We added a

storage compartment which no poop scoopers on the market have of yet so as to allow the user to scoop up multiple rounds of poop with all of it being stored in the same compartment. The poop can be emptied and the compartment can be washed out through a trapdoor on the side which can be opened and closed. Overall, it is a modified poop scooper with many benefits that will be explained in the next part.

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

Our invention is aimed at allowing dog owners to very conveniently pick up and dispose of their dog litter while at the same time reducing the use of plastic bags which harm the environment, and in the end provide a better experience for the dog owner and the neighbourhood. Since some dog owners are still reluctant to take care of their dog's poop, we thought it was probably because of inconvenience, we wanted to make this invention so it would be more convenient for the owner thus decreasing the amount of dog poop on the ground and creating a cleaner environment for the neighbourhood. This invention at the same time also helps to limit the use of plastic bags used to clean dog poop. Since it is widely the most popular method of cleaning dog poop, a lot of plastic bags are being used and thrown away every time a dog decides to poop. We wanted to make this invention to provide an alternative solution that is as convenient as plastic bags while also not harming the environment. Our device also has many benefits to the user. Since there is an extendable and retractable handle, the user is able to decide when they want to retract the handle(while keeping it at home) and when they want to extend it(when walking their dog). The extended handle allows the user to not have to bend down to clean up the poop which could be very important especially for elderly pet owners. This increases the convenience of cleaning dog poop which would make dog owners' lives easier. Secondly, we also added the ability for poop to be stored in a compartment. This allows for poop to be collected in multiple rounds before only disposing them at the end of a walk. The user would find it much more convenient not having to dispose of the dog poop for every time the dog poops. There is also a trapdoor for easy removal and disposal of the poop and easy washing if the storage compartment is dirty.

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

Our design would be lightweight and easy to carry around. This compared to the poop rake and pan, is much more convenient to carry around and therefore is a better solution to picking up dog litter. Our design would also negate the need for plastic bags, which is quite crucial in saving the environment as plastic bags are the

most common methods of disposing of dog litter and since it would store multiple rounds of droppings, this would make it more efficient than the poop scooper as the poop scooper would only be able to grab another 'round' of droppings if the claw is opened, which directly results in the original contents dropping out. Our design would also be held separately and not be attached to the dog in any form or way, making it not only more convenient and comfortable for both the dog and the owner than using 'Piqapoo' The Dog Poop Collector but also being more environmentally friendly by removing the need for unnecessary waste of plastic bags or discomfort for the dog. We would also allow a leash to be attached to the handle so that the user need not carry multiple items just for one walk. Thus, our design would be overall more convenient and efficient than current products out on the market.

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

Some people might have difficulty using the string pulley system to scoop up the dog poop, especially because this is a relatively uncommon method used in poop scoopers, they might not be used to this and be unwilling to start using a foreign mechanism and device instead of the standard plastic bags. This could cause some dog owners to not be willing to purchase this product as they might not realise the convenience it brings. Another problem which might happen is the inability to wash and clean the poop scooper conveniently. Since the poop largely goes through the box like structure, it could be quite inconvenient for the user to clean the insides of the scoop where the poop went through. Although this would be possible by washing it through the trapdoor at the side and through the front by opening the scoop, some dog owners may not like to go through this hassle and instead would choose to use methods like plastic bags which do not require washing but are more environmentally unfriendly.

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

Date of major milestone	Major milestone
12 march 2020	Birth of project idea
1 april 2020	Making of first design
14 April 2020	Proposal evaluation
5 june 2020	Second version of our design - Redesign of our prototype upon feedback from Judges

28 July 2020	Third version of our design - Updating our design after much thought
4 August 2020	Completion of our animation and model
7 August 2020	Final reconsiderations and changes
12 August 2020	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 did not construct a real prototype, these are the materials that we would be using if we did construct one.)**

##### **Plastic**

We felt that plastic was a good material for the main structure of the device as not only did it have low production costs, it also had very durable properties and could be made with high build quality even at a low price. It is also a very lightweight material which could ensure the user would not find it inconvenient to carry. It is also waterproof and easily washed clean which was crucial in the construction of the device as it would need to be washed regularly after poop is collected.

##### **Steel**

We decided to use steel for the key elements to our design such as the hinges and the springs. This is because those are the areas of the device where it has to be the strongest and the most durable. Steel is not just durable but also lightweight enough for the user to not feel like carrying it is a burden and it is also very cheap compared to other materials such as iron.

## **Nylon**

We proposed to use the material nylon for the string mechanism of our device. Nylon is a very sturdy and strong material that can be stretched and made into a string. As it would be often pulled, with our design, we needed a tougher material for the string so it would not wear off easily and could be used for a longer time.

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

When we were deciding on the construction of the prototype, we were considering it based on the price of materials, the simplicity of the manufacturing process should it be mass produced, the reliability of the materials and the simplicity of the design, so as to ensure that should the prototype become a reality or be released into the market, there would be optimal cost effectiveness. **(if we were actually constructing it)**

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

#### **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.

<https://youtu.be/40LYngAuVTo>

**Here is the animation of our 3d model.**

### **4A Explain why construction of a prototype is not possible and the proof of concept is needed in your case.**

Due to Covid 19, school was closed for 2 months or more and within that period we could not utilise the makerspace facilities and equipment to construct a working prototype. During the Circuit breaker period we could almost not even meet up which drastically slowed down our engineering and design process for our invention. We

took many more weeks to design an aspect of our device which could have taken much less time if we were able to meet up in real life to design the device together. Communication online also was very limited with it being almost impossible to explain more complex concepts for our design. After school finally reopened and with Circuit breaker ending, we would find more time at school to meet up and discuss, however this amount of time proved too little for the construction of our prototype as we had completed the final design much later than expected. We were also still not allowed to meet during weekends due to safety precautions. In the end we decided to settle on a 3D model of our design as it could be safely done at home while still being able to effectively visualise and explain how our device would look and work.

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

It is a near identical model to what we had envisioned and our video shows the string mechanism used to open the claw to scoop up the poop, how it falls through the triangular lever into the compartment to store the poop, and how it can be taken out and disposed of later on. We also considered the different physical possibilities and adjusted our model to make it realistic.

**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. 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.)**

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5. Webley, P., & Siviter, C. (2006, July 31). Why Do Some Owners Allow Their Dogs to Foul the Pavement? The Social Psychology of a Minor Rule Infraction<sup>1</sup>. Retrieved from <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1559-1816.2000.tb02525.x>