

Hwa Chong Institution

Project Work

Category 3 Inventions Log Book

Title of Project: Automatic Rain Blocker

Group Name: 3-19

Group Members:

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- 3) Lucas Tan
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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 initially came up with problems that mothers with babies face. Like picking up their small toys like legos after they play, ensuring that the food is of the right temperature and ensuring the corners of furniture is cushioned. All 3 problems were shot down by our mentor as there were already products to solve all of them.

We decided to choose some problems relating to rain because rain causes many problems and there might not be much we can do to prevent it. All 4 of us face some problems relating to rain. We chose 3 problems relating to rain: rain wetting our clothes when we hang them out to dry, rain splashing in through our windows and the difficulty of entering your car when it is raining.

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

Rain splashing through the windows have the least available solutions. Now there is spin drying and indoor drying so rain wetting your clothes might not be that much of a problem now. Entering your car when it is raining does not really cause that much problem as it does not take long to clean the car as it is just a bit of rain.

Solving the problem of entering your car when it is raining is not feasible as it will involve actual modifications to a real car and it might be too costly for us. The problem of rain wetting your clothes involves putting some kind of shelter above it, this is feasible but we must use the right materials to make sure it is strong. Rain splashing through your windows is feasible to solve as we just need to attach something to our window that can block out rain.

We chose the problem of rain splashing in through our windows when we forget to close it as it can cause many other problems it happens, like the floor getting wet and slippery, our things getting wet, and the inconvenience of cleaning up afterwards.

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
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	Rain splashing into car when it is raining.	Rain wetting clothes when its hanging to dry	Rain splashing in through windows when it rains
Solvability of problem	1	3	3
Scale of problem	1	3	3
Existing solutions	3	1	3
Total Score	5	7	9

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)

We conducted surveys and found that 57% of respondents experience rain splashing in through their windows. Also, we found that 2 thirds of respondents have forgotten to close their windows at some point before and had rain splash in through their windows.

The problems most of the respondents face are having to clean it up later, the rain making the floor wet and slippery, posing a potential danger of slipping, and potentially wetting wooden floors and furniture, causing the wood to rot. These problems may cause injury or damage to property.

2 B Compare and contrast the existing or similar solutions.

Closing your windows

It is cheaper

It is not reliable if your memory is bad

It is not automatic and you have to do it yourself

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 rain sensor connected to a motor that lowers a plastic sheet when rain is detected by the sensor. The plastic sheet will cover the window and prevent most if not all the rain from coming in.

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

The purpose of our invention is to help old people or people that are forgetful to stop rain from coming in through their windows when it rains. It will help prevent slips on elderly or young children if the floor is kept dry

It will also save the trouble of closing and opening your windows when it rains

This product will prevent the rain from splashing in, as it might wet your wooden floor and furniture, saving you some repair cost or just keep the house dry when it rains.

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

Closing the windows yourself

It is better as it is cheaper and you don't have to pay anything extra

But if you forget to close it all the rain will splash in, causing problems

Our product aims to be able to block out the rain without help from humans, it will sense when there is rain and block the rain automatically

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

The difficulty and cost of obtaining some of the parts

The difficulties in programming the arduino in c++ as none of us were proficient with it

The difficulty of putting the circuit together as it was a very delicate and time consuming process

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

We did not do much before the june holidays

We met up every Tuesday to work on our project.

We got all the circuit parts delivered by the 2nd week of the June holidays

We started going to makerspace the subsequent Tuesdays but didn't get much done there as our main problem was the programming

We finished the code a week before mid term evaluation

We tested it 2 days before it but found there was a problem

We worked on it and finished the code a day before the 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 used an arduino R3 uno board, a servo motor, an arduino rain sensor, and will make our own plastic sheet and roller and casing.

The arduino R3 board is one of the basic and most commonly used boards for arduino programming.

The rain sensor was chosen as it was compatible with the Arduino and could (of course) sense water.

The servo motor was chosen as we could easily control the number of turns it turned, depending on the type of window, to and fro easily. It was also compatible with Arduino
A casing was needed to protect the wires and circuit from the rain as it may get wet and cause a short circuit and stop functioning. Therefore, it will be made of plastic hopefully as it is both light and waterproof

Plastic sheet and roller is to block the rain

The plastic sheet will be made with a transparent sheet of thin plastic, with a weight at the bottom of it, holding it straight as it rolls down

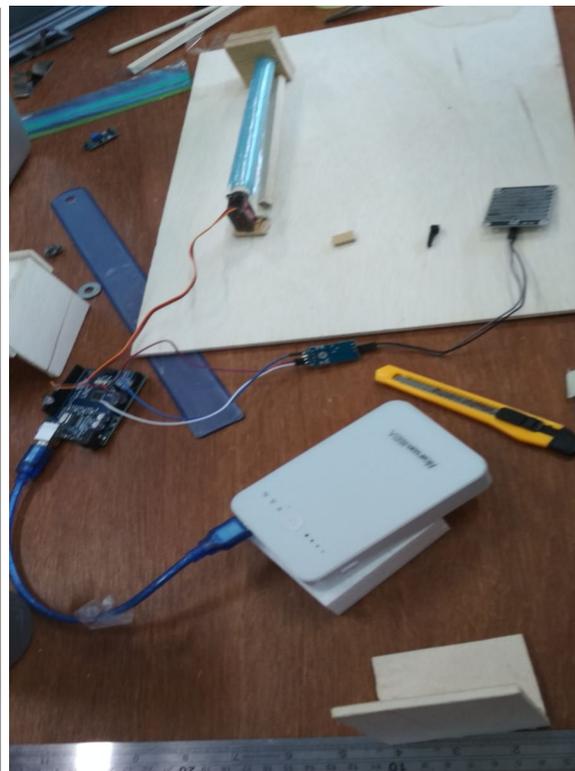
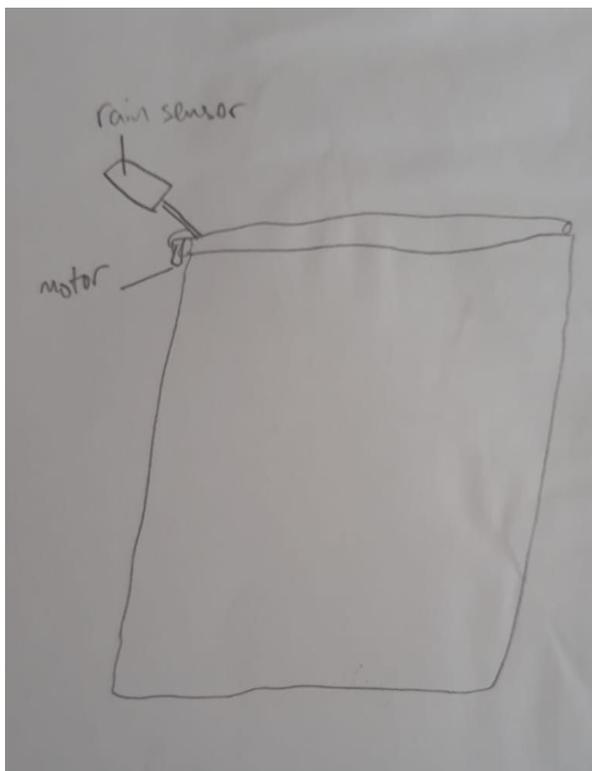
The roller will also be made with plastic as we want to make our product as light as possible to be able to attach it to the windows with ease

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

The material used to construct the parts must be waterproof and lightweight, maybe some plastic.

A strong material must be used to hold out the rain sensor to a place where it can detect the rain

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



The first photo is a drawing of our invention, it shows roughly how our prototype will look like and how it will be attached to a window

The second drawing is our prototype being tested, we were testing if the plastic sheet can be rolled down properly.

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. 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:1	Tick			Remarks
Test Date: 16th August 2018	Pass	Fail	Potential Failure	
Blockage of Water	✓			Water can be blocked pretty well

Waterproof	✓			Water will not be absorbed by the plastic sheet and the parts are protected
Water dripping inside the house			✓	Water could potentially flow down the sheet and into the house depending on the rain.

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.)

- Mold (2017, September 05). Retrieved July 8, 2018, from https://www.cdc.gov/mold/dampness_facts.htm
- A member of the NUHS (2010, April 9). *More seniors hurt at home than outdoors* [DOC]. Singapore: The Straits Times.

- Boynton, E. (2010, November 1). For Elderly, Even Short Falls can be Deadly. Retrieved July 8, 2018, from <https://www.urmc.rochester.edu/news/story/3020/for-elderly-even-short-falls-can-be-deadly.aspx>