Hwa Chong Institution
Project Work
Category 3 Inventions Log Book

Title of Project:
Project Vita Zoi
Group Name: 3-15
Group Members: 1)Rexton Tan (1A1) 2)Matthew Chia (1A1) 3)Liu Dong Yue (1A1) 4)Julien Wong (1A1)

1. Problem Finding

(The beginning…)

Identify a problem you would like to solve. You may want to 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.

Our 1st problem is Temperature taking. Now in this Covid 19-pandemic, temperature is vital. However, temperature taking can be difficult and inconvenient at times. Thus, we wanted to resolve this problem.

Our 2nd problem is lack of social distancing in outlets. Lack of social distancing can result in the spread of coronavirus, thus increasing the number of cases.

Our 3rd Problem is Lack of control/Manpower.Shop owners are expected to have a limited number of people in their outlets/shops. However, sometimes they/their employees are unable to control/remind everyone to abide by this rule, and some may just pretend they did not think the shop was overcrowded. This could potentially lead to shops being ordered to close down and a temporary inactivation of business. Hence, we hope to come up with a solution to monitor and regulate the number of people visiting or clustering around store during a duration/period

Our 4th problem is Caring for our plants.Many people buy plants without knowing how to properly care for them, thus resulting in the plants wither without proper care and nutrition.

Our 5th Problem is on Climate change. In this age, we overly emit greenhouse gases which pollute the air and thus leading to global warming and climate change. This threatens many species of animals, and maybe even us in the future. We hope to solve the problem of pollution through inventions that does not require the burning of fuels or other non-renewable sources.

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

We selected the problem of social distancing in outlets. We wanted to invent something that could be applied in this covid 19 pandemic. Firstly, we realised that there were many news reports on overcrowding or lack of social distancing in outlets/restaurants. For example, it was reported by CNA that 3 F&B outlets were ordered to close because of flouting of social-distancing rules. Foot Locker was also shut down because there was overcrowding outside the shop as there was a limited edition of sneakers being sold and hence there was no social-distancing between customers. Due to the lack of social distancing, these outlets were ordered by the government to close for a certain period of time. Thus, we hope to help the shop owners maintain social distancing in outlets.

Secondly, we wanted to alleviate the burden of social distancing ambassadors. Though one may say that these ambassadors were employed after retrenchment, we should still help them out. Thus, with an invention that can ensure social distancing, we would be able to help the social distancing ambassadors to focus on other important measures.

Thirdly, with regards to a post-pandemic future, we hope to reduce overcrowding in outlets. We also hope that with the data obtained by the shop owners, this system will also allow outlet/store owners to gather more data on the popularity of their stores on a daily basis.

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.

<p align="center">Problem Evaluation Grid</p>

*add more columns and rows where necessary

Considerations for Selection	Problems		Talking plant
	Mask	Social-distancing machine	
Need	2	4	3
Feasibility	2	3	2
Total Score	4	7	5

2. Define the Problem
<p align="center">(This is one…)</p>

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)

Social-distancing is a problem because shops do not adhere to the rules and regulations set by the government. For example, Foot Locker were selling limited edition sneakers, which caused large crowds of people to gather outside the shop. As such, there is no social distancing. There is also a case at Banana Leaf Apolo restaurant where diners were not spaced out. As such, it was forced to close down. All in all, through our invention, we hope to prevent future shops from closing down because of non-compliance to social distancing rules.

2 B   Compare and contrast the existing or similar solutions.

1. People Counter. It Requires self-assembly and does not ensure social distancing in a shop. Parts need to be shipped from overseas
2. Using Python to monitor social-distancing in a public area. This was developed by towards data science where pedestrians are marked in Purple boxes.From Bird's Eye View, they are marked using dots and the system measures the distance between the dots. However, they cannot be used to count the number of people in a shop
3. Drones. The drones are developed by Airobotics and HTX and are programmed to track anomalies such as gatherings and stream footage to the police.They also check for social distancing and can pinpoint locations and zoom into areas that might not be visible to police officers on foot or in vehicles. However, they cannot be used to count the number of people in a shop and there is a risk of them being damaged because of birds,and all objects like lamp posts although there will be cameras on the drone. The drones would also not be operational in extreme weather conditions

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 will be a social-distancing system to count the number of people in a shop to ensure a social-distance between each person in the shop. This system will consist of a set of LED lights (red) connected to a camera that has a programming code inserted inside. The code would mark out the person in a box for easy identification and the size of the box would depend on the size of the person so that there would be an accurate view of the people inside the particular shop.After marking out the customers in the boxes, the code would then allow count the number of boxes and look at the distribution of the people in a shop. If there are a lot of boxes in a particular area, the camera would show the footage to the shop owner/employees. They will then turn the LED light on and tell people to be socially-distanced.

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

 The purpose of our invention is to count the number of people in a shop to ensure that the rule of social-distance can be strictly adhered to at all times. In this way, it will prevent shops and restaurants from closing down by the authorities.

Furthermore, it reminds people to be socially-distanced, easing the workload of social-distancing ambassadors, retail and F&B managers and employees, especially the last three as they can focus on other jobs like promoting an item or serving people etc. This system will also allow outlet/store owners to gather more data on the popularity of their stores on a daily basis.

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

Existing solutions in the market (E.g. using python or drones) do ensure social-distance. However, they do not count the number of people in a shop/restaurant. So far, these solutions/products are only used outdoors (wide open areas) instead of indoors (E.g. Shopping malls etc.). If shops/restaurants are overcrowded, social-distancing is not possible and these solutions cannot remind people to be socially-distanced, rendering them useless.

Hence, our invention is different in a way that it is used indoors and can record the total number of people. It also reminds people to be socially-distanced. This allows the proposed invention to be much more efficient in monitoring and collecting data at indoor places for monitoring and future planning purposes.

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

One problem would be the programming of the system. We have not deciphered what code language we will be making use to programme the system in order to make the system count the number of people entering the shop and what it would do as a reaction if there are too many people either queuing or in the shop.

Another part of the programming that proves to be a challenge is how we will programme it in order to ensure social distancing in shops. Time would also be a problem because we need to create the invention by the Final Evaluation and usually people take months to years to create an invention and we need to do it within a year. Lastly, money is needed to acquire the resources and materials needed. We are unsure how and where to get the things we need to make the invention.

3 E   What and when are the major milestones (project timeline) in your invention?
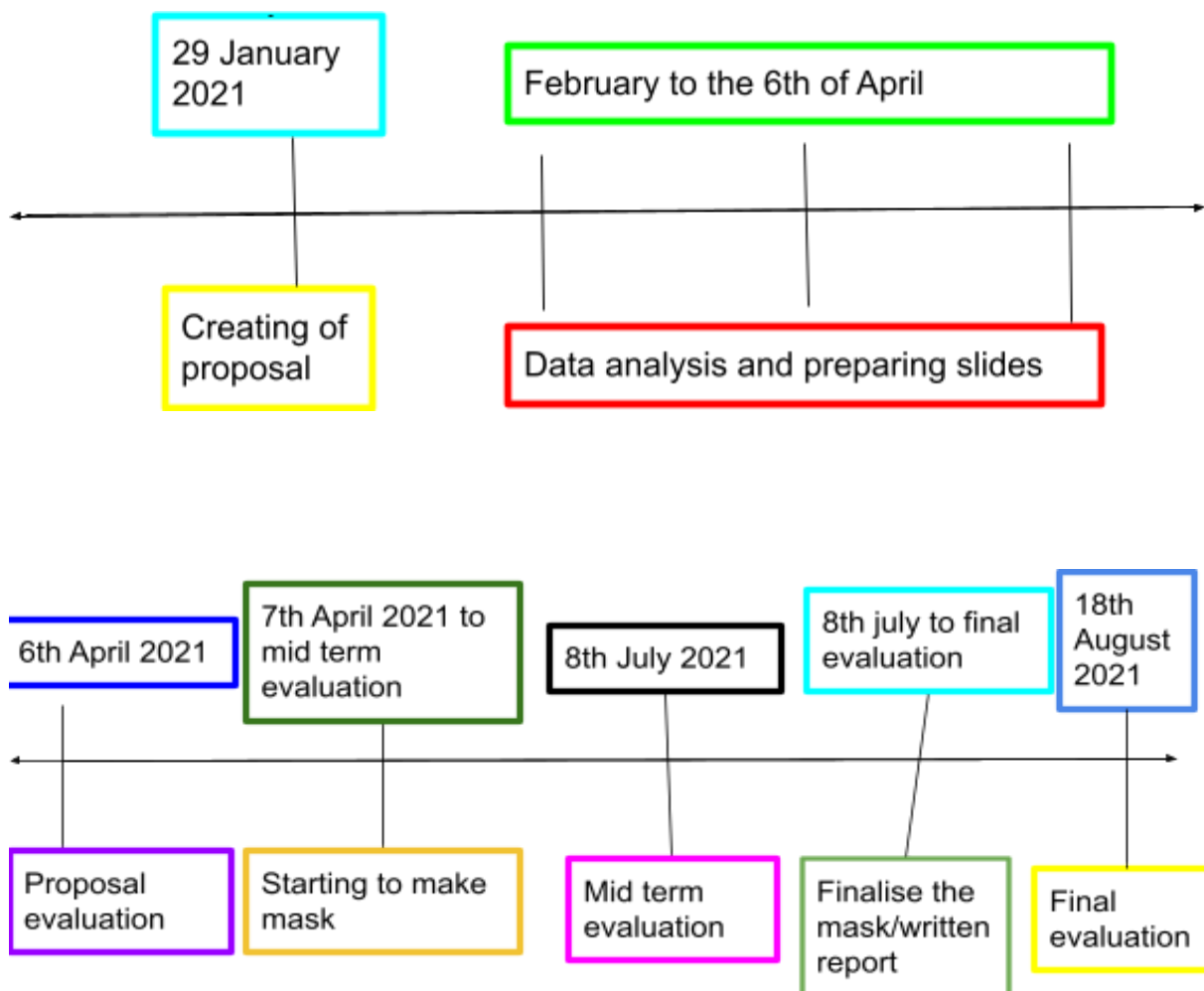
#must be able to be constructed based on current / emerging technologies, must not violate the laws of Science or go against the laws of nature.

4. Construction <u>or </u>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 are using mainly code and an IP camera from xiaomi (**Xiaomi Smart IP Camera Standard Version 2K 1296P**) because we don't have the adequate resources or knowledge to assemble the camera on our own. Also, it is also relatively cheap in comparison to the other prices.

As for the output to remind people to distance themselves at least 2 meters, we would be using an LED red and blue light from **Lazada Suke [Lowest price] 4.4-Inch 10 LED Ultra Slim Strobe LED Lighthead External Emergency Grille Surface Mounting Lights**. Since we think the light would be a good and distinctive output that people will recognise when the shop is overcrowded, the light would be used to alert people.

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

1. We would want to use coding in Python or C++ since it's needed for the people counter to identify lack of social distance.
2. We might need some additional materials to connect the red light to the camera or use Wifi to do so.

4 C   Propose how the prototype/ product development stages. You may use drawings and photographs

Here is a plan we propose in order to complete of construction of our invention:

1st 2 weeks: We would find ways to code using either Python or C++.

Next 3 weeks: After finding a suitable programming language code for our People Counter, we would attempt to insert the code into the Xiaomi IP camera in order for it to count the number of individuals. Then, we shall connect the LED lights we bought on Lazada to the camera so that the red and blue lights will light up as an output to signal a lack of social distancing when the camera detects overcrowding in the enclosed or open areas (shop).

Last 3 weeks: We would test our invention in school to ensure that it carries out instructions in the code smoothly and will satisfy our requirements for the invention. After testing for one week or so,

we would conduct a survey to the people who used the People Counter to gather feedback and comments about our invention so that we can improve. If there are any flaws and does not serve its purpose, we will ask our mentor for information on how to improve before refining our invention.
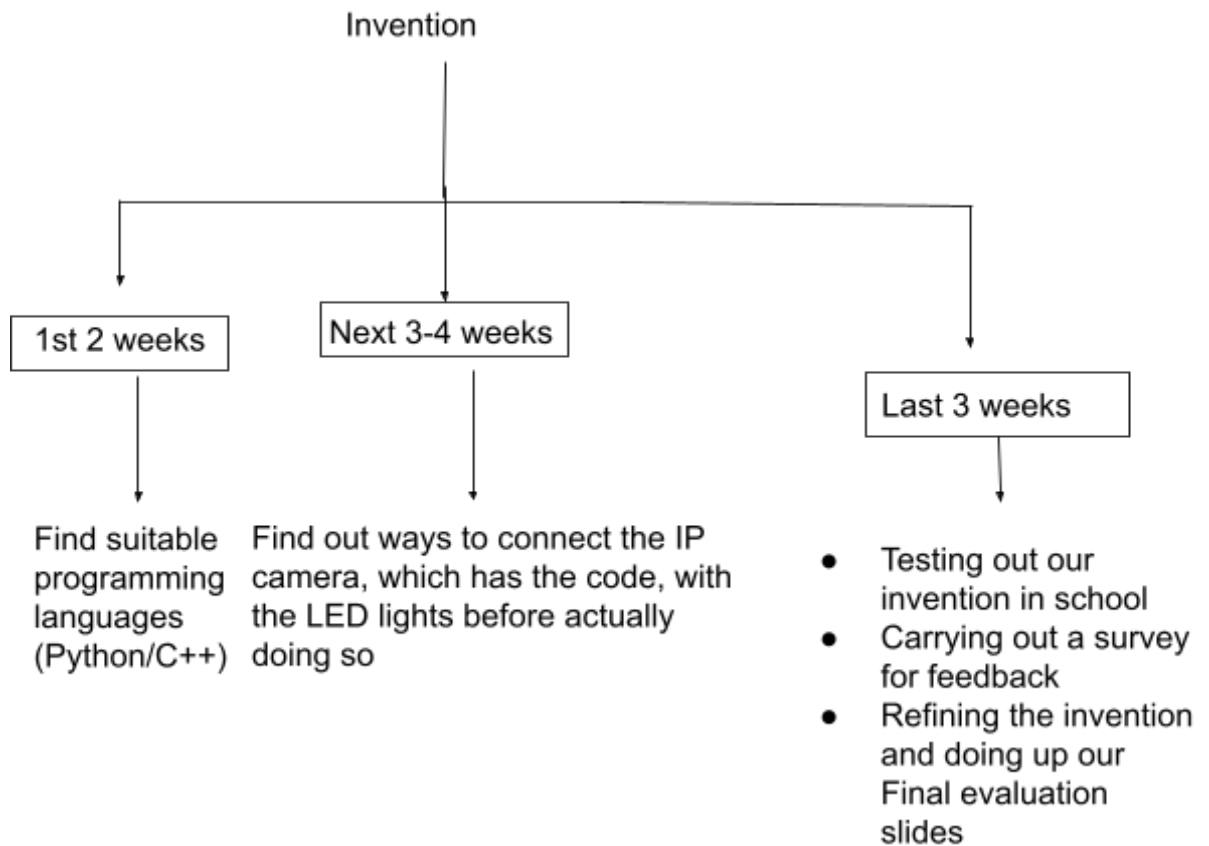
<div align="center"><u>OR</u></div>

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 on a bigger scale.

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

We could not construct the prototype because of the restrictions due to Covid-19. During the June Holidays, we were not allowed to return to school to do Project Work. Once we returned to school, we did not have the adequate time to gather information and finish our prototype. We would be very rushed and we felt that it was not possible to finish on time.

Hence, we decided to use an animation to show how our proposed prototype would work in a real life context to illustrate the idea and structure of the invention in a limited timeframe.

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

This animation uses the app "Blender" to imitate the structure of the camera and the real life setting of the place it is installed in. The animation shows how the invention will work in a real life scenario. We thought it would be best for us to set it in a real life scenario so that we can truly show how it works. The areas at which we want to elaborate on for our invention are the following:

1. Feasibility (is it realistic in its description)
2. Cost of materials
3. How well it functions(does

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.*
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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 (e.g. books, magazines, websites, journal articles, interview, photographs, product brochure, reviews etc.)**

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