

Hwa Chong Institution

Project Work

Category 3 (Inventions)

Log Book

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| Title of Project: Project Work Seat Alarm |
| Group Name: Dranshion |
| Group Members: 1) Yue Jiakai (1A2) [Group Leader] 2) Wu Haotian (1A2) 3) Jovan Tan (1A2) 4) Thay Yu Rei (1A2) |

1. Problem Finding

(The beginning)

Identify a problem you would like to solve. You may want to brainstorm for issues using different approaches, e.g. thematic, survey, 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 issues.

We looked at many types of problems, and we decided on the category “Health and Mental” issues. Here are some of the problems that we have thought about.

1. Physical inactivity

2. Depression

3. Myopia

4. Dehydration

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

1. Physical inactivity causes people to have a greater risk of developing high blood pressure and increases certain cancers’ risk. Data from the Global Burden of Disease (GBD) study revealed that **physical inactivity** was a risk factor accounting for approximately 1.3 million **deaths** (17 **deaths** per 100,000 inhabitants) in individuals aged 25 years and over. 28.0% of **Americans**, or 80.2 million **people**, aged six and older, are **physically inactive**. Not getting enough physical activity can lead to **heart disease**—even for people who have no other risk factors. It can also increase the likelihood of developing other **heart disease** risk factors, including obesity, **high blood pressure**, high blood cholesterol, and **type 2 diabetes**.

2. Depression is a typical mental health problem that causes people to experience low mood, loss of interest or pleasure, feelings of guilt or low-self worth, disturbed sleep or appetite, low energy, and poor concentration. Over 264 million people (especially the elderly) die from depression through suicide and other problems. Being depressed will lead to suicide, which is part of the 264 million people affected by depression.

3. Singapore is the fifth most Myopia in young adults with a shocking 82%. While Myopia isn't an infectious disease, it is still widespread as each year goes by, with cases each year growing drastically. 82% of the people in Singapore have myopia. May cause Glaucoma, Cataracts, and Retinal tearing, which is extremely serious.

4. Dehydration is not recognised by many people as a serious health problem. Still, it is severe as it leads to many problematic side effects such as kidney problems and seizures. There were more than 2000 deaths since 2003. 75% of Americans are chronically dehydrated. May cause heat injuries, urinary and kidney, seizures and low blood volume shock.

1 C List some problems your group would like to solve. List also the considerations for the selection of the issues in the evaluation grid below. Score the reviews, against the problems, with points 1 (least significant) to 4 (most important). Sum up the total points for each situation. Identify that problem you would like to solve.

Note: The considerations in 1B were used for the problem decision and identification matrix.

1. Physical inactivity
2. Depression
3. Myopia
4. Dehydration

Problem Evaluation Grid

| Considerations for Selection | #1 Physical Inactivity | #2 Depression | #3 Myopia | #4 Dehydration |
|-------------------------------|--|--|---|---|
| Death rate | Data from the Global Burden of Disease (GBD) study revealed that physical inactivity was a risk factor accounting for approximately 1.3 million deaths (17 deaths per 100,000 inhabitants) in individuals aged 25 years and over. Reference [4] | Over 264 million people (especially the elderly) die from depression through suicide and other problems. Reference [4] | 0 [0] | There have been more than 2000 deaths since 2003. Reference [3] |
| Percentage of people affected | 28.0% of Americans , or 80.2 million people , aged six and | 264 million people are affected by | 82% of the people in Singapore have myopia. | 75% of Americans are chronically dehydrated |

| | | | | |
|---------------------------|---|---|---|---|
| | older, are physically inactive . Reference [3]] | depression. Around 3% [2] Reference | [4] Reference | Reference [2] |
| Side effects | Not getting enough physical activity can lead to heart disease —even for people who have no other risk factors. It can also increase the likelihood of developing other heart disease risk factors, including obesity, high blood pressure , high blood cholesterol, and type 2 diabetes . [4] Reference | Being depressed will lead to suicide, which is part of the 264 million people affected by depression. [4] Reference | May cause Glaucoma, Cataracts, and Retinal tearing, which is extremely serious. [4] Reference | May cause heat injuries, urinary and kidney, seizures and low blood volume shock. Reference [3] |
| Ease to solve the problem | Our product [4] | You can't just ask somebody with depression to stop being depressed. Reference [0] | You can't just get rid of myopia [4] | The dehydrated person can just drink water. [3] |
| Total Score | [15] | [10] | [12] | [11] |

2. Define the Problem

(This is one...)

Now that the problem has been identified, it is essential to gather information on its extent. You may need to conduct surveys and research on existing solutions.

2 A Extent of the current/emerging problem (Research and discuss the situation and write down the problem statement)

Research:

So far, the World Health Organization (WHO) found a significant increase in people's natural laws leading to sedentary lifestyles. They define the level of physical activity of less than 600 metabolic equivalent tasks (MET) minutes per week as not sufficient to produce the health benefits that the body requires.

- You burn fewer calories. This makes you more likely to gain weight.
- You may lose muscle strength and endurance because you are not using your muscles as much.
- Your bones may get weaker and lose some mineral content

- Your metabolism may be affected, and your body may have more trouble breaking down fats and sugars
- Your immune system may not work as well
- You may have more insufficient blood circulation
- Your body may have more inflammation
- You may develop a hormonal imbalance

[medlineplus.gov > healthrisksofaninactivelifestyle.html](https://medlineplus.gov/healthrisksofaninactivelifestyle.html) Health Risks of an Inactive Lifestyle

<https://www.cdc.gov/chronicdisease/resources/publications/factsheets/physical-activity.htm#:~:text=Not%20getting%20enough%20physical%20activity%20can%20lead%20t>

Problem Statement:

The product aims to decrease the number of people who lead a sedentary lifestyle (physical inactivity) to have a lower chance of dying due to the side effects that physical inactivity may cause. (which was mentioned above)

2 B Compare and contrast existing or similar solutions.

Criteria:

1. Cost
2. Effectiveness
3. Ease to use

Fitbits/ Apple Watches:

They are like watches that can remind you when to stand up and drink water and tell the time, and some can also track your electrocardiogram, Blood Pressure, and Oxygen Level.

Cost:

\$129.25 - \$699

This is too expensive, and not everyone can afford it.

Score: 1/5

Effectiveness:

It is not very effective as it is just a vibration on someone's wrist and since it is a watch, it can be removed immediately, making the user not stand up. However, it might be effective if the user pays enough attention to it.

Score: 2.4/5

Ease to use:

It is fairly easy to use, and it is also portable and light, ensuring that the user is not burdened by it.

Score: 4/5

Total score: 7.4/15

[Reference](#)

MOVE (Application):

It is a smart sports movement application that empowers you to move more, better and faster. Like athletes, their mission is to be the best version of themselves through encouragement and empowerment. They are driven to inspire everyone to reach their highest potential by walking, running, jumping, dancing, or just simply moving. MOVE provides the perfect platform to achieve your goals regardless of who you are. (from the developer)

Cost:

MOVE is free without any in-app purchases.

Score: 5/5

Effectiveness:

It is not very useful as MOVE only makes a ding sound which can be cancelled almost immediately.

Score: 3/5

Ease to use:

It is pretty difficult to use as there are many configurations and no tutorial.

Score: 2/5

Total score: 10/15

[Reference](#)

Alarm Clock

Cost:

Most alarm clocks will cost \$8 - \$50

Score: 4/5

Effectiveness:

It is not very useful as it will only ring and the user will not be forced to stand up. The user can only press the alarm clock to stop the ringing.

Score: 2/5

Ease to use:

It is easy to set the timer.

Score: 5/5

Total score: 11/15

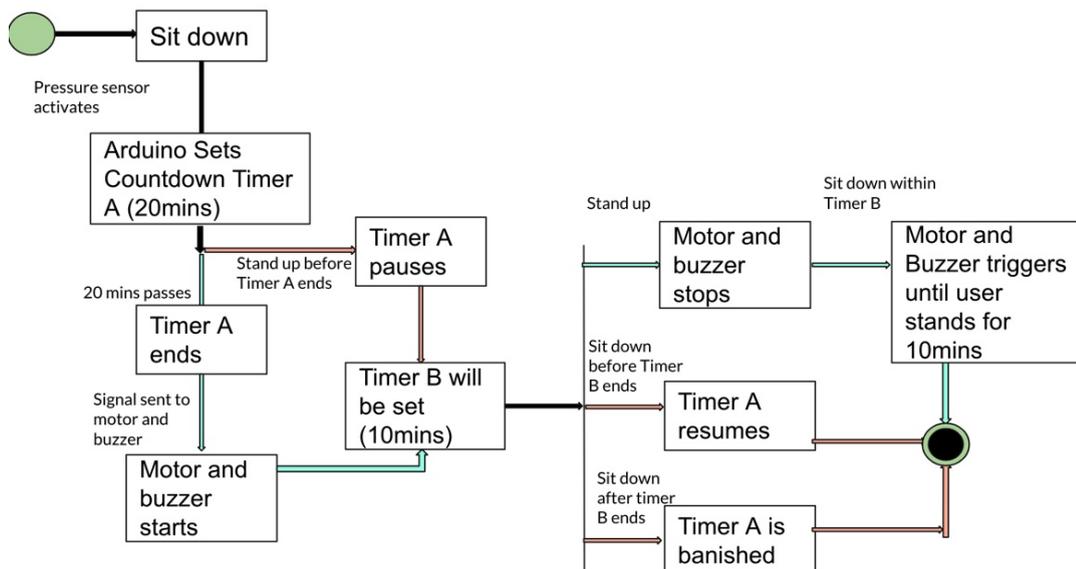
3. Your BIG IDEA (Developing the idea....)

3 A Describe your proposed invention.

It is a cushion of low cost, highest efficiency and easiest to use. There is a cushion on top of a mechanism. The mechanism consists of a pressure sensor to sense the pressure of someone sitting down. Then there is an Arduino Uno board to process it. After a specific period of time, the Arduino will trigger the buzzer that will buzz and get the user up.

Flowchart:

Activity flow chart



Black arrow is neutral. Green arrow is Path 1. Red arrow is Path 2.

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

The purpose of the proposed invention is to remind the users to stand up after sitting down for an extended period. This will reduce the number of people who sit down for long periods. Thus, the number of people leading sedentary lifestyles (physical inactive) will be fewer. This could also remind people to drink water and move around more frequently. The potential benefits to users of the Dranshion(our invention) are that they will lead a more active lifestyle and stay more healthy.

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

Instead of being like a watch or an app, it is a cushion right under our buttocks, which has the highest effectiveness since we are forced to get up. It is better than other existing solutions as the other solutions do not 100% get us up. Our product does not need to be set and automatically set a timer once the user sits on the cushion. (For example 20mins) Once the timer is up, there is a stand-up period where the buzzer will buzz. The human can stand for as much time as he/she wants since the timer will only start once the user sits down. Plus, it is also the lowest cost, highest efficiency and easiest to use.

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

There has to be an easier way to let the user time the timer instead of keeping the time fixed, and the product might have a problem with that. It might have a problem ensuring that people using the device would not easily crush the cushion mechanisms.

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

Please log in to your Microsoft account using your HCI account before viewing this [timeline](#). Thank you.

#must be constructed based on current/emerging technologies, must not violate the laws of Science or go against nature's laws.

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 you chose the materials for the prototype/ product of your invention

Wood

It is strong and durable. Besides that, it is also resistant to decay and it is also inexpensive.

Sponges:

Sponges will allow the seat to move down, so that it can trigger the pressure sensor, and it also ensures that the user would not spoil the pressure sensor.

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

Durability/ Sturdiness: The cushion must be durable and sturdy enough to hold the weight of the user.

Portability: The cushion must be portable enough to be carried around.

Price: The materials used to make the cushion must not be too expensive.

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

Please enter this document:

[Logbook-4C](#)

OR

If the prototype's construction is impossible, you have to create an animation/proof of concept applied on a bigger scale.

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

NA

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

NA

Warning:

- *Video / animated simulation only if prototyping is absolutely no possible.*
- *Video / animated simulation must be logical and convincing that the invention works.*
- *You must include constraints in the logbook, or the project will be heavily penalised.*

References

Read [this](#) on how to cite references.

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

These are the bibliographies. The citation format is in APA. **DISCLAIMER: Some links were reused.**

- John Hopkins Medicine (2021). Risks of Physical Inactivity. The John Hopkins University. Retrieved from:
<https://www.hopkinsmedicine.org/health/conditions-and-diseases/risks-of-physical-inactivity#:~:text=What%20health%20risks%20are%20linked,risk%20for%20type%20>
- The Mental Health Foundation UK (2018). Depression and Mental Health. The Mental health Foundation UK. Retrieved from:
<https://www.mentalhealth.org.uk/a-to-z/d/depression>
- Mayo Clinic (19 September 2019). Dehydration- Symptoms, causes, diagnosis and treatment. Mayo Clinic Staff Retrieved from:
<https://www.mayoclinic.org/diseases-conditions/dehydration/symptoms-causes/syc-20354086>
- Kevin Rawlinson (Mon 2 Dec 2013 02.10 GMT). Dehydration and malnutrition led to 2,162 deaths in care since 2003. The Guardian. Retrieved from:
<https://www.theguardian.com/society/2013/dec/02/dehydration-malnutrition-care-homes-hospitals#:~:text=In%20the%20previous%20seven%20years,more%20than%20200%20per%20year>
- Diego Silva-Mark Tremblay-Fatima Marinho-Antonio Ribeiro-Ewerton Cousin-Bruno Nascimento-Paulo Neto-Mohsen Naghavi-Deborah Malta (1990–2017). Physical Inactivity As a Risk Factor For All-cause Mortality in Brazil. BMC. Retrieved from:
<https://pophealthmetrics.biomedcentral.com/articles/10.1186/s12963-020-00214->

