

Hwa Chong Institution

Project Work

Category 3 Inventions Log Book

Title of Project: Wakey
Group Name: Sleepbusters
Group Members: 1) Jacques Tang 2) Jarrett Loke 3) Joshua Ong

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.

- 1) Spilling liquids
 - a) We thought of inventing a mug that can't be spilled. We would often have accidents and spill liquids and we thought this was a good idea.
- 2) Reserved seats
 - a) We thought about making an invention that could tell if the person seating on the reserved seat was a person that actually needs it or a fit and well person that sits on the seat just for his/her own personal comfort.
- 3) Oversleeping
 - a) We thought of finding a way to wake up more naturally and overcome the issue of snoozing the alarm and staying in bed as this is a problem we often face.
- 4) Food-waste
 - a) As food waste is a prominent issue we thought of tackling the problem using innovation

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

Considerations:

- 1) Feasibility of solutions - Are we likely to be able to tackle this problem with a single invention? Would we be able to easily implement a solution? We thought about these questions as if the problem was beyond our reach, we would be unable to solve it.
- 2) Prominence of these issues - Do many people have this problem? How impactful is this issue to them? We had to consider this as making an invention that not many people would use or solve a problem that has little to no effect on a person's life would be redundant.
- 3) Has it already been solved? - Are there already existing solutions that do a good job at tackling the issue? Are there faults with existing solutions? We had to consider this as if we did not we would be "reinventing the wheel".

- 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			
	Unspillable cup	Reserved seats	Oversleeping	Food waste
Feasibility	4	1	3	2
Prominence	1	2	3	4
Solved?	1	4	3	2
Total Score	6	7	9	8

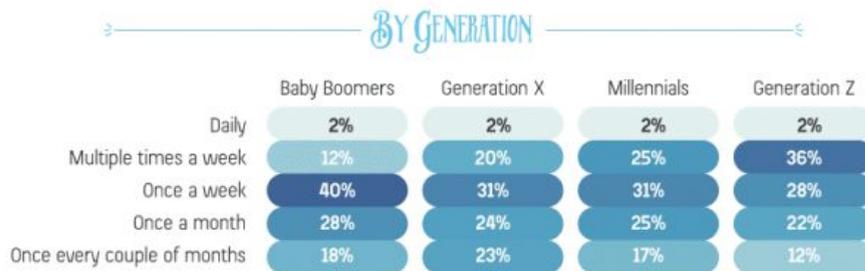
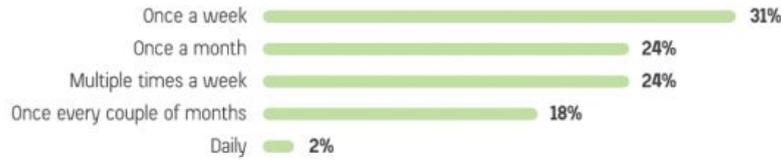
2. Define the Problem
(Oversleeping and annoying alarms)

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)**

According to a study from Mattress-Inquirer of over 1,000 people, 55% of people oversleep at least once a week and 75% of those have missed work.

FREQUENCY OF OVERSLEEPING



SOURCE: Survey of 1,038 People **Mattress**
Inquirer

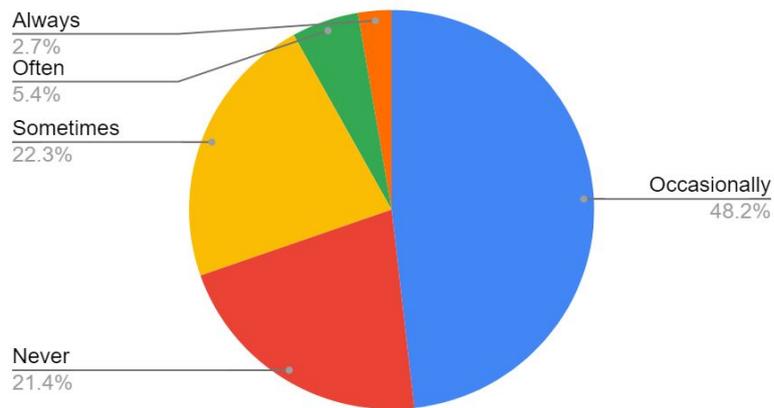
This data corresponds with our findings in our survey.

There are many negative impacts of hitting the snooze button. If you went to bed at a decent hour the night before, your body's internal clock is ready to wake up once the alarm goes off. But when you hit snooze and go back to sleep, you send your whole system into a confusing tailspin. Before long, your body isn't sure when it's time to wake up and when it's time to go to sleep. This will cause your body not being able to identify when to sleep, and you might spend a lot of time tossing and turning. This can ultimately affect the amount of sleep you get throughout the whole week, and this may cause you to become snappy and irritable. This also decreases the immune systems strength and causes you to fall sick easily. Furthermore, many alarms are loud and harsh and can lead to waking up in a bad mood and disturbing family members or loved ones.

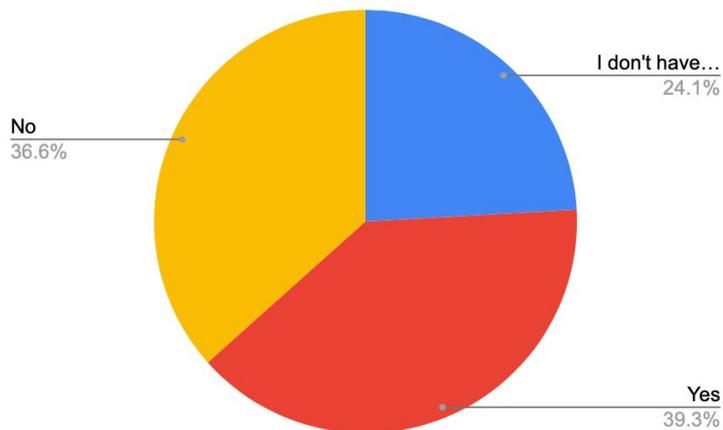
Results of our survey of over 100 singaporean students from different schools :

How often do you oversleep?

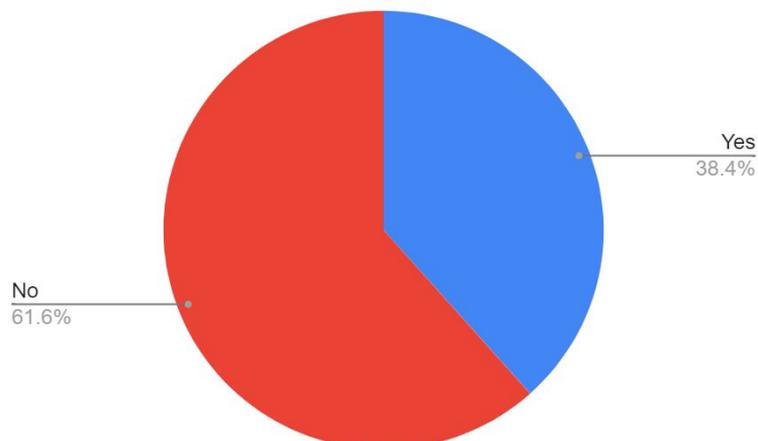
Answers



Do you find your alarm clock annoying or disruptive?

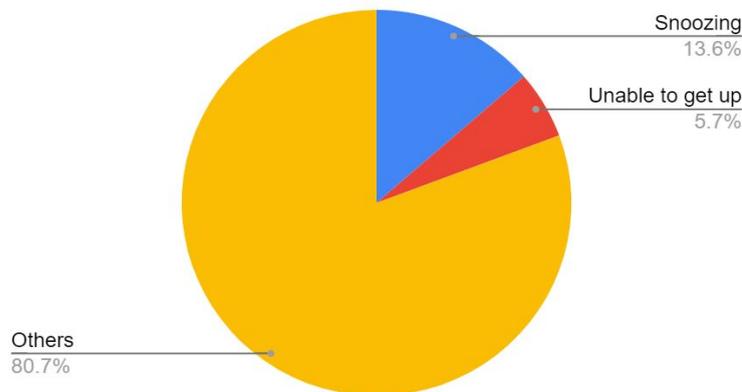


Does your alarm disturb your family members or vice versa



Why do you oversleep?

Answers



In conclusion, we think that this is a worthy problem to tackle and is a prominent issue.

2 B Compare and contrast the existing or similar solutions.

Existing solutions include:

- 1) Clocky Alarm Clock
- 2) Ruggie Alarm Clock
- 3) Apple watch's vibrating alarm
- 4) SpinMe Alarm

Clocky Alarm Clock - This alarm will run away from you when you snooze, requiring you to get up and chase after it in order to turn it off. This can effectively get you to get out of bed. However, the loud alarm can be harsh and needing to get up to chase after it as it continues ringing can disturb family members or loved ones.

Ruggie Alarm Clock - This alarm shares a similar concept as Clocky. It requires the user to get up and step on a rug before the alarm stops. However, it shares the same issues such as disturbing family members.

Apple Watch's vibrating alarm - The apple watch and other similar devices have a feature where the watch vibrates to wake the user up naturally and comfortably. However, this does not address the issue of snoozing the alarm as the alarms can be easily snoozed or turned off.

SpinMe Alarm - This is an app which acts as a regular alarm however, similarly to Clocky and Ruggie, it requires the user to spin around with phone in hand to turn it off. This is supposed to help blood circulate. However, waking up to a loud beeping sound and needing to look at

a bright screen is not exactly a fun way to start your day. Furthermore, looking at a bright screen may affect the eyes of the user.

In conclusion, there are many solutions out in the market as of today, however, they have many flaws. We plan to incorporate the best of all the solutions to ultimately solve the problem.

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.

We would like to create a wristband/ something to attach onto your calf that contains a device that is connected to a mobile device via bluetooth. When the time arises, the watch will start to vibrate or emit a sound of your choice and in order to turn off the alarm, the wearer will have to spin around in circles. This will wake the wearer up due to “centrifugal force that spreads the blood throughout the body” This will be most effective to wake the wearer up.



Possible design

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

Our proposed invention would allow people who suffer from snoozing the alarm too much to wake up on time. This would help the user sleep more healthily and have a better sleep cycle as studies have shown that oversleeping can cause harm. It would also allow people to wake up comfortably and naturally whilst not disturbing and potentially waking up their fellow housemates or loved ones. This would allow the user to wake up on a happier note and not be cranky or grouchy. If the user decides that he or she is a heavy sleeper he or she can also make the alarm emit sound. Furthermore, this device would also appeal to deaf people who are unable to hear the alarms of the alarm clock.

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

Our proposed solution would address many of the flaws of the existing solutions, such as allowing users to wake up with a vibration and not have a loud, harsh sound to wake up to. Vibrating alarm clocks provide what many would consider to be a more gentle wake-up experience. If you're not a morning person, this can be hugely attractive. Our solution would effectively not disturb and wake up other household members or family members. Our solution would also not require the user to look at their phones early in the morning.

According to Research by the National Institute of Industrial Health in Japan, despite the popularity of using an alarm clock, waking up to a jolting noise can be bad for your heart.

The study examined the effects of self-awakening on heart rate and blood pressure in a short afternoon nap (20 min) among the elderly. Nine participants underwent both self-awakening and forced-awakening conditions. In the self-awakening condition, it was revealed that blood pressure gradually increased before the scheduled time of awakening, and that heart rate did not show a rapid increase at arousal. In contrast, forced-awakening induced acute increases in both heart rate and blood pressure. These results suggest that self-awakening facilitates a more smooth transition from sleep to wakefulness via autonomic activation before the time of self-awakening.

Waking up abruptly can cause higher blood pressure and heart rate. Besides increasing your blood pressure, an alarm can add to your stress levels by getting your adrenaline rushing. Snoozing the alarm also has its fair share of negative impacts. For one, it can affect your natural sleep cycle. This would lead to a weakened immune system in some cases which can make the person prone to illness.

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

Problems we may face would include:

- 1) Coding the motherboard
- 2) Designing
- 3) Testing

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

1. Designing the prototype
2. Prototyping
3. Testing
4. Redesign and repeat (9 Jul)
5. Written Report (6 Aug)
6. Repeat for Final Evaluation (12 Aug)

#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...)

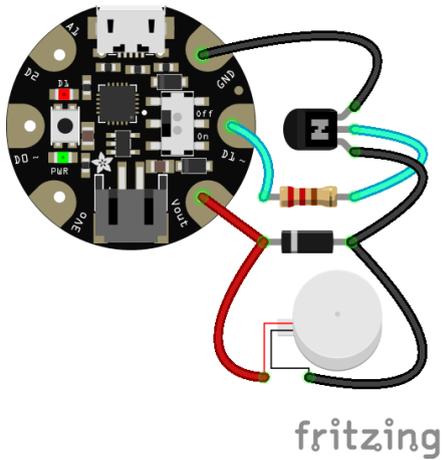
You are now onto the fabrication of your prototype/ product. You need to select material and understand how to put them together so that your prototype/ product can perform its function.

4 A Explain how and why the materials were chosen for the prototype/ product of your invention

We decided to use a Gemma M0, which is the motherboard to be coded, a vibrating mini disc motor to vibrate when set time comes and wake the wearer of the user up, a 100mAh lipoly battery, which is rechargeable, to prevent constant change of batteries, heat shrink tubing to protect the user and accelerometers to detect movement, which in this case is the person spinning. We also decided that leather would be the most viable option for making the bracelet. This is because leather is of high quality and has a soft feel, allowing the user to sleep well without feeling conscious of having a wristband on his wrist while sleeping.

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

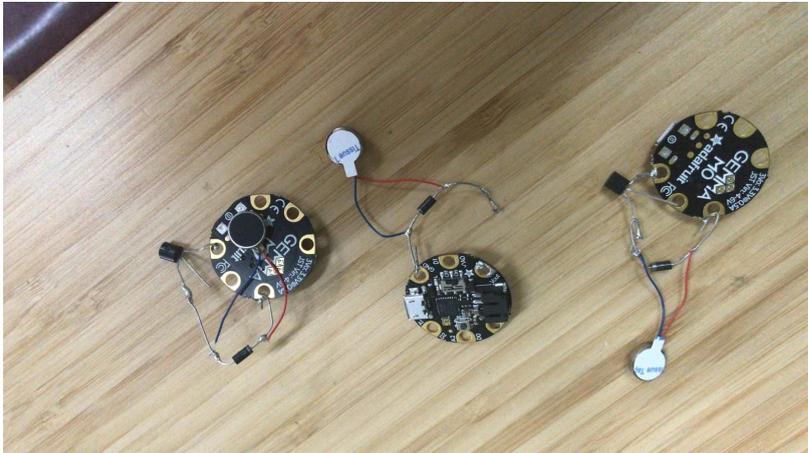
We decided on making a basic prototype that can vibrate at a set time. We did not have the time to include accelerometers. We followed a circuit diagram shown below by adafruit on their "mindfulness bracelet".



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

Shown here is just a basic prototype, it does not include the accelerometers or any way to switch it off as of yet.

It includes the vibrating motor disc and can vibrate at a set time.



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 on 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.

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.)

<https://pubmed.ncbi.nlm.nih.gov/15732320/>

Kaida K, Ogawa K, Hayashi M, Hori T. Self-awakening prevents acute rise in blood pressure and heart rate at the time of awakening in elderly people. *Ind Health*. 2005;43(1):179-185. doi:10.2486/indhealth.43.179

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