

Hwa Chong Institution
Category 3 (Inventions)

Group Name: Hip Protector (1.0)

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#1 Problem Finding

Initially, we thought of inventing a hip protector to protect the elderly and can automatically send a message to the loved ones when the elderly fall down. However, we realised we could not do the programming. Thus, we thought why not have many different functions instead of one complex one. We think one of the few reasons that caused us to make this decision is because we were influenced by our grandparents who showered us with much care and love through our journey of growing up. We also wanted the elderly people to be safe as they can be quite frail. If they fall, they might suffer a serious injury, and if they hurt their hips, their mobility might be affected. Therefore we came up with the idea of a hip protector.

Through the process, we had a discussion about another idea which is a medical bed protector that could be extended above manually and to prevent the patient from rolling off the bed. We spent a few days thinking hard and planning through it. We drew out diagrams, discussed pros and cons. However, in the end, we dismissed that idea. That was due to the materials and working process required. Also, some of our group members realised it would be difficult to install functions and physically built it. We thought that it would be more meaningful to make a hip protector than a bed protector. It might not be that useful to hospitals as compared to the hip protector for the elderly

Problems	Product 1	Product 2	Product 3
Elderly gets hurt critically after a fall	We make a protective "gear" around the elderly's hip such as inflatable sponges (4)	We make a cushion around the elderly crucial parts with functions inside. (5)	Nil (0)
Elderly did not get immediate medical attention after an injury	We attach a sensor with bluetooth devices to the hip protector to alert hospital and family members after falling (3)	We make a sensor in a hip protector that would make a loud sound to alert people nearby (4)	Nli (0)
People often fall off hospital beds			We install a completely covered metal frame onto hospital beds(2) + We install motion sensors or fall detectors to detect patients when they fall(4)
Total Score (out of 10)	5	9	6

#2 Define the Problem

As we moved on to think deeper on how to help the elderly, we realised there were many areas that the elderly needed help in too! After some research, we found out that many of the incidents involve elderly in our current living world. In the first half of the year, there were 183 accidents involving pedestrians who were aged 60 and above, an increase of 59.1 percent from the same period a year ago. We thought the rate that they are getting injured is alarming. Many elderly live on their own and do grocery shopping alone. When they travel to the market, they would pass by many places that have little people around them. So, when they fall, even with a protection layer around their hip, no one might notice them and the situation could worsen. Hence, the people around them must be notified or if not their injury may worsen.

An example of existing hip protectors is the Tytex Safehip Hip Protector. It has sewn in hip protector foam shields, guarding people if they fall down. The product is targeted at active elderly who are susceptible to falling down. Our hip protector also has a similar function as that product, with a protective layer around the elderly's hip. However, our hip protector has several additional functions added on to the function of protecting the hip. These functions make it more convenient to seek help when injured.

Tytex Safehip hip protector

- It has a horseshoe-shaped cushion to help divert impact to softer parts around the hip.

vs

Our hip protector

- Our hip protector has a bubble wrap and sponge layers to completely block out impact Altogether without even diverting any of it.
- Our hip protector also has a GPS tracker to Let family members know about the incident
- Fall detectors detect the fall so as to set off The alarm to alert others about the incident.

#3 Your BIG Idea

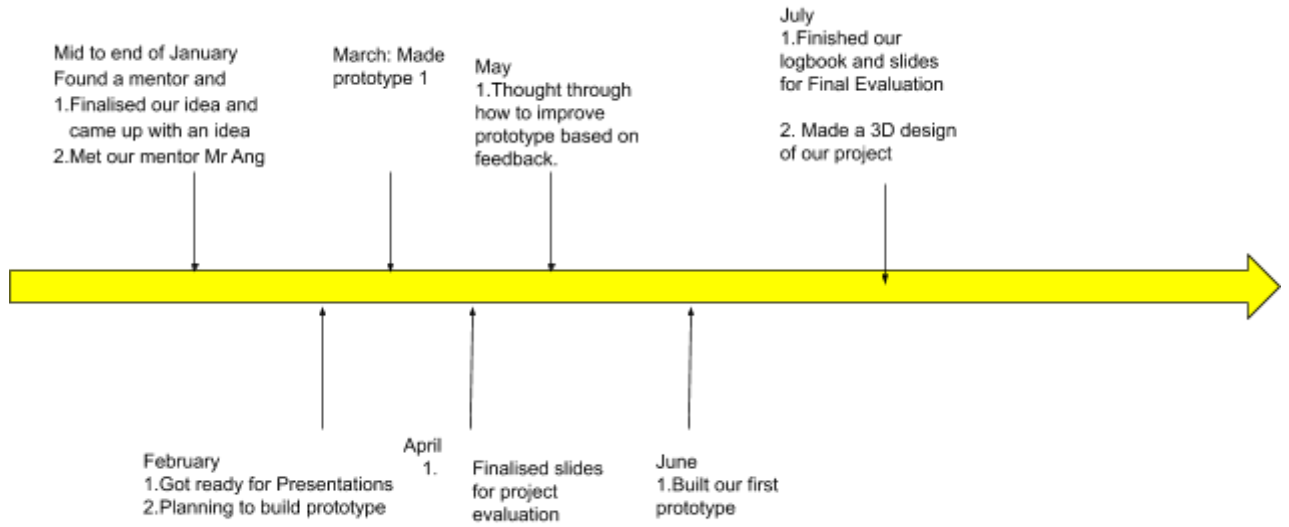
We are planning to install alarms on the hip protector. This alarm would make a loud sound as they are triggered by the impact and alert others. There would also be fall detectors to detect if the elderly person is falling down. When they sense that he/she has fallen down, the alarm will be activated.

Our invention can contain more functions that would benefit the elderly. It can also help the elderly by not having severe injuries and seek immediate medical treatment. For elderly with dementia, they might not be able to seek treatment from family members promptly if they get injured. Thus, with an alarm and fall detectors installed, it would be faster for them to seek treatment.

Current hip protectors do not have a function that would make it alarm and make a loud sound when the elderly falls. We feel that this is important as some elderly do their shopping or go out themselves to places with less people. Therefore, with the alarm, it can let the elderly seek treatment faster when he/she is alone as people will be alerted by the accident.

The materials will be hard to find and may be very expensive, above our budget. Constructing the hip protector may also be a challenge, as we have to find ways to protect some of the sensors since it may be broken if the elderly falls down.

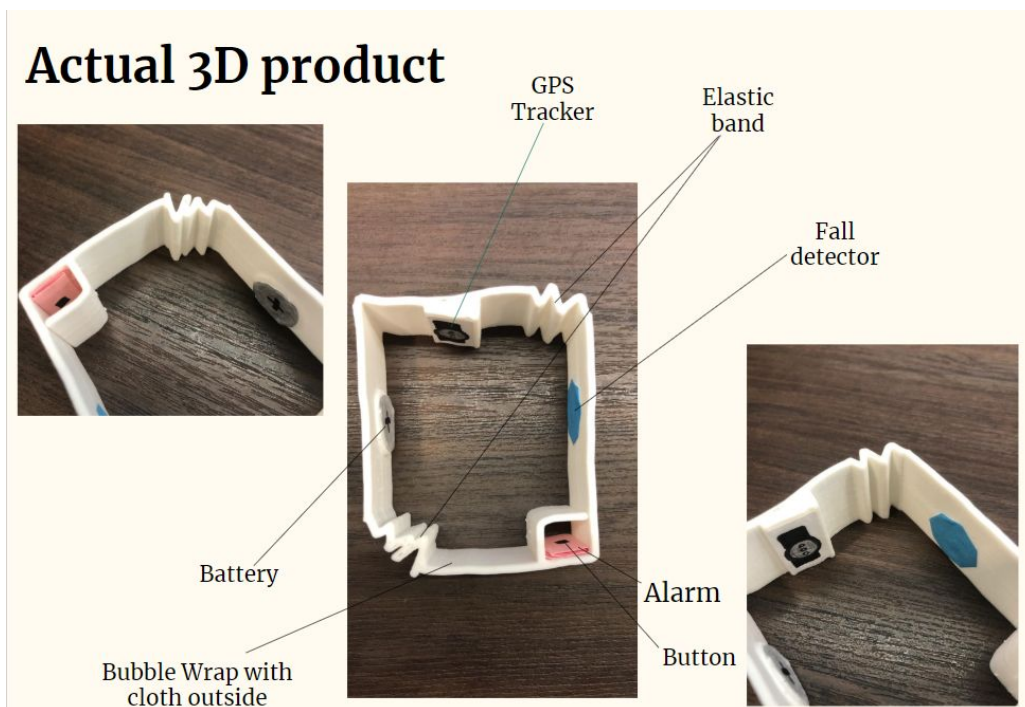
We are planning to install fall detectors on the hip protector. The problem that we have so far predicted is that when the person sits down, the alarm might sound due to the fall detector wrongly detecting that the elderly person fell down. Therefore, we would have to consider how we are going to make the fall detectors go off only when a certain amount of impact is applied. We are planning to put a fragile casing around the fall detectors so that it would only sound when a certain amount of impact is applied.



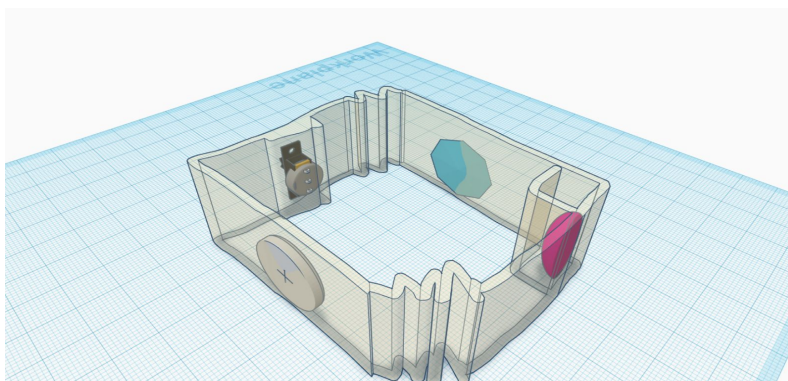
#4 Construction or Modelling Process

The materials were chosen with great consideration on whether they were able to protect the elderly person's hips, and if they were less bulky or standing out if he/she goes outside and into the public. We also wanted the materials to be lightweight and easier to carry around so the elderly person would not feel tired having to wear it on his/her hip.

The material that can be used for this product outer layer is bubble wrap or sponge layers. There are 4 fall detectors that detect the elderly person when he/she is falling down and once he/she falls down, the alarm will be activated, and if he/she is alone, the alarm will increase the chances of someone knowing that the elderly is injured, and will rescue him/her.



Our digital 3D design



References

- **Tytex** - Hip Protection. (n.d.). Retrieved August 10, 2020, from <https://tytex.com/products/hip-protection>
- **CNA** - Accidents involving elderly pedestrians on the rise, many due to jaywalking: Police. (2019, September 28). Retrieved February 27, 2020, from <https://www.channelnewsasia.com/news/singapore/singapore-elderly-pedestrians-accidents-jaywalking-11952054>