

Hong Kong Student Science Project Competition 2023

Template of Extended Abstract (Invention)
(Word Limit: 1,600 words, Pages: 3 pages only)

Team Number:

Project Title:

Project Type: Invention

To our best knowledge, there are/are not works in the market; (if there are,) related product links are as below:

<https://www.techeblog.com/macquarie-university-apptrakk-anti-drowning-device/>

I. Background

The project addresses all swimmers who swim in the swimming pool. Then, let's talk about how the invention works, the swimming pool that installs our invention, a camera is put under water at different spots. The recording that is taken from the camera will be sent to the computer. The program in the computer divides the area into many grids and detects the movement of swimmers by calculating the coordinate. By using this method, the program can detect whether there is any abnormal movement of swimmers. When swimmers stay in the same coordinate for 3 seconds, if the range of movement is less than 350 units, the program may define that swimmers are in danger and may need help. The LED placed at different areas in the swimming pool may light up to inform the lifeguard to save the swimmers and shows the location of the drowned people.

Finally, the highlight of technology used is Mynotifier to send notifications to people's phones. It's very user-friendly that even users that are not familiar with technology products can handle it easily. First, we need to download the app and log in using email and then connect your phone. Finally, you can receive notification.

The technology gap of the project is trying to fill that there are no similar products in the market.

II. Objectives

The team absolutely understands that lifeguards are staying near the swimming pool to keep an eye on swimmers. However, due to the lengthy working hours, lifeguards may fail to spot swimmers who need help, and this may cause severe consequences. Therefore, our project can help lifeguards to know there may be someone who needs help to prevent the situation of overlooking drowned swimmers. We hope to reduce the number of drowning people and the length of time for lifeguards to be aware of the swimmers who are in distress. The longer the period of time needed for lifeguards to be aware and take action, the more permanent and drastic damages it may bring to their health. This can reduce the number of deaths because of negligent homicide.

III. Methodology

For equipment the team uses, we use the waterproof camera to monitor swimmers' and elderly's situation. The material the team uses to make our prototype is a transparent plastic

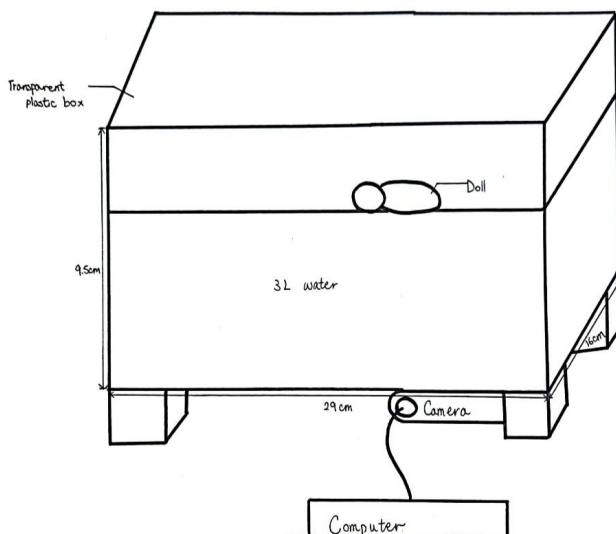
box so we can observe the situation inside the water. Then, we use a baby doll as the model of the swimmer who drowns for the simulation scenario.

For the test, the observation is that lifeguards sometimes get distracted and not paying attention to the swimmers. Then, the question is why are there many drowning cases that lead to death even though there are lifeguards? Furthermore, the hypothesis of the experiment is that Lifeguards sometimes get distracted and not paying attention to the swimmers due to durable working time. Therefore, even if someone is in distress and needs help, lifeguards can't give a helping hand to them at once. When lifeguards discover swimmers, the swimmers have already drowned, and this leads to irreversible harm to their health. Finally, according to the Global Resuscitation Alliance's report, the sooner we start to perform first aid on people who are suffering from OCHA, that may bring less harm to the nervous system. In conclusion, the sooner we perform first aid on drowned swimmers, the more likely they will be saved and won't bring harmful consequences to them.

IV. Design of Invention

The team put a baby doll inside a transparent box that is filled with water to simulate the situation of a drowned swimmer in the swimming pool. Then, a camera is set up above the box which is connected to the computer to observe the situation.

There is the sketch:



V. Application / Market Need

The invention is used in swimming pools, the invention can save swimmers at once if they are in distress to reduce the possibility of negligent homicide. No such product can protect the safety of swimmers who live alone and the production cost of our invention is very cheap, approximately 300 dollars so it has a high market need.

Our invention can't be used in sea and beaches because the visibility of them is so low that the

recording can't record the situation clearly so the program can't work accurately.

VI. If your team will compete the Sustainable Development Award, please indicate the specific sustainable development goal the project is related to, and provide justification for competing for this award. (Word limit: 300 words)

Our invention meets the third sustainable development goal which is good health and well-being as it saves lives and reduces the harm to drowned people and injured elderly.

Our invention also leads to economic growth as we use affordable inventions to reduce the harm to people of their health. As there are fewer harms, less medical expenditure for the government is spent to provide medical services for drowned people and injured elderly.

For this justification, we hope that our invention can be used in the larger region such as beaches. As the area of the beach is even greater so it's hard for lifeguards to observe the situation of swimmers, then there may be more drowning cases.

VII. If your team will compete the Social Innovation Award, please list the target group or social issue the project focuses on, and provide justification for competing for this award.

(Word limit: 300 words)

The target groups of our invention are swimmers who swim in swimming pools. Also, the invention can help lifeguards to discover the drowned swimmers and perform first aid on them at once to minimize the harm to drowned swimmers' health. Therefore, we may say that our project focuses on health issues.

VIII. Conclusion

The prototype made by the team has achieved its objectives.

Regarding the part of detecting drowning swimmers in the pool, the team has successfully programmed the camera to do so. The invention can surely reduce the number of deaths caused by drowning and achieve the sustainable goal – Good Health & Well-being.

Our project is developed based on previous project and the enhancement is below: