Hong Kong Student Science Project Competition 2022

Template of Extended Abstract (Invention)

(Word Limit: 1,000 words, Pages: 2 pages only)

Team Number: SAPE221

Project Title: Heroic Window

Project Type: Invention

To our best knowledge and after thorough literature research, as at 30/6/2022 , there ~~are~~ / are no* similar works. If there are, the reference links are as below:

The enhancement our project has made for the existing related products or research is summarized as below:

***Please delete if not applicable. HKSSPC values the originality of works. Students must conduct literature research thoroughly to ensure that their works are unique, and to list relevant reference materials to complement the research or invention.**

I.Background

Every year, there are a considerable number of injuries caused by falling out of windows, resulting in traumas of the families. Currently, there are two solutions to prevent this situation—window grills and floor-to-ceiling windows. However, they have the problems of blocking views and bad ventilation respectively. The use of common window grills might also cause the children being stuck.Our invention can tackle these problems with an automatic window-closing system.

I. Objectives

Our novel automatic window-closing system is invented to prevent children from falling out of windows without affecting good views and ventilation.

I. Methodology

- Briefly describe the **approaches** used e.g. use of equipment, materials, tests and experiments
- Explain the selected implementation strategies with the **scientific theory**

A multi-chip module system for automatic application was introduced. Several types of sensors, including ultrasonic sensors and motion sensors, were controlled by activated micro:bits, which were placed near the window. The window model was demonstrated by Fishertenick.

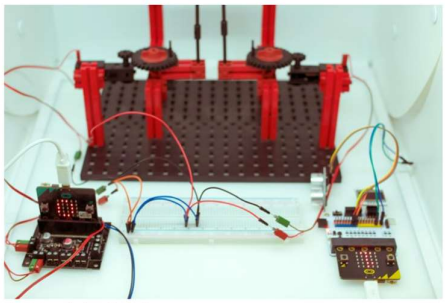
The feasibility of the invented system was tested by some experiments using carts. The carts simulate children in real life. If the car nears the window too much,

micro:bits receive signals from the sensors and execute codes to close windows immediately.

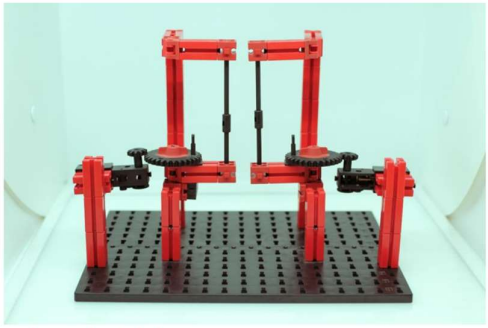
V. Design of Invention

- Describe the **design** and the **principle** of invention (e.g. The ideation of the projects, the prototypes or creative solution as far as applicable)
- Provide sketches / drawings / photos of the invention

Ultrasonic and motion sensors detect any living things coming too close to the window at a certain distance. If the motor of the model is triggered, the window will be closed automatically. A notification of phones will be sent to parents at once.



simulating windows frontside



simulating windows backside

VI. Application / Market Need

This invention can ensure the safety of children or even pets in homes. Also this is downright important as people may ignore this and incidents may therefore happen, in the needs of the markets regarding home safety application. The techniques can be applied into other situations, preventing traumas caused by carelessness, such as preventing children from getting burnt by the stove and preventing children from removing the data of computers unintentionally.

VII. Conclusion

- Make a **data-driven** conclusion of the project and the way forward of the invention process
- Justify if the proposed project meets the objective(s)

The average walking speed of children varies from 0.49 m/s to 1.29 m/s. The carts were used to simulate the children. In our experiment, when the carts approach such a range of speed, the sensors of our model successfully start measuring the distance between the child and the window; and they send signals to micro:bits. Micro:bits execute codes to close windows immediately.

This is only a pilot model and a proof of concept. It is believed that safety distance and response time will be other critical parameters to be measured for more practical use.

☐ **Our project is developed based on our school's previous project and the enhancement is as below:**

Nil