

# Automated car parks

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## Project Introduction & Design Rationale

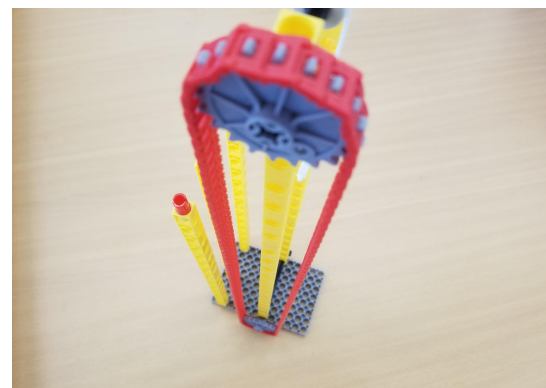
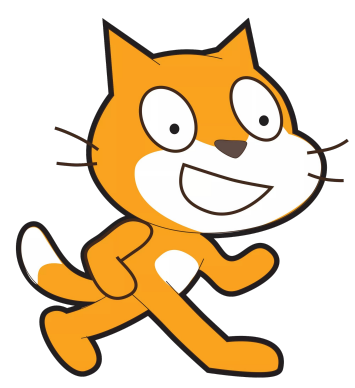
The relationship between our life and technology is closely related. Automated parking is an essential part of smart cities. In Singapore and Taiwan, there are already related facilities to make more efficient use of space and time. Hong Kong has proposed an underground "smart parking system" in Sham Shui Po.

The project design provides instruction manuals and aims to introduce the advantages of automated parking, which is better than traditional parking, to arouse students' interest. Then, students can make a smart product by themselves to try to solve various software and hardware problems of automated parking through try and error and understand more about its STEM principle:

### S/E/M:

- Automated escalator: Understand the **Gear principle** of physics and mathematics through *Gigo blocks*
- Ramp: Learn the **Inclined Plane principle** of science through *cardboard*

**T:**  
Programming software: Learn the skills of **Coding** through *Scratch and Lego Wedo*



### Teaching Materials:

Scratch  
Lego Wedo  
Gigo blocks  
Cardboard

## Teaching Design and Lesson Planning

### Target Student

→ From Senior Primary student to Junior Secondary student

### Teaching Timeline

1. We spent 15 minutes on the introduction. In this part, we would try to capture the attention of students on the automated car parks issue and motivate their interest by showing different pictures and videos. Moreover, we asked some simple questions to arouse their thinking.
2. Students spent 30 minutes to construct their product. They had a set of prepared teaching materials and two sets of instruction manuals.
3. We spent 15 minutes on simple programming lesson. Students would learn Scratch and the method of controlling the motor.
4. During the remaining 15 minutes, students optimized their products to show their creativity.
5. Lastly, we spent 15 minutes on conclusion and tidied up the teaching materials with students.

### What can students learn?

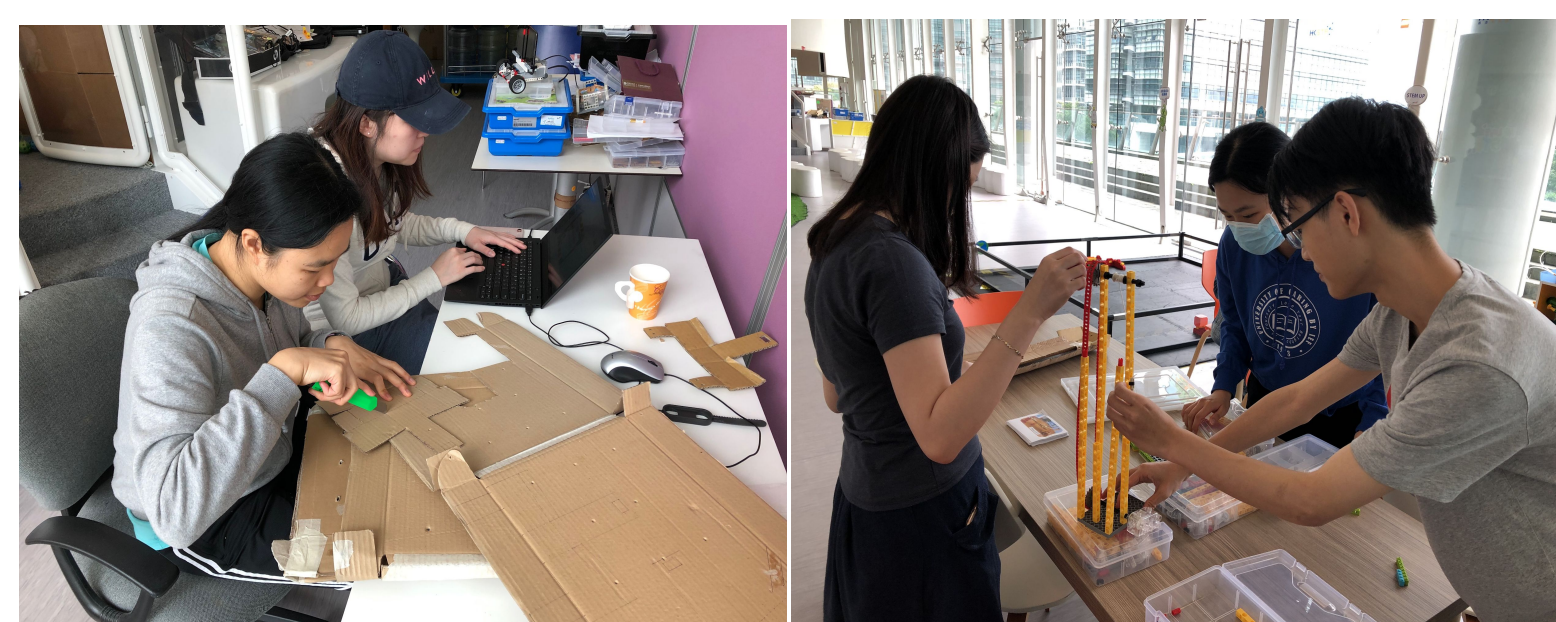
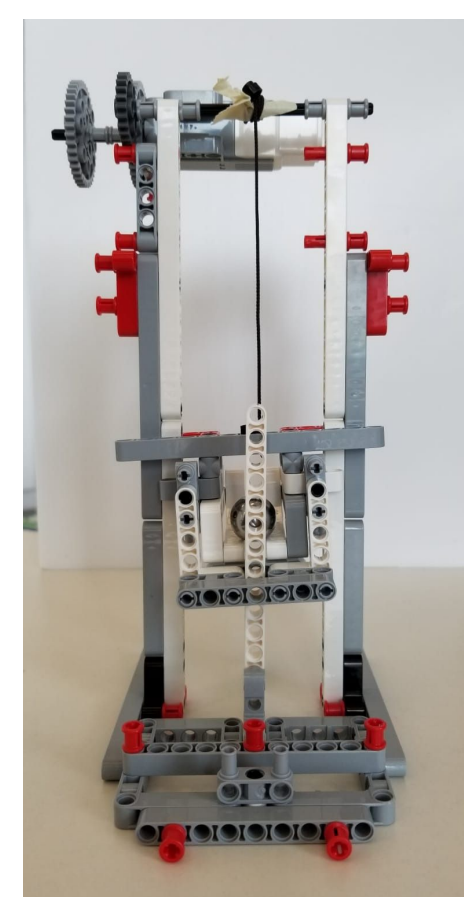
We expect student can learn STEM knowledge and cooperate with group mates. For STEM knowledge, students would be able to improve their product with different creative ideas. They also need to collaborate.

## Preparation (Feb to May)



From  
Prototype critical thinking

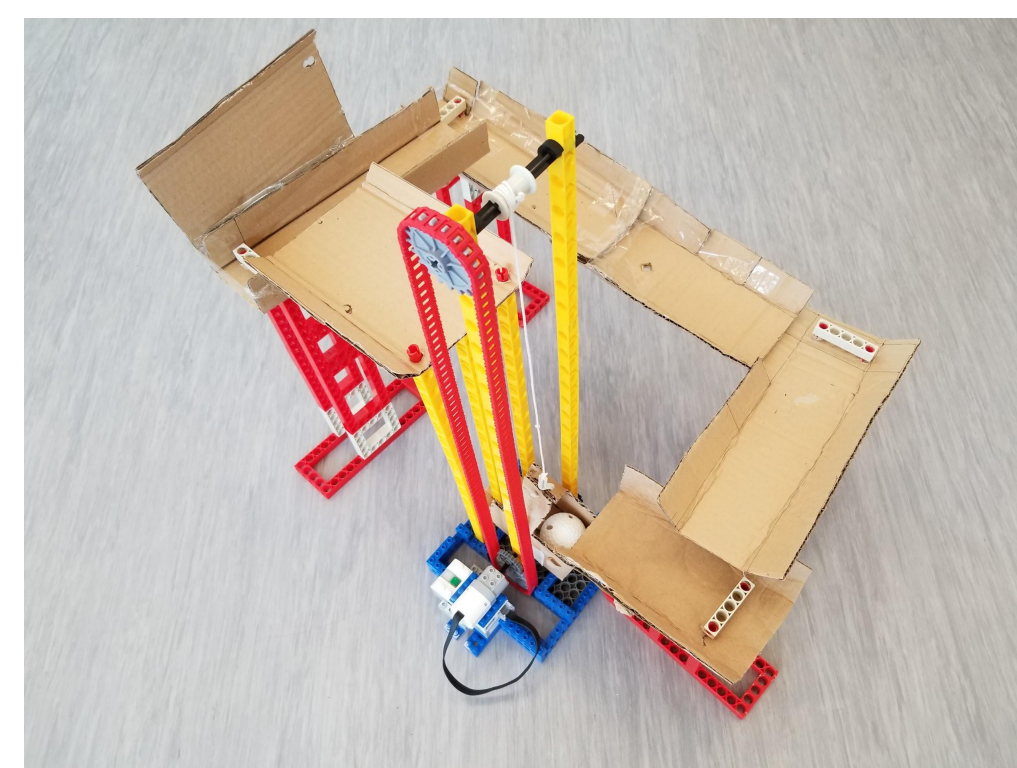
To  
Final product



Prepare our teaching material in HKSTP



Micro-teaching with community partner

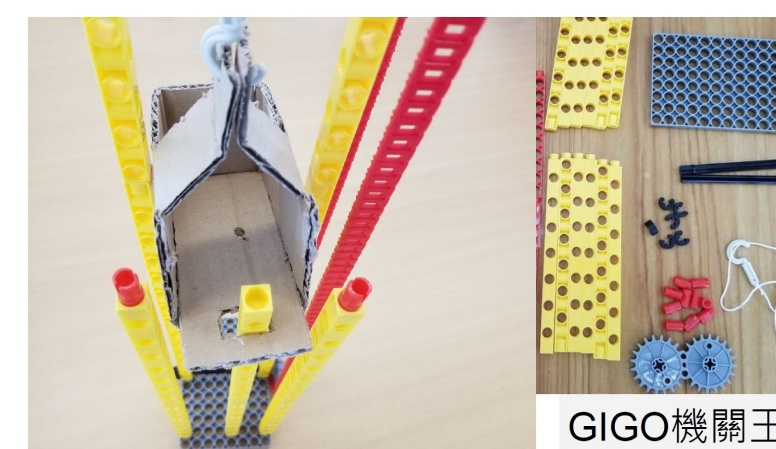


## Teaching Day (21/5)

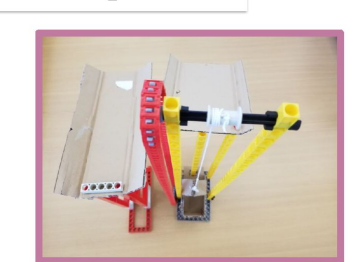


## Limitation and difficulties

- ❖ Students were inactive and quiet  
→ Solution: Play ice-breaking games to let students be more active.
- ❖ Some students have known STEM before but some students not  
→ Solution: Ask them questions about STEM at the beginning to know more about their background, and then we can tell more information according to their knowledge background.
- ❖ Time limitation: The designed product cannot be finished within a limited time  
→ Solution: Since there is a critical thinking part for students to create their path for automated car parks. We arrange the critical thinking part as the last part of the teaching schedule such that students can learn what we expected. Although students may have less time for trial and error experience, we believe they know what is trial and error after this experience.
- ❖ It is difficult to let four students focus on one single instruction manual within a long period.  
→ Solution: We divided the instruction manual into two parts. Then they can finish each part with two people. It would let student contribute to their product more easily.
- ❖ It is difficult to manage time after we start to use the two-part instruction manuals.  
→ Solution: We divided our programming part into two parts. If we do not have enough time, we would teach one part only. If we have enough time, we would teach both parts and also give the trial-and-error period.



### Step 11



自由發揮你的創意  
目的：繼續上學

## Individual Reflections

- ❖ Glad to see that students enjoyed the process of designing their automated car parks and optimized their designs through try and error although they were passive at the beginning. For me, it was an unforgettable experience because we did a lot of preparation before teaching and taught students the product we designed. From preparation to practice, I gained a great sense of satisfaction.

Wong Tsui Wan Apple

- ❖ We have designed a lot of prototypes and the one that we used for teaching is believed the best balance on both complexity and play. However, the whole product is still not the one can be finished in one and half hours. Thus, the design of our teaching material can be improved. Of course, we still met our teaching purpose. It is cheerful that students can learn in this project and experience such an interactive teaching style.

Kenny, Lo Kai Man

- ❖ After we finished a workshop with the students, I discover that preparing a workshop is more difficult than I expected. Especially in the prototype period of our product, I did not expect that I would change my design many times. In order to get a better flow of the workshop, it is very sad whenever the new design is banned. However, all of them are worth. During the workshop, students have a good learning experience and we have a teach experience. This experience would let me have a funny memory.

Peter, Yuen Lok Pang

- ❖ This is an educational as well as a meaningful learning experience to students and us. Students can enjoy a different class and learn STEM knowledge with us in an interesting Lego class. At the same time, we can also learn how to design and develop a STEM class. This is really an unforgettable and impressive experience for both of us.

Vanes, Poon Man

- ❖ After joining this workshop, I found that teaching STEM is more difficult than I thought before. The abilities of students are diverse, so we have to prepare teaching materials in details, and provide guidance to students when they are in need. I do really believe this workshop provided an excellent STEM teaching experience for me.

Rani, Chu Ka Yan

## Conclusion and Future Planning

This is a STEM workshop. The theme of the lesson is related to our daily life: what effect brings to us of technology. The target of our STEM workshop is to let students learn STEM knowledge with interest. During the workshop, most of the students showed their creativity to solve their tasks. Students would try to use some knowledge we have taught. Moreover, they would cooperate and be willing to try their group mates' new ideas from again and again. Most of them had good patience when they are facing failure. It seems that this workshop can achieve our target.

After the workshop, we hope to design a more interesting workshop and let the topic closer to daily. Our topic is about car parking now, but not all students have a clear understanding of the car park. In some students' view, the car park is a basic knowledge term in daily life but not a common thing in their actual daily life. Therefore, we should choose a topic which is closer to students' daily life.

Moreover, we will study the performance and reflection of the teaching day and then improve the teaching materials that we have. After that, we will deliver what we have to our community partner. Our community partner will ameliorate our project and may treat it as a future teaching lesson for those interested schools.

## Acknowledgement

Last but not least, we must thank for kindness and enthusiasm from our community partner - Robo Workshop. They are really professional in STEM education. They taught us a lot of skills and knowledge that are really useful for our project and also for our future.

Also, we want to thank Dr. Yip, our person in charge in this project, and Bella, Dr. Yip's helper in this project. They gave us a lot of useful advice and reminders.

