# Hong Kong Student Science Project Competition 2023
Template of Extended Abstract (Invention)
(Word Limit: 1,600 words, Pages: 3 pages only)

**Team Number: JAPE230**

**Project Title: The Possibility of Future Education: Mixed Reality**

**Project Type: Invention**

*To our best knowledge, there ~~are~~/ are no* * *similar works in the market*; (if there are, ) related product links are as below:

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**The enhancement our project made / the difference with related products are:**

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*\*Please delete if not applicable. The competition values the originality of works. Students must do enough literature research to ensure that their works are unique and list relevant reference materials before starting research or invention.*

## I. Background

> ➢ Provide background information as to learn about the audience for whom the project is addressing
> ➢ Provide highlights of **literature review** and/or related technologies or devices, with the support of pertinent and reliable references
> ➢ Provide an overview of work, create a point of view as to define the needs and insights of the audience and mention the **research or technology gap the project is trying to fill**
>
> Metaverse is a vision of what the computer industry believe is the next iteration of the Internet. Such virtual world has been getting more and more attention since 2022.
> It is brought by the Extended Reality technology which has developed rapidly in the past years, from Augmented Reality and Virtual Reality to Mixed Reality. People like us can move around in the virtual world while interacting with the real-world environment at the same time.
> We developed a lesson on the solar system with MR hardware called
> Oculus Quest 2. It was developed together with the game engine, Unity alongside a plugin named Zoe.
> Unity supports simulating physical properties with all objects in the Mixed Reality world, which does not only ease the heavy workload on programming the physical world.
> From our testing, we found that Mixed Reality shows immense potential for education.
> In Hong Kong schools nowadays, Mixed Reality is not promoted widely for learning.

## II. Objectives

> ➢ State the **aim(s)** of project
> We hope to find the aiding tool for current education. Thus, we try to investigate if any current cutting-edge technology will help for raising students learning motivation.

## III. Methodology

> ➢ Briefly describe the **approaches** used e.g. use of equipment, materials, tests and experiments

➢ Explain the selected implementation strategies with the **scientific theory**

We have selected Mixed Reality as our starting point, and assume that such cutting-edge technology will raise students' motivation. As the solar system has different planet, for example, following elliptical path, or the earth tidal is caused by the gravity pull by the moon, we want to build a simulation system on the mixed reality to visualize those physical properties.

## IV.    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)
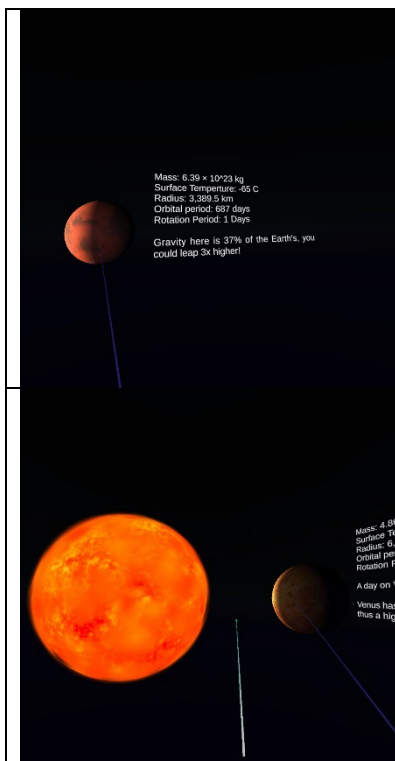➢ Provide sketches / drawings / photos of the invention



Figure 1.
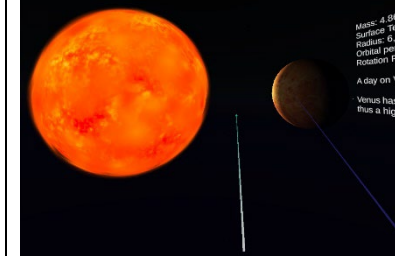Showing planet's details in the virtual world



Figure 2.
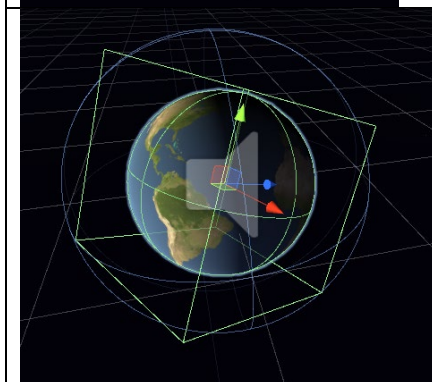Showing directional light by the sun.



Figure 3.
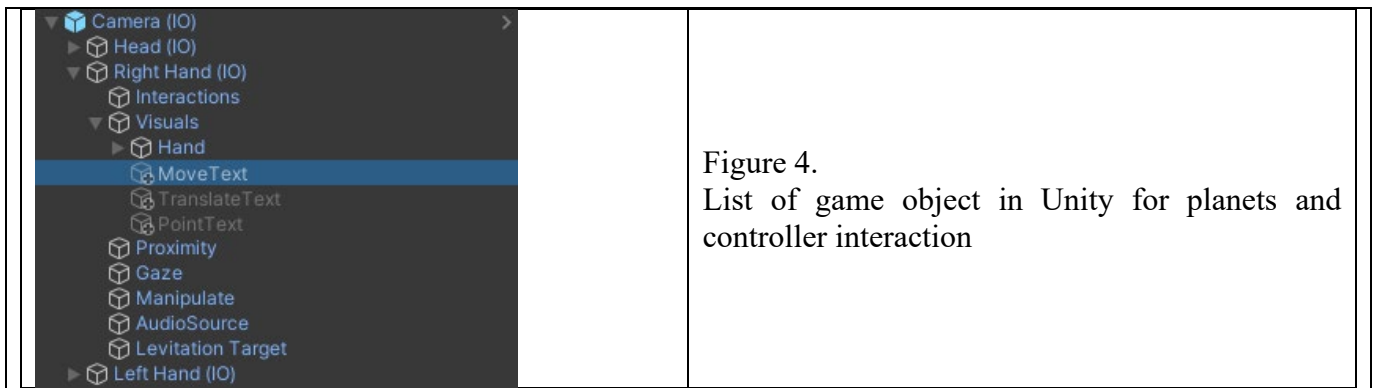Planets are tilted by its rotational axis

| | |
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|  | Figure 4.<br>List of game object in Unity for planets and controller interaction |

We have created a Unity project for the Oculus Quest 2, a Mixed Reality headset.

When we are trying to merge physics and engineering together, we found that both of us want to create an interactional way to learn more about physics with some cutting-edge technology.

Therefore, we decided to build such tutorial in the virtual world with the aid of Oculus Quest 2.

We also found some of our schoolmate for telling us about their thoughts towards such a different learning way. More data and details about the feedback are mentioned in our reports.

## V.    Application / Market Need

➢    Explain the area of **application** and function of invention
➢    Indicate the market need and impact of invention
➢    Discuss **limitation** and compare with existing related works (if any)

We have applied programming and applied some physical simulation in Unity for this invention. We believe that nowadays the improved technology will help for students understanding in different abstract concept. Therefore, this invention may improve students in education. Furthermore, with the lower attention span from students, using the mixed reality as the aiding tools will help a lot for nowadays education and teaching.

Our invention does have some limitation. First, we did not invite much students for the feedback or testing, our prototype may not be suitable for all the students in Hong Kong. Also, we do not make good use of the power of mixed reality, which enables the interaction between real world and the virtual world.

## 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)*

N/A

## 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)*

N/A

## VIII.  Conclusion

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

To conclude our thoughts of a viable way of adapting Mixed Reality (MR) in Hong Kong Secondary School Learning Environment is that MR is revolutionary. We have also learnt the difference between Virtual Reality, Augmented Reality and Mixed Reality. It is not easy to transfer our original style of learning and teaching to a futuristic vision of MR education. MR education has been launched in various regions, but it has not been fully maximizing its potential yet. We know that it will help our classmates and Hong Kong students improving their studies. Not just in other countries, but also in Hong Kong. MR cannot replace our common way of learning yet, but it is a great tool to raise our learning motion. Students will be even more focused than before as learning in lessons are even more fun and have engagement using MR.

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