



Virtual Reality Educational Module to Demonstrate the Law of Faraday Cage.

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Introduction

A Faraday cage is an enclosure that allows the electric charge to be redistributed on the exterior surface to shield the interior from electromagnetic fields (Chapman et al., 2015). Often they are made with a wire mesh or a metal screen to block electric fields and electromagnetic waves. Cars are a great example of a Faraday cage. During a lightning storm, the metal body of a car will act as a Faraday cage and can provide some protection to reduce the risk of injury. Virtual reality (VR) is an advanced human-computer interaction system that can simulate different realistic environments (Zhenq et al., 1998). Participants can move around

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Methodology

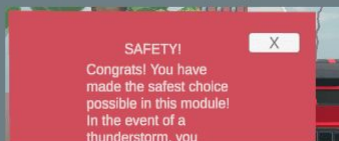
1. Designed module layout
2. Downloaded suitable Unity assets
3. Placed assets into module
4. Modified scripts to add visual components and allow for movement
5. Converted important computer keys to joystick actions

Primary Results



Figure 1.1: Opening Scene for Faraday Cage Virtual Reality Application.

In Figure 1.1, the opening scene is shown. Viewers see this scene as soon as the game is launched. As the purple pop-up window explains, the demo asks users to imagine that they were outside when all of a sudden it starts to rain and you can see lightning in the far distance. Audiences have to choose between staying in the open air, going under a tree, or running into the car. Staying in the open air is extremely dangerous since in an open field, you will be one of the tallest items in the vicinity. Similarly, seeking shelter from under a tree is also dangerous as trees are usually the tallest items in their environment. As such, they can act as attractors for lightning. In this scenario with these three choices, going into the car and trying to get to a covered indoor place is the safest option. If struck by lightning, the metal body of the car can act like a Faraday Cage.



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Discussion and Conclusion

This module aims to show different scenarios under a severe thunderstorm. The three scenarios are as follows:

- In the open air → dangerous
- Under a tree → dangerous
- In a car → relatively safe option

Currently, there is still work to be done in order to properly convey that concept. The limitations include:

- Application needs to be improved
- Lack of details in VR visualization
- Simulated lightning is used only

References

Thank you to Unity Asset Store creators for their free Public Use Domain work from which this project was built upon. We would like to express our sincere acknowledgement and appreciation to the Unity Asset Store for providing the valuable assets that were used in this project.

3d.rina, Cartoon Buildings Constructor - Lite, July 27, 2016, Unity Asset Store

Ada_King, Free Trees, Dec 4, 2017

Jeff Johnson, Lightning Bolt Effect for Unity, May 17, 2022

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