Using Virtual Reality to Demonstrate the Law of Faraday Cage & Its Application in Lightning Safety

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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 (Zheng et al., 1998). Participants can move around in the simulated environment and explore as though they are actually in that virtual world. It is this ability of VR to create immersive learning experiences that makes it an ideal platform for educating the public about the mechanisms behind Faraday cages, and by extension, lightning safety. In this poster, we present an innovative and interactive VR module designed to educate individuals about lightning safety and the crucial role of Faraday cages in modern life. By leveraging the immersive nature of VR, we aim to enhance public awareness and understanding of electrical safety, empowering individuals to make informed decisions in the face of lightning risks.

Methodology

1. Designed module layout
2. Downloaded Unity Assets
3. Placed assets into module
4. Modified scripts to add visual components and allow for movement

Primary Results

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

Future Work

1. Demonstrate the passing of electrical charge down the car
2. Incorporate historical lightning data from Washington DC summer storms
3. Make necessary changes to be compatible with Apple's Vision Pro

References

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Zheng, J.M., K.W. Chan, and I. Gibson. 1998. Virtual Reality, *IEEE Potentials* 17 (2): 20–23. https://doi.org/10.1109/45.666641.

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