Using Virtual Reality to Study Human-Building Interaction in School Shooting Scenarios  
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### Introduction

The research that Professor Becerik-Gerber and her team is working on is conducted in a virtual reality environment to study the effects of certain building aspects that can either help or hurt during a school shooting. Because school shootings cannot be reproduced and studied in a real world environment without exposing participants to danger, virtual environment are used instead. The virtual environment will be used to study how people will interact in the school shooting scenarios with different building aspects in a safe manner.

Between 2000 and 2017, active shooter incidents resulted in 779 fatalities and 1,418 injuries in the U.S. many of which have been school shootings and events like Stoneman Douglas High School shooting. Santa Fe High School shooting have demonstrated that something needs to be done to stop the devastation.

### Methodology

- Used Unity to make the environment realistic looking
- Programmed sound manager in C# as well as some animations
- Used Oculus headset to test the environment

### Virtual Environment Created

![Image of virtual environment](image.png)

The first screen of the school in the virtual reality environment. At first the room was empty but after adding one scene to the room the desk and books in the room started to appear. The background also included like computers to add into the virtual reality.

![Image of virtual environment](image.png)

Inside of a classroom with scattered books and other classroom materials were added around the room to make it seem more realistic. (PC: Saul Droutman)

### Skills Learned

While working on this research I learned a lot of new skills and new programs but I also learned how fun the research process can be. The program that I worked on the most was unity, this was where the school was textured and where I built the rest of the virtual environment. In Unity I also learned a bit about animation and animator controllers. I also had to code some things in C# to make doors open as you walked close to them and a sound system.

### How This Relates to Your STEM Coursework

![Image of coding](image.png)

Sound Manager Built in C# that creates a timer variable, sets it to a random time in between 20 and 240 seconds and plays a random amount of gunshot sounds after the time runs out to make it seem like random shots going off (PC: Saul Droutman).

Although I had never used c# specifically I have used other programing languages before and I think that learning and practicing using another language was really helpful. I would also like to continue learning more programing and possibly even major in it once I go to college. The research process was really fun and was something I really enjoyed and hopefully someday I will be leading my own research project.

### Objective & Impact of Professor’s Research

Professor Becerik-Gerber is creating a virtual reality environment to try to fill the current existing research gap on Human-building interaction and if/how the current safety guidelines impact occupant response to school shootings. In doing this she is also finding out what the virtual environment must have in it, and how those things should be visualized. This is vital information to create a realistic environment that can be studied so that the data will be valid in the real world not just virtual reality. The end goal of the research is to provide guidelines to make buildings safer during times of danger and distress, and guidelines on how to conduct further studies in VR on HBI (human-building interaction).

### Next Steps for You OR Advice for Future SHINE Students

The next steps for me in my project is just to continue to add aspects that make it as realistic as possible, the biggest feature would be to have other computer controlled players running around. If you are considering joining the SHINE program for your summer I highly recommend it and don't get overwhelmed by how complex the labs seem because you will have sufficient help, learn a lot and truly enjoy your summer.

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