2019

MULTI-USERIMMERSIVE ACTIVE SHOOTER RESPONSE TRAINING USING OCULUS RIFT S

PROJECT REPORT

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Project Title: **Multi-User Immersive Active Shooter Response Training**

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GOAL AND OBJECTIVES:

Active shooter situations are unpredictable and evolve quickly. Active shooter situations are often over within 10 to 15 minutes, before law enforcement arrives on the scene. Individuals must be prepared both mentally and physically to deal with an active shooter situation. Active shooters use firearms and there is no pattern or method to their selection of victims.

The goal of the project is to create virtual environment of campus emergency evacuation when there is an active shooter inside the campus. It is a multi-user VR environment with two user modes. User can enter as Campus Security in one mode. Where Security officer has an ability to shoot the active shooter with his gun. In other mode user can enter as Faculty/Student to help the student to evacuate the building and guide them to the safe place. The objective of this project is:

•What to do if you find yourself in an active shooting event.

•What to expect after an active shooting takes place.

•What to Remember during an active shooting .

The Project is implemented in Unity 3D with Oculus integration and is based on RUN, HIDE, & FIGHT mode for emergency response.

MODELING:

The virtual environment consists of buildings, trees, people, furniture, landscaping modelled in Google SketchUp. This project is developed in Unity with Oculus integration. The programing is

done in C# using Microsoft visual studio. C# scripts are used for Animations and for Event triggers in this game.

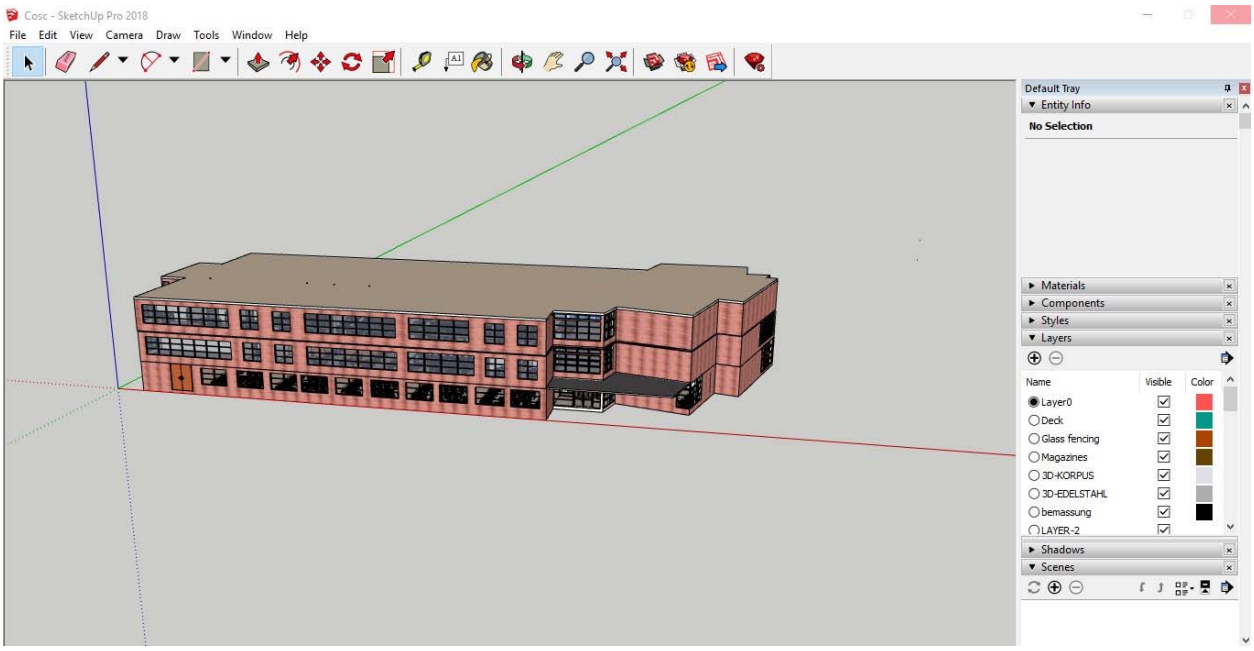

Figure 1: 3D model of BSU CS building created in SketchUp.

FUNCTIONALITY:

Vision: 3D models with textures and mesh are created in Google SketchUp.

Sound: Explosion sounds and Emergency alarm to alert everyone.

Animation: Evacuating, Hiding and Fighting.

Interactivity: Shooting with gun, explosion, running outside and grab and throw crates .

Characters: .Mixamo customized Avatars as shooter and people .

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Sensors: Collision, Proximity, Time, Touch, and Visibility are used in this project.

Figure 2: Oculus rift s Touch controller used for movement, shooting and grabbing.

The oculus rift s touch controller is assigned to the OVR player controller prefab which acts as a First-person controller in this project.

Distance grab prefab is assigned to OVR camera rig to view the hands in the environment. This prefab helps to grab gun and crates from distance without going near to them.

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Multi-User Environment: Unity networking is used for multi-user environment. More than two people are present in this VR environment.

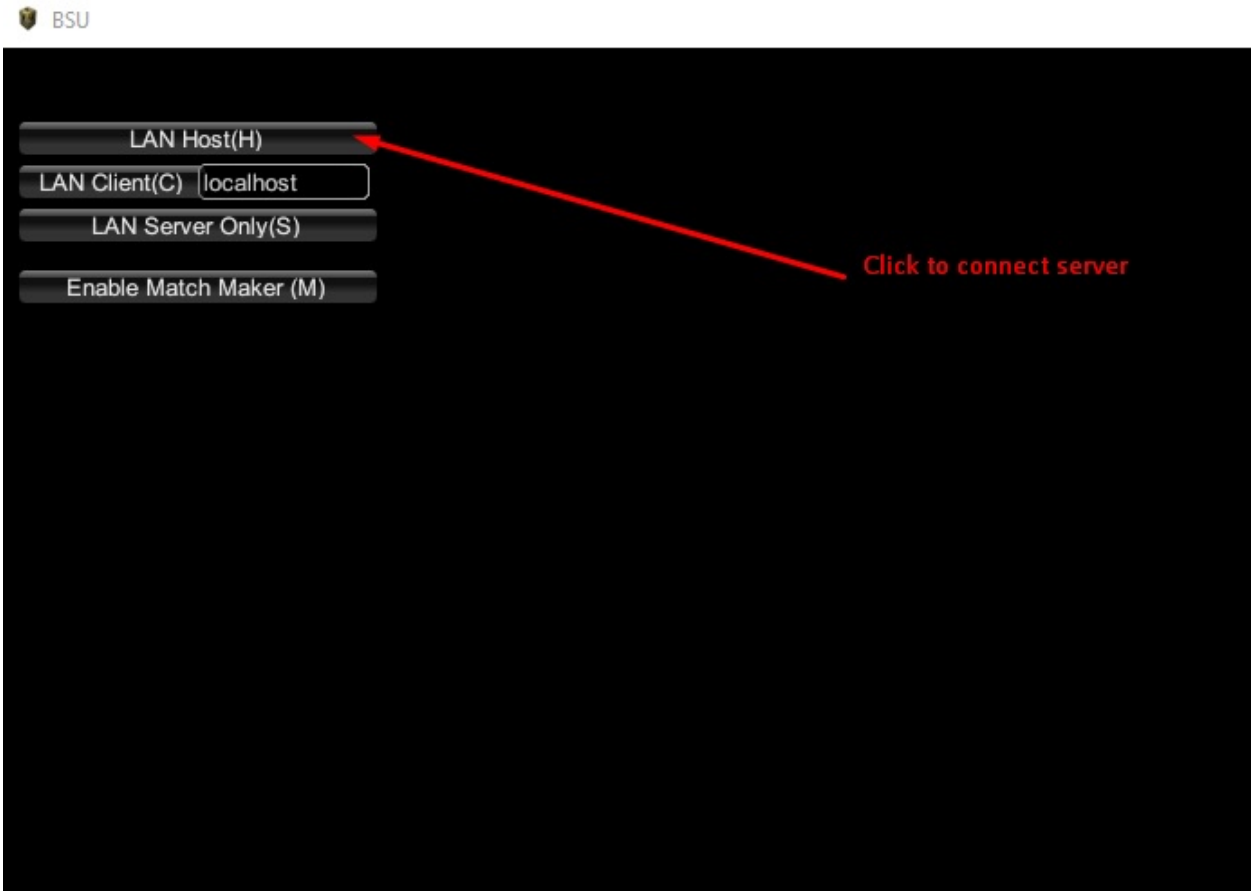

Figure 3: Unity networking feature to connect in multi-user environment.

Click the Lan host button to start the server from the unity build.exe file. The same unity executable file can be used to connect the client.

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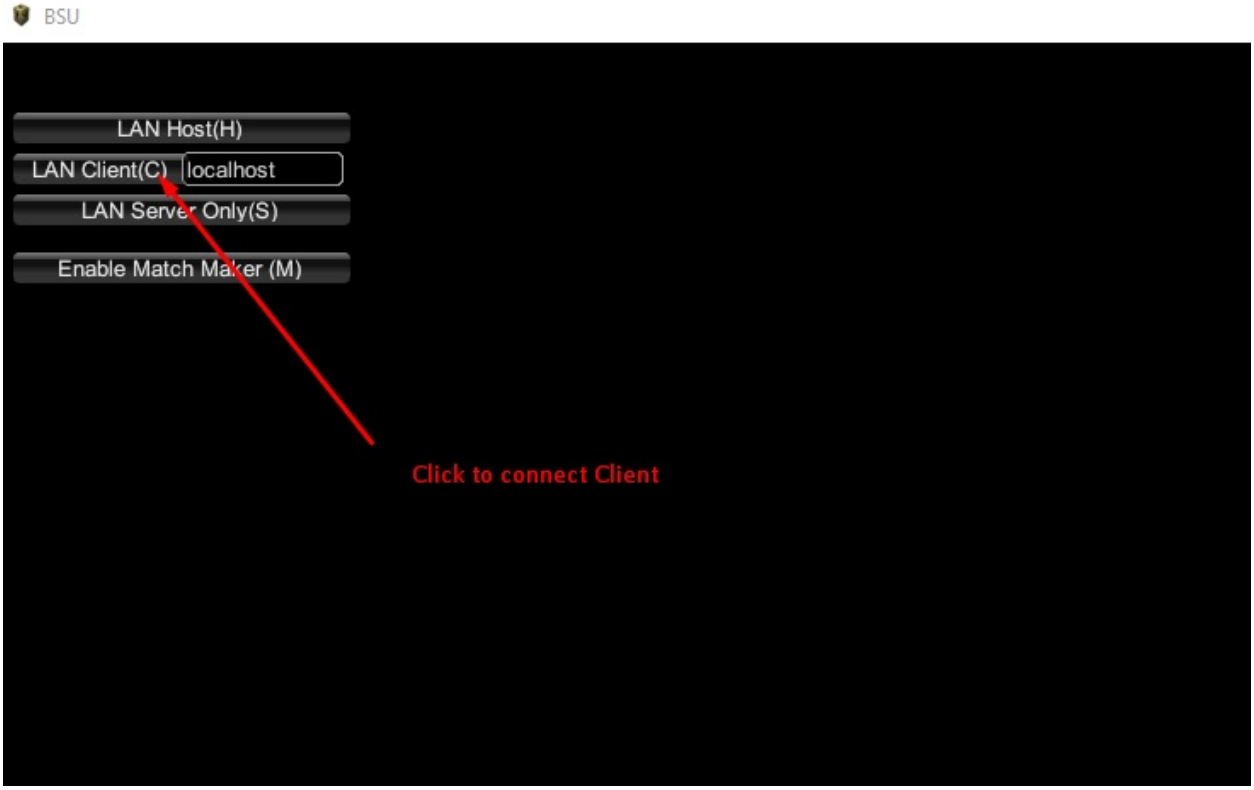

Figure 4: Unity networking feature to connect in multi- user environment.

CUSTOM avatar: Custom avatars are used in Unity to create the multi-agent system.

AI: Navigation and Panic behaviors are implemented in the environment.

Interface: The user interface includes items such as buttons.i.e., Run, Hide & Fight.

Figure 5: User Interface view in this game.

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Hardware Integration: Oculus rift s integration.

Software and Hardware Equipment: Unity 3D and Oculus integration package.

Figure 6: Oculus rift s with touch controllers used in this game.

The oculus integration package is downloaded from unity asset store and In order to make the hardware work, The Player settings/ XR setting in the Unity editor must be enabled and Oculus Id must be created to run the game.

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SCREENSHOTS

Figure 7: Starting scene in the game.

Figure 8: Menu view and Explosion on is clicked with the help of laser pointer in the game.

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Figure 9: Explosion is triggered.

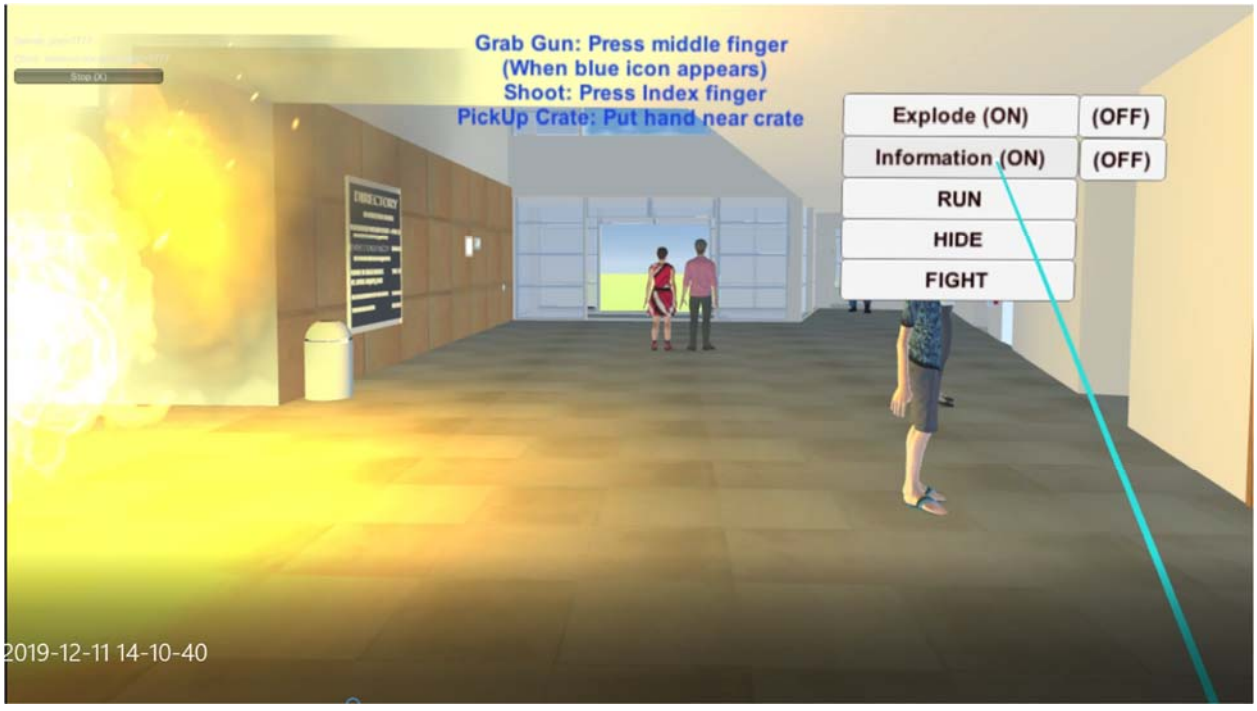

Figure 10: Information text is displayed on the screen.

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Figure 11: Run button is clicked and Two agents are running outside of the building.

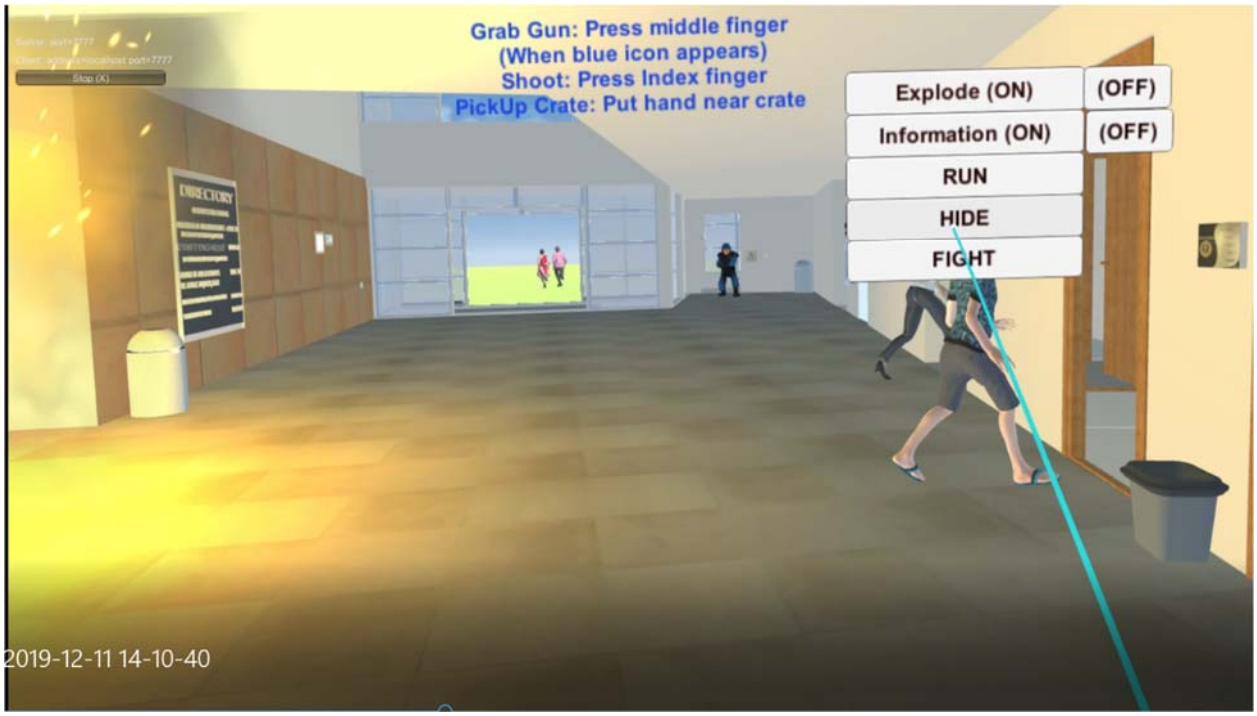

Figure 12: Hide button is clicked and remaining agents started hiding out of the shooter's view.

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Figure 13: Agent is hiding out of the shooter's view.

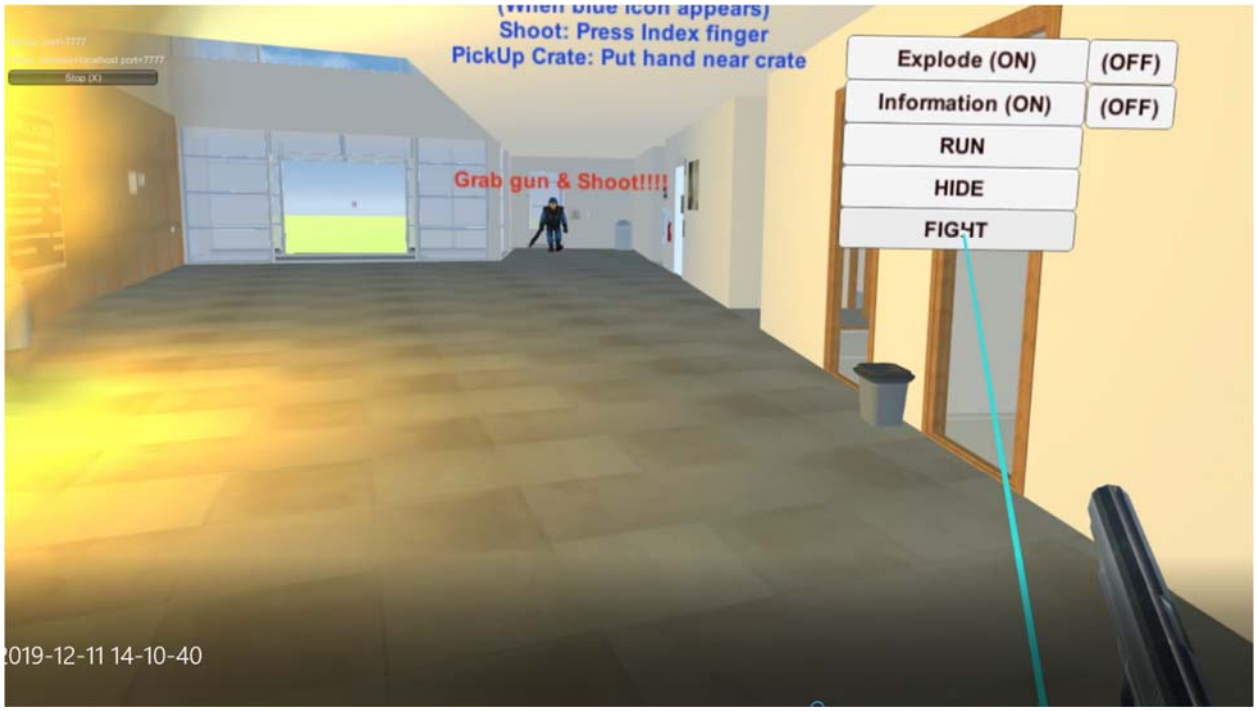

Figure 14: Fight button is clicked, and Active shooter event is triggered with warning text.

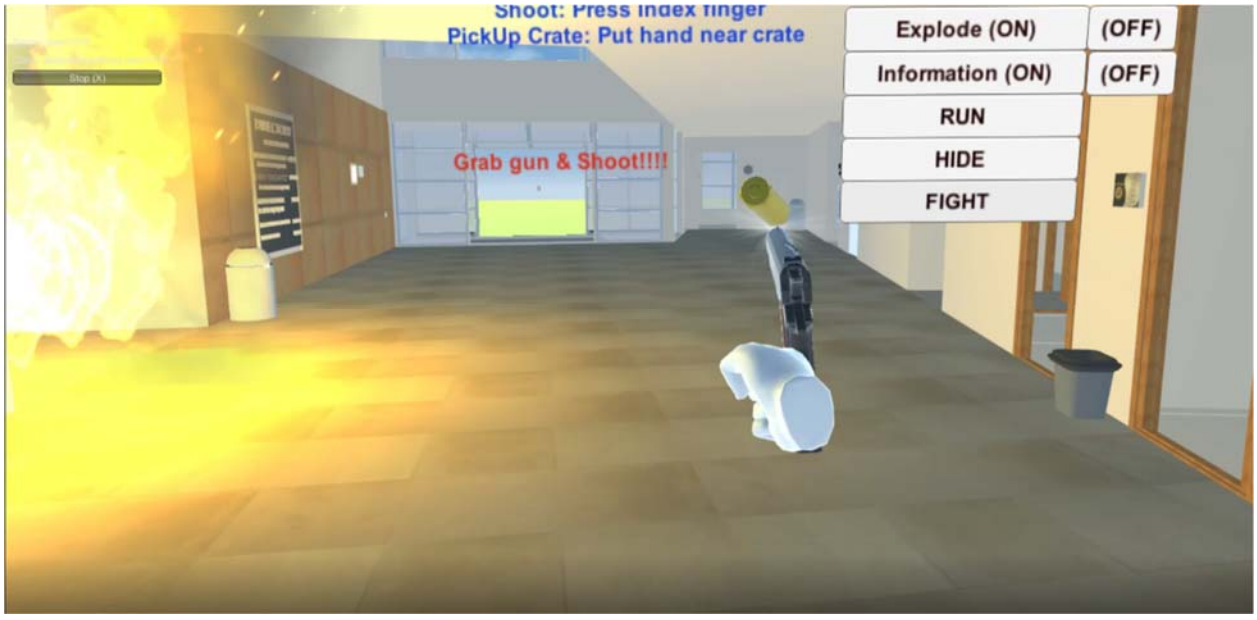

Figure 15: Gun is grabbed with touch controller and shot is fired at Active shooter.

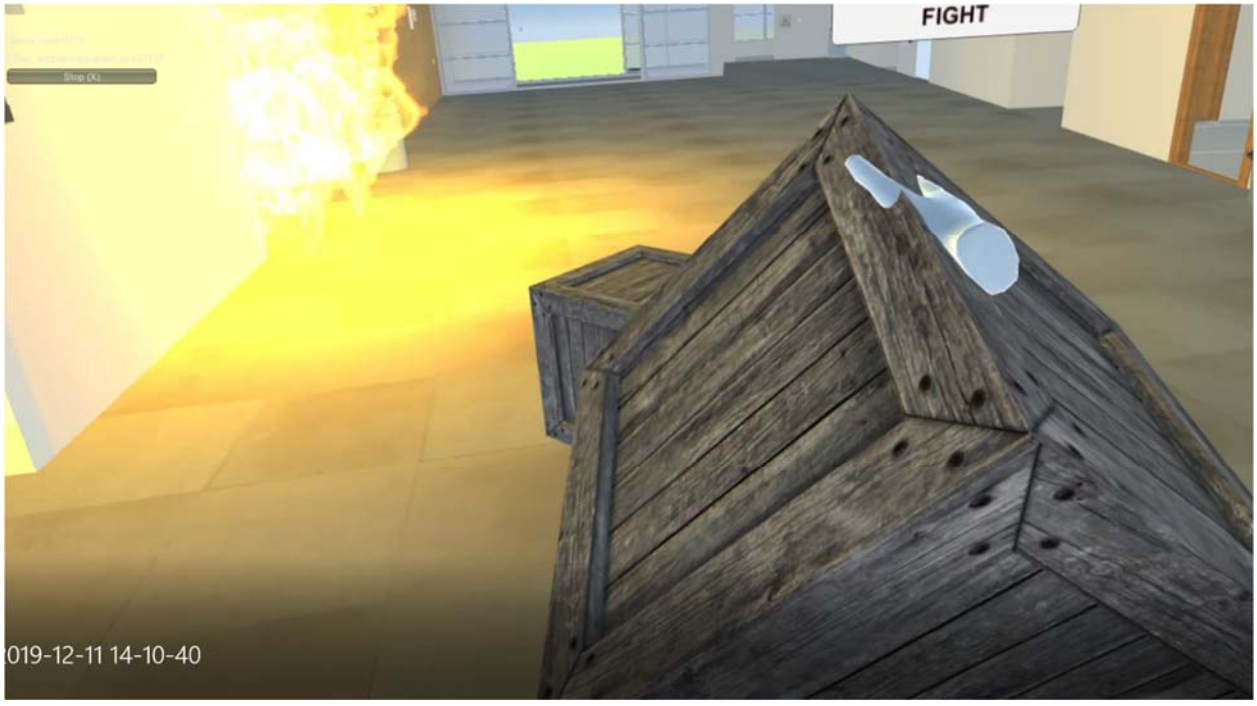

Figure 16: Crate is grabbed with touch controllers.

Figure 17: Crate distance grab with touch controllers.

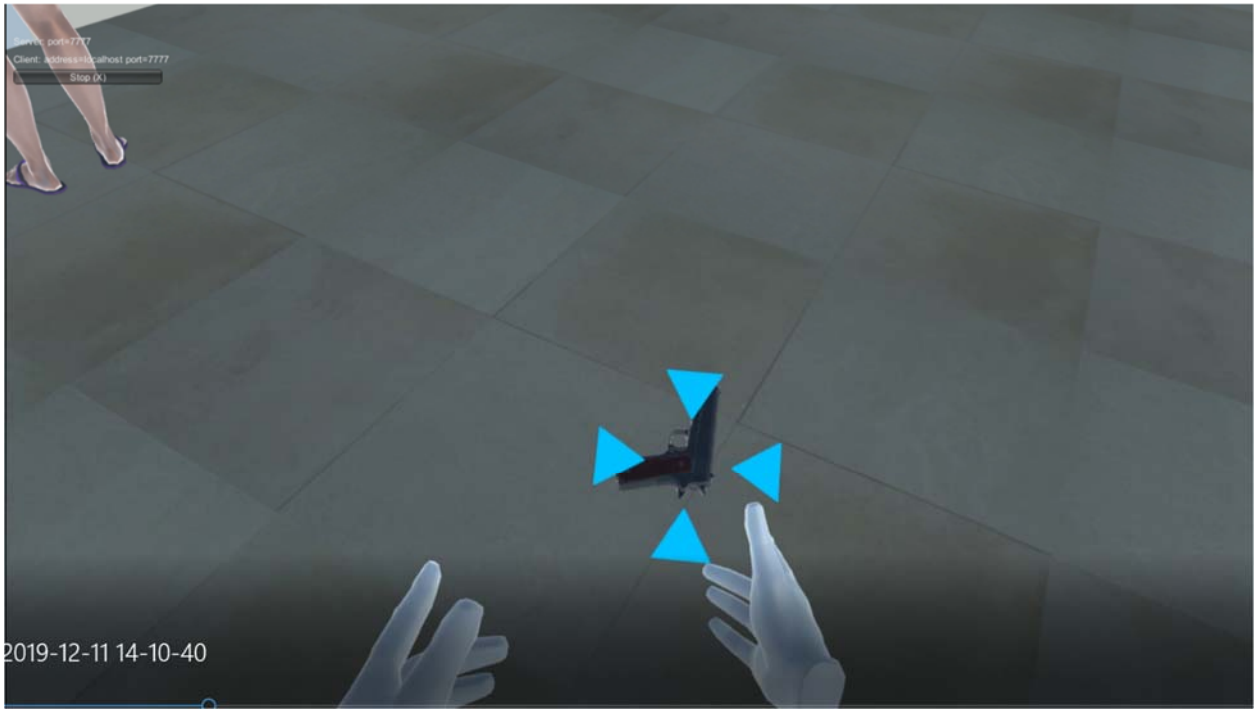

Figure 18: Distance grab and crosshair view of gun with touch controllers.

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CONCLUSION

The multi-user capability is implemented for training the users in VR environment. It has two user perspectives. 1)Campus security officer who has gun and 2) Faculty/Student who does not have gun. To safeguard students and staff in emergency situations, This VR environment is a study which will help when the unpredictable events occur in real life.