CS 428: Intro to Computer Graphics - Final Project Proposal

Team members: Sriya Vudata & Moriah Walker

Topic: VR Video Game - Escape Room

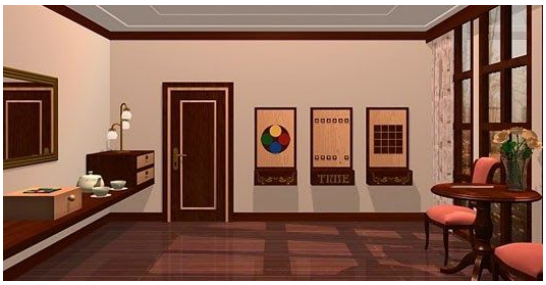
Synopsis: In a regular escape room, the player is locked inside of a room, and must obtain the key to leave. There are a series of puzzles that are around the room, all to figure out the combination to a safe containing the key to unlocking the room. In making this a VR game, we hope to make the escape room more immersive and realistic.

Intended goals:

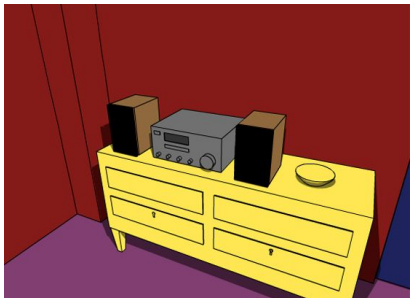
- Create an interactive 3D environment
- Create a project for VR and that takes advantage of the capabilities VR provides
- Create everything using our knowledge of WebGL and learning WebVR, A-Frame, and other tools for creating a VR game
- Make a game that properly follows a player's progression
- Have the game run at about 60-90 fps (the ideal fps for VR programs)
- Complete the MVP (Most Viable Product) for the game, so that it is playable and enjoyable and add more advanced features if time permits

Important references:

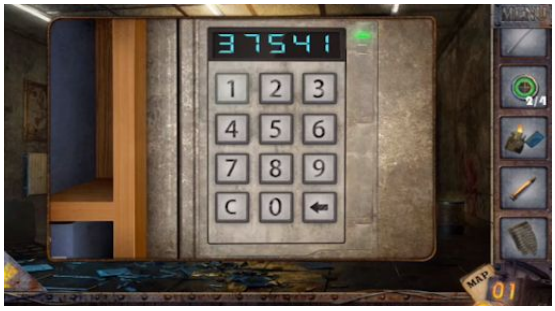
- Manishearth/webgl-to-webvr: Example of turning a WebGL application into WebVR
- The Importance of Frame Rates
- Bringing Virtual Reality to the Web (WebVR)
- https://www.youtube.com/watch?v=W0PcJjBU7gg (Gameplay possibilities)
- Web VR Experiments (WebVR design possibilities)
- Introduction (Documentation for A-Frame)
- How To Build An Endless Runner Game In Virtual Reality (Part 1) (This could be a good starting point for creating a more complicated WebVR project)
- Possible layout:

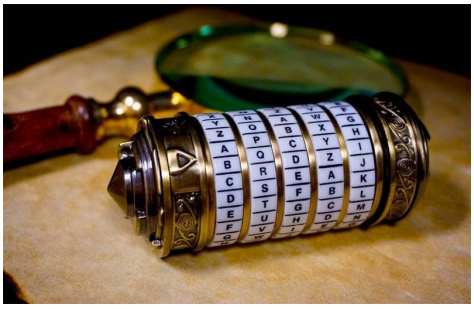


- Possible style and what it looks when you get closer to objects:



- Possible challenge objects





Associated Challenges:

1. Learning how to translate WebGL to WebVR
2. Rendering things to a VR headset
    a. Using a computer that is VR-ready
    b. Having the game run at about 60-90 fps
3. Creating a space-sensitive environment
    a. Rendering the room and all the 3D objects
    b. Being able to appropriately move around the room
4. Interacting with objects using the headset/joystick
    a. Triggering specific events when coming in contact with an object
    b. Having input come in from the joystick
5. Working with the camera to ensure that the environment is immersive
    a. Need a 360^{O} view
6. Planning out the progression of the game and the puzzles
7. Incorporating the puzzles into the game

A timeline description of how the challenges will be solved:

By the First Milestone:

1) Step 1 and 2:
    a) Research WebVR and interactivity/animation with WebVR
    b) To have a computer WebVR ready, it is required to have a WebVR compatible website (such as Firefox)
    c) First, we will attempt to render a simple shape using WebVR
    d) Then, we will add interaction with the object to see what sorts of functionalities we can have with VR
2) Step 3:
    a) Work on rendering the room, including calculating the size and relativity of all objects within the room
    b) Develop all the puzzle objects
3) Step 6: After getting a better idea of the workings of WebVR,
    a) Develop a design of the escape room, the objects, the puzzles, and the general game progression

Remaining Time:

4) Step 4 and 7:
    a) Using the experience of initially interacting with shapes, we will add functionalities for interacting with objects in the room
    b) From earlier research, we will include getting input from the controllers/joystick
    c) We will incorporate our plans for puzzles around the room into the interactions with the objects in the room
5) Step 5:
    a) This will likely come along with refining the room we render and working with the camera to make the frame rate 60-90 fps
6) Final touches:
    a) Refining the room
    b) Making sure there is smooth progression of the game

Individual responsibilities of all team members:

- Sriya
    - Research all the requirements for making playable VR game
    - Develop game environment (testing environment and actual environment)
    - Lead integration of WebVR into original WebGL project
    - Optimize user interaction response in game (improve controls)
    - Script code for the user initiated events
- Moriah
    - Draft game design (includes environment and objects design as gameplay)
    - Develop in-game objects (testing objects and actual objects)
    - Deal with camera optimization issues for both lenses
    - Optimize code for rendering to ensure maximum frames per second

- Script code for events not initiated by user (conditional logic based events)