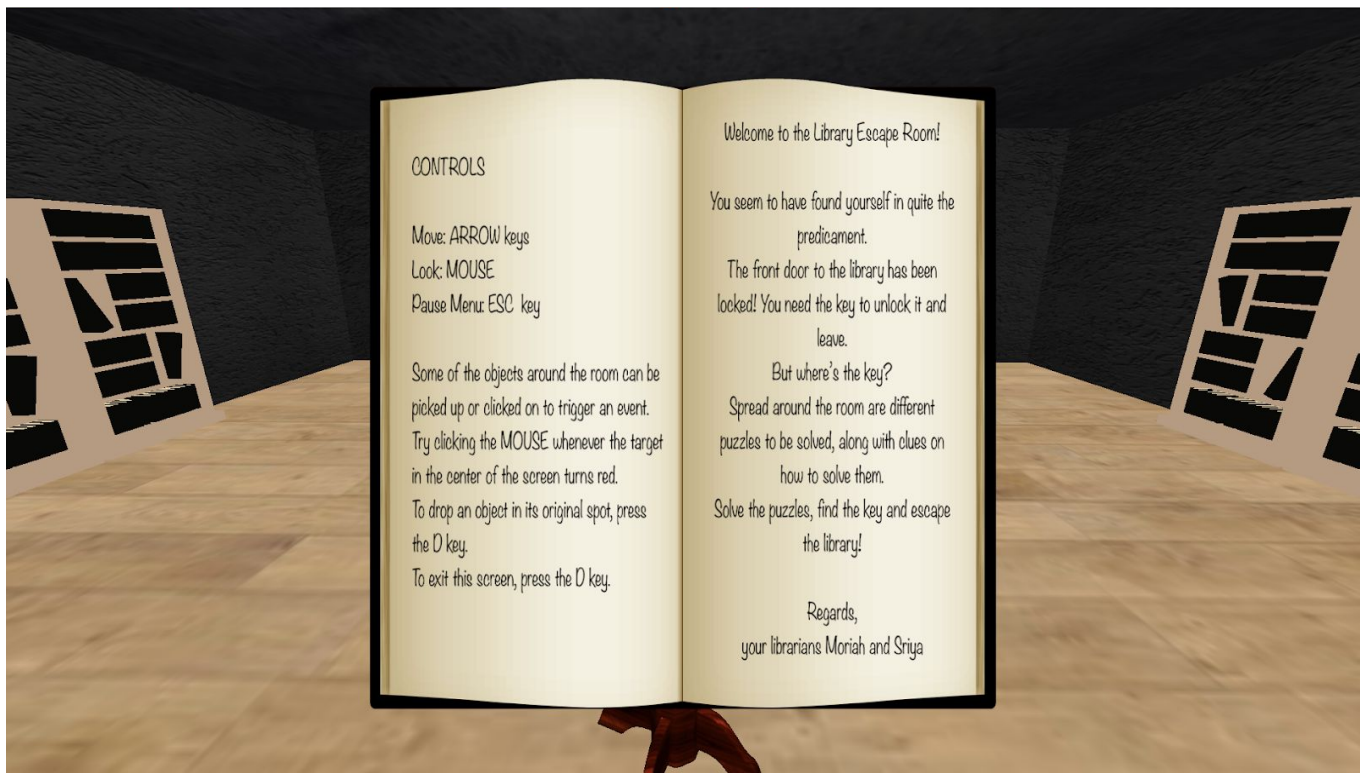


CS 428 Final Project: 3D Escape Room

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OVERVIEW

Note: While our original plan was to do this in VR, the university shutting down hindered our plan as we no longer had access to the headsets in the hackerspace and neither of us owned a VR headset. We thus opted to make this an online computer game.

Theme: Library

Synopsis: The player is locked inside a library! To escape, they must solve a series of puzzles to ultimately find the key to the front door.

HOW TO RUN THE GAME:

Note: The game is going to lag a little at first due to the models being loaded and sometimes due to animations.

GitHub Repository: <https://github.com/svsriya/VREscapeRoom/tree/master>

- Its running at this link: <https://svsriya.github.io/>
- You can simply open index.html in the browser
- This might not always work due to browser security, in which case you can host it using php by entering the following command in the terminal: `$ php -S 127.0.0.1:8080`
 - Then navigate to 127.0.0.1:8080 to see the game
- Otherwise, you can also host this using Python

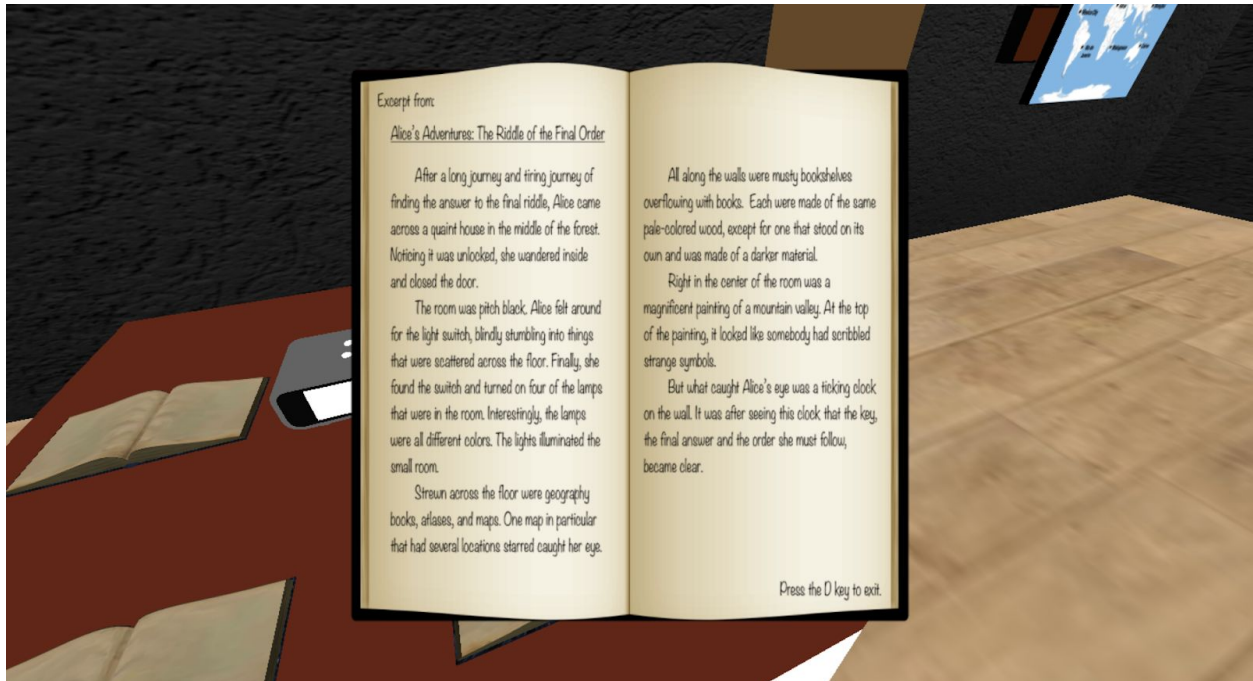
CONTROLS:

- Use the ARROW KEYS to move around
- Use the MOUSE to look around 360°
- Onscreen target turns red when an object can be interacted with
- To drop an object that is picked up, press the D key and it will return to its original location
- Click on an open book with the target to get a close up of its contents, and press D to close the book window
- Click on a lamp with the target to turn it on, and click on it again to turn it off. If all four lamps are turned on at once, click any of them again to reset all of them to off.

PUZZLES WALKTHROUGH:

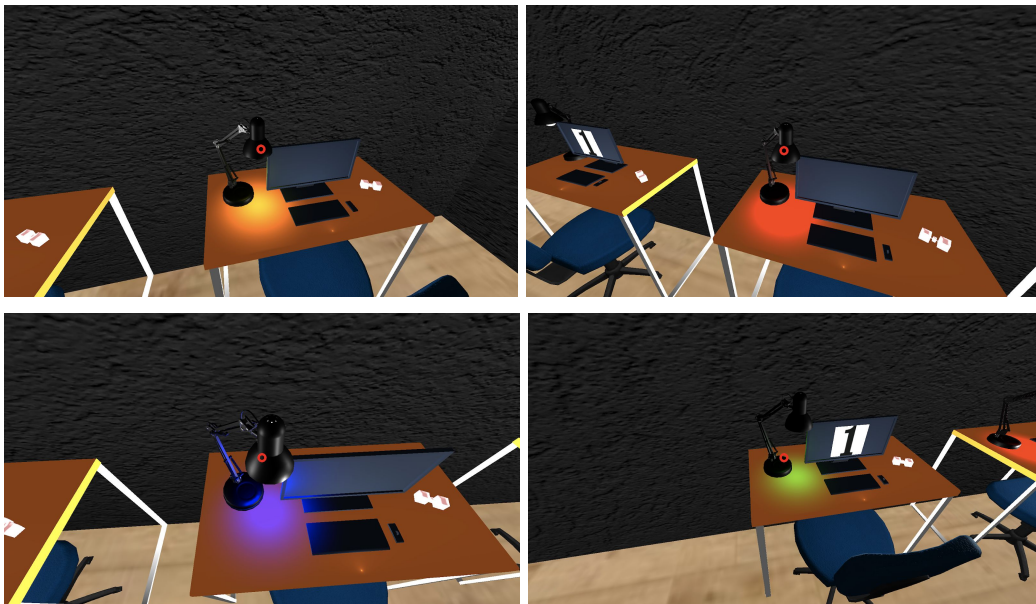
- 1) Key is inside an alarm clock

- a) Each of the puzzles gives a digit for the correct time to be entered (4 puzzles in total)
- b) Final order of the digits is hidden in a book excerpt to the left of the clock. The excerpt mentions things related to the puzzles that are to be solved, which is the order in which the digits of the clock should be entered.



2) First digit: 1 (back wall opposite the front door)





- a) Four lamps, each different color light
 - b) Turn them on in the correct order and a computer monitor will display the next digit
 - c) Hint for solving the puzzle is located in the right book on the table near the front door (click on the book)
 - d) Correct order: yellow, red, blue, green
- 3) Second digit: 2

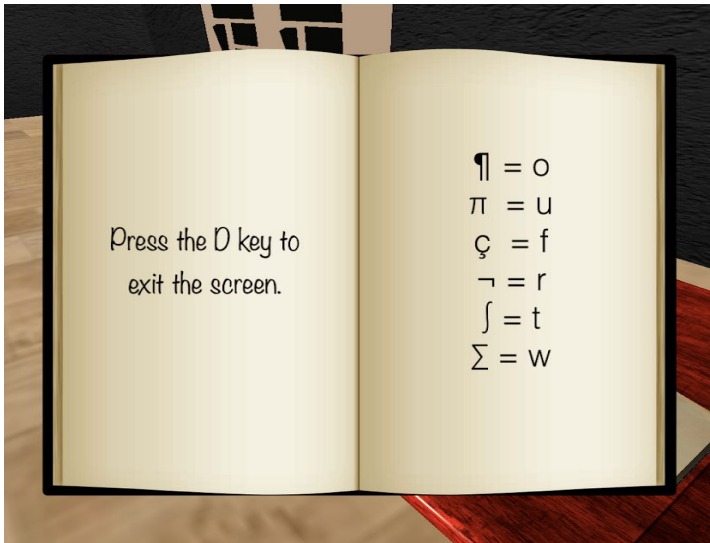


- a) Map with different cities starred and in bold
 - b) Plaque next to it telling the tale of an explorer
 - c) By following the plaque's description and connecting the dots, the next number is revealed
 - d) Press the D key to exit the plaque's screen.
- 4) Third Digit: 4 (On the back of the bookshelf)

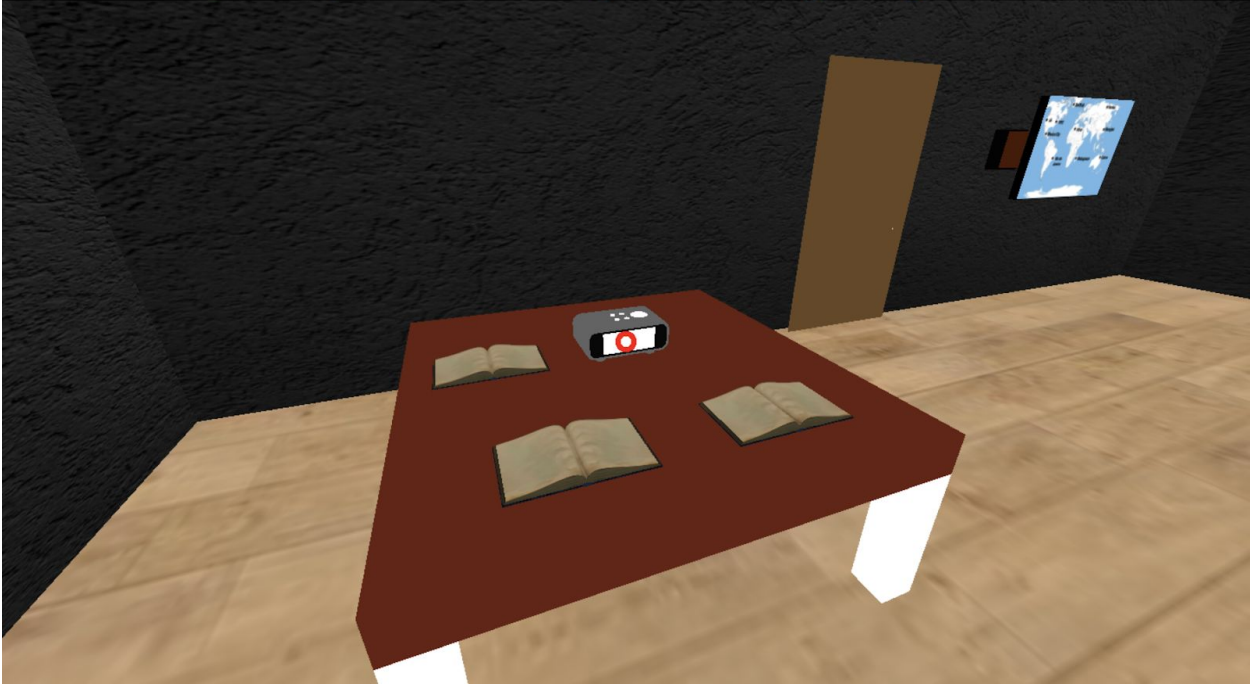


- a) Choose the correct bookshelf and its secret number will be revealed

5) Fourth Digit: 6 (forest painting with symbols on side wall)



- a) The painting has symbols that spell out an equation
 - b) The translation for the symbols is in the book on the left on top of the table near the front door
 - c) Correct answer: $4 + 2 = 6$
- 6) Final puzzle:



Enter a time

Press ESC to exit

:



- a) Enter 12:46 into the clock.
- b) Pick up the key and click on the front door.
- c) Congrats, you've escaped!

HOW WE WENT ABOUT PROGRAMMING THIS:

- Main library: three.js
 - GLTFLoader.js for loading blender models, and also for implementing the loading screen using LoadingManager
 - PointerLockControls.js for the user controls: movement and looking around the room
 - Audio.js and AudioLoader.js are for adding in sound effects
 - three.js and three.module.js for renderer, camera, scene, and all 3D and Vector objects
 - The renderer used is a WebGLRenderer, so most of this is written in WebGL using JavaScript and HTML
- After coming up with our idea for the project, we dove into researching all that is possible with three.js, including looking at tutorials, YouTube, and the examples on the three.js website.
- We then began working our own examples to better understand three.js.
- Finally, we came together and worked on the game. Before picking a theme, we had a simple key-door puzzle working, as we showed in the milestone.
- Then we planned out the gameplay and theme for the escape room.

- We separately worked on parts of the room and puzzles, until finally we put it all together.
- Sources:
 - We got the models for the books, tables, computer desks, chairs, lamps, and painting from this website: <https://sketchfab.com/3d-models/popular>
 - The rest of the models were created using Blender, and all of the static images were edited by us.
 - All three.js documentation and source files came from the original source: <https://threejs.org/> and <https://github.com/mrdoob/three.js/>

SPECIFIC ROLES:

- Both of us played a large role in the initial research we did as well as planning out the gameplay
- Moriah
 - Initialized set-up for raycasting needed for interaction with objects and for the target the player uses
 - Create need objects and animations that could not be found from outside sources on blender
 - Coded the map+plaque, bookshelf, and clock puzzle
- Sriya
 - Set up the empty room and PointerLock controls
 - Added the code for user seemingly picking up and dropping items
 - Coded the four lamps puzzle and the puzzle with the symbols on the painting, as well as the models and book hints associated with these puzzles