

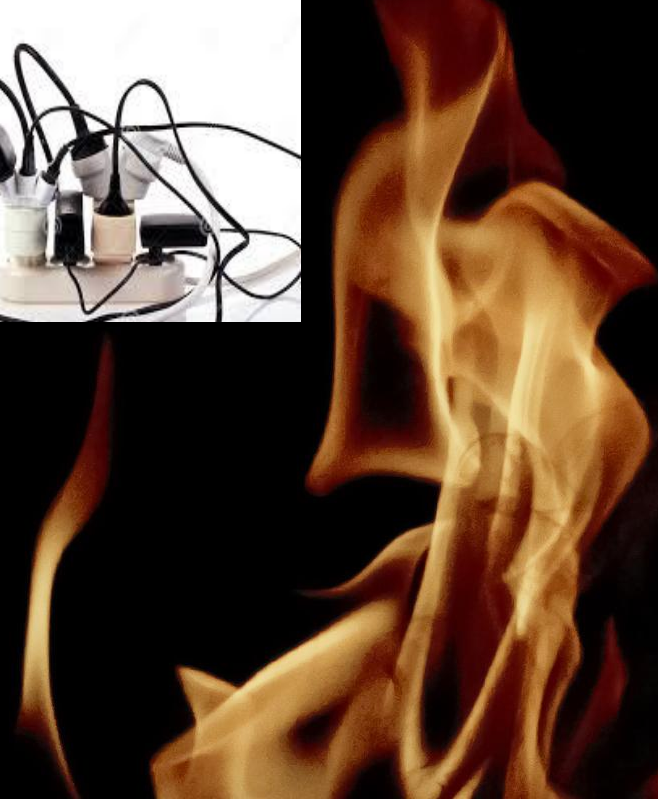
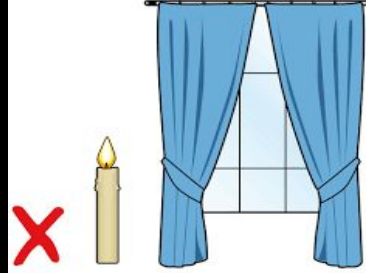


MENARK FIRE EMERGENCY SIMULATION:

**EXPERIENCE A SAFER TOMORROW WITH VIRTUAL
REALITY FIRE EMERGENCY SIMULATIONS**

By Bismark Buernortey Buer

In emergency preparedness, Virtual Reality (VR) is a transformative tool for fire emergency simulations. Unlike traditional drills, VR offers an immersive experience, honing critical skills and fostering effective decision-making. Exploring the virtual realm enhances preparedness, ensuring a proactive response to real-world crises with increased safety and reduced panic.



This project uses VR technology to create realistic fire emergency simulations. Users can practice fire safety procedures in a safe environment. The user has three options to use to navigate the game



USER ONBOARDING

OPTIONS:

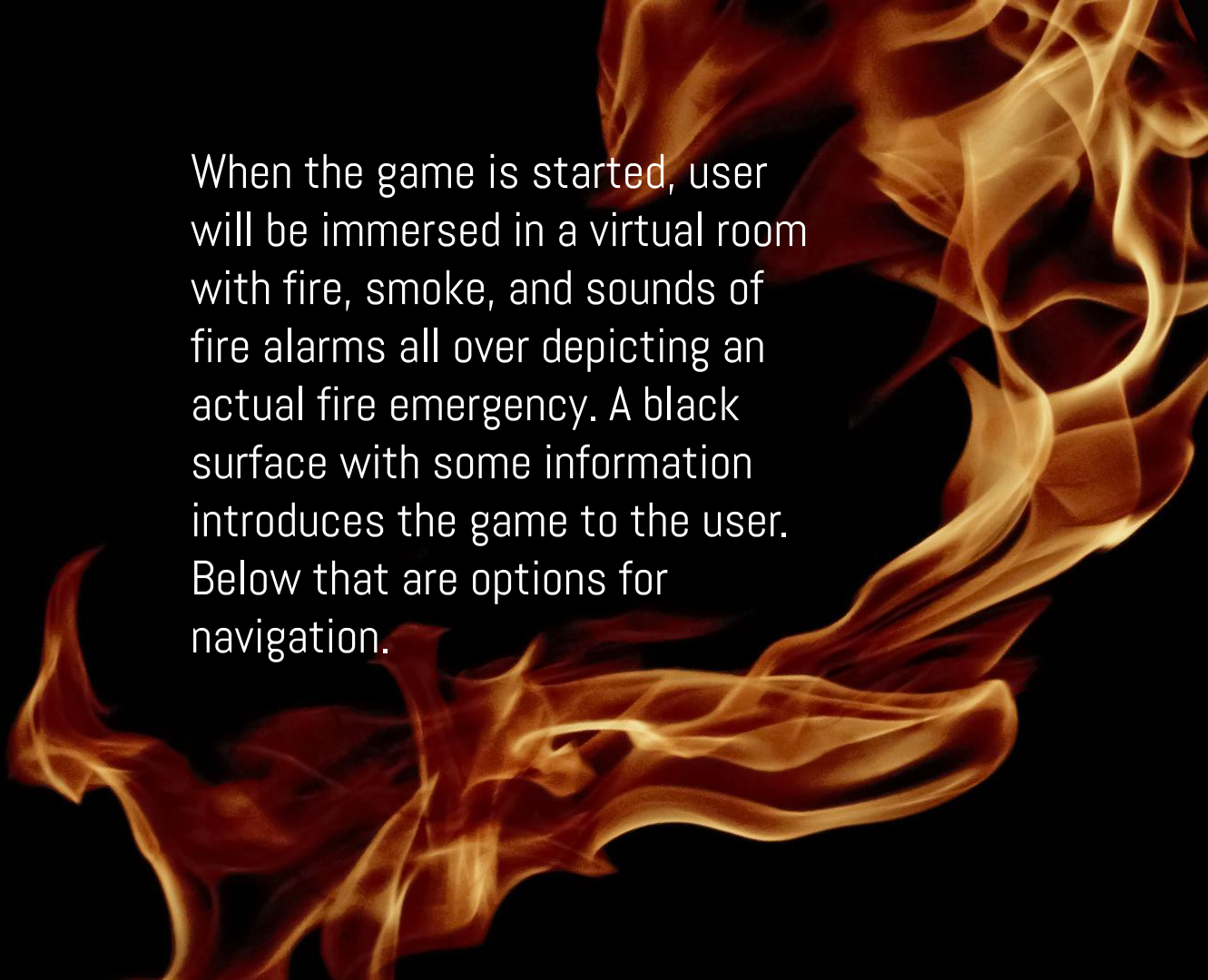
Call 911

Use Fire Extinguisher

Home Fire Hazards

Quit

When the game is started, user will be immersed in a virtual room with fire, smoke, and sounds of fire alarms all over depicting an actual fire emergency. A black surface with some information introduces the game to the user. Below that are options for navigation.



MAIN SCENE

TOOLS AND ASSETS:

- A 3D warehouse
- Fire extinguisher
- UI clickables
- Fire and smoke particles
- Fire alarms

IMPLEMENTATION

A new unity project is created and 3D warehouse is added. Fire and smoke particles are imported and added to the project. A fire alarm sound is added to the background and looped to make it sound continuously.





01

CALL 911

This option simulates an interactive call with 911 during a fire emergency. Users have some few seconds after each question to answer the questions.

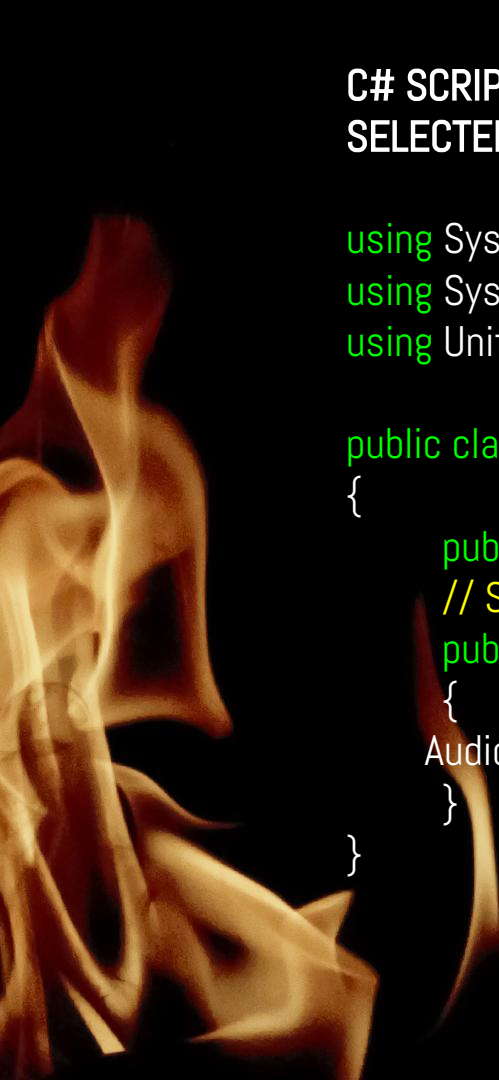
OPTION I IMPLEMENTATION

TOOLS AND ASSETS:

Eleven labs for voice over
Fire alarms
C# script

A 911 audio clip made with eleven labs was imported into Unity and an empty GameObject called "AudioPlayer" was set up with an AudioSource to handle audio playback. A C# script called ButtonScripts was integrated into unity which has a reference to the AudioPlayer Gameobject. Clicking the Call 911 option will activate the AudioPlayer Gameobject to play the audio.

C# SCRIPT THAT MAKES THE 911 CALL HAPPENS WHEN THE CALL 911 OPTION IS SELECTED



```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class ButtonScripts : MonoBehaviour
{
    public GameObject AudioPlayer;
    // Start is called before the first frame update
    public void playAudio()
    {
        AudioPlayer.SetActive(true);
    }
}
```


A stylized, abstract graphic of fire or flames in shades of orange and yellow, set against a black background. The flames are composed of flowing, ribbon-like shapes that create a sense of movement and heat. They are positioned on the right side of the image, partially framing the text.

02

FIRE EXTINGUISHER

This option helps user to learn how to use a fire extinguisher to quench fire during a fire outbreak.

ADDING THE OBJECTS

Objects used:

- White smoke
- Fire extinguisher

The smoke and the fire have a parent-child relationship. The smoke is dragged onto the fire extinguisher in the hierarchy window and its position is adjusted so it looks like it is coming out of the fire extinguisher and moves with it.



INTERACTION BETWEEN SMOKE AND FIRE

- Setting up the scene
 1. Assigned box colliders to each fire object and the smoke object.
 2. Adjusted the size of these box colliders to match their approximate volumes.
- Scripts
- Tagging fire objects



```
using System.Collections;

using System.Collections.Generic;

using UnityEngine;

public class FireExtinguisher : MonoBehaviour

{

    public GameObject fireExtinguisher;

    // Start is called before the first frame update

    public void ShowFireExtinguisher()

    {

        fireExtinguisher.SetActive(true);

    }

}
```



SCRIPT 2:

```
using UnityEngine;

public class FireKiller : MonoBehaviour

{

    // Start is called before the first frame update

    void Start()

    {

        // Debug log to check if the script is running

        Debug.Log("FireKiller script attached and
running.");

    }

    // OnTriggerEnter is called when the Collider
'other' enters the trigger

    private void OnTriggerEnter(Collider other)

    {

        // Check if the collided object has the tag "Fire"
```

```
if (other.gameObject.CompareTag("fire" )

{

    // Debug log to indicate a fire object has been detected

    Debug.Log("Fire detected and being extinguished: "

    // Remove or disable the fire game object

    // You can also add custom logic here to handle the fire
extinguishing effect

    Destroy(other.gameObject);

    // Debug log to confirm the fire object has been removed

    Debug.Log("Fire extinguished: " +
other.gameObject.name);

}

else {

    // Debug log if the object is not tagged as "Fire"

    Debug.Log("Collided with a non-fire object: "
ther.gameObject.name);

}
```


03

HOME FIRE HAZARD POTENTIAL COMMON DANGERS

The user enters a living room. The user will see a welcoming message telling them that they should find three fire safety Hazards by pointing to the three objects.

They are given hints for each. When the user points towards each of the correct object, they will hear a tick buzz sound and a message will appear informing why this is a wrong habit and why it can cause a fire.

The scene: a living room

The three correct objects: a candle near curtains, heater near newspaper, and overplugged Power Strip.

hazard manager

```
using UnityEngine;
```

```
using TMPro;
```

```
public class HazardManager : MonoBehaviour
```

```
{
```

```
    // Reference to the TextMeshPro UI component
```

```
    public TextMeshProUGUI messageText;
```

```
    // Total number of correct hazards in the scene
```

```
    private int totalCorrectHazards = 3;
```

```
    // Number of correctly identified hazards
```

```
    private int identifiedCorrectHazards = 0;
```



```
// Call this when a correct hazard is selected
```

```
public void CorrectHazardSelected(string message)
```

```
{
```

```
    identifiedCorrectHazards++;
```

```
    messageText.text = message;
```

```
    // Check if all correct hazards have been identified
```

```
    if (identifiedCorrectHazards == totalCorrectHazards)
```

```
    {
```

```
        messageText.text = "All fire hazards are cleared!";
```

```
    }
```

```
}
```

```
// Call this when a wrong hazard is selected
```

```
public void WrongHazardSelected()
```

```
{
```

```
    messageText.text = "Sorry, wrong object.";
```

```
}
```

```
}
```

Hazard detector

using UnityEngine;

```
public class HazardDetector : MonoBehaviour  
{
```

```
    // Indicates whether this is a correct hazard  
    public bool isCorrectHazard;
```

```
    public GameObject AudioToPlay;
```

```
    // The specific message for this hazard if it's correct  
    public string correctHazardMessage;
```

```
    // Reference to the HazardManager  
    private HazardManager hazardManager;
```

```
    void Start()  
{
```

```
        // Find the HazardManager in the scene  
        hazardManager = FindObjectOfType<HazardManager>();
```

```
}
```




Hazard detector continued:

```
private void OnTriggerEnter(Collider other)
{
    // Check if the collider belongs to the player or the player's VR
    controller
    if (other.CompareTag("Player"))
    {
        // Notify the HazardManager about the interaction
        if (isCorrectHazard)
        {
            hazardManager.CorrectHazardSelected(correctHazardMessage);
            AudioToPlay.SetActive(true);
        }
        else
        {
            hazardManager.WrongHazardSelected();
        }
    }
}
```




```
player controller
```

```
/**
```

```
 * PlayerController.cs
```

```
 *
```

```
 * This script is designed for controlling player movement and rotation using the  
Oculus Touch Controllers
```

```
 * in a Unity environment. The right thumbstick controls the player's forward,  
backward, left and right movements,
```

```
 * while the left thumbstick controls the player's rotation.
```

```
 *
```

```
 * Usage:
```

```
 * Attach this script to the player object or the object intended to be controlled by the  
user.
```

```
 * Adjust the `speed` and `rotationSpeed` public fields as necessary to suit your  
game's needs.
```

```
 *
```

```
using UnityEngine;
```

```
public class PlayerController : MonoBehaviour
```

```
{
```

```
    public float speed = 3.0f; // Speed at which the player moves
```

```
    public float rotationSpeed = 55.0f; // Speed at which the player rotates
```

```
private void Update()
{
    // Action Buttons on Right Controller
    if (OVRInput.GetDown(OVRInput.Button.One, OVRInput.Controller.RTouch))
    {
        // Insert the action to be performed when the button is pressed
    }

    //-----
    // Player Movement Code Begins
    //-----

    // Gather input from the right thumbstick for movement
    Vector2 movementThumbstick = OVRInput.Get(OVRInput.Axis2D.SecondaryThumbstick); // Right-hand controller
    float moveHorizontal = -1*movementThumbstick.x;
    float moveVertical = -1* movementThumbstick.y;

    // Gather input from the left thumbstick for rotation
    Vector2 rotationThumbstick = OVRInput.Get(OVRInput.Axis2D.PrimaryThumbstick); // Left-hand controller
    float rotateHorizontal = rotationThumbstick.x;

    // Move the player forward, backward, left, or right
    Vector3 movement = new Vector3(moveHorizontal, 0, moveVertical) * speed * Time.deltaTime;
    transform.Translate(movement, Space.World);

    // Rotate the player left or right based on the horizontal input from the left thumbstick
    float rotation = rotateHorizontal * rotationSpeed * Time.deltaTime;
    transform.Rotate(0, rotation, 0);

    //-----
    // Player Movement Code Ends
    //-----
}
```

THANKS!

Embrace the future of emergency preparedness with Virtual Reality Fire Emergency Simulations. Beyond traditional training, VR simulations offer an immersive, dynamic, and realistic approach to ensuring our safety. Let's continue to learn, adapt, and stay prepared for a safer tomorrow.



RESOURCES

- 
- <https://www.firemiddleeastmag.com/over-2000-fires-in-the-uae-last-year-resulted-in-nine-deaths-and-89-injuries/#:~:text=Official%20figures%20have%20shown%20that,were%20firefighters%20attending%20the%20scene>
 - <https://youtu.be/QYBVHJm6tS4?si=i-rQyd2ZLJ5iEXIF>
 - <https://skfb.ly/oKQvN>
 - <https://youtu.be/GdwhlKKw0Lc?si=08LB2iQYWMMKfclGq>
 - <https://assetstore.unity.com/packages/3d/props/fire-extinguisher-21147>
 - <https://elevenlabs.io/>
 - <https://voicechanger.io/>

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