Project Deliverable G: Prototype II and Customer Feedback

**University of Ottawa**

**GNG1103: Engineering Design**

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**Group 6**

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Abstract

Based on the feedback received during the second client meet and our first prototype. We have edited and added features to prototype 1. These include modeling the layout for the simulation, basic game functions such as scene switches and the various years. We then tested it in VR to check for any missing elements. We’ve updated the bill of materials and devised a new plan for prototype 3. We’re a little behind schedule but we have made a modified plan for the following weeks that allows us to catch up and have a working product for design day.

# 1.0 Prototype I

Our prototype one consists of a first-floor plan of the house that the first scene of the simulation will occur. The user will get a notification on their phone that a tornado is coming and is prompted to find Benny which is the user's dog. A second prototype tests the ability for the user to navigate through their home to find Benny based on proximity audio cues, so that the user can find him quicker than exploring without any indication of how close they are to finding him.

## 1.1 Prototype I Overview

We bought the floor plan of a house from the unity asset store, and we had to construct the house by hand. The house has only a first floor and consists of a kitchen, living room, and bedroom. Small features are added to each room like wardrobes, beds, tv, etc. They all have interaction set into them however we will be excluding some features due to time constraints of the simulation. This asset consists of many different walls which when added to a material, will each have a designated color to them. The biggest test was to place 1 by 1 the different walls and add their designated material given within that asset. We did this for everything, like room appliances, kitchen appliances and living room appliances.

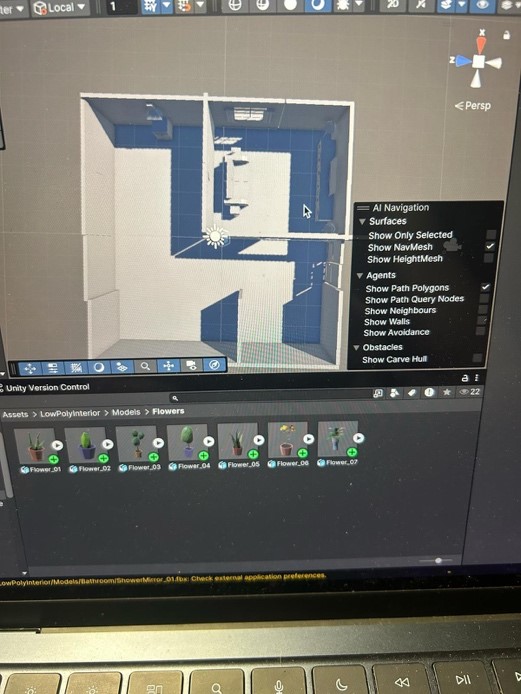


Fig 1. The constructed test floorplan of the kitchen (left) and living room (top right), with the hallway to be placed afterward. This floor plan may be used and adapted instead of the drawing above, depending on which one is easier for the user to navigate, as well as which one simulates reality more than the other.

## 1.2 Prototype I Test

We tested prototype I in the client meeting by presenting it to the clients and getting feedback. We also tested prototype using measurements. For example, we tested the measurements of the walls and the floors to make sure they were properly aligned.

# 1.3 Client Feedback

During the first test, described above, the clients gave us the following feedback:

* Focus less on the upstairs floor plan
* Focus more on the basements
* The calendars are a good idea as scene switch buttons

|  |  |  |
| --- | --- | --- |
| **Feedback** | **Analysis** | **Application** |
| * Focus less on the upstairs floor plan * Focus more on the basements | The clients were aware that the basement was where most of the education would happen for the user. They were also aware that the upstairs of the house was where most of the interactivity would occur. This feedback demonstrated that they want us to prioritize the education part of the simulation going forward. | Our team plans to make it very easy for the user to find Benny so that they have more time in the basement getting educational information. |
| * The calendars are a good idea as scene switch buttons | The calendar will blend into the scene well, but it user will also be prompted to press it. The clients liked this idea. The client likes that we aren’t using text indicators or “breaking the fourth wall” with the user. They like that we are telling the story through images. | Our team will continue to replace any text indicators or obvious buttons with images/objects that blend with the scene. |

## 1.3 Analysis

As stated above, the story design for the simulation has been adapted and updated. The design for the home has been updated as indicated above. The floorplan consists of a very simple hallway with 1 room branching off with a kitchen and living room to provide potential hiding places for Benny. The hallway is designed to be long enough to take some time for the user to get there, but the house is designed in a simple enough way that the user should be able to get to Benny in time to see the rest of the simulation play out in the basement. All of the details within the rooms (designed to provide context) will be indicated in a way that is obvious to the user to prevent time being wasted.

# 2.0 Prototype II

## 2.1 Prototype II Overview

|  |  |  |
| --- | --- | --- |
| **What** | **Why** | **When** |
| The second prototypes focus was on developing the essential buttons to be used in the simulation which include:   * A clock that switches scenes * An exit button   The second prototype also includes the three basements.  A second element of the second prototype is the proximity barking audio. | The elements in prototype II are essential to the function of our simulation. Without them, our simulation would not be:   1. Educational   The scene switch buttons bring the user to educational scenes of the simulation. The basements are the educational scenes.   1. Accessible   The exit button allows users who might be scared/overwhelmed to leave the simulation.  Having the proximity audio will facilitate users being able to find Benny within a reasonable timeframe to be able to advance to the next scene with enough time to view it all. | This prototype will be finished by March 8th,2025. This date is very important as it will leave us time to test the prototype and make any changes. |

All prototype II testing is included in an attached PDF, though more specific details are included below for the process of the proximity noises section of the prototype.

### 2.1.1 Proximity Audio Component

To test the proximity noises of the barking, a test plane was created with the user as a movable capsule (even though this is not how the simulation will run, it is useful for testing purposes). A YouTube tutorial was consulted to find out how to create spatial audio revolving around a specific entity within the game (SoomeenHahm Design (SDInfo), 2021). A code was created with the help of artificial intelligence. The prompt used was “Generate a code for the unity software where an entity will stop its audio when clicked," and later “Generate a code for the unity software where an entity will follow the user after being clicked” (ChatGPT, personal communication, March 5, 2025). These codes were implemented as components of the sphere (representing Benny), to be able to test whether or not it will work in the main simulation. The codes use an audio file that was cut and reassembled using free audio sources from Uppbeat and a video editing software afterward (Uppbeat, n.d.).

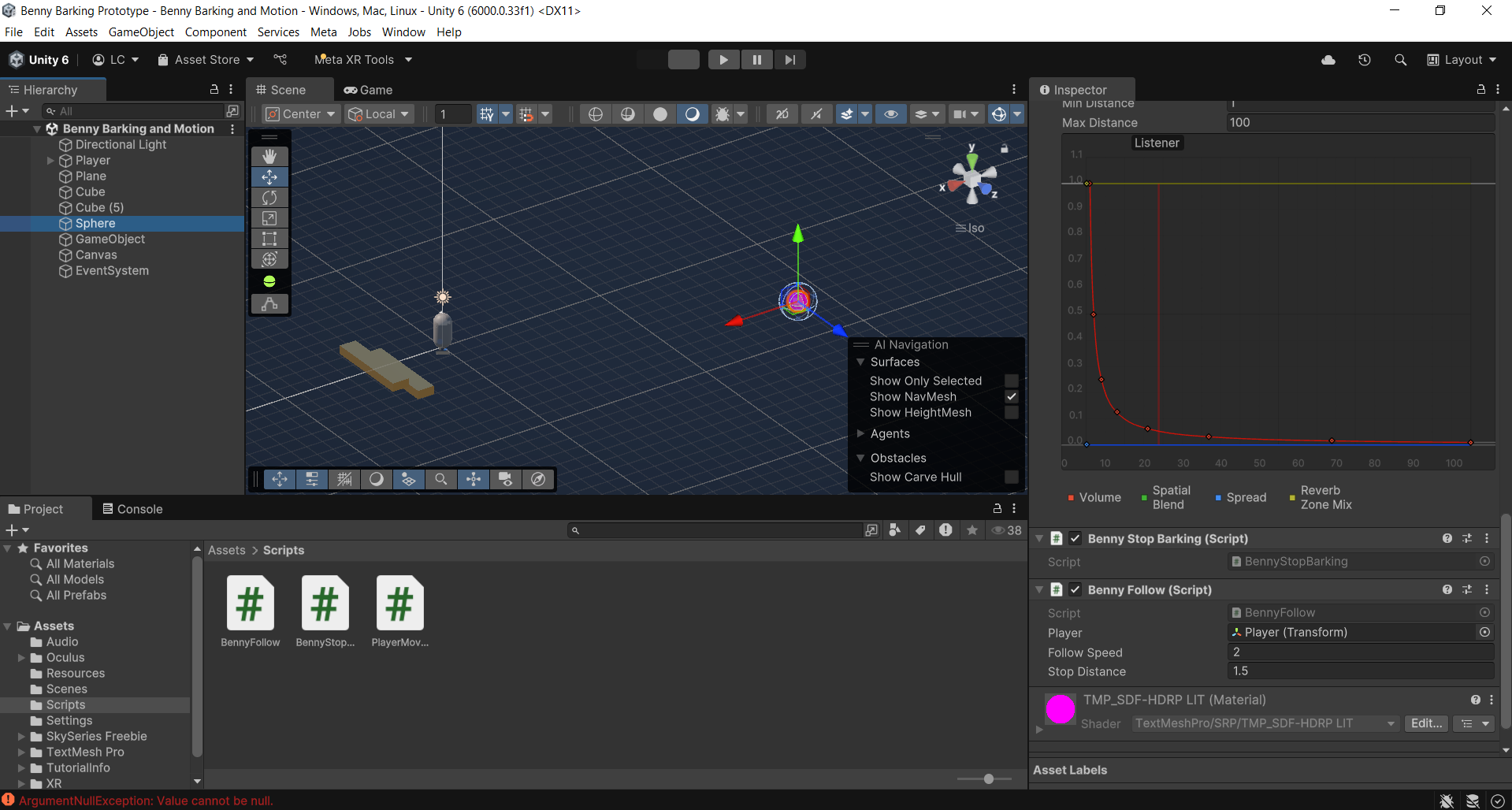
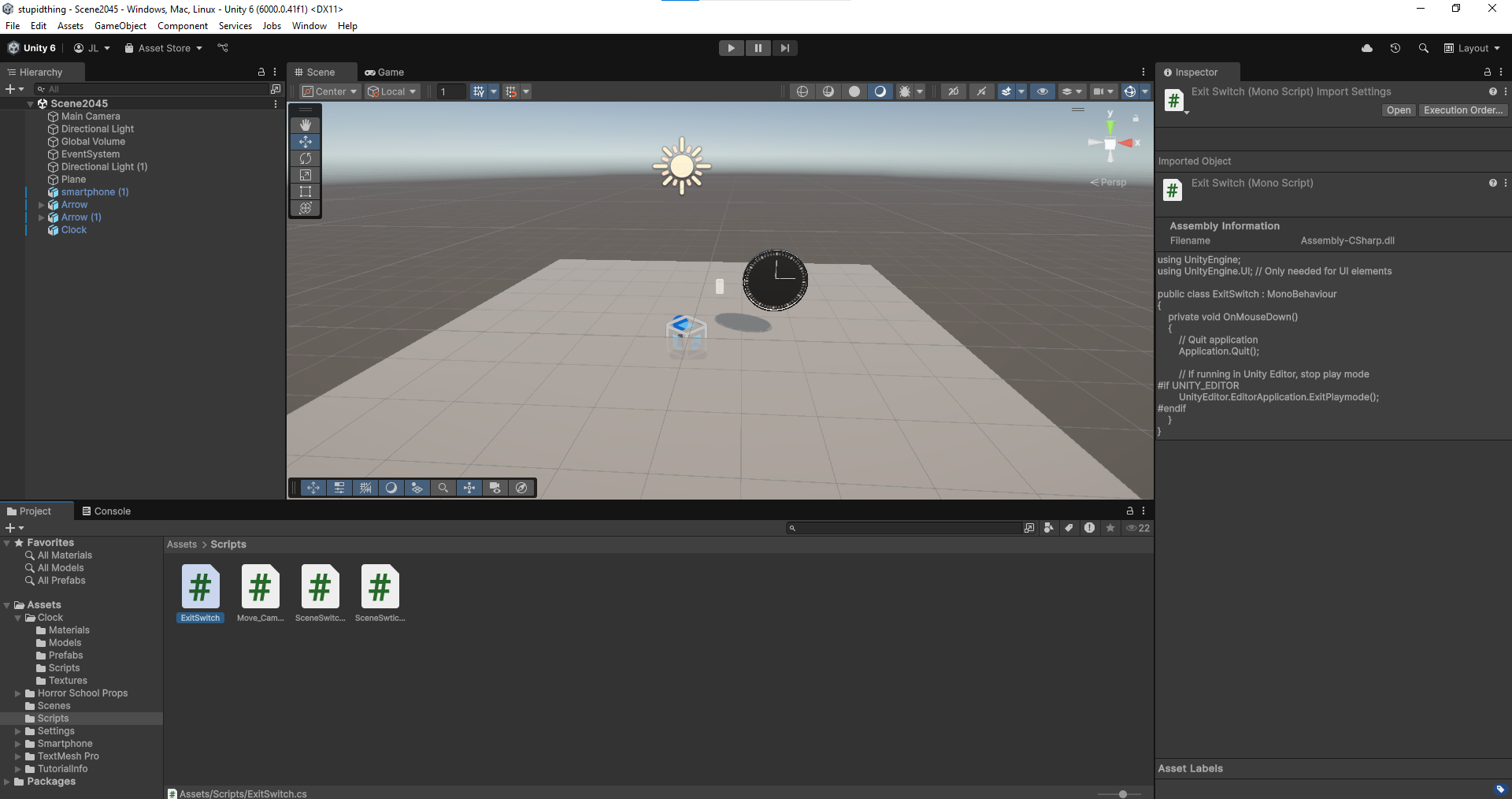
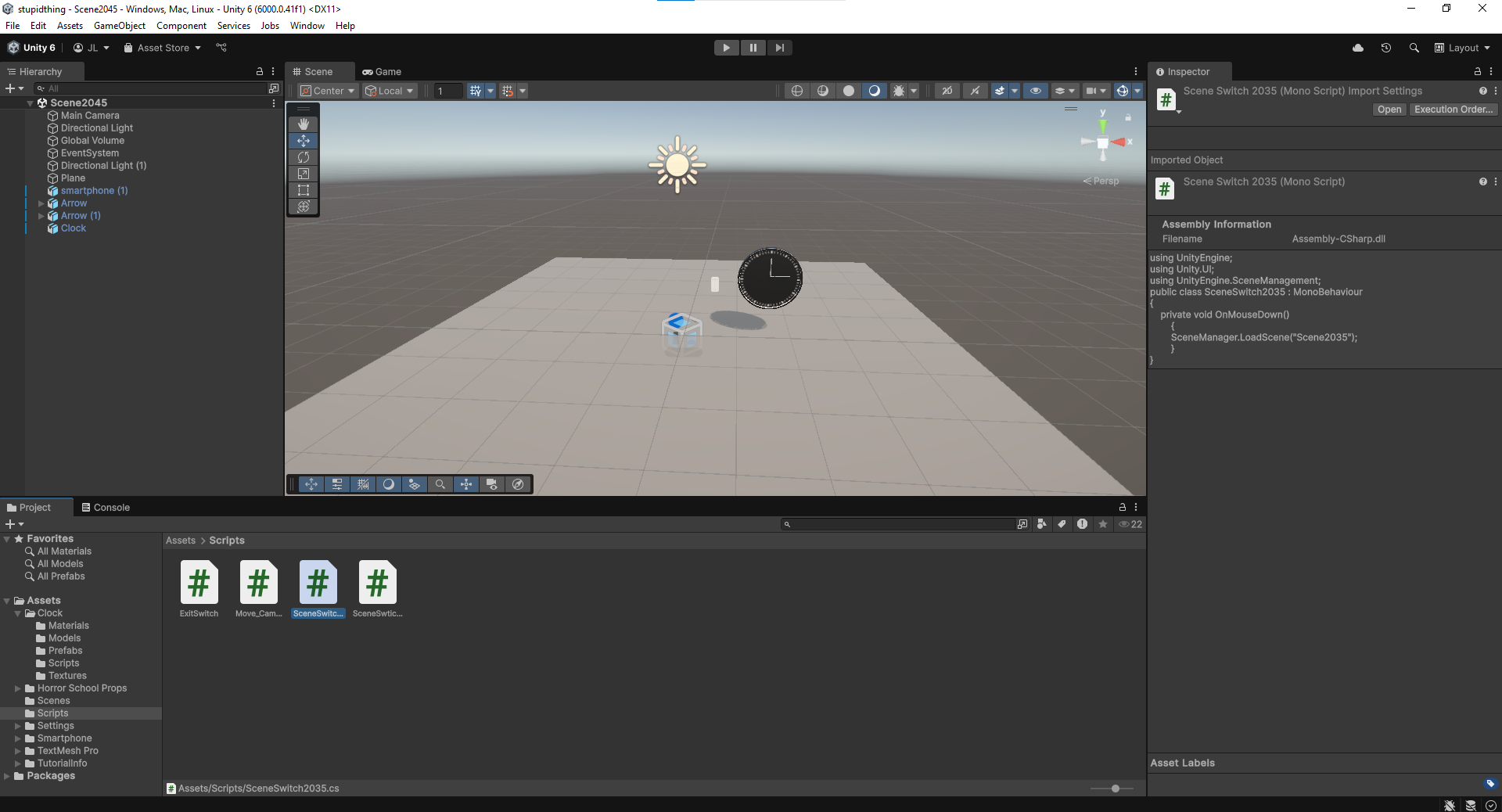


Fig 2. The player (grey capsule on left) relative to the spatial audio source (pink sphere representing Benny). The code implemented (right) shows that the audio is a logarithmic function relative to the player, to maximize realistic increase of volume. The two codes for stopping the audio and having Benny follow are also indicated both in the bottom menu and on the right below the function.

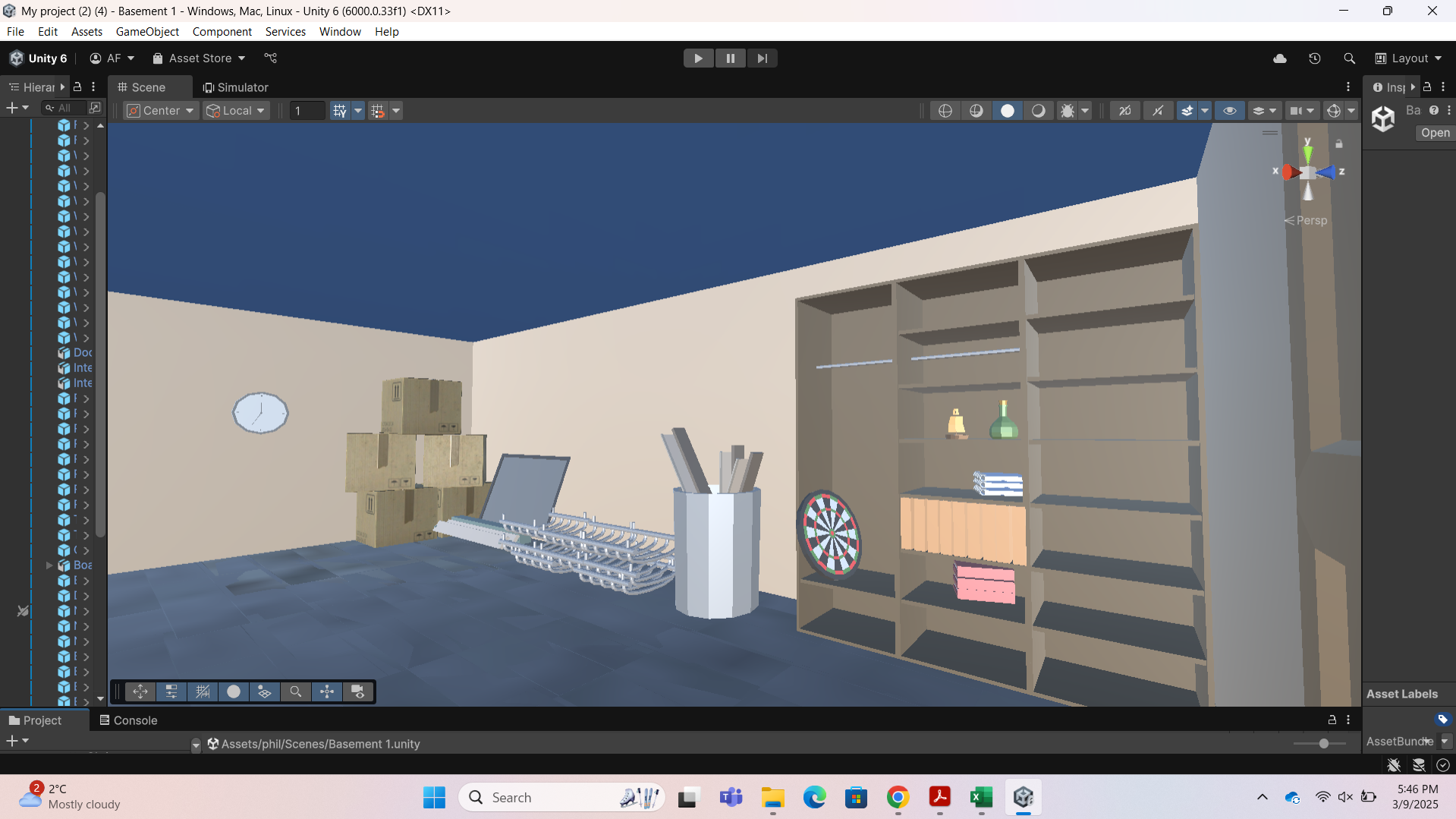
To test the spatial audio, the following tests were conducted within the software. They were then reattempted using the headset, which worked only for the audio. Changes are indicated in the third column of the following table. It is important to note that all tests were on a pass/fail spectrum, since the audio needs to work, and if it does not, would not be effective for the simulation. For this reason, the stopping criteria was simply when it worked as intended.

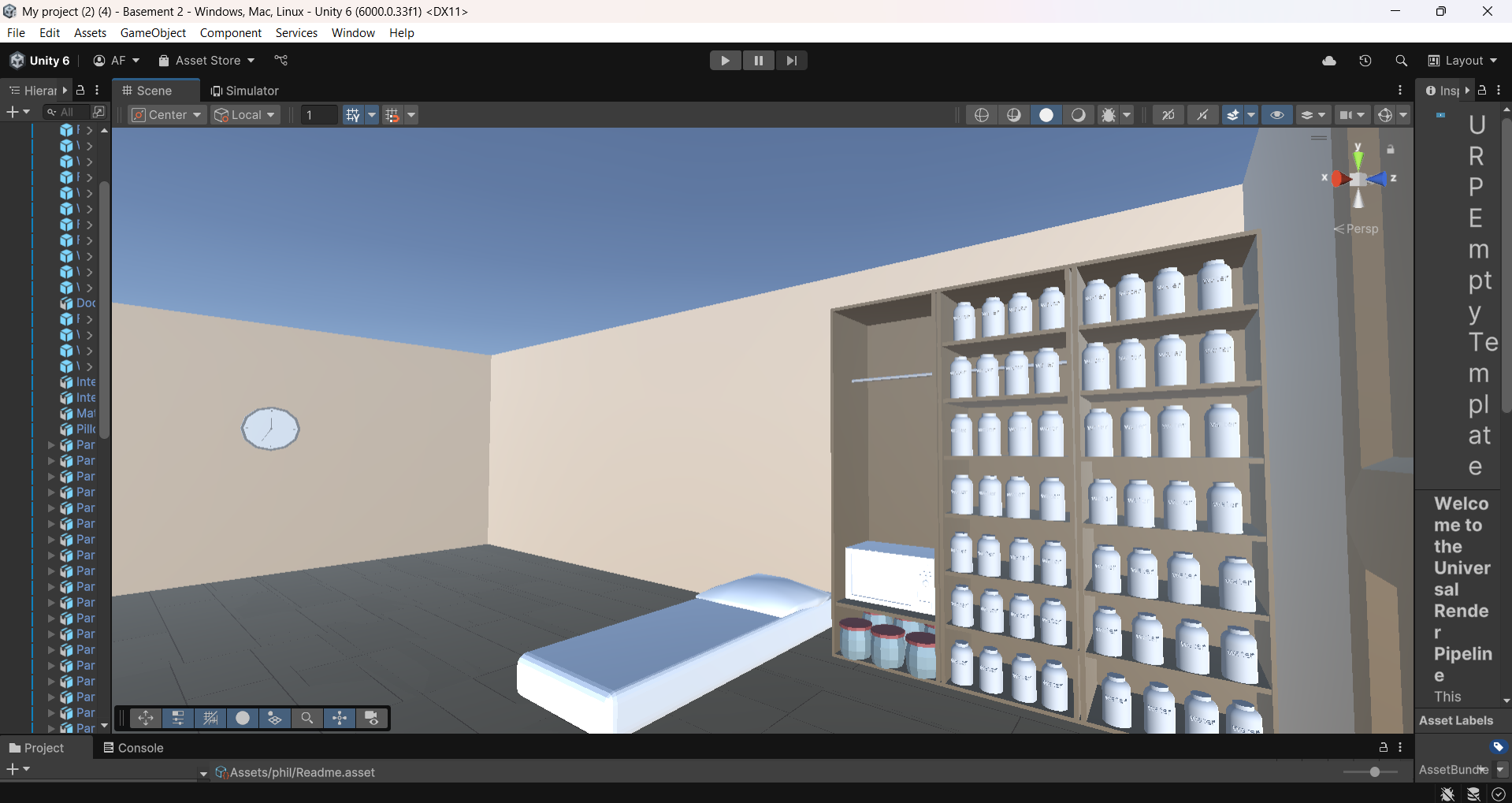
### 2.1.2 Scene Switch “Time-skip” Button Component

Fig 3. and Fig 4. The above screen captures demonstrate the codes used to program the scene switch button that will be used to move the basement forward in time.

## 2.2 Prototype II Model

Because the prototypes are strictly on software, we have been using experimental models. We developed the prototype in unity and then tested it. There is no cost, and we can modify and test the prototype as many times as we need to, which is why we chose this type of model. Some images of our experimental model follow:





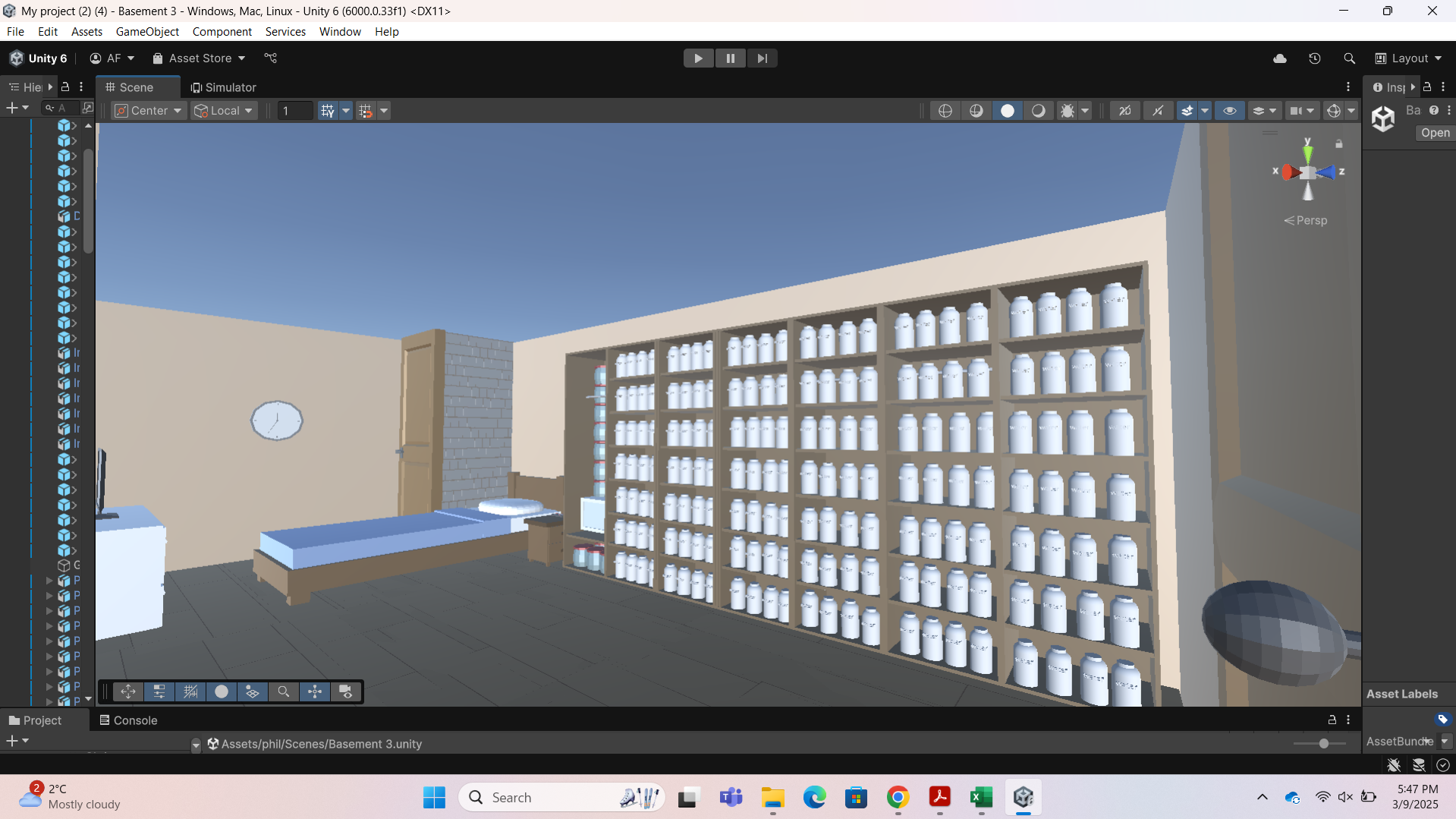


Fig 5., Fig 6., and Fig 7. Different views of the basement model complete with the bottles and interactibles for analysis throughout the decades. These scenes will be moved to and from using the code from Fig 3. and Fig 4.

# 3.0 Prototype II Peer Feeback Analysis

## 3.1 Prototype II Test Plan

The prototype II test plan is attached as a second PDF file in the Brightspace submission.

## 3.2 Prototype II Potential User Feedback Analysis

As described in the Prototype II Test Plan, we tested prototype II on a few potential users. For this test, we chose two third year Carleton students. These students are the correct demographic for the potential users, which is why they were chosen to perform this test. After using attempting to use the features created in prototype II, the potential users gave the following feedback:

* The different functions of the buttons are clear
* The scene switch should instant, the button should not take any time to load
* Make sure that in the game the buttons are obvious so that the user knows to press them

|  |  |
| --- | --- |
| **Feedback** | **Analysis** |
| * The scene switch should instant, the button should not take any time to load | * Try new methods to make the buttons more responsive |
| * Make sure that in the game the buttons are obvious so that the user knows to press them | * Put a “?” or “!” over all buttons * Make objects that are buttons big and colorful to attract the user's attention to them |

# 4.0 Prototype III

As both the VR and button implementations work, the next step of our plan is to combine as of these separate components into a working product.

## 4.1 Prototype III Test Plan

The prototype III test plan is attached as a second PDF file in the Brightspace submission.

# 5.0 Bill of Materials

The following is an updated bill of materials for the simulation, sourced from the Unity Store. The yellow highlight indicates elements that have been included in the first prototype. The green highlighter indicates added elements that were included in prototype II. The red text indicates elements that won’t be included in our simulation.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item No** | **Component** | **Importance level (1-4)** | **Quantity** | **Cost (Including Tax)** | **Unity Link** |
| 1 | House floorplan | 4 | 1 | $11.29 | [Low Poly Cartoon House Interiors | 3D Interior | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/interior/low-poly-cartoon-house-interiors-167425) |
| 2 | Dog (Benny) | 4 | 1 | $11.30 (1 and 2)    Free | [dog Chihuahua | Characters | Unity Asset Store](https://assetstore.unity.com/packages/3d/characters/animals/mammals/dog-chihuahua-105073)    [Dog Beagle | Characters | Unity Asset Store](https://assetstore.unity.com/packages/3d/characters/animals/mammals/dog-beagle-70832)    [Animals FREE - Animated Low Poly 3D Models | 3D Animals | Unity Asset Store](https://assetstore.unity.com/packages/3d/characters/animals/animals-free-animated-low-poly-3d-models-260727) |
| 3 | Survival Kit Items | 3 | 1 | Free | [Item Pack: Survival | 3D Props | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/item-pack-survival-131598) |
| 4 | Cell Phone | 2 | 1 | Free (both) | [[Free] Phone | 3D Props | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/free-phone-181455)    [Low Poly Office Props - LITE | 3D Environments | Unity Asset Store](https://assetstore.unity.com/packages/3d/environments/low-poly-office-props-lite-131438) |
| 5 | Proximity Noise | 1 (only if tutorial cannot be used) | 1 | $5.65 | [Sound Proximity | Audio | Unity Asset Store](https://assetstore.unity.com/packages/tools/audio/sound-proximity-182591) |
| 6 | Trees/Shrubs | 3 | 1 | Free | [Polygon Trees | 3D Trees | Unity Asset Store](https://assetstore.unity.com/packages/3d/vegetation/trees/polygon-trees-224068) |
| 7 | Tornado | 4 | 1 | Free | [Ez Tornado | Environment | Unity Asset Store](https://assetstore.unity.com/packages/vfx/particles/environment/ez-tornado-203025) |
| 8 | Dark Weather Background | 3 | 1 | Free | [seasons/weather effects | Particles/Effects | Unity Asset Store](https://assetstore.unity.com/packages/tools/particles-effects/seasons-weather-effects-268820) |
| 9 | Household assets | 1 | 1 | Free | [Low Poly Food Lite | 3D Food | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/food/low-poly-food-lite-258693) |
| 10 | Fonts` | 1 | 1 | Free | [Retro Sprite Font and Icons | 2D Fonts | Unity Asset Store](https://assetstore.unity.com/packages/2d/fonts/retro-sprite-font-and-icons-39741)    [Fatality FPS Gaming Font | 2D Fonts | Unity Asset Store](https://assetstore.unity.com/packages/2d/fonts/fatality-fps-gaming-font-216954) |
| 11 | Return/Exit Menu | 2 | 1 | Free | [UltimateMenus | GUI Tools | Unity Asset Store](https://assetstore.unity.com/packages/tools/gui/ultimatemenus-71893)    [Settings & Options Menu Creator | GUI Tools | Unity Asset Store](https://assetstore.unity.com/packages/tools/gui/settings-options-menu-creator-268863) |
| 12 | Progress Bar | 1 | 1 | Free | [Progress Bars - Customizable and Extensible (Health Bars etc) | GUI Tools | Unity Asset Store](https://assetstore.unity.com/packages/tools/gui/progress-bars-customizable-and-extensible-health-bars-etc-268457) |
| 13 | Home Furniture | 2 | 1 | Free | [Furniture FREE - Low Poly 3D Models Pack | 3D Furniture | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/furniture/furniture-free-low-poly-3d-models-pack-260522) |
| 14 | Water Jugs | 3 | 1 | $5.64 | [Water Bottle "19 Litre PET" | 3D Interior | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/interior/water-bottle-19-litre-pet-211076) |
| 15 | Picture Frames | 1 | 1 | Free | [Picture Frames | 3D Furniture | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/furniture/picture-frames-301169) |
| 16 | Pet Accessories | 1 | 1 | Free | [Small Kit 3D Stylized Petshop Asset | 3D Props | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/small-kit-3d-stylized-petshop-asset-291990) |
| 17 | More survival supplies | 3 | 1 | Free | [Survival Kit Lite | 3D Tools | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/tools/survival-kit-lite-92549) |
| 18 | Ambient noise | 2 | 1 | Free | [Thunderstorms SFX Pack | Audio Sound FX | Unity Asset Store](https://assetstore.unity.com/packages/audio/sound-fx/thunderstorms-sfx-pack-149736) |
| 19 | Storage boxes | 1 | 1 | Free | https://assetstore.unity.com/packages/3d/props/pbr-cardboard-box-110635 |
| 20 | Mattress | 2 | 1 | Free | https://assetstore.unity.com/packages/3d/environments/3d-low-poly-room-furniture-beds-01-225005 |
|  | Total |  |  | $22.59 |  |

# 6.0 Conclusion

The second prototype was a significant step forward in development. Our next goals are to combine our separate projects together and test its VR capabilities as well as develop the survey website. Our tests showed positive results in their respective functions, and we should be on track to having the skeleton of our final prototype by next week.

# 7.0 References

OpenAI. (2025). *Response to* “Generate a code for the unity software where an entity will stop its audio when clicked," and “Generate a code for the unity software where an entity will follow the user after being clicked” *"* [Large language model output]. ChatGPT. [https://openai.com](https://openai.com/)

SoomeenHahm Design (SDInfo). (2021, December 6). *Unity Interaction Tutorial: 3D Sound (Change Volume by Distance) [Video]. YouTube.* [Unity Interaction Tutorial : 3D Sound (Change Volume by Distance) - YouTube](https://www.youtube.com/watch?v=md7wCkkv_g4)

Uppbeat. (n.d.). *Royalty-free music for creators*. Uppbeat. <https://uppbeat.io/>