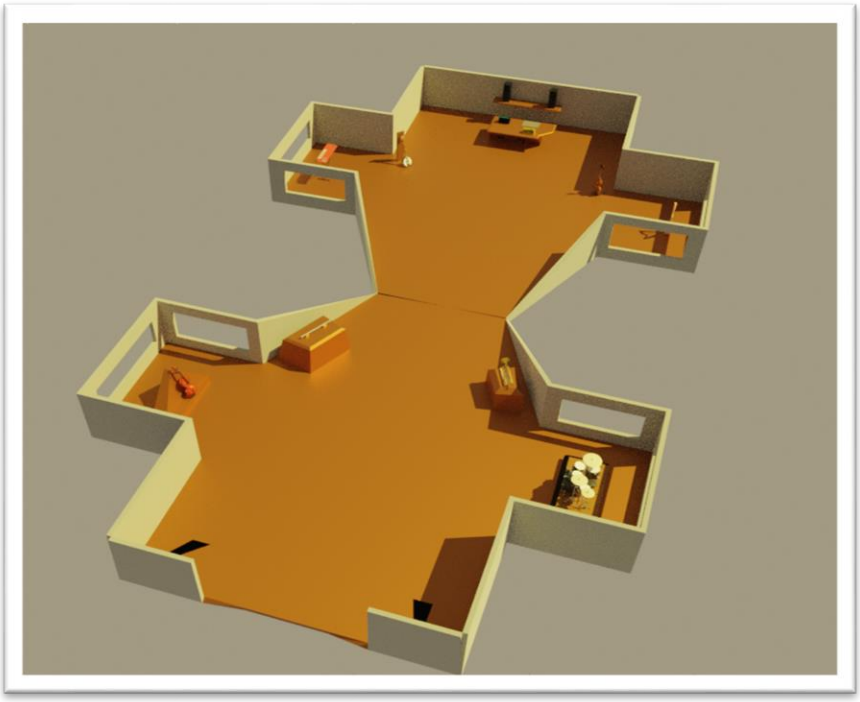

Group M: VR Musical Instrument Shop

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Designing for Virtual Environments

Ralf Bierig

08/05/2023

Project

Making of the shop and the instruments in Blender, to then be used in a Godot program to code the VR aspect to allow for the user to move around the scene and for audio samples of each instrument to play when the user moves closer to said instruments.

Blender (Objects/Models)

Some objects were downloaded from free online resources, links to resources are in the Appendix, they were then further edited to fit our vision.

Button, Banjo, and Harp by Eleanor Dunne.

- Button was a simple cube with a green material.
- Reduced Vertices:
    - In "*Object Mode*" go to "*Modifier Properties*", seen as the wrench Fig 1.
    - Click [Add Modifier], Fig 1, and search for [Decimate], Fig 2.

Figure 1:

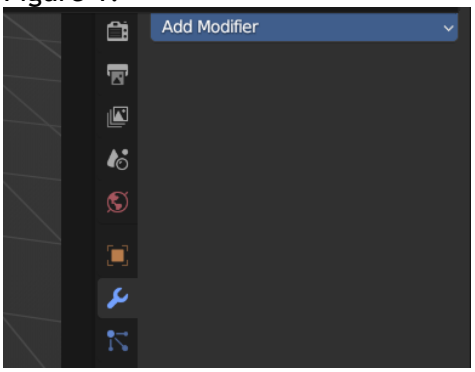
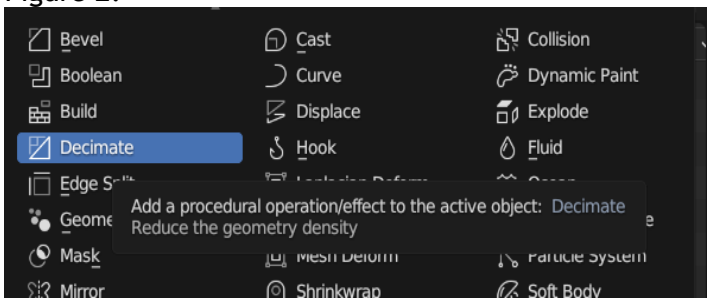


Figure 2:



Guitar and Keyboard by Conor Patrick Kavanagh.

- The Guitar was taken from BlendSwap. A model was found where a guitar is already sitting on a stand to hold it upright, so there was no need to make one. A suitable sound file for a Guitar was later found and added to the scene.
- A Keyboard already stands on its own. Taken from BlendSwap, a low poly model was selected along with a short sound file that would play once the user gets close to it.
- A chair was made by altering a cube mesh in Blender. The materials were made within blender and the shading was done to give the chair a simple, low poly look.

Trumpet and Flute by Justas Grimaila.

- **Flute** was relatively simple, mainly just a cylinder with solidified rings.I used the boolean difference modifier to cut out various sized holes in the flute.
- The **Trumpet** was a bit more difficult, however. I had to make use of curves and lots of fill actions to create a realistic looking Trumpet. The end of the trumpet was a cone which had a bunch of cuts done to it and then adjusted to give a nice exponentially increasing in size hollow cone.

Violin and Drums by Kristien Nyamutsaka.

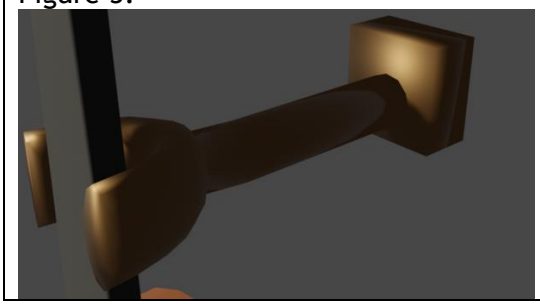
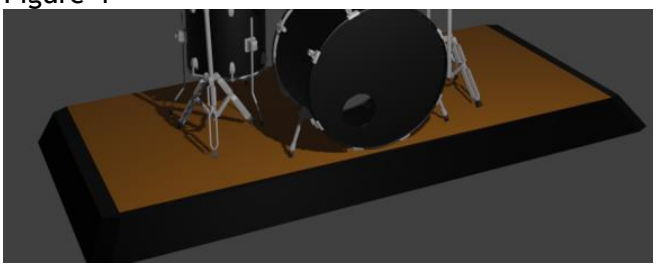
Imported Instruments. Reduced Vertices to both instruments using the “decimate” modifier property that is further elaborated in the modification of the Banjo and Harp.

Violin:

- Wall Hanger was made to hold Violin, following steps were taken to create it (Fig 4):
- A taurus, cylinder and cube were used to create the hangar, and then the subdivision modifier used to finish off the model.

Drums:

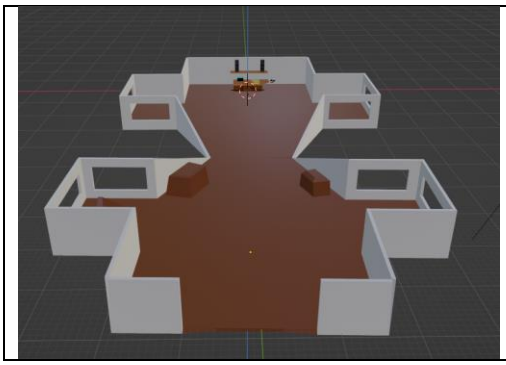
- Platform to stand Drum set on, was made using the following steps (Fig 5):
- A plane mesh was added to the model with inset top edges, and then scaled to cover the full area of the drum set model.
- Two material properties were then added to give the edges a black metal look, and the top surface a glossy wood design.

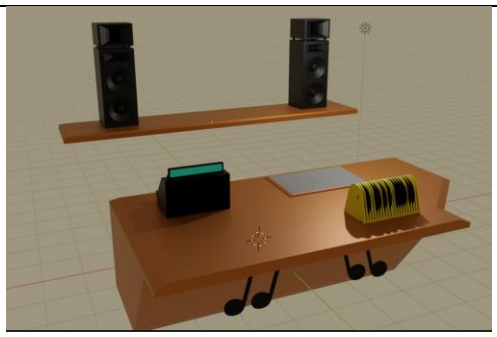
Figure 3:	Figure 4
	

Room, Desk and Cash Register by Luke Hartnett.

- The structure of the music shop: starting with a flat plane in blender. The plane edges were extruded upwards to form walls, and then the floor was subdivided to allow for further diversification.
- The edges of the sub planes were extruded to create separate rooms and the walls were raised. Then the whole floor was subdivided again to extrude smaller segments to provide platforms which were each individually modified to hold the appropriate instrument. The windows were simple insets. Then the whole building was copied and pasted flipped and connected to the other side. (FIG 5).
- The desk was a flat plane extruded upwards and then one of the edges was grabbed outwards to appear more stylized, then the surface was beveled. The cubbies at the back were insets.
- Cash Register was just a cube with one of the edges beveled the whole way until it looked like a ramp. The face was subdivided to make buttons, which were just extruded small faces. (FIG 6).

Figure 5:	Figure 6:





Godot

Eleanor Dunne:

- Added the Music Shop structure and objects as different glb files and attached their scenes to their respective “Button” spatials.
    - Instruments were changed from Spatials to Static Bodies, and [AudioStreamPlayer3D] child nodes were added. MP3 files were then added to these by dragging the audio file from “res:/” into the “Stream” section in Inspector, (Fig 7 & 8).
    - Area nodes were added and connected to their instruments Scripts. Using the “body_entered” and “body_exited” nodes. The instrument Scripts made music play when Player entered the Area by calling the [AudioStreamPlayer3D] using this command [$AudioStreamPlayer3D.play()]. (Fig 7 & 8)

Figure 7:

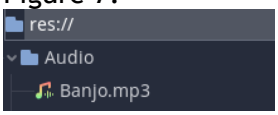
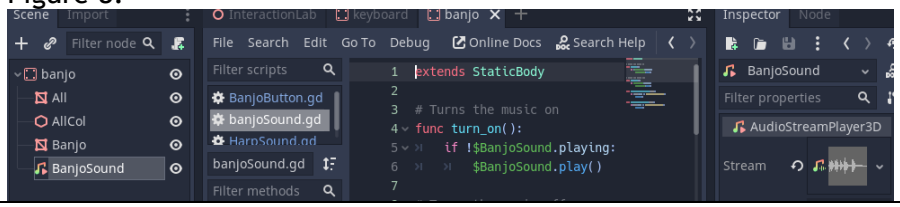


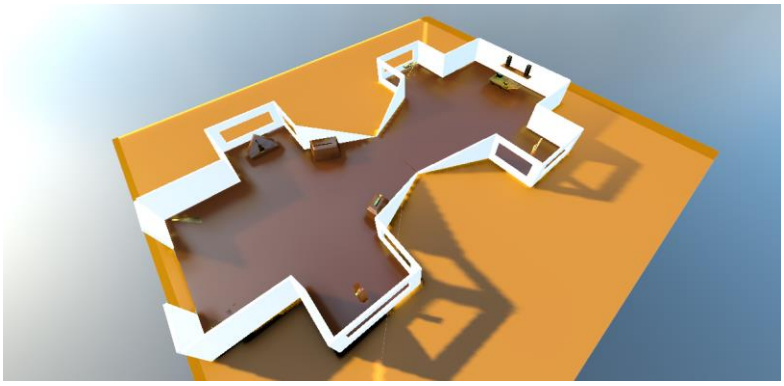
Figure 8:



    - Instrument Buttons had Areas, like above, and attached Scripts. Scripts used “body_entered” and [queue_free] to “remove” respective instrument from the world once interacted with. This was to act as if the User “BOUGHT” the instrument.

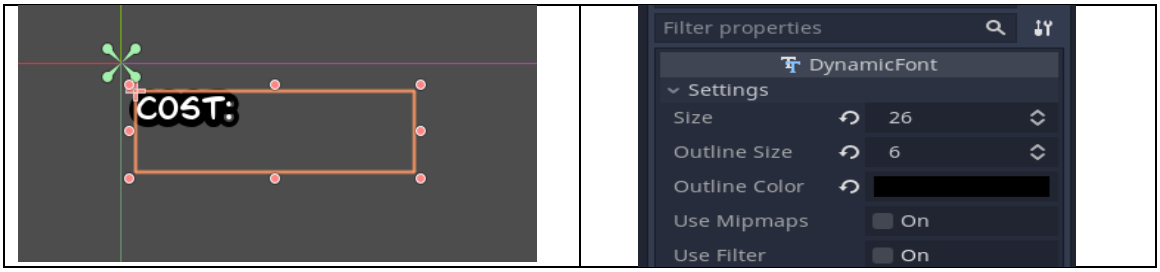
Luke Hartnett:

- View of the scene in Godot finalized with lighting and sky box implemented.



Justas Grimaila:

- Added some UI elements using the “Label” node and stylized the UI using a dynamic custom font. Also done the scripting for the UI and it interacts with the environment, with it changing when near any instrument, displaying a “cost” for said instruments



Challenges

Eleanor

- Originally used “.hide()” and “.stop()” to hide the instrument object and stop the audio from playing when the user went over the button, but that didn’t stop the audio, probably because I had it looping. After a bit of googling, I found “.queue_free()” which worked in both removing the object and the audio.
- Could not stop the Bought audio from replaying. Getting the VR to be detected as a “body” to play the music wasn’t working when I said [if body.name == “VRLocomotionPlayer”] so had to raise the areas and just have it so that once any body enters the area play the music.

Luke

- A problem we had initially was finding low poly designs for the models we were using, such as the drums and violin which were extremely high poly count which really hindered performance in Blender and caused memory issues.
- Issues showed up when we had the model in Godot relating to collisions which I believe was due to the model not having collisions on it in Blender. In hindsight, we

should have developed the shop model in Godot to attach the meshes and collision there.

Appendix

Eleanor Dunne

- Harp
  - https://mixkit.co/free-sound-effects/discover/harp/
- Banjo
  - Banjo - Download Free 3D model by El Cuervo (@ElCuervo7) [b9a1042] (sketchfab.com)
  - Banjo Comical Ending, Royalty Free Sound Effects Track - Envato Elements
- Arranged Meetings, Structured Write up, Added the sound effects to each instrument and the code to play them, Made and Added buttons to hide instruments that were “bought”.

Justas Grimaila

- Flute
  - https://www.myinstants.com/media/sounds/martin2.mp3
- Trumpet
  - https://www.myinstants.com/media/sounds/trompette_KLn0Q6w.mp3
- Created models, and helped with UI/HUD Elements. UI used the RedKost Comic font
  - https://www.dafont.com/redkost-comic.font

Conor Patrick Kavanagh

- Guitar
  - https://blendswap.com/blend/25700
  - https://mixkit.co/free-sound-effects/guitar/ : Guitar stroke down slow
- Keyboard
  - https://blendswap.com/blend/19091
  - https://orangefreesounds.com/piano-glissando-sound-effect/

Kristien Nyamutsaka

- Tested VR interaction for iOS devices
- Drums: https://blendswap.com/blend/4323
- Violin: https://sketchfab.com/3d-models/violin-540c7ce584814112bae1be4a2355328c
- Sounds: violin - https://shorturl.at/bzCV0 drums - https://shorturl.at/crvD8

Luke Hartnett

- Speaker: https://free3d.com/3d-model/big-speaker-84165.html
- Vinyl Holder: https://www.thingiverse.com/thing:544139
- Music Note: https://www.thingiverse.com/thing:536757

Infographic (by Luke Hartnett)

You can explore the shop virtually and listen to a variety of instruments such as a banjo, guitar, keyboard, flute, trumpet and a harp.