Final Year Project Proposal

TU856

Rhythm Render

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Declaration

I hereby declare that the work described in this dissertation is, except where otherwise stated, entirely my own work and has not been submitted as an exercise for a degree at this or any other university.

Signed:

John Hinch

john hinch

13/10/24

Summary

This project will present the user a virtual midi step sequencer that can be programmed using various different musical instruments, mainly, guitar, drums, and bass. Once the user has programmed their sequence, they can press a "Perform" button which will bring them to a new scene. This scene will render a 3D model of a person performing the user's sequence. This application can be used for creative purposes as well as recreational, allowing the user to effectively created their own personal concerts. There are also some educational uses as well, as a user can use the application to practice their own music with other instruments.

I believe that this project is unique because, while there have been similar applications providing a digital sequencer, there has not been an application to include the performance aspect.

The intention of how the project will operate is that it will run locally on the user's VR headset or other hardware. The end deliverable should be a fully functional application that the user can download.

Background (and References)

There are many similar applications that served as inspiration for my personal take on the project, namely SoundStage (Olson, 2018), a VR application that is now longer supported. This application focuses more on the music production aspect whereas my project will have a performance feature. There are several other similar applications available online but to my knowledge none of them combine music production with a 3d rendering of a performance in VR.

A similar solution was found in the previous project of Rhythmically Generating an Audio Virtual Reality Experience created by Graham Byrne in 2018. However while this project as many similarities in analysing audio for a VR environment, this project focused on using the audio to create the environment, whereas my project will use the audio to create a performance using 3D model. Regardless, I believe that Byrne's project will be a great source of inspiration.

Proposed Approach

To begin this project, I began researching similar projects while creating sample mock-ups of the UI. I created a Use Case diagram outlining the overall flow of the project.

For implementation I will begin by creating aspects and various functionalities of the project in 3D using Godot 4. Once the logic of code works, I will begin converting those scenes into VR. That way I can have a functioning version of the scenes for test purposes without needing to deal with the complications introduced with VR. However, this may change during development if I find this workflow to be inefficient.

For testing purposes, as previously stated, I will be creating a standard 3D version of the application in order to test functionality. As for overall testing I plan to use a more Agile methodology, creating and testing individual functionality, only moving on once it is complete to a satisfactory level.

Deliverables

The main deliverable of this project is a fully functional VR application allowing the user to create their own music and see this production performed by a 3D model. If possible, there will also be a separate 3D version of the application without the need for a VR system that can run on a standard PC.

Technical Requirements

The game will be created using Godot 4 and will be developed for the Meta Quest 2 and Meta Quest 3. As such I will need a Meta Quest 2 or Meta Quest 3 for development purposes, which I can supply personally.

Conclusion

This project offers users a virtual MIDI step sequencer that can be programmed with a variety of musical instruments, primarily guitar, drums, and bass. After creating their sequence, users can click a "Perform" button to transition to a new scene. In this scene, a 3D model of a person will perform the user's sequence. This application can be used both creatively and recreationally, enabling users to craft their own personalized concerts

References

Hint:

Use Zotero to manage your references (see Brightspace resources).

Use the **Harvard** referencing style

- https://www.zotero.org/support/quick_start_guide

Appendix A: First Project Review

Title: Rhythmically Generating an Audio Virtual Reality Experience

Student: Graham Byrne

Description (brief): Detect rhythmic patterns in any given music to procedurally generate terrain and objects in a virtual reality game.

What is complex in this project: Analysing digital signals, Virtual reality.

What technical architecture was used: C# programming language, Unity Game Engine

Explain key strengths and weaknesses of this project, as you see it: The core functionality of the project works well at both analysing digital signals and using these signals to generate terrain and object, however the algorithm could be improved using a more advanced onset detection technique. The secondary functionality of the project, the game aspect could have used more time and focus to make it more engaging for the user, though this is clearly not the focus of the system.

Appendix B: Second Project Review

Hint: review a past project from the library website that relates to your project idea.

Title:

Student:

Description (brief):

What is complex in this project:

What technical architecture was used:

Explain key strengths and weaknesses of this project, as you see it.