Cooperative Education

FINAL REPORT

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Computer Programming

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for the A.A.S. Degree in...

Computer Programming

Introduction

This report is a summary of my motivations, objectives, and results of my work co-op at Arch Virtual. I am a computer programming student and I was working towards becoming a developer in the Virtual Reality (VR) and Game Development field. I chose to do my co-op at Arch Virtual as I had an opportunity to work with a team of other developers in a small but growing VR startup. There were several reasons why I preferred the opportunity at Arch Virtual over others.

Firstly, I had been working there in the past as a Quality Assurance Tester so I was familiar with our in-house software, part of the team, and the general work environment. Secondly, it was a remote opportunity, where, thanks to the generosity of the CEO for sending out a loaner VR headset, I was able to work from home. This was especially valuable during the COVID-19 pandemic. Lastly, as I wanted to learn as much as I could during the 8-week work co-op, other developers with more experience than me were a very important factor. Although the team was varied, I did have the opportunity to learn from a couple of fairly knowledgable programmers and another developer who leaned more towards the arts/3D generalist.

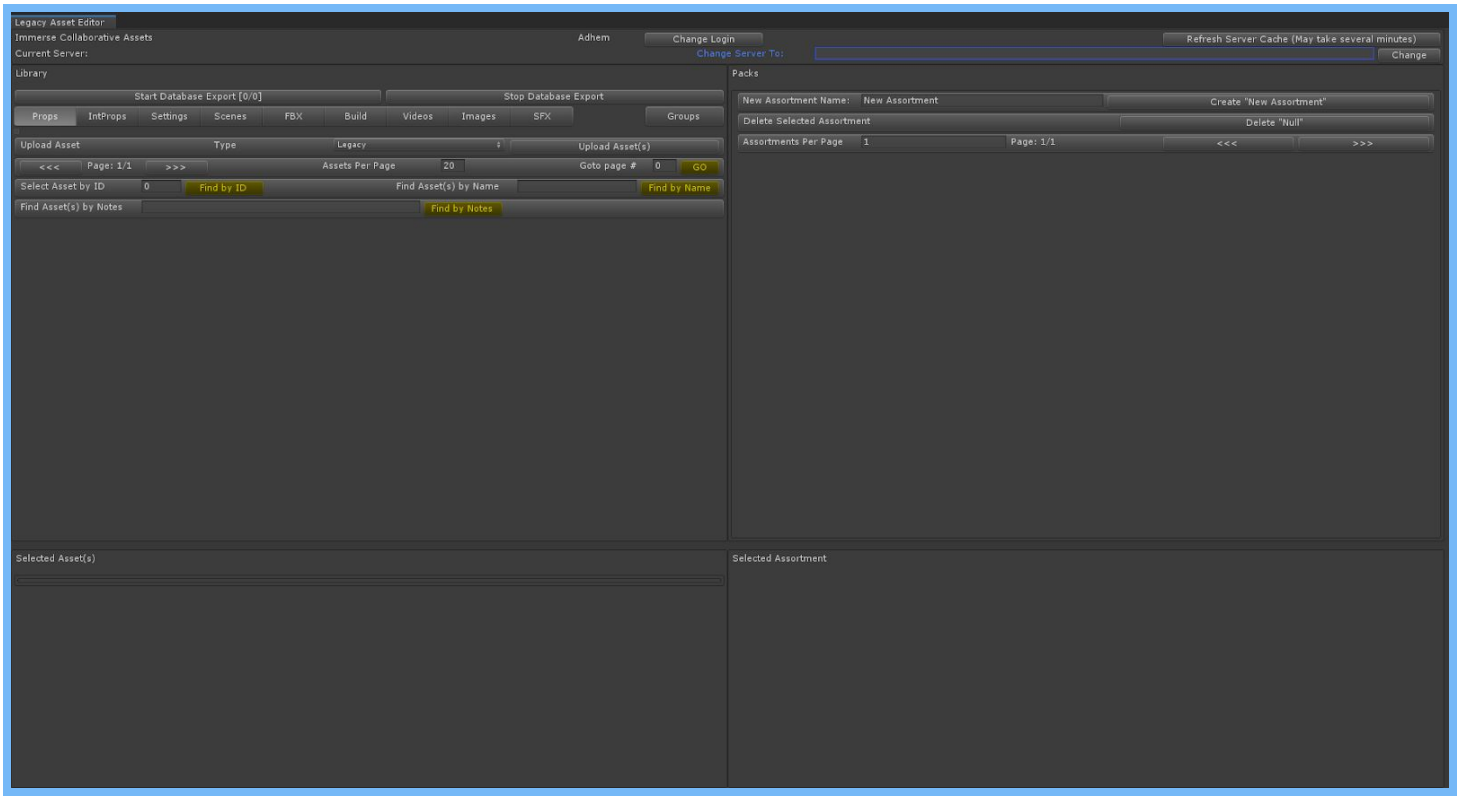
A bonus to the position at Arch Virtual was that we'd be using Unity3D. I'm a big fan of the Unity platform, having spent a good majority of my free time during the course of my degree learning C# to code and build games with Unity. Because of this, I felt right at home using the software from day one.

Learning Objective 1

My first objective was to update and add functionality to the Acadicus in-house Asset Editor Window, a tool for developers and designers to use in order to streamline the asset creation process. This came up as a task for me after I presented my interest and ability in developing tools that helped me and other developers reduce the time it took to develop assets.

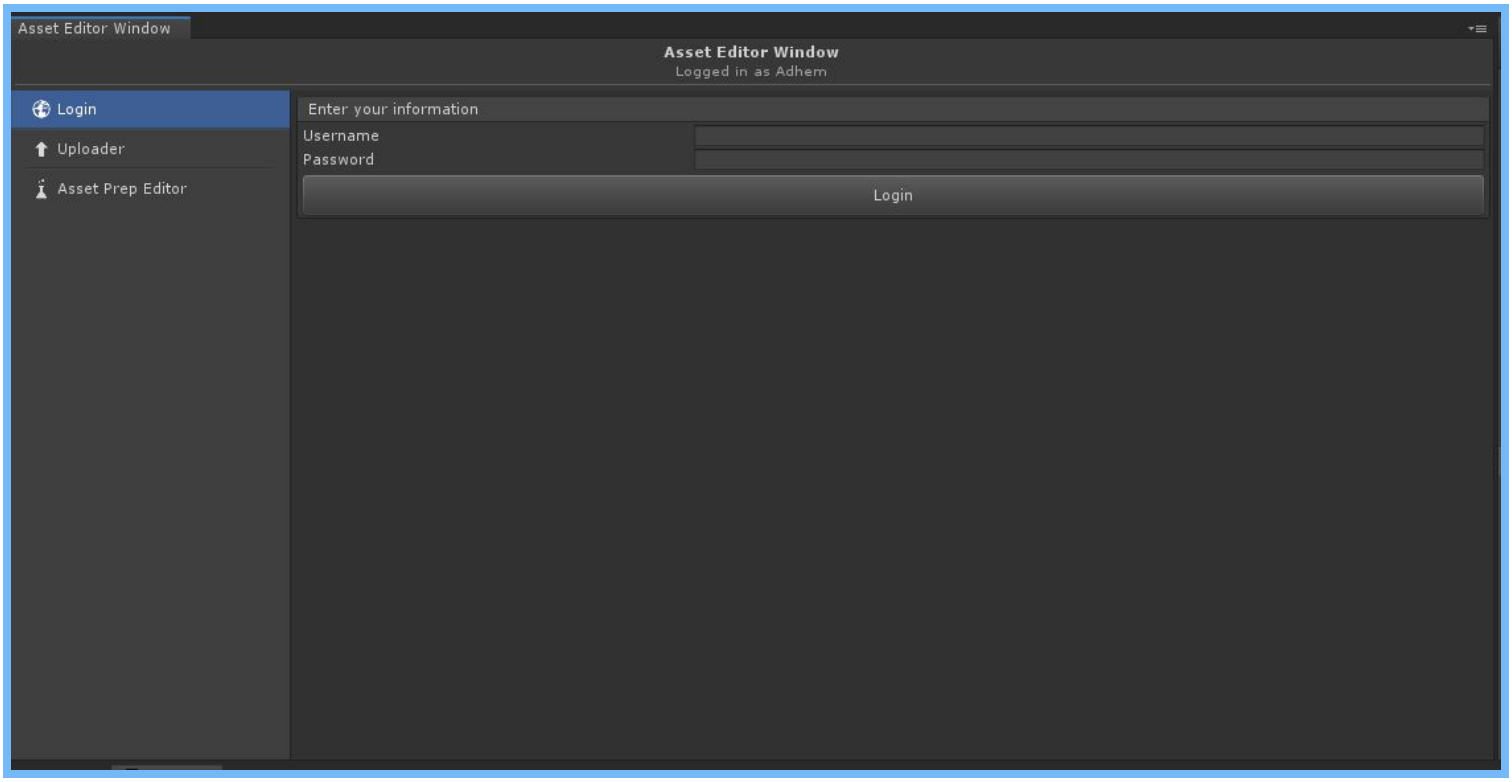
I was honored to take this task on as a junior developer, as it is a significant factor in the workflow of the Asset Pipeline and will be used by every developer on the team at one point or another. My first task was to convert the original Asset Editor Window into something that was more user friendly, intuitive, and increase functionality. I was tasked to do this by using the Odin Inspector Library, which is a Unity3D plug-in/library that helps developers create highly functional Unity Editor Windows.

I started by rigorously studying the existing editor window code while simultaneously reading the Odin documentation. As I began to get a handle on the legacy code and the new library, I started to workpiece by piece to update and polish the old editor. As a disclaimer, this isn't a completely finished product at this point in time as my help was needed more for interactive assets that clients were waiting on. However, I will be continuing this work even after the work co-op.



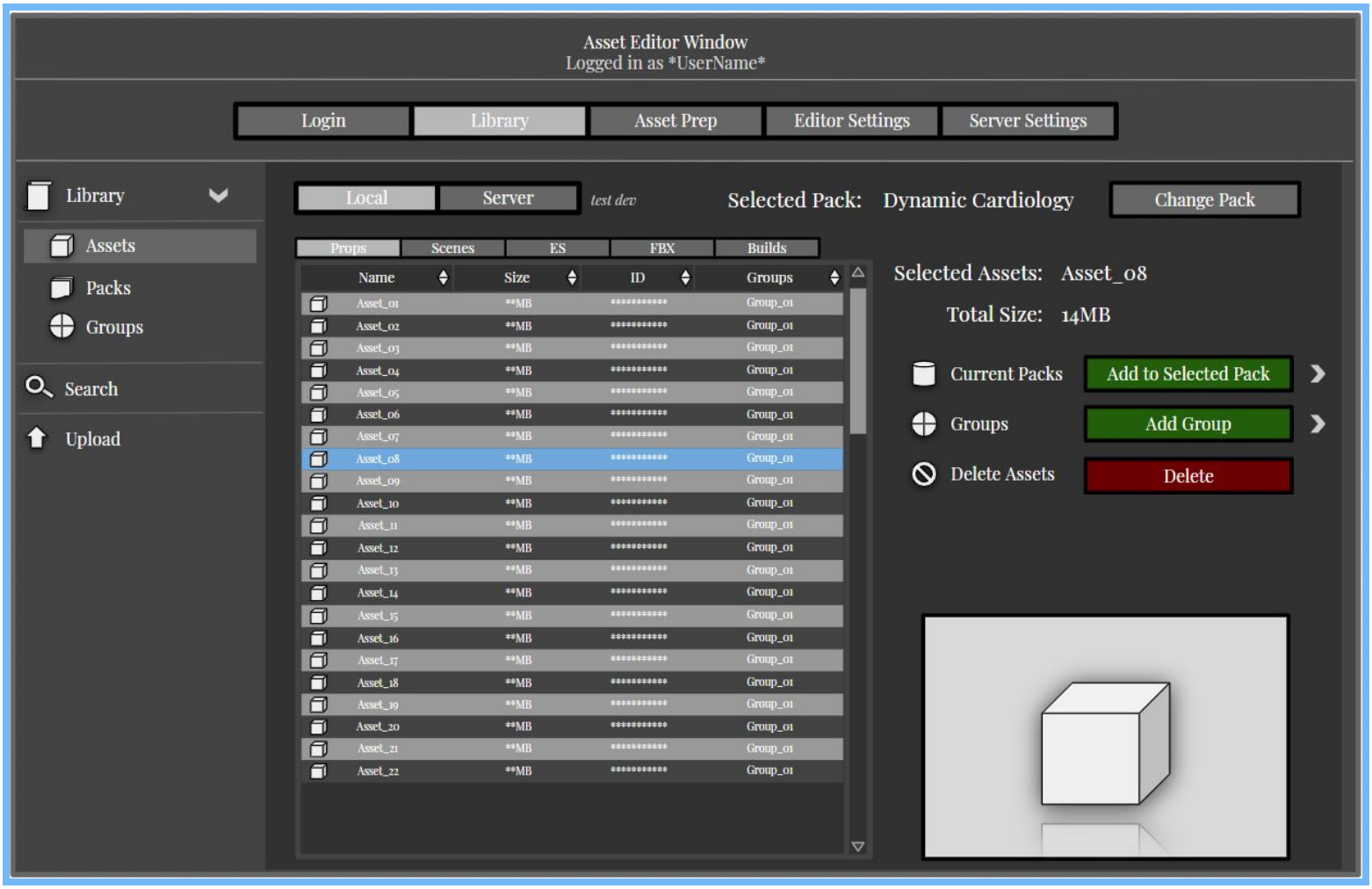
Legacy Asset Editor Window - Pre-Conversion

The Legacy Asset Editor Window had a lot of functionality as it was the main tool used for uploading assets to the Acadicus servers and organizing asset packs (collections of 3D Acadicus objects). Because of this, I spent a lot of time working on interactive assets as well as the Asset Editor Window, which gave me a better understanding of the “user” (a.k.a. developer) side of the tool.



Early conversion of the Asset Editor Window Login Screen

As I learned new mechanics of the Odin Inspector Library, I was able to implement a cleaner look to the Asset Editor Window. I brought what was originally piled onto and stretched out on one screen into a cleaner tab-based window. After working this out, I worked on a new Asset Editor Window Concept, which would suffice as the goal to the new flushed out editor window, and presented it to the Senior Developer.



New Asset Editor Window Concept

I designed this concept using Google Drawings exclusively. This new concept was swiftly adopted, and it is my current project at Arch Virtual. I have learned a lot over the course of this objective, and am happy to be continuing the development of a massive tool for the team.

Learning Objective 2

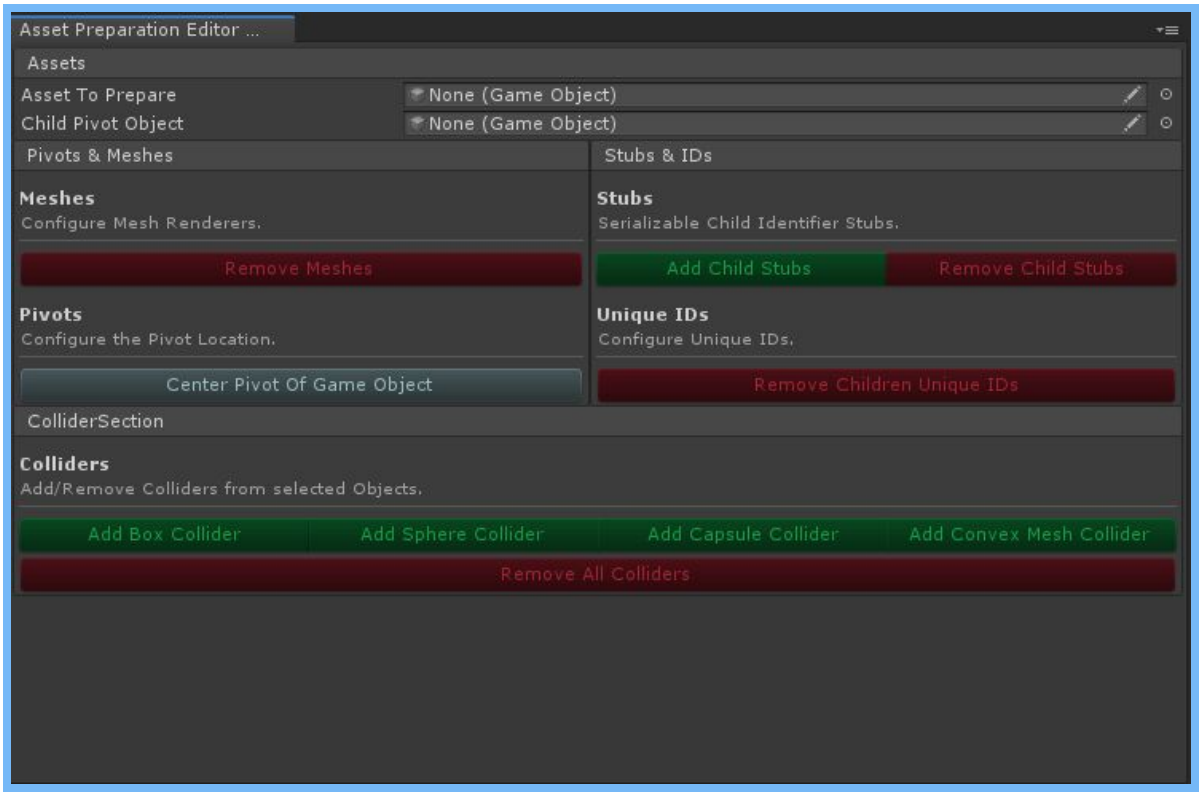
My second objective was to assist in implementing and working with an asset production workflow to efficiently prepare and deploy simulation content. What this means is that I was crucial in helping smooth out the development of a new workflow for getting new assets, (3D objects users can interact with), from the design phase, through modeling, development, and exporting from Unity into Acadicus. Thus, the Asset Development Pipeline.

The major reason Jon and I chose this objective was that it would get me to be a lot more familiar with the workflow thus increasing my chances of receiving an offer for full-time employment. Just as well, I was able to learn a lot about Unity3D, the Acadicus software, certain programming concepts, and more by constantly working to improve the pipeline.

The way we starting the co-op was by working through an onboarding period where I handled smaller tasks and worked on larger ones as I progressed. Through the onboarding period I had a mentor who would always make themselves available to me, as well as the rest of the team if I had questions. Because of this and my past experience developing Unity projects, I didn't have too much trouble learning the ropes. I was able to quickly get a handle on most of the basic tasks they had for me, which seemed to please the team as they quickly had more work.

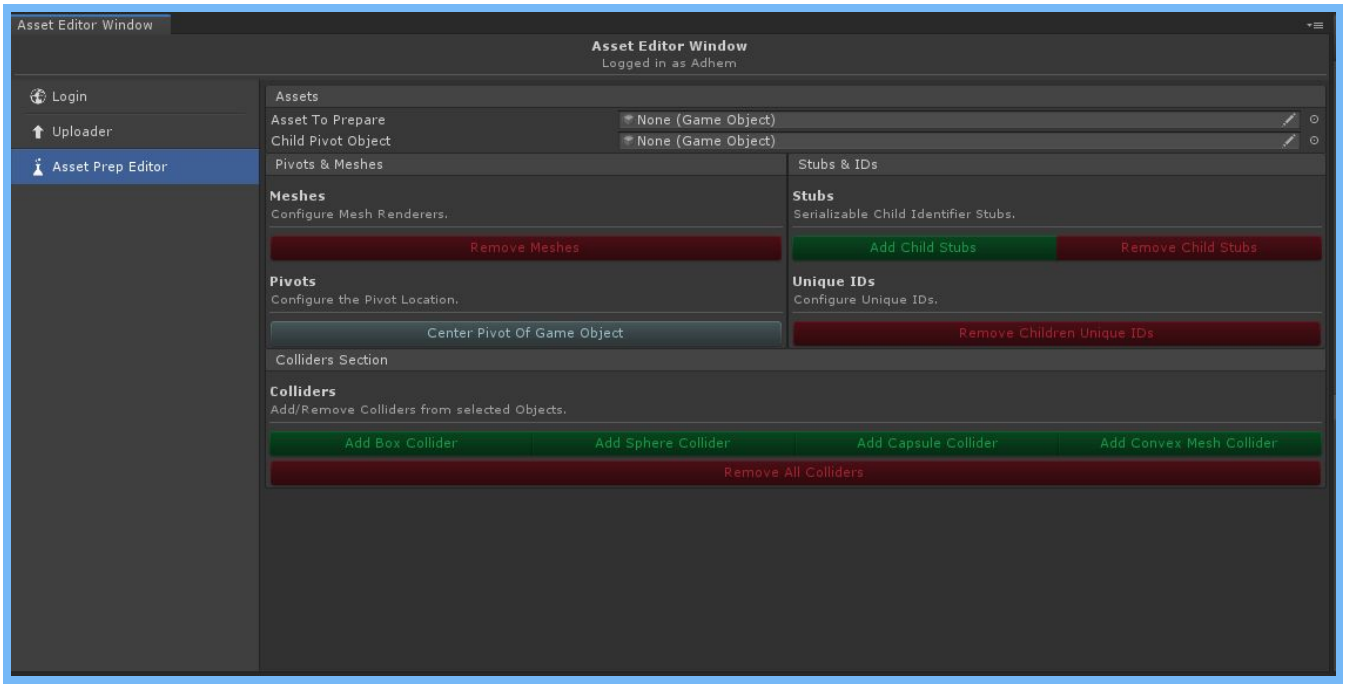
A terrific aspect of this objective was that I was receiving regular feedback from both my assigned mentor and the rest of the team. However, I was encouraged to explore alternatives all the time, and I was able to make several improvements throughout the course of the co-op.

The major improvement I made was something of my own creation. I took a small chunk of time to create some Unity Editor Window scripts which would automate certain tasks I had to repeat quite regularly. I then took this to the Senior Developer on the team to see if it would be liable as a potential tool for the development team. Both he and my mentor were enthusiastic and supportive of my work and plans.



Asset Preparation Editor Window Example

After their feedback, I made some edits and created the Asset Preparation Editor Window as a plug-in tool for use in the Acadicus Asset Pipeline. I handed this off to several of the Artists/3D generalists and they were able to decrease their development time substantially. I later would incorporate this into the Asset Editor Window which is part of Objective 1.



Asset Prep Editor Window tool used in the Acadicus Asset Editor Window

I was able to learn a lot as a result of this learning objective and it got me to be a lot more comfortable with the workflow of the Asset Pipeline. I successfully helped streamline the process of preparing assets for use within Acadicus, so I would say it was a great success. My teammates and mentor seem to agree, as I received regular feedback from them on my progress.

Learning Objective 3

My third objective was to learn and develop content using a standardized scripting editor to develop interactive assets for use in virtual simulation and educational experiences. This essentially was the majority of what I did during the course of my co-op. I developed *interactive* assets regularly for use in Acadicus by using both Unity3D and the PlayMaker plugin.

PlayMaker is a visual scripting plugin that allows developers to quickly piece together functionality by using pre-written code. I was able to create a custom PlayMaker Action, which was a script that handled rounding inputted floats in a flexible manner which helped us display more readable information to users in a respiratory therapy simulation.

An example of PlayMaker's Visual Scripting

Using both the default actions/scripts that are part of the PlayMaker plugin and custom actions made specifically for Acadicus, I was able to develop numerous "Interactable Assets". Most of these assets were related to the medical field, so I got to learn a bit of medical terminology along the way.

The major difference between the interactable assets and the assets I started with during

my onboarding is that interactable assets are interactive, as in the user can do more than just pick them up and move them around. Some assets have animations or complex scenarios, some allow you to attach other assets to them, and some allow instructors to change values such as vitals on a monitor.

I worked on too many assets to list a detailed description of each, however, one of the major ones was the Standalone Vitals Monitor. The vitals monitor was a fantastic intermediate project for me to work on, as I had a lot of freedom in the way I went about it, but it was also going to be shown off and the work needed to meet a certain standard.

Standalone Vitals Monitor (Without Waveform Animations)

I enjoyed working on the vitals monitor quite a bit, but it was a challenge for sure. For starters, I had to convert an asset that was built for a legacy version of Acadicus and needed to have the proper components to work with the new updates. This also was meant to work completely on its own, while the original asset was meant to attach to a virtual patient. Another concern was that the client wanted a variety of waveforms (the graph version of the vitals) based on two different pre-set scenarios, as well as an option to manually input the vitals.

As a solution, I copied, removed, made adjustments to, and replaced the original waveform images using a program called Paint.net so that there would be a set of waveforms that met the requirements the client was looking for. I then went above that (with approval of course) and added animations to the waveforms to give the appearance of an active ECG feed.

Conclusion

I couldn't be happier with my results for this work co-op. I am extremely grateful to have had the opportunity to take this course and for the opportunity to work at Arch Virtual. I felt that there was no one task, learning objective, or interaction that I benefited from the most. Rather, each objective worked towards a larger goal of molding me into a professional developer, having only worked on personal projects and some volunteer work. I am pleased to announce that I have received and accepted an offer as a full-fledged Software/Unity3D Developer at Arch Virtual.

I would like to give a personal thanks to Jeannie Neeley, who has been a wonderful mentor to me this past year. She has opened doors for me and helped me stay on track, and I'm forever grateful!

Aside from the result of a job offer, I do feel that even if that hadn't occurred I would be ready to start a career as a developer with even more confidence than before. I now know what it's like to work on a small team of professional developers, each of which has to wear "multiple hats" and constantly be expanding their knowledge. I have an understanding of the professional development workflow, which I was otherwise blissfully ignorant of.

I will be continuing this journey right away, only now I won't be enrolled in 13 credits over the course of 8-weeks at the same time. I absolutely would recommend this course to anyone seriously considering entering the professional workforce. Thank you!

Bibliography

This is a simple disclaimer. All images used in this report were taken by me, Adhem Azzabi, with my own permissions and access granted to me by Arch Virtual. These images are directly from my own work and no one else's, save for the one exception of the Legacy Asset Editor Window which was used to compare the previous version to the current one.

For Reference

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Google Drawings: https://docs.google.com/drawings/

Odin Inspector: https://odininspector.com/

Paint.Net: https://www.getpaint.net/

PlayMaker: https://hutonggames.com/ (Developer Page)

https://assetstore.unity.com/packages/tools/visual-scripting/playmaker-368 (Unity Asset Store)