# Project Overview

* Much of the time on this project was spent on navigating Revit, the architectural software used for the building, for a few reasons:
  + This laptop is not optimized for such large scale architectural projects.
  + Revit is a CPU heavy application. Architects are often using higher core work station machines (can use up to 16 cores for maximum efficiency, but this is definitely overkill). For reference, the Razer Blade 2017 is using a 4 core CPU with a relatively low clock speed.
  + The CPU performance difference can be offset with a workstation class GPU (an NVIDIA Quadro for example). For normal VR applications and run time of VR applications, the GTX series is better (the Razer Blade has a GTX 1060, which is great for VR run time).
  + Overall, if working with Revit again, it is important to figure out how to optimize the model faster. Due to time constraints and lack of training this was not done for this project in Revit. Perhaps coordination with the architects could have assisted, but did not think of it until late into the process.
* The work flow of exporting first from Revit to Autocad worked well for getting models into Unity.
  + This method preserved the geometry of the level quite well, and allowed for trimming of the model down to acceptable levels.
  + Every aspect of the building was modelled. Piping, wiring, conduits, etc. needed to be removed from the model in order to stabilize performance when brought to Unity.
  + Autocad made this easier as it was possible to identify the grouped models and delete them in bulk. However, this manipulation of the model took time (during which my computer’s resources are completely used).
  + Occasionally Revit or Autocad would lock. This is most likely just attributed to the limited hardware requirements.
* Once sufficiently optimized models were loaded into Unity, workflow was straightforward.
  + Work had to be done to balance completeness of the model vs performance of the application. Initial attempts using large models would render the application unusable.
  + Texturing was also an issue. The export from Revit disconnected any textures the architect had used in the building. From research, I determined that most of the “textures” that I had viewed were actually just added to 2d images for promotional materials.
  + To remedy this, I wrote a shader for the windows in order to make them transparent and reflective.
  + I found a collection of free textures that I could use in order to cover the models I used. Textures such as cloth for chairs, wood for flooring, and metal for fixtures. In future, it might be worth working with the architect to determine more appropriate textures.
* Development work was relatively straightforward.
  + Movement mechanics had been prototyped long before model was acquired (teleport to move, VR rig).
  + Generating appropriate navigation meshes for the building took time, as I needed to determine the best ways to restrict participant movement (avoiding tables, making sure they didn’t move into an incomplete part of the building, etc.).

# Work time Distribution

|  |  |
| --- | --- |
| Task | Hours Spent |
| Unity Programming | 12 |
| Asset Generation | 25 |
| Research | 6 |
| Tool Training | 12 |
| **Total** | **55** |

# Conclusions

* Repeating this process would take less time. A fair amount of time was spent learning Revit and determining how to optimize the model. Now that a workflow has been established this can be pipelined and potentially offset to another machine.
* For the next iteration, it might be beneficial to work more with the architects. The extra time this would cost in coordination may be balanced out by the speed the models could be manipulated on workstation class machines.
* There are some bugs to be corrected and features to be implemented.
  + The active learning classroom needs to be made more expandable.
  + The screens in the active learning classroom need to be updated with models from the design team. Waiting to hear back on the status of this.
  + A main menu should be implemented that explains controls and starts the simulation.
  + The skybox needs to be completed. Waiting on Rob for completion.
  + Some minor texturing work needs to be done to stop some portions of the model from clipping.
* Overall, with more time available for a project like this, better QA work could be done. Blocks of deep work are recommended.

# Links

Repo:

<https://gitlab.com/Uldrendan/QIWC-VR-project.git>