Kvasir-VR Notes from a Project-based High School VR Course

Forward

This document contains course-related notes from the Kvasir-VR project portion supported by funding from Round 3 of the Mozilla Gigabit funds under the following grant:

Christoph W. Borst (lead investigator), Mozilla Gigabit Community Fund: “Kvasir-VR Teacher-guided Shared Virtual Worlds”, $10,000, 10/30/17 – 2/16/18

A separate experiment component is documented elsewhere, as part of the following paper:

Christoph W. Borst, Nicholas G. Lipari, Jason W. Woodworth, “Teacher-Guided Educational VR : Assessment of Live and Prerecorded Teachers Guiding Virtual Field Trips”, IEEE VR conference, 2018

The team contributing to this document and to the Round 3 project consisted of:

Dr. Christoph W. Borst, Associate Professor, University of Louisiana at Lafayette, School of Computing and Informatics (UL Lafayette, CMIX), Kvasir-VR Project lead
Nicolette Darjean, David Thibodaux STEM Magnet Academy (DTSMA) Engineering Academy Educator, lead partner at DTSMA and project lead of another Gigabit grant (Tiny House)
Nicholas G. Lipari, CMIX Graduate Student, networking and experiments
Jason W. Woodworth, CMIX Graduate Student, virtual teacher and experiments
Paul Smith, UL Lafayette Undergraduate Assistant, student mentoring
Adam Prejean, UL Lafayette / Informatics Research Institute, CG Artist, student mentoring

Additionally, we thank Lisa Ranney at Comeaux High School for enabling and assisting deployment of a related experiment.

An overview of project activities is found on the project blog:
https://vrlab.cmix.louisiana.edu/category/news/mozilla-gigabit-blog/

If there are any updates to this document or other associated materials, they will be linked in the above blog (wrapup post for Round 3 of the Gigabit fund).

- Christoph W. Borst, March 16 2018, cwborst (at) gmail (dot) com

1 Assigned Activities

This section was initially written by Paul Smith, with updates by Christoph Borst, to log main assigned activities and follow-up suggestions.

Tools used
Unity (Game Engine)
Autodesk Maya (3D modeler)
Unity SteamVR plugin
VRTK (Unity asset pack, VR toolkit)
Trello (web-based project management tool)

UL Overview
The assistants from CMIX at the University of Louisiana at Lafayette mentored students during regular visits. This also included the following assignments (more detail provided later):

A1 Basic Maya modeling tutorial

We assigned the students a series of online videos to watch so that they could learn the basics of 3D modeling with Maya. Main suggestions for revision: 1) Find a simpler modeling tool for beginners. The students did not need advanced features, and 2) We believe that better videos could be found, to make sure the illustrated techniques consider best practices for game engines (some of these are hinted by Adam Prejean's notes).

A2 Students model and import their own environments

We asked the students to use their own ideas and make models for the VR games they were trying to create. Main suggestions for revision: We recommend splitting this assignment up into parts, seen as phase 2-4 in the suggested curriculum document.

A3 Adding VR

We showed the students how to add VR camera rigs into their Unity scenes, for viewing with head-mounted displays (they used Oculus Rift CV1 displays).

DTSMA Overview
David Thibodaux STEM Magnet Academy personnel provided some background assignments to get students started prior to the more frequent visits from UL Lafayette personnel. Other information is in a separate Mozilla-funded project "Tiny House VR Project", due to some overlap of topics. Some of these assignments were not completed, or were reworked into the activities above.

Aug 17: Roll-a-Ball

This is a standard tutorial, from Unity, for beginning with Unity. It is important for introducing basic operation of Unity.

Aug 17: Space Shooter

This is another standard tutorial, from Unity, for beginning with Unity. Scripting aspects may be too much for some students, as not all students had programmed before. Scripting vs. Modeling should be emphasized depending on student backgrounds. Beginner Unity tutorials do not teach modeling, beyond adding simple primitives.

Aug 23: Candy Crush self-study

UL Lafayette personnel were not involved in this assignment. Refer to the “Tiny House VR Project”.

Sep 3: Critical thinking in game design

UL Lafayette personnel were not involved in this assignment. Refer to the “Tiny House VR Project”.

Sep 7: Importing assets

Students were asked to create a new Unity project, import any reasonable assets into it, and add a standard Unity object (sphere) to the scene.

Sep 13: Video games report

Students were asked to write a 1000-word report describing a game play experience or that of someone else, after having a pair meeting in which one student taught another student how to play an unfamiliar game. The report included aspects such as describing the most and least difficult game play aspects.

Sep 21: Maya tutorials

This started as an assignment to model a church based on a Maya 2014 tutorial. It was incomplete, reworked into UL A1.

Sep 30: Unity Scope and Sequence Unit 3: Game Design Theory

Students were asked to start developing a game design document based on MIT OpenCourseWare “CMS.300/CMS.841, Introduction to Game Studies, Fall 2011: Game Analysis Guidelines”. The general idea has been considered in “phase 2” in an attached curriculum outline.

Oct 8: 3D environment development

This assignment was intended to have students develop a 3D environment for an educational application of their choice. Due to the complexity of working in Maya and Unity for beginners, this assignment was not readily completed, and was instead reworked into the UL A2 assignment and guided by several mentoring visits.

Nov 13: Maya "quiz"

Students were asked to present their 3D environment pictorially and by filling in a blank chart that asked "what do we know", "what questions do we have", "what did we learn", and "what would you do next".

Nov 15: Avatars

Students were assigned to create 3D avatars to display in their environments. Human-like avatars can be very complex to both model and use, therefore we do not recommend them unless good pre-made assets are incorporated. The assignment allowed students to use simple avatars such as a block or a stick person. The assignment was somewhat open-ended and we believe a more constrained and specific assignment is necessary, if any, on avatars.

A1 Maya Basics/Unity Importing Tutorial

Draft by Paul Smith

Introduction

This tutorial is meant as a stepping stone to get you familiar with some of Maya's more useful functions and to with importing your Maya creations into Unity.

Objectives
The objective of this assignment is to have you move some environment into Unity so that you can view something you have created in VR.

Details
Follow this link to a Youtube playlist I have compiled that will lead you through the entire process (https://www.youtube.com/playlist?list=PLXbKOvGhY7j8t7hJpgG73I0MqK2xZA-0-). Bonus points will be available to students that add extra elements. After the due date, I will bring an Oculus Rift and a VR PC to the class to let you view your projects in VR if and only if your project is complete by the due date. {additional videos can be found in the original playlist: https://www.youtube.com/playlist?list=PLsPHRLf6UN4n778LjMnKVG1nw_PX8Lhja}

Submission Requirements
- At least 3 screenshots of the complete project in Unity
- A minimum 100 word description of the work that you did
- A link to a zipped folder containing your Unity and Maya projects uploaded to Google Drive.

This is an individual assignment (to be worked on your own). All of these things can be submitted as comments on the card in Trello, as well as however else Ms. Darjean requires you to submit them for your grade. Your reports will be checked for similarities to prevent copying. This assignment is due Saturday, December 9 at 11:55 PM. Late submissions will not be considered for VR integration.

A2 Environments

Draft by Adam Prejean / Paul Smith

Static Environments should be completed and ready for VR implementation by the time we get back from Christmas break.
We will make a list of what is left to be done and add to this Trello card.
We will discuss in more detail tomorrow.
Summary of advice given in class

Modeling

- Don't use backface methods in Maya when exporting to Unity
- Make walls have a thickness using Edit Mesh > Extrude
- If faces will always be hidden, they can be deleted (no point in wasting resources)
- Avoid Polygons with more than 4 points (top and bottom of this mesh)
- Quick way to fix this is to select the mesh and use Mesh > Triangulate

UVs

- Create UVs with matching density
- Use texture I provided
- Easiest way to do this is to use Automatic Mapping, then Stitch Together on any edges necessary

Materials

- Make simple Lambert materials in Maya and apply to models.
- I like to name materials with a prefix + asset name (ie, "M_Wall")
- See this for more info on naming conventions (https://wiki.unrealengine.com/Assets_Naming_Convention#Assets_names)
- These materials should import into Unity as the "Standard Shader" and already be applied to the models.
- This isn't necessary, but can save some time.

Exporting
Export as FBX using File > Game Exporter
Model Default
FBX Version 2014/2015
Only export Geometry, Locators, Joints that will be used in Unity.

Remember to:

- Create UVs
- Freeze Transforms
- Delete History

A3 VR Integration

Draft by Paul Smith

It's finally time to add VR to your environments! In this assignment, we add a tool called VRTK to your Unity scenes, and then use it to view your scenes in VR.

Objectives
The objective of this assignment is to get you familiar with working with VR rigs and to observe your models in VR.

Details
This assignment is broken into two parts:

Part 1 (on your own)
First, import VRTK from the asset store into Unity. Then, follow this link (https://www.youtube.com/watch?v=bxxGaJg75g4) to view a video about how to set up the VR simulator in VRTK. This will allow you to view your scene without the need of a headset.

Part 2 (after class on 1/25/18)
Import SteamVR from the asset store into your project. I will work with you to get the SteamVR camera rig added to your main VRTK rig. This will allow you to use VR headsets (Oculus, Vive, Windows MR) to view your scene. I will bring an Oculus Rift for testing purposes and so you can see your environments. If you want to get familiar with the process, you can follow this link (https://youtu.be/tyFV9oBReqg) to find out how to do this.

Bonus
If you add at least one other feature of VRTK to your Unity scene, you can earn bonus point for this assignment

Submission Requirements
One screenshot of your Unity scene with a clear view of the hierarchy.
A minimum 50 word write-up on what you did in this assignment, what challenges you faced (if any), and what you did to overcome them (if any).
A link to a zipped folder containing your Unity project folder uploaded to google drive.
This is an individual assignment (to be worked on your own). All of these things can be submitted as comments on the card in Trello, as well as however else Ms. Darjean requires you to submit them for your grade. Your reports will be checked for similarities to prevent copying. This assignment is due 1/25/18. Late submissions cannot receive bonus credit.

2 An Introductory VR Course Sketch

This section is Paul Smith's high-level sketch of what a VR curriculum may look like, based on his reflection on the mentoring experience. Minor editing was done by Christoph Borst.

Goals
The goal of this curriculum is to help you to develop a course around the topics of 3D modeling, (use of) game engines, creating Virtual Reality applications, and (optionally) creating networked applications within game engines.

Skills
Your students will acquire skills in 3D modeling, organization and planning of large-scale projects, use of software relevant to digital entertainment industries, and scripting (programming).

Actions
Your students will create 3D models, lay them out in a scene in a game engine, and add interactive components to their scene (VR and networking).

Deliverables
Your students will each create two scenes in a game engine. The first will be a pre-planned scene where every student will be making the same thing. The second will be a student designed scene. Both of these scenes will be populated with 3D models.

Tools and Programs
There are two major types of programs that you will need for this curriculum: a game engine and 3D modeling software. Additionally, students should learn to use some project management tool (such as Trello) to plan and report progress throughout. Two of the most common game engines used in education are Unity and Unreal Engine. Major 3D modeling applications include Autodesk Maya, Autodesk 3DSMax, and Blender, and all are available free for educational purposes. But, we recommend considering simpler modeling tools depending on the intended course duration and difficulty.

Suggested Phases

1. Standard 3D Modeling
2. Planning Environments
3. Creating Models and Textures
4. Layout in Game Engine
5. Adding Virtual Reality
6. (Optional) Adding Networking

Phase 1: Standard 3D Modeling

Goals

The goal of this phase is to allow students to learn the basics of 3D modeling, or to refresh them if they have prior experience. The reason this assignment is standardized is twofold: so that the students can have a pre-planned and pre-explored baseline, and so that grading should be easier as you (the instructor) only need to compare the student's work to the basis that you are using to teach from.

Skills

By the end of this phase, students will have developed all of the basic skills necessary to succeed in their individual projects from a modeling and texturing standpoint.

Actions

Students should follow a set of tutorials based on the specific 3D modeling software you choose to use. For example, Maya includes introductory tutorial videos. Be mindful that not all tutorials are intended for modeling for a game engine, and some practices in tutorials may conflict with the best practices for game development (Adam Prejean's notes include some comments on problems encountered). We strongly recommend that students start modeling in terms of some real-world unit (e.g., meters) according to how they want their models to appear in VR.

Deliverables

Students should turn in a scene with the products of their modeling assignments contained within. Optionally, it is helpful for the students to turn in a document stating what was done, what challenges were faced, and how they were overcome. This is a generally good project management skill that will translate well to their future jobs.

Tools and Programs

This section will make use of your 3D modeling software and can also introduce project management software for documenting progress.

Phase 2: Planning Environments

Goals

The goal of this phase is to help your students create a plan of attack for their projects. Students may have lofty ambitions that cannot be realized by the end of the project period. But by careful planning of their environments, students will have a better idea of exactly what they are making and how long it will take before they begin working on it. It will also allow the students to have a tangible blueprint of how the environment will look and what pieces will compose it.

Skills

By the end of this phase, students will have gained skills and experience with project planning. They will have learned how to critically analyze things like feasibility of a project within time constraints and prioritizing tasks.

Actions

Have the students plan out their environments. Have them make a couple of first person perspective drawings of their proposed environment as well as a top-down view. Additional details are encouraged. Have the students think through the storyboard and the pieces they need to add to make their environment look and behave as they want (objects and behaviors). Have them develop a plan that breaks everything down into tasks or deliverable pieces, with estimated time frame (due dates per piece), listed on a project management tool (such as an online “scrum board” tool). Have them prioritize critical pieces first. They may need to adjust this list throughout the project due to a variety of circumstances. Review the students tasks and progress with them periodically and discuss any adjustments needed.

Deliverables

Students should turn in their concept drawings, as well as their task breakdown (what do they feel like they should accomplish by X date, by Y date, etc). Have them set milestones for themselves.

Tools and Programs

This section could make use of digital art programs, such as Photoshop or GIMP, but these are not necessary. Hand drawing should do just fine. Also, some project management software should be used.

Phase 3: Creating Models and Textures

Goals

The goal of this phase is to allow students to create the building blocks that will make up their custom scenes. We generally expect students to create their own models instead of using others work. This section also emphasizes how to adapt the students plans from something that works in 2D into something that looks appropriate for 3D.

Skills

By the end of this phase, students will have experience modeling a variety of 3D objects as well as more familiarity with the workflows of modeling program used. Student will also have to manage their growing project with a project management tool to adapt their plans to meet goals.

Actions

Have students model and texture their assets using the skills they developed in **Phase 1**. They should roughly follow their tasks that they created in **Phase 2**. Some adaptation will be required, but the students should come out with all of the necessary parts to make their scenes work.

Deliverables

Students should turn in all of the 3D models that they laid out in their planning phase. Optionally, have the students report on some difficulties that they had either with their project planning or with the modeling itself. Pay attention to the designs themselves to make sure students are not getting them from online sources without permission.

Tools and Programs

This section will make use of your 3D modeling software and your project planning software.

Phase 4: Layout in Game Engine

Goals

The goal of this phase is to allow students to use all of the components that they created. They will also specify how the user will interact with those components to create a cohesive environment. Most game engines will contain a physics and/or collision detection system to control the way objects interact with one another. The student will need to work with these systems to create the behaviors they want.

Skills

By the end of this phase, your students will have experience working with a game engine to create scenes and environments, a crucial part of the game making process. They will also learn how the workflow pipeline of a game is handled (exporting 3D models and importing them into a game engine).

Actions

Students will first have to try some game engine intro tutorial(s). This could optionally be moved to Phase 1 or into an additional phase. Once they have a basic idea of how to get started with the game engine, have students export all of their 3D components from the modeling software and import them into the game engine. Then the students can begin arranging the models to create a scene. There may be a need to resize some object to better fit the scale of the environment, although it is best for students to always think in real-world units for VR (e.g., one “Unity unit” meaning “one meter”). They should also start developing basic interactions such as control of a moving object based on input, or interactions between objects. Note, however, that standard keyboard or joystick controls for moving the main player are not a preferred way to move in VR, as they are often not natural and can even lead to motion sickness (if visuals don’t match real user motion).

Deliverables

Students should turn a copy of their game project folder along with a description of the work they did, what challenges they faced, and how they overcame them.

Tools and Programs

This section will make use of your game engine, your 3D modeling software, and your project planning software.

Phase 5: Add VR Components

Goals

The goal of this phase is to show students how to work with VR systems within their scenes to make them more life-like, immersive, and interactive. Students will need to adapt their environments so that they are suitable for viewing in VR. They will also need to add all of the necessary scripts and objects that allow VR Rigs to function in their scenes.

Skills

By the end of this phase, your student will learn how to use and manipulate VR Software Development Kits (SDKs) to suit the needs of their projects. They may also learn how to handle a small amount of related scripting in a game engine environment setting. In addition, they will become more familiar with the game engine software itself.

Actions

Have students download the appropriate VR SDKs for the environment they are using. Take into consideration both the kind of hardware being used and also the game engine. For example, if you plan to use the HTC Vive hardware with the Unity game engine, you would download the SteamVR Unity plugin from the Unity Asset Store. Once these have been downloaded, have the students use the scripts provided to create VR camera rig objects. These allow you to view your environment through a VR headset. For more complex interactions, such as grabbing and pick up objects or moving through the environment (via teleportation or other means) other toolkits or scripting will be necessary (such as the VRTK toolkit for Unity). Most of these toolkits come with beginner tutorials.

Deliverables

Students should turn a copy of their game project folder along with a description of the work they did, what challenges they faced, and how they overcame them.

Tools and Programs

This section will make use of your game engine, your project planning software, and any external toolkits you decide to use.

Phase 6: (Optional) Add Networking Components

Goals

The goal of this phase is to show students how to work with networking systems in their scenes so they can share their environments with others. This is an advanced topic so we only concentrate on basic networking capabilities built into the game engine. Other custom networked functionality can be added through scripting.

Skills

By the end of this phase, your students will have learned how work with networking toolkits or implement their own network code within the confines of a game engine. Depending on which route you take, they may also have gained substantial scripting experience.

Actions

Have students either follow appropriate networking tutorials for your chosen game engine or download a prebuilt networking SDK (for example, for Unity, see its UNetSetUp manual). These tutorials do not necessarily need to be specific to VR networking, as most of the general concepts apply regardless. For vocal communication, it is recommended that you run a separate software alongside the executable build of your game project (e.g., TeamSpeak). A basic networking assignment would be to let students see some representation of each others' heads (even if just blocks) in VR. This can be extended to other tracked real-world objects (hand-held controllers) or to actions of game objects.

Deliverables

Students should turn a copy of their game project folder along with a description of the work they did, what challenges they faced, and how they overcame them.

Tools and Programs

This section will make use of your game engine, your project planning software, and any external toolkits you decide to use.

3 Adam Prejean's Notes

These notes were made by Adam Prejean to document his main activity and some specific comments he provided to students during visits from UL Lafayette to DTSMA.

Adam Prejean
Computer Graphics Artist
University of Louisiana at Lafayette

Main Tasks:

- Regularly visited DTSMA as needed to assist students.
- Compiled list of resources to get students acquainted with Autodesk Maya.
- Lead students in successful creation of 3D assets.
- Assessed students' progress on tasks/goals and provided feedback to students both during visits and via Trello.

Information Shared:

Tutorials:

- General overview of Autodesk Maya - link
  https://www.youtube.com/playlist?list=PLxVq-O_gWqkDnwvdsyRZTr-6iDwjPlTKX
- UV mapping basics - link
  https://www.youtube.com/watch?v=G2qFdVr-FEk
- UV editing tools - link
  https://www.youtube.com/watch?v=6f2-CZHp-_M&feature=youtu.be
- UV mapping tips - link
  http://www.paulhpaulino.com/6-tips-to-improve-your-uv-mapping-workflow/
- Various Autodesk Maya tutorials - link
  https://www.youtube.com/playlist?list=PLyMuCmXTUZG5ve080KgYhT6nojrlJkV25

Files:

These files are available through our same blog that distributes this document (see Forward).

- **ProjectName.zip** - Sample directory structure to show students how their projects can be organized in a production environment.
- **Inch_Grid_Overlay_UVmapping.png** - Image that can be used as a texture to check the UV layout of a 3D model.
- **Maya_Hotkeys.doc** - Document for students to use as a quick reference when working in Autodesk Maya.

Static Environments - Assignment

- Students were given the assignment to create all of the 3D assets that would be used to create their individual VR environments.
- We asked that their environments be completed and ready for VR implementation by the time everyone was back from Christmas break.
- This assignment was also an opportunity to see how well students would work on a task outside of the classroom.

Main Student Tasks for Assignment:

Students were required to adhere to the following guidelines while working on their assignment.

Modeling

- Don't use backface methods in Maya when exporting to Unity
- Make walls have a thickness using Edit Mesh > Extrude
- If faces will always be hidden, they can be deleted (no point in wasting resources)
- Avoid Polygons with more than 4 points (top and bottom of this mesh)
  - Quick way to fix this is to select the mesh and use Mesh > Triangulate

UVs

- Create UVs with matching density
  - Use texture I provided
- Easiest way to do this is to use Automatic Mapping, then Stitch Together on any edges necessary
- Start with simple mapping
- Right-click "Shaded" button in UV Editor to show UV shells in viewport.
- Use 3D Cut and Sew tool to create new shells.
- Unfold (and sometimes Optimize) to smooth results.
- Layout

Materials

- Make simple Lambert materials in Maya and apply to models.
- I like to name materials with a prefix + asset name (ie, "M_Wall")
  - See this for more info on naming conventions
    https://wiki.unrealengine.com/Assets_Naming_Convention#Assets_names
- These materials should import into Unity as the "Standard Shader" and already be applied to the models.
- This isn't necessary, but can save some time.

Exporting

- Export as FBX using File > Game Exporter
  - Model Default
  - FBX Version 2014/2015
- Only export Geometry, Locators, Joints that will be used in Unity.
- Remember to:
  - Create UVs
  - Freeze Transforms
  - Delete History

Notes from in-person DTSMA Visits:

11/16/2017

- Instructed teacher and students on how to use Trello for project management and tracking.
- Assisted teacher by creating a Trello board for each student's project.
- Teacher decided we can use Trello to give feedback and answer student questions.
  - Students were told to send questions, comments, and updates on a regular schedule and post project descriptions and design documents to Trello.
- Students seem to be grasping Maya, but mainly need guidance with best practices when creating assets for a game environment.
- Assisted student with their project, explained how to better optimize the 3D model for Unity.
- Explained modular asset creation and why it's better to arrange assets inside of Unity rather than trying to create everything in a single Maya scene.

11/30/2017

- Students are taking more time than anticipated.
- Most students seem to be grasping Maya, but are trying to do too much in the given timeline.
- Reviewed student work, explained how models and textures could be better optimized for Unity.
- Reiterated that students should use Trello to send updates, questions, etc. on a regular schedule.
- Some students were experiencing navigation issues in Maya, but said they weren't running into those problems on their home systems.
  - This may have been a GPU issue. I emailed a possible solution to teacher.

12/14/2017

- Discussed Static Environment Assignment in more detail.

- Reviewed student work, provided specific feedback on their progress and suggested next steps.
- Provided more information on best practices for asset creation, including Modeling, UVs, Materials, and Exporting.

01/11/2018

- Reviewed student progress and suggested next steps.

01/23/2018

- Reviewed student progress and suggested next steps.
- Provided more information on best practices for asset creation, including Modeling and Exporting.
- Walked through how best to deal with scaling differences between Maya and Unity when exporting assets.
  - Some students noticed an issue with the scale of their 3D models in Unity.
- Helped student import a 3D CAD model (robot) and explained what needed to be done to the model to prepare it for Unity.

01/30/2018

- Helped import student's 3D model from CAD software into Maya to be exported correctly for Unity.
- Instructed student to prepare model for export and import it into their Unity project.

02/20/2018

- Assisted with camera animation in Unity for video captures of student projects.
- We were able to get better results than before, but still not completely what was desired.
  - The 3rd party plugin used was not easy to work with.

Other Notes:

11/14/2017

- Some of the students are struggling with UVs and texturing.

12/14/2017

- Covered a variety of asset creation issues and how to correct them.
- Don't export models with "Smooth Mesh Preview"
- Explained why static objects should not be transformed in Maya.

- Instructed students on how to make the walls for their environments using the Extrude function in Maya to give the walls thickness.
- Explained modular asset creation and why it's better to arrange assets inside of Unity rather than trying to create everything in a single Maya scene. (Chairs, Tables, Laptops, etc.)

01/09/2018

- Covered more asset creation issues and how to correct them.
  - Explained how to clean up geometry by deleting unnecessary edges and merging vertices.

01/10/2018

- Reiterated best practices for organizing and exporting the 3D model.
- Provided student with a Maya scene to use as a reference so they can see how to better optimize the stair geometry in the environment.

01/16/2018

- Reiterated how to assign materials in Maya.

01/18/2018

- Opened student's Maya scene to try exporting and testing in Unity.
- Reiterated that only Geometry, Locators, and Joints that are needed in Unity should be exported using Maya's Game Exporter.
- Showed an easy way to do this by selecting all objects needed, grouping them together, selecting the group, and using the "Export Selection" option.

01/24/2018

- Helped import student's 3D model from CAD software into Maya to be exported correctly for Unity.

4 Paul Smith's Notes

These notes were made by Paul Smith to document his main activity during visits from UL Lafayette to DTSMA.

[PAUL - UNITY] 10/26/2017: First day at DTSMA for mentoring/checking progress on students with Unity projects. Was a little difficult, as unity was not running on any of their machines and they had no Maya files (except for tiny house, but it was incomplete). The school is still having problems with some software called deep freeze that (presumably) resets the computer to some image when they get restarted. I discussed some of the projects with the students working on them. The group is working four separate projects. The one I knew about, the tiny house project, is meant for VR. Another project was a rolling ball demo that could shoot out pellets or pick them up, but it would conserve the mass of the player sphere while doing so. The third was to be a simulation of the robot arena for the school's robotics competition. The remaining project was some sort of laboratory environment? There was also a fire drill halfway through the session.

[PAUL-UNITY] 11/9/2017: First visit since Mozilla support has officially been announced. Saw an update of one student's work (one could get Unity up and running on their laptop). Had a small town built with some low-poly models and had added the built-in unity first-person controller. Worldbuilding was nice. Everything was an easily topple-able rigidbody. Offered some advice on how to get controller input. One project goal was to demo at the B&N makerfaire. Students were waiting for some supplemental instruction for texturing in Maya.

[PAUL-UNITY] 11/16/2017: Unity is now working on the school computers. Adam and I went over the basics of how to use Trello. We thought it best to create an individual board for each project that are all connected under one group. Many students did not have their models prepared ahead of time, so Adam used one students model to explain some texturing things and some modelling best practices. I encouraged the students to have broken their projects up into tasks by the time that we get to the school next week. I explained some of the ideas around project management and setting feasible goals.

[PAUL-UNITY] 11/30/2017: Students are still working on projects in Maya, but limited progress since last visit. One group of students has taken advantage of the Trello tools\ that we showed before Thanksgiving break. One student (tiny house project) was making good progress with texturing.

[PAUL-UNITY] 12/4/2017: Formally gave assignment 1 for the students to work on. I found some good Maya beginner tutorials and compiled them, along with some instructions on how to export from Maya into Unity. The submission should include screenshots of the environment that they created in Unity, as well as copies of both their Maya and Unity project folders. Hopefully this will give any students who are overwhelmed something that can ease them into

their larger projects. Also, I plan to show them their environments in VR by taking the scenes they send me and adding a steam VR rig to them.

[PAUL-UNITY] 12/14/2017: Last update before the students go on break. Adam and I layed out assignment 2 for the students to work on over the break. We intend for their modeling, texturing, and lighting to be done by the time they get back to school so we can start incorporating vr assets into their scenes. Adam spent much of the time going over specific questions the students had about their models. He also left various resources for the students to look over on the assignment page. We think this should be very doable for the students and are excited to see their finished Maya models. Happy holidays everyone!

[PAUL-UNITY] 1/11/2018: Adam and I went to DTSMA to check up on the assignment that we issued in December. We were able to add a VR simulation program to a student's scene successfully. This is one aspect I had been looking at over the break, trying to find ways to accommodate students, since some of their work happens at home and none of them have VR headsets yet. We are using a tool called VRTK for this simulation, as well as other interactive bits that the students may wish to add to their projects (if time allows).

[PAUL-UNITY] 1/23/2018: Adam and I reviewed student projects. I introduced assignment 3 to add actual vr camera rigs to their scenes. The scenes are progressing nicely, much more complete than they were before the break. All students now have the simulation rig in their scenes as well.

[PAUL-UNITY] 1/30/2018: Students now have VR integrated into their scenes! It was great getting to see the students reactions to view their environments in VR for the first time. Also, after some initial complications, we got a digital copy of the official First Robotics Competition field into Montana's project.

[PAUL-UNITY] 2/1/2018: Student computers and headsets finally came in at DTSMA! We spent most of our time unboxing their new workstations and going over best practices when working at a desk with VR equipment. Obtained a copy of the tiny house neighborhood scene to try loading into Kvasir. Resolved some problems with the First Robotics Competition project not zipping properly.

[PAUL-UNITY] 2/8: We also made fly-through video of each of the student's environments.

[PAUL-UNITY] 2/15 & 2/18: Worked with students to load their models for a networked Kvasir-VR demo. Tiny house is loaded but untested. Others should be much easier due to the use of actual geometry for the ground instead of terrain. We also polished fly-through videos of each of the student's environments.

(Nicholas Lipari and Jason Woodworth took over for remaining aspects, especially school-to-school networking setup and demos. We also discussed a basic Unity networking assignment to let students create their own multi-user networked versions of their VR environments).