

Final

Due: May 13, 2022

Introduction

For your final project in Topics in 3D Game Engine Development, you will be creating your very own 3D game! You will spend one week doing research on game and engine features and creating a proposal for your project. Then, you will spend 4 weeks implementing your project.

Final Plan

Due April 18

Each group must complete a project proposal. This is a document containing the following information:

- Group member's names
- Engine or game features you plan to implement - Refer to the Engine/Game Features section of this handout for possible features. You should pick out the features you think are essential to your game.
- Game concept - Briefly describe the game and explain how your features fit into the game.

In your proposal, it should be clear how your project will be an appropriate amount of work for your group size. Please be as specific as possible. Keep in mind that if you plan on implementing easy engine features, then you will be expected to make a polished game. If you plan on implementing difficult engine features, then your project will not be expected to be as polished. Do some research to find features that you are excited to implement. Ask the TA staff for project ideas if you are not sure what would be an appropriate amount of work. If you do a reasonable amount of research, then a suitable project idea should come naturally. See the Engine Features section for more information on what separates "easy" and "difficult" engine features.

If you are taking this course as a senior capstone, you must work alone or with other students taking the capstone. Students taking the course as a capstone will be expected to implement difficult engine features and make a polished game. **Students taking the capstone should get their project proposals approved before April 1 so that they can start early.**

Project Check-Ins

We will have project check-ins every week during class time. You are encouraged to come to class (or hours) to get feedback on your progress!

Final Handin

Due May 13

Final project presentations will be on May 13 at 2pm.

Engine/Game Features

Keep in mind that there are tutorials online providing implementations of some of these features. For instance, it is very easy to find code for shadow mapping or bump mapping. Most features with readily available implementations that can be referenced are considered "easy". You can get a small amount of credit for implementing easy features, but you will be expected to either implement more difficult features or create a very polished game as well. A "difficult" feature is anything that is not easily implemented by following a tutorial with code, or a feature that takes considerable effort to incorporate into a game engine, such as networking.

Some "easy" features can be extended and become "difficult" features. For instance, there are lots of creative things you can do with particles, such as animating them with a texture atlas. There are many ways you can extend shadow maps to improve their look and performance.

Also note that game-side features, like original assets or portals, only make sense to pursue if you are planning on making a polished game.

This project is an opportunity to pursue what makes YOU interested in game engines. If you want to make a polished game, then go for it! If you want to make a lightmapper and then create a walking simulator with your light maps, then do that!

Here is a list of possible features:

- Networking
- Graphics features
 - Particles
 - Bump mapping, Parallax mapping
 - Deferred shading
 - Depth of field
 - Toon shading, Silhouette edges
 - Shadows
 - Ambient Occlusion
 - Real-Time Indirect Illumination
 - * Raytracing (Hybrid Rendering)
 - * Light Probes

- * Screen Space Directional Occlusion
- * Light Propagation Volumes
- Advanced animation features (Inverse kinematics, Dual quaternion skinning)
- Advanced AI
- Polished UI toolkit
- Chunk streaming (for a large world)
- Occlusion culling
- Tools
 - AI editor
 - Embedded scripting
 - Lightmapper
 - Procedural content generation
 - Level editor
- Sound
- Really cool original assets
- Portals
- Physics
 - Rigid body physics
 - Ragdoll physics
 - Fluid simulation
 - Cloth simulation, clothing animation