

CSI4130 Computer Graphics

Winter 2025: Assignment 4

Due: Demo Video: Monday, March 31st, 2025, 18:00 in MS Teams
Code and Documentation: Wednesday, April 2nd, 2025, 23:00 in Virtual Campus
University of Ottawa - Université d'Ottawa

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1 Groups of Four

The project is to be worked on in groups of four. The group sign up has been available on BrightSpace.

2 Theme

The project this year has to address the theme *Space Travel*.

3 Presentation [10]

You need to present your project with the help of a video (screen capture) on the last day of classes (April 2nd, 2025) during the lecture. The video should highlight the main aspects of your project and is expected to have a length of about 3 minutes. Please also upload the video to MS Teams before the demo. The best demo will receive an award. Note that the marks are based on the graphics content shown and not on the award.

3.1 Bonus Marks

A video posted early on MS Teams will receive bonus marks according to the following schedule.

Date	Time	Marks
March 3rd, 2025	18:00	5
March 10th, 2025	18:00	3
March 24th, 2025	18:00	2
March 28th, 2025	18:00	1

4 Graphics Techniques [10]

The theme does only give a general direction, you can incorporate the theme in many different ways. Below is a list of specific technical requirements for your course project. You must incorporate at least one of the items.

4.1 Mandatory Techniques (minimum 1 required)

- Use procedural noise for texturing or content creation.
- Use sphere or cube mapping either to generate texture coordinates for objects or for lighting with an environment map.
- Use a particle system to create stars, exhaust, explosion or similar.
- Use splatting for a part or a whole scene.
- Use volume rendering for a part or a whole scene.

Some overall avenues to consider are below:

- Extend Assignment 2 or 3 with an additional feature of similar difficulty than the original assignment.
- Implement various mapping techniques without three.js. Example: Procedural bump maps in the fragment shader.
- Use sphere mapping or cube mapping to generate texture coordinates for meshes loaded from file. Demonstrate your code by loading an image as a sphere map, or six images arranged in a cube map for cube mapping with various meshes.
- Create a Perlin noise demo. Give the user control over the effects and let the user decide how to use it (directly, with turbulence, for color selection, etc.)
- Explore the ammo.js physics engine in three.js (see three.js examples).
- Create an animation using skeletal animation.
- Create an interactive fly-through
- Your own idea of similar difficulty but you must consult with me first.

You can use whatever you like in this project assignment from the labs. If you are looking for meshes, there are many commercial sites that provide sample meshes without charge. One source for numerous 3D models is Sketchup warehouse but the native sketch up format is not commonly supported by other tools (Sketch-up pro has apparently exporter to more useful formats). Some models however support another format, e.g., dae, which you may be able to load in MeshLab or Blender and convert to obj wavefront. The quality of the meshes on Sketchup varies greatly. You can find MeshLab at <http://www.meshlab.net/>, or you can try MeshLabJS at <http://www.meshlabjs.net/>. Blender is a full-fledged opens source modelling tool, see <https://www.blender.org> but be warned it is not only very powerful but the user interface has a steep learning curve. Another commercial website with many freely available 3D models is <https://sketchfab.com/>. Two academic sources of free meshes are <http://vcg.isti.cnr.it/nexus/> and <http://people.csail.mit.edu/tmertens/texttransfer/data/>. In any case, make sure to only use meshes legally obtained and which do not depict violence. *Make sure to acknowledge the source of your meshes in the required form.*

Your video should not need an age restriction and you should be able to show it to a future employer; use your judgement.

5 Submission

Please organize your project in a zip archive and upload it to Virtual Campus. Your code must run by loading the corresponding web page in your submission. You can assume that the same libraries as in the labs are available at the same locations. Avoid additional libraries beyond what was used in the lab but if you absolutely need it, than it must be part of your submission. Please include in your submission a short document (preferably pdf) which describes the following:

- Provide a one-paragraph description of your project plus a list of achievements with a table showing the work done per group member.
- Provide a short description of the usage of your program (keys, mouse, steps to perform).
- Acknowledge any external resources used, i.e., anything that is not your own, be it code or assets.