

Proposal

Project

Purpose

Your final project is a capstone for the course. The goal is to demonstrate your proficiency as a mature programmer, dealing with challenges in computer graphics, allying technical and artistic solutions for an environment of your team design. Using the high-level graphics library `THREE.js`, you showcase an interactive scene visually composed based on your interest, running a proposal by me first.

Each group has to

- meet with me by next Friday 5:00 p.m to discuss their ideas and
- submit a `.pdf` proposal on Moodle by Sunday, November 10th 6:00 p.m.

Your first deliverable will be a proposal. It should start by describing how the output of your program will look like, guiding what the project does and what you are building on, in addition to the details described below.

The final project incorporates specific modelling, lighting and interacting techniques which form a whole. The selected techniques resulting in an attractive game or environment to explore for examples.

I expect implementation to require you to do research, which could range from finding tutorial online, reading online manuals or graphics textbook to looking up inspirational sources and research papers. Implement a set of graphics techniques, features and algorithms of your own choosing to create a graphics context you specify and draw/illustrates (by hand) in the write-up proposal.

Project Specifications

Statement

This final project is the culmination of your efforts. Its primary purpose is to allow you to plan and execute a project of your own creation. So, do something interesting based on the course topics, i.e., write a graphics program that

- creates a game...
- animates a scene, an environment to explore with some interaction...
- something else...

To encourage you to **plan** what the program will output, I want you to pick up a Colgate campus theme/element or scene to integrate a common theme among the groups. While you are recommended to combine robust code base to help you get started with the mechanisms of a `WebGL/three.js` application, it is essential that the final program significantly diverge from any source of inspiration you used. This common theme makes sure that as early as possible you set an appearance that we all relate to and help guide your design and its achievement.

Proposal Outline

Your proposal should including the following sections:

- A general, introductory **Statement** of the nature and goals of the project as filled-in above. You should describe the scene/environment/models, that are achieved by the objectives you describes in the proposal and implements for the project.
- A **Technical Outline** section surveying the objects, data structures and techniques you used to organize your code and solve your project goals.
- A **Bibliography** of a small number of URLs, papers and/or books that will be consulted, with a comment about the relevance of each to the project.
- An **Objectives** sheet containing ten different points upon which the achievement of the stated goals are to be judged.

BE CAREFUL! While part of your grade will be based upon your success at reaching your goals, another part of your grade will be based upon your intelligence, understanding, comprehension, and good sense at setting goals that are neither too hard to be achieved nor too easy to be significant. Inventiveness and originality will count as well.

Proposal Grading

The proposal and presentations will be graded subjectively, by comparing the proposals against each other and against expectations. What I want to see in your proposal and later presentations is that you have investigated what you plan to do for your project, that you have decided upon a reasonable project and that you are doing your best to work well within your team.

To receive full marks for the proposal, you need to have

1. A clear description of your project: one paragraph about what your program does; followed by a few paragraphs describing what are the main visual elements—how each will be created, what they should look like (think simple; then maybe complex) and how they are manipulated. Deciding how and who will create each element and how they will be integrated incrementally together is key to a good planning.
2. An outline of the technical details that indicate that you understand the issues involved;
3. Appropriate technical references from adequate online tutorials, manuals or reference books. Texts, journals, and conference literature might be helpful;
4. A list of 8 non-trivial, pertinent, obtainable objectives;
5. **Mock-up pictures** of what your project will look like, which guide and plan your implementation: your goal is to implement something that is visually, i.e. graphically, pleasing, plus possibly fun;
6. Some amount of individuality in what you propose.

If you are vague about your plans or objectives, if you are too ambitious or have unrealistic objectives, or if it is clear that you have not read up on your chosen subject, you will lose points.

Section details

The goals of your proposal are

- a. to tell me what your project is,
- b. to be convincing that your project is reasonable in the sense that it's not too hard and not too easy and
- c. to organize how you will work as a team.

Technical Outline

In this section, you need to explain the data structures and file responsibilities (to store and organize your code features) and techniques that will be necessary to achieve your objectives.

How well do you need to explain the data structures and algorithms? Well enough to convince me that you are planning and thinking hard about what is involved with each objective and how each is integrated to the code base as they are developed by different team members. For example, if you want to include texture or many bump mapping as one of your objectives, you should explain why and how each will be used. Describe which element will benefit from this particular appearance and thus with primitive it should apply to or how you intend to map the bump map to each and how the normals are perturbed, etc. If you are implementing something from a tutorial, it is not enough to refer to it, you need to explain how you will process the algorithm in stages: how you plan to divide the work divided, tackling each concept in coded gradually and achieving integration with the base code as you are progressing with the objective.

When I read your objective list, I will refer to your technical outline for details. A good technical outline gives details on the process by which you intend to achieve each objective.

Objectives

What are good, reasonable objectives? Briefly, an objective is a unit that contributes one fundamental, essential goal to your project. On the average, an objective is roughly 1.2/10 of your work.

In a 4-5 week development time, it represents 3-4 days of planning, implementation, debugging, and integrating.

A poorly done proposal is often characterized by attempting too much, and that derives from not understanding clearly what is involved—either in terms of objectives or in the difficulty of each objective. For each, it is critical to think hard about the appearance gain on the final project composition. If a project is too difficult, you may have trouble getting your objective marks.

Examples of poor objectives:

- Add spline surfaces.
- Code is well organized.
- Program executes correctly.

The first objective is too difficult and should be broken down, probably narrowed to a specific goal. It is vague. As it is, it indicates that the person does not know what those words means and does not demonstrate how it fits the project. The two other objectives are expected to be true as a minimum and are not worth special mention as they are not graphics objectives.

Here are some objectives that are not specific enough:

- Interesting interaction.
- Useful feedback given on screen.
- Good use of colour.

How to be specific? What is the meaning of interesting? Who decides what is *useful* or *good*? How do you assess a goal has been reached? If you model from art, or an image, a sketch, an abstraction you drew, or a design or interaction references then there is a valid comparison to be made; the intend has a contextualization. Be precise, commit to something simple but pleasing so to reach this goal. Mock-up pictures are essential to clarify intend and for comparison.

In short: an objective should be precisely stated, clearly understood, capable of unambiguous determination about whether and to what degree it has been met.

Be careful when making goals: your goals should contain technical and/or artistic content. Essential objectives are listed next as they form an explicit narrative fitting any visual context.

- Up to three modelling objectives. One could be the particular elements that make the base of your scene. Another will be the hero. Intensive modelling should represent a couple of objectives, make sure to differentiate the aspects included in each.
- Motion or animation objectives. Implementing some animation or constraining the movement of the main character are often essential. (Animation is hard so make sure to read/find references to guide you). Something needs to move to navigate.
- One or two user interface objectives. This objective is used to turn on/off features (manipulating key aspects of the appearance) and for complex interaction such as controlling a plane, manipulating the camera, picking, etc, can also be a U.I. objective, describe it precisely.
Note: Be wary if your project needs a lot of menus and dialogs. These are easy to implement in `THREE.js` and you have already done so and so are not worth spending too much time on. Time is better spent on achieving other objectives and fine-tuning your project.
- An artificial intelligence objective. This objective does not really have technical graphics content, but is useful for games. If you want an A.I. objective, make sure you model it on an example and add to it. It is essential you progress quickly, have a core to build on so to get started without developing a full-pledged AI system. Adapting it to your need counts.

Unacceptable objectives are *feature* goals without graphics content. This commonly happens with game projects. For such projects, displaying a numeric score, or giving the player extra life when a food pod is consumed may all be nice game features, but it is not acceptable as such as an objective for a graphics project. You can have a game score objective because you precisely explain the visual feedback you provide: a texture you need for it is a graphics objective; as is the collision mechanism or the particle system.

In addition some graphics features you may look at to make an objective are

- texturing explicit elements/geometry
- picking (i.e., interacting with the 3D objects by clicking on the screen)
- shadow maps
- environment maps
- particle systems, L-systems
- shader style: non-photographic rendering / toon shading
- incorporating a physics engine
- splines (curves and surfaces)

Bibliography

An excellent way to prepare for a good proposal, and to continue from there to a successful project, is to give evidence that you have informed yourself about the issues, the techniques and an influence for the appearance of your project. You do this through searching reference material: read `three.js` tutorials and game ones, computer graphics topics; look at illustrations for art including children books (they tend to be simple and nice).

Include specific pertinent references to literature in your proposal is a good way to show that you know what you are doing. The mock-up images can use photographs you are basing the appearance of graphics on: think simple, concise as modelling is time-consuming; image-based/texturing techniques can also be helpful.

Team work and reflection

A portion of the final deliverable will be a reflection on the experience, working in group. The common parts include the following

- a description of what you did as a group
- a list of resources you used to implement each objective
- what objectives were particularly difficult
- a description of any aspects that don't work as desired
- a description of what you would have improved if you had more time

Individually you will respond to the following

- what you personally did and your assessment on your work
- what your partners did and your assessment on their work