# CS537 Final project

INSTRUCTOR: G. KAMBEROV

**Requirements:**

The final project must show your mastery of the fundamentals of computer graphics covered in the course:

- You may not use deprecated code. The only exceptions are if you want to use some pre-cooked models, e.g., GLUT objects or third party models if your converter can't handle vertex arrays or if you are using updated GLM which I provided but you are stuck with a version of OGL that cannot handle VAOs.
- Modeling and scene hierarchy
- Smooth animation of camera and object motions
- Entertaining and easy interaction
- Pleasing, and engaging appearance using: appropriate illumination, materials, texture mapping.

• In addition to the required components listed above you may include at least one of the pseudo-realism effects listed below

- transparency, refraction,
- shadows, object reflections
- environment mapping(cube/sphere mapping)

Let me know if you need references on any of these effects.

**Suggested Final Project**

This project builds on your in-term projects. There are several levels of possible achievement. In general the grade depends on the level but a very well executed lower level project may result in a better score than a so executed higher level project.

- **High Level**
  - Travel component
  - Exploration component
- **Middle Level**
  - Exploration component
- **Low Level**
  - Travel component (you must use texture mapping and shading)

**Travel component:** The user travels to a village in a car. During the trip the user is allowed to toggle viewpoints using the keyboard command V.

***Available viewpoints:***

- Outside (a la police chopper): A moving viewpoint outside the car, slightly above the car following the car. It allows the user to view the car progress & the scenery it passes by.

- Inside (driver): A moving viewpoint inside the car, from the driver's seat. It allows the user to view the road ahead (and part of the scenery) through the windshield.

***Scenery:*** A road leading to the village (the village may be visible during the whole trip or become visible eventually - your choice); some terrain, including texture mapped grass.

**Note:** You are allowed to download the car model from one of the many free modeling sites or use some modeling software - for example Blender. You must explain how you got the model; give proper references and credit, and how the model was incorporated in your scene. You will need a model loader. For models in *obj* format you can use the glm library included in the course resources.

You are allowed to download textures. For more on texture mapping and what you are allowed to download see the note at the end of this document.

Once the car stops in the village the user gets out & begins to explore.

**Exploration component:** In this component the user is identified with the flying camera. The village is built by embellishing the scene you created in Homework 5. This component builds on the knowledge and the code & skills from all the in-term projects.

The scenario is: the user walks around the village, enters and exits buildings, and picks and explores some objects by turning them around (you should use the exploration mode and the 3D interface from homework 3). You should use ray-casting to do the selection and picking.

The rooms in the buildings are furnished. The interior decorations and the furnishings are up to you but you must include both texture mapped and smoothly shaded objects (using lights and materials). The user should be able to switch lights on and off as in homework 5, also make sure that outside/inside lights do not illuminate interiors/exteriors (unless there are windows).

Possible extras:

1. Transparency (glass balls, painted glass windows) or

2. Refraction (glass of water with a straw in it). to illustrate the refraction effects place two identical objects one in a glass with water and one next to the glass.
3. Object reflection on the surface on which it is positioned.
4. Use environment mapping to simulate shiny objects reflecting their surroundings.

**Note on Texture mapping**. This requires tools to read in and store appropriately image files. You should download textures from the web. YOU MUST GIVE PROPER REFERENCES FOR EVERYTHING YOU DOWNLOAD AND EXPLAIN HOW YOU USED THE DOWNLOADS.