SCIT

School of Computing & Information Technology

CSCI336 – Interactive Computer Graphics
SIM Session 1 2026

Assignment 1

Write an OpenGL program using the libraries covered in this subject to create a simple 2D scene with a truck. The image in Figure 1 illustrates an example scene.

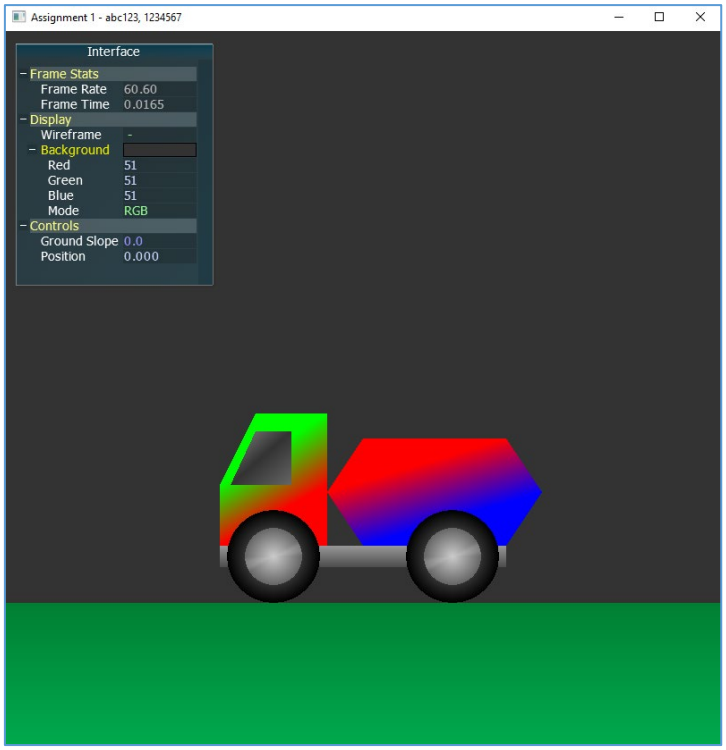


Figure 1: Truck.

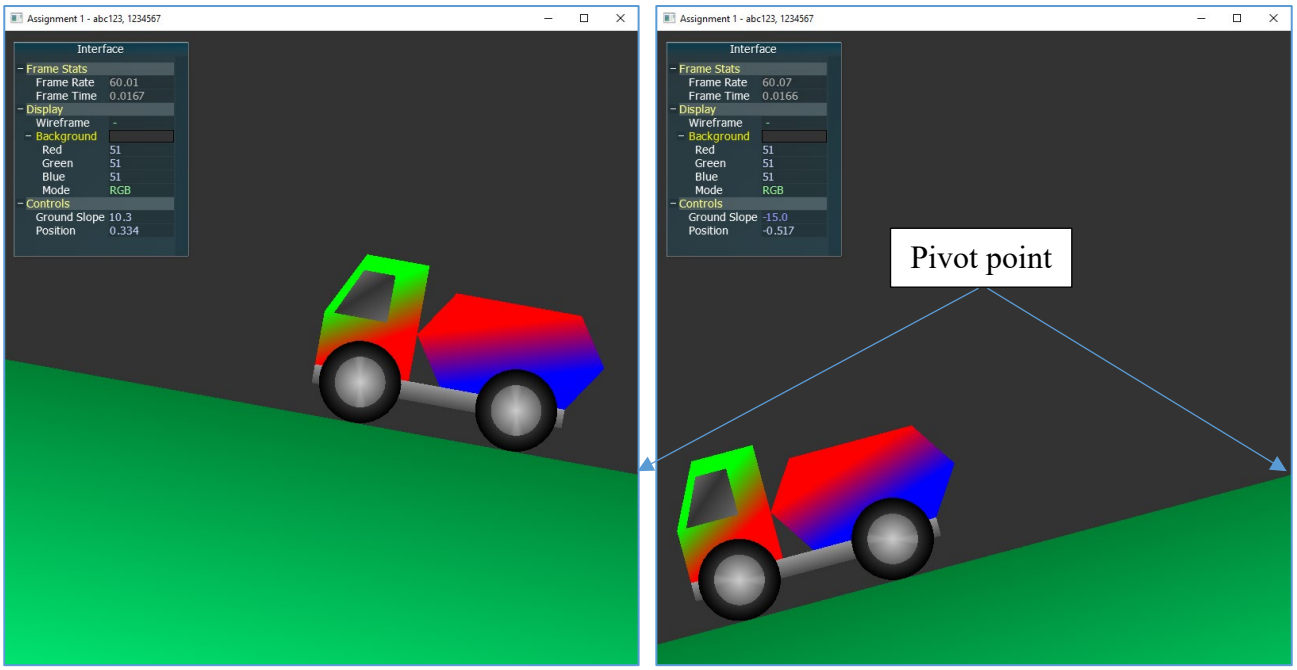
- 2D scene (8 marks)
  - Create an 800 x 800 resolution window. In the window title, put your UOW username and student ID number.
  - Construct a 2D scene like the one shown in Figure 1. The scene should consist of the following objects:
    - A ground
    - Two tyres and their hubcaps
    - The truck consists of a base, driver compartment, window and back.

    Note: the rendering order affects the final image. The "Painter's Algorithm" – things rendered later will overwrite previous content in the frame buffer.

- Transformations and keyboard input (8 marks)
    - Allow the user to
        - Move (translate) the truck left and right using the left and right arrow keys, respectively.
            - Rotate the tyres when the truck moves.
        - Increase/decrease the slope of the ground between -15 and 15 degrees using the up and down arrow keys. The ground should be rotated from the right corner, where the ground meets the window boundary (shown in Figure 2).

      To maintain consistent movement speed regardless of frame rate, movement should be based on frame time.

  The images in Figure 2 show the truck at different locations with the ground at different slope angles. Note the pivot point of the ground. Also, note that the tyres of the truck have rotated.

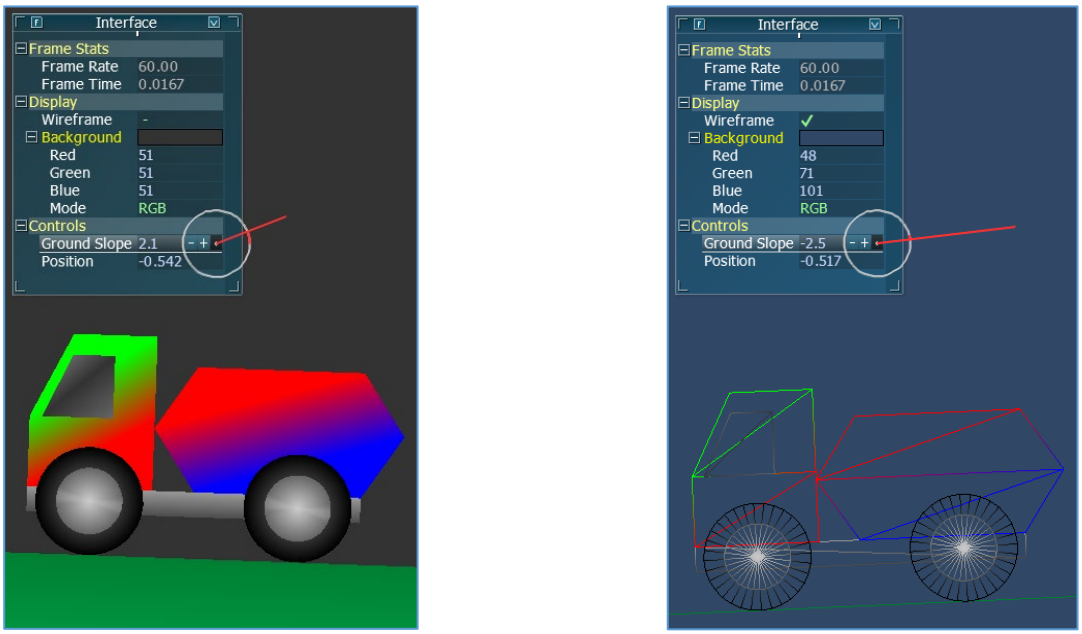


(a) Ground slope: 10.3 degrees. (b) Ground slope: -15 degrees.

Figure 2: Transformations.

- User interface (4 marks)
    - Create a graphical user interface with the following components:
        - Display the frame rate and frame time.
        - A button to toggle between wireframe and solid polygon rendering mode.
        - An interface element to change the background colour.
        - An interface element that shows the ground slope angle where a user can change the angle using the mouse.
        - Display the truck's position along the *x*-axis with respect to the centre.

The images in Figure 3 illustrate the user interface. A user can toggle between wireframe and solid modes, change the background colour, and adjust the ground slope.



(a) Solid rendering mode. (b) Wireframe rendering mode.

Figure 3: User interface.

Report with Screenshots

In your submission, include a report that includes screenshots demonstrating your program in operation and the implemented features. Follow all instructions from your tutor.

Instructions and Assessment

Follow all instructions from your tutor.

The purpose of this subject is to enable students to learn, understand, and apply computer graphics techniques. As such, generative AI tools are **NOT** permitted for assessments in this subject.

Assignments must be implemented using modern shader-based OpenGL with the libraries covered in this subject. The use of other libraries is not permitted.

The assignment must be your own work. If asked, you must be able to explain what you did and how you did it. Marks will be deducted if you cannot correctly explain your code. The mark allocations shown above are merely a guide. Marks will be awarded based on the overall quality of your work. Marks may be deducted for other reasons, e.g., if your code is too messy or inefficient, if you cannot correctly explain your code, etc. For code that does not compile, does not work, or for programs that crash, the most you can get is half the marks (i.e. 10 marks or less). It is better to comment out sections of your code that do not work and include a note for the marker.

