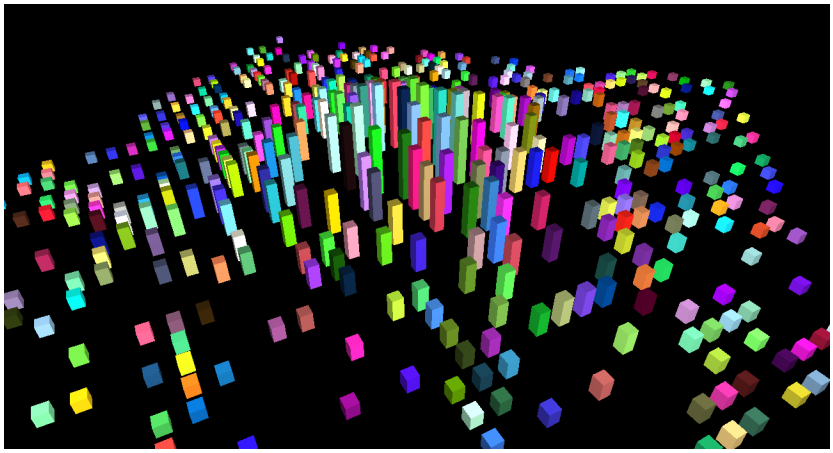
Assignment 2
Computer Graphics, Spring'24
Dept. of CSE, IIT Kharagpur

Posted: 29th February 2024
Due: 14th March 2024, 11:55 PM

Description

In this assignment, you will be implementing camera motion to simulate the flying effect recorded from a helecopter. Usually these types of features are used in video game design (but in more advanced level). Your task is to build a very basic feature of the motion.

Imagine that you are in a helecopter and are recording the view of your city from the top. Let you are flying in the night time and the landscape is very simple. There is a small city in your vicinity (rest are black and nothing around is visible), with only the lightened up multicolored buildings are visible in black background. You can simply implement this by placing solid cubes of different random color and random size scattered around randomly in black background. Place the buildings in such a way that the housing area does not look like a regular shape (like square, rounded, etc.), and the taller buildings are situated mostly around the center. Set up your camera so that the scene looks like as if you are taking the shot from a higher altitude. This will look something like the following:



Now you will be adding more functionalities to this set-up. Implement the feature so that the orientation of the scene can be changed by dragging the mouse. The user should be able to look at any direction in the scene. Next, add the keyboard functionalities so that the forward and backward camera motion can be simulated by pressing 'F' and 'B' keys respectively as shown in the demo

(continuously holding the keys should show smooth camera motion, and you will actually fly "through" the buildings). The scene orientation should also be able to be changed by mouse dragging at any point during the camera motion, thus letting the user to change the flying direction as well. Add some lighting and material properties to the scene so that it looks nice.

Your task is to implement this in OpenGL using C/C++. Note that being a computer graphics student, your program output should be aesthetically nice (ideally better than the demo)!

Weightage

This assignment carries 15% of the total mark.

What to submit?

Submit the program file(s) you have implemented. You must use OpenGL with C/C++ to implement the assignment. Put all the file(s) into a zip and submit in Moodle (no files will be accepted by email). Please do not submit any unnecessary files (such as the whole project).

Plagiarism

Copying the code is a serious academic offence, which will be treated with zero tolerance. Any detection of plagiarism will give zero marks in the assignment.

General marking scheme

The marks will be distributed as follows:

- Working program: 80%
  - Create the basic scene of colored building in black background: 15%
  - Creating the static camera view from the top: 10%
  - Implementing the mouse effect for changing orientation: 20%
  - Implementing the keyboard functionalities for forward and backward motion: 25%
  - Aesthetic part: 10%
- Documentation: 10%
  - Main comment block identifying the student (name, roll number, email address): 4%
  - Defining input and output parameters for a function: 3%
  - Purpose of functions/blocks of code: 3%
- Program style: 5%
  - Meaningful variable names: 1%
  - Constants instead of "magic numbers": 1%
  - Readability (complete sentences, indentation, white spaces, etc): 2%

  - Code flows "nicely": 1%

- Program structure: 5%
  - Modular code: 2%
  - Uses appropriate data structure: 1%
  - Loops when needed/no loops when not needed: 2%