Hacettepe University
Computer Engineering Department
BBM 414 Computer Graphics Lab.
Experiment 3

Subject: OpenGL transformations and basic GUI
Submission Deadline: 25.11.2015 – 23:59
**Advisors:** Asst. Prof. Ufuk ÇELİKCAN, R. A. Öner BARUT

Tasks

Part 1 (30%):

- Download the book source code from the book website:
  http://www.cs.unm.edu/~angel/BOOK/INTERACTIVE_COMPUTER_GRAPHICS/SIXTH_EDITION/CODE
- Modify the code for Example 6 from Chapter 3:
  - Currently the spin axis for rotation is changed by 3 mouse buttons.
  - You will modify the code to change the spin axis by 3 interface buttons you will add at the bottom of the window.
  - You can simply name them "Rotate X", "Rotate Y" and "Rotate Z".
  - You will also add 2 other buttons (next to the previous 3) to increase and decrease the speed of rotation and show the current speed on the interface.

Part 2 (70%):

- Change the scene from HW2 into form below.
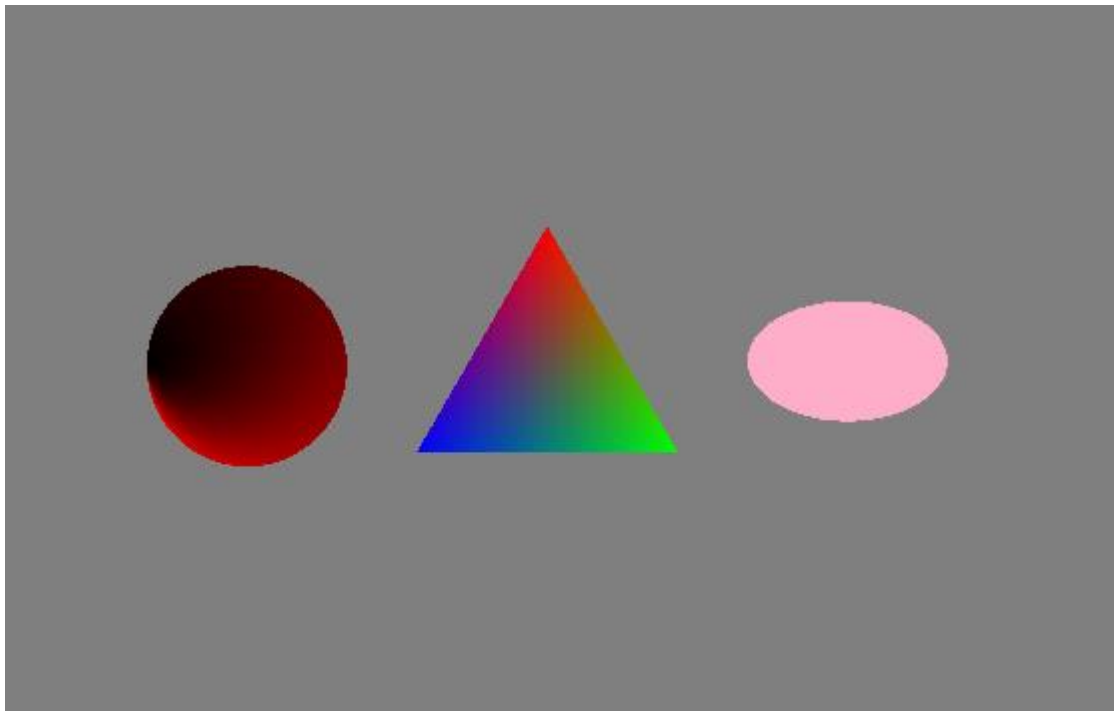
- Perform the following requirements on the shapes:
  - (20%) Make the ellipse rotate as the cube in Part 1 but only around z axis and counter-clockwise, continuously.
    - Add a button to start and stop the rotation.
    - You can simply name it "Rotate Ellipse".
  - (25%) Make the triangle grow and shrink in size like a beating heart, continuously.
    - Add a button to start and stop the animation.
    - You can simply name it "Scale Triangle".
    - The scaling of the animation should be between 0.5 at its smallest and 1.5 at its largest.
    - And it shouldn't hit the other 2 objects during the animation, so arrange your scene accordingly.
  - (25%) Make the circle go up and down in the scene, continuously.
    - Add a button to start and stop the animation.
    - You can simply name it "Translate Circle".
    - During the animation, the circle must not hit the window edges, so arrange the translation distance accordingly.
  - You may place the buttons at the bottom of the window or on a separate window. You will use GLUI for this.

Notes and Restrictions

- Implement your homework using OpenGL 3.1 version or higher. All programming assignments must use the shader-based functionality of OpenGL: 1) no immediate mode 2) at least one vertex shader and one fragment shader. Therefore, you should not use any of the deprecated features of the API, e.g. glBegin, glEnd, glVertex3f, glTranslate etc. Otherwise the corresponding parts of your homework will not be graded.
- The assignment must be original work. Duplicate or very similar assignments will be regarded as cheating and are both going to be punished. General discussion of the problem is allowed, but do not share answers, algorithms or source codes. Using other resources (example source codes, books, webpages etc.) is allowed as long as they are properly referenced.
- All rules and restrictions stated in the BBM414 syllabus apply.
- Style and appropriately commented code matter.

Submission

- You should submit entire Visual C++ project directory including source files, header files and the compiled executable in a zip file.
- You should also submit a report explaining your algorithm, description of your functions, and any other implementation details that explain your code in Part 2. The report constitutes 25% grade of each corresponding section (e.g. The Report on Part 2 Section 1 is 20% * 25% = 5% of the whole experiment grade).
- Submission file structure must conform the template given below:
- <student_number>.zip
  |--- project.zip
  |--- report.pdf
- You should upload your files via "Online Experiment Submission System" which is at http://submit.cs.hacettepe.edu.tr
- Do not submit any file via e-mail.
- No submission will be accepted after deadlines.