Computer Graphics, Lab Assignment 3

Handed out: April 3rd, 2022

Recommended due: 15:00, April 3rd, 2022

Hard due: 23:59, April 9, 2023 **(NO SCORE for late submissions!)**

1. Write down a Python program to draw a transformed triangle in a 2D space.

   A. Set the window title to **[studentID]-[assignment#]-[prob#]** and the window size to (480,480).

   B. Draw a triangle using render() function below (DO NOT modify it!).

```
def render(T):
    glClear(GL_COLOR_BUFFER_BIT)
    glLoadIdentity()
    # draw cooridnate
    glBegin(GL_LINES)
    glColor3ub(255, 0, 0)
    glVertex2fv(np.array([0.,0.]))
    glVertex2fv(np.array([1.,0.]))
    glColor3ub(0, 255, 0)
    glVertex2fv(np.array([0.,0.]))
    glVertex2fv(np.array([0.,1.]))
    glEnd()
    # draw triangle
   glBegin(GL_TRIANGLES)
    glColor3ub(255, 255, 255)
    glVertex2fv( (T @ np.array([.0,.5,1.]))[:-1] )
    glVertex2fv( (T @ np.array([.0,.0,1.]))[:-1] )
    glVertex2fv( (T @ np.array([.5,.0,1.]))[:-1] )
    glEnd()
```

   C. If you press or repeat a key, the triangle should be transformed as shown in the Table:

Key	Transformation
Q	Translate by -0.1 in x direction **w.r.t global coordinate**
E	Translate by 0.1 in x direction **w.r.t global coordinate**
A	Rotate by 10 degrees counterclockwise **w.r.t local coordinate**
D	Rotate by 10 degrees clockwise **w.r.t local coordinate**
1	Reset the triangle with identity matrix
W	Scale by 0.9 times in x direction **w.r.t global coordinate**
S	Rotate by 10 degrees counterclockwise **w.r.t global coordinate**

D. Transformations should be accumulated (composed with previous one) unless you press '1'.

i. You'll need a global variable to store current accumulated transformation.

ii. For example:

gComposedM = newM @ gComposedM; or gComposedM = gComposedM @ newM ;

E. Do not use OpenGL transformation functions.

F. Submit a single .py file - **[studentID]-[assignment#]-[prob#].py**

G. Expected result: