Computer Graphics Homework1 Report

110062401 李浩榮

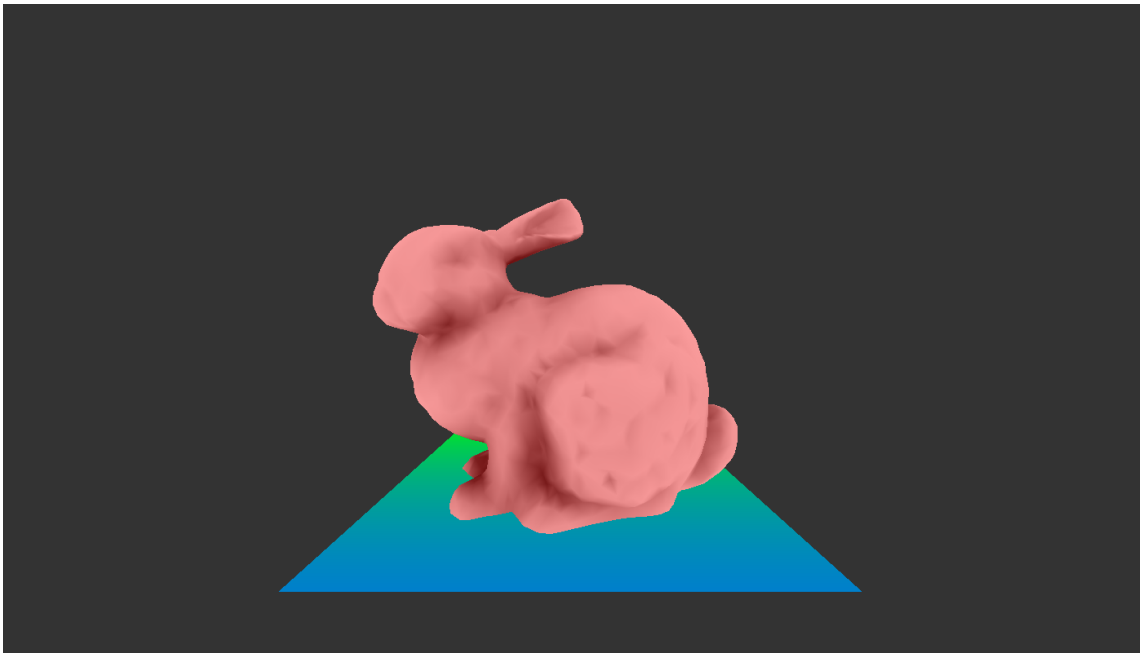
Assignment Requirements and Key Mapping

- Z / X : Switch the model
- W : Switch and toggle between Solid and Wireframe mode
- O : Switch to Orthogonal projection
- P : Switch to NDC Perspective projection
- T : Switch to translation mode
- S : Switch to scale mode
- R : Switch to rotation mode
- E : Switch to translate eye position mode
- C : Switch to translate viewing center position mode
- U : Switch to translate camera up vector position mode
- I : Print information (Translation Matrix, Rotation Matrix, Scaling Matrix, Viewing Matrix, Projection Matrix)
- Change Window Size with ratio

Screenshot for each key actions

- **Default**

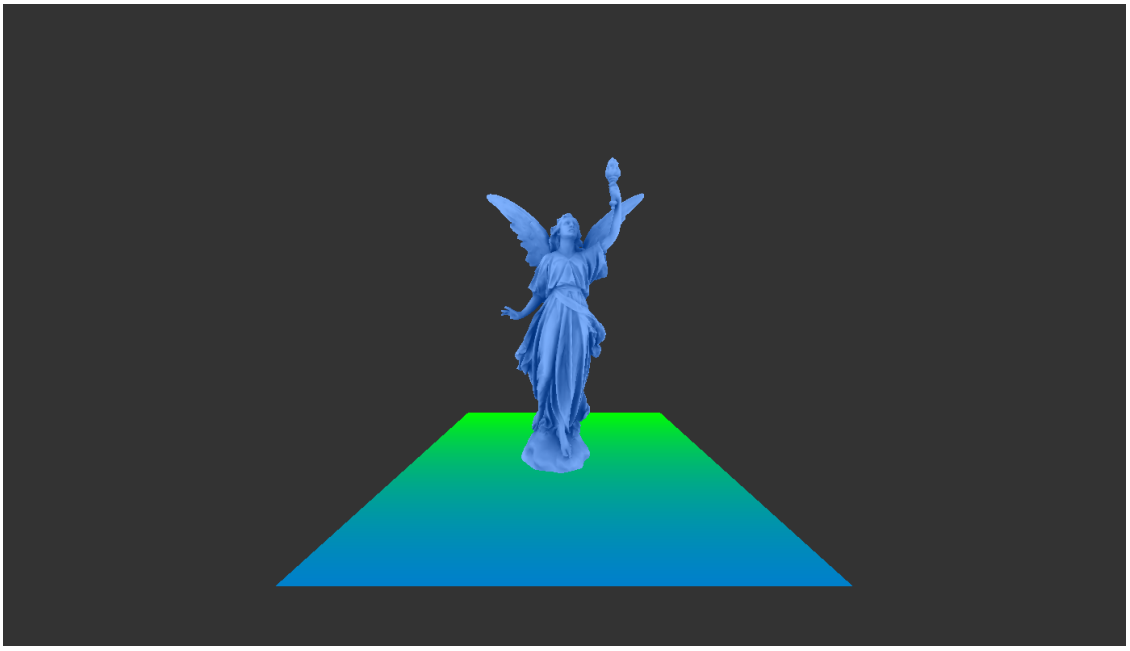
  (This is the default condition of model and place before giving any instruction.)

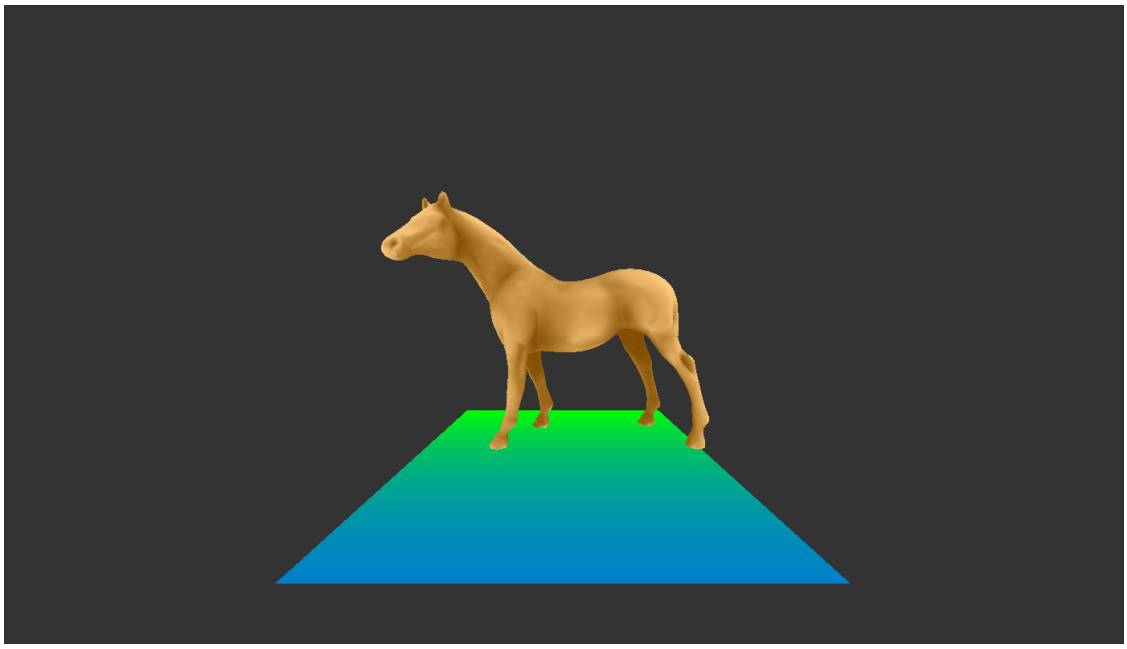


- **Z / X (Switch the model)**

  (Using the Z key and X key to switch another different model from the 5 selected models.

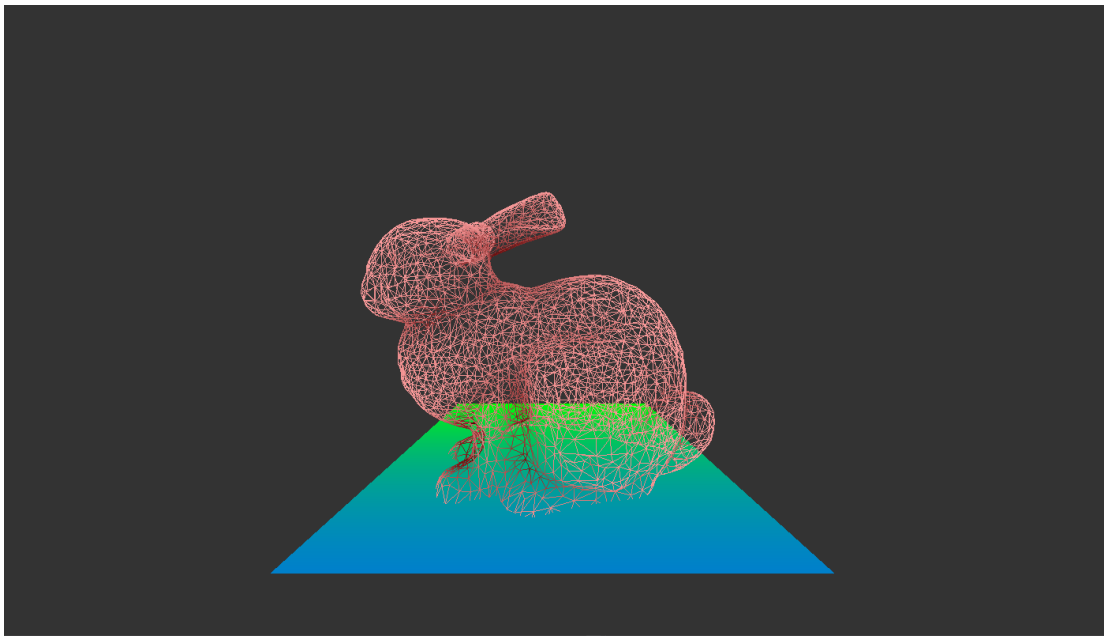
  Implemented with for loops to access selected models.)

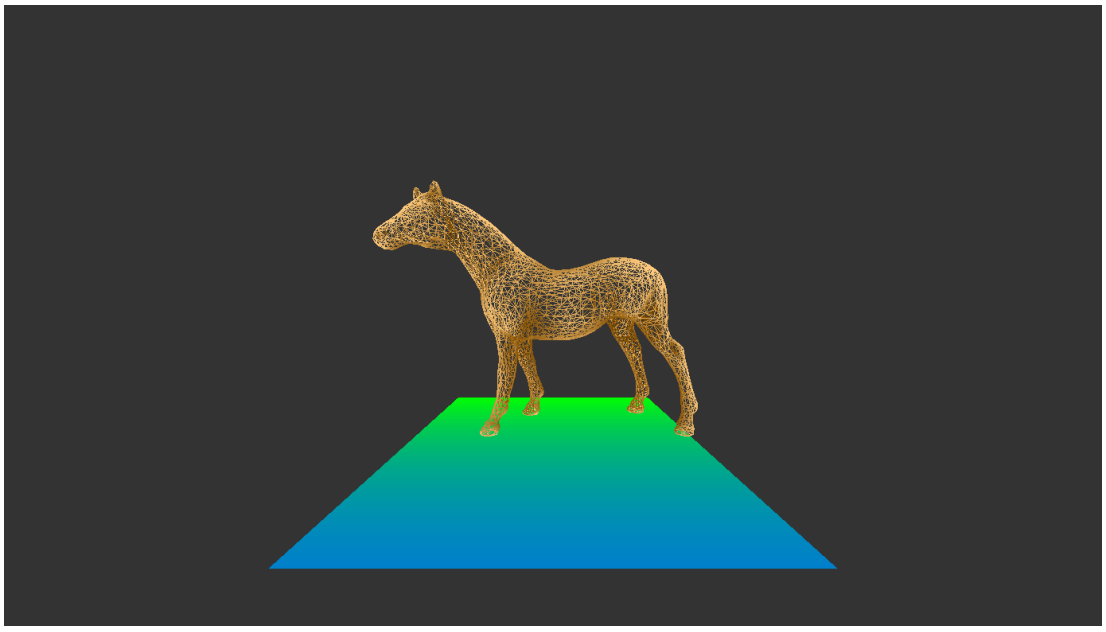




- **W (Switch and toggle between Solid and Wireframe mode)**

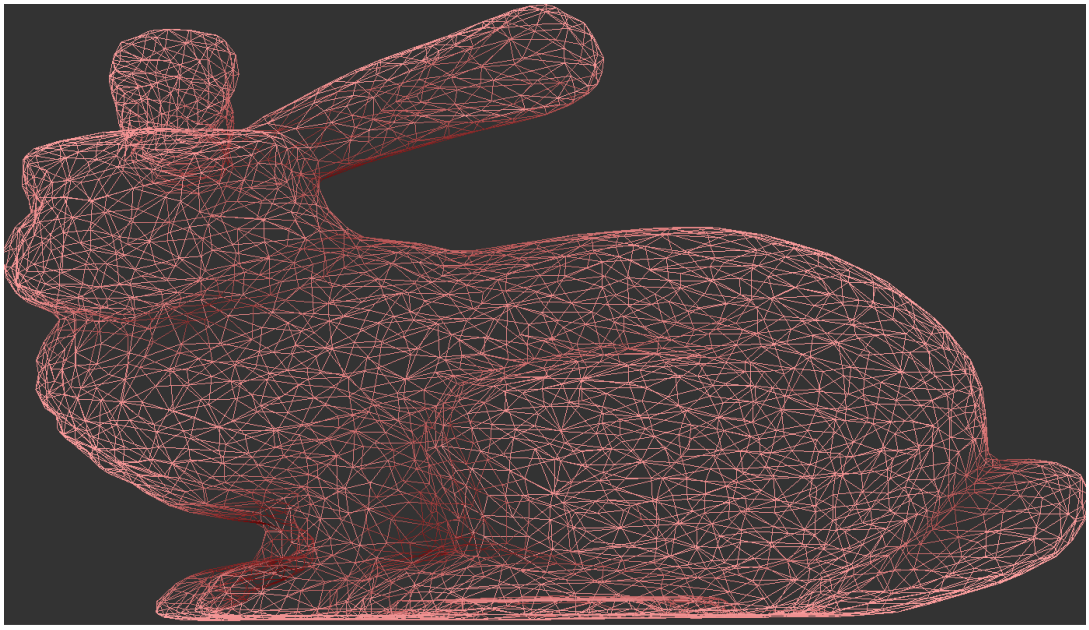
  (Using the W key to toggle the model in solid or wireframe. I set the line width with 1.0f for wireframe mode and use a variable to save the current state mode. Implemented by glPolygonMode with GL_LINE or GL_FILL.)





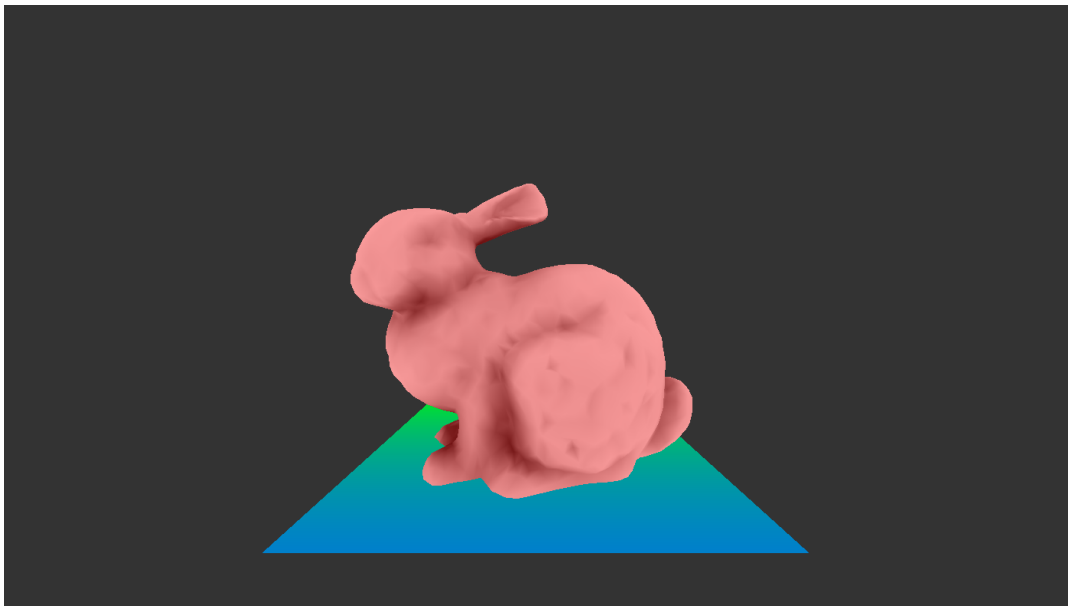
- **O (Switch to Orthogonal projection)**

  (Using the O key to set the projection in Orthogonal. There is no plane (ground) shown in orthogonal projection mode.)



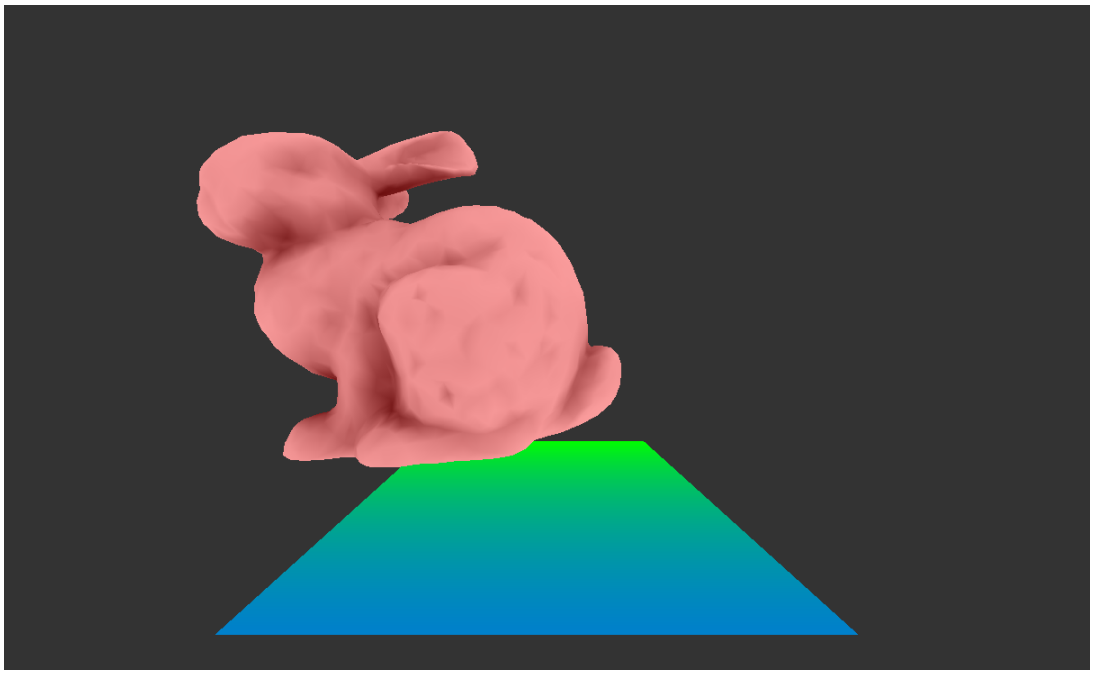
- **P (Switch to NDC Perspective projection)**

  (Using the O key to set the projection in NDC. As usual perspective.)



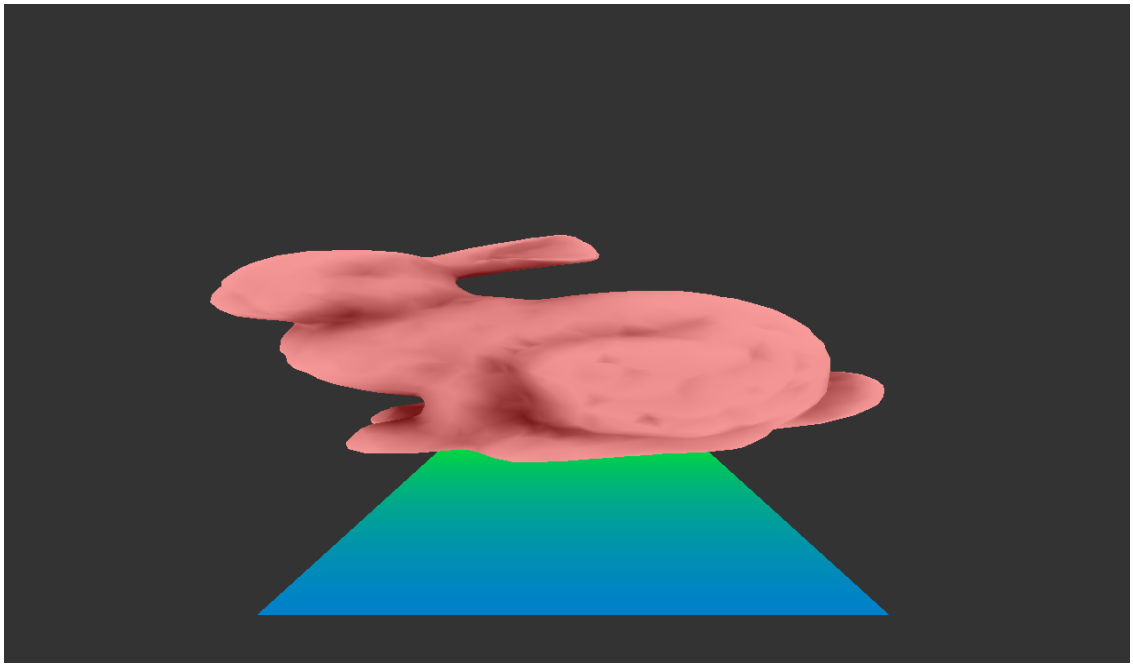
- **T (Switch to translation mode)**

  (Using the T key to switch to translation mode, we can move the model through our mouse click or mouse scroll with any axis, the plane is not going to be translated, only the model can translate. Once the mouse is clicked and drag to new position, new x and y will updated to models.position.x or .y or .z)



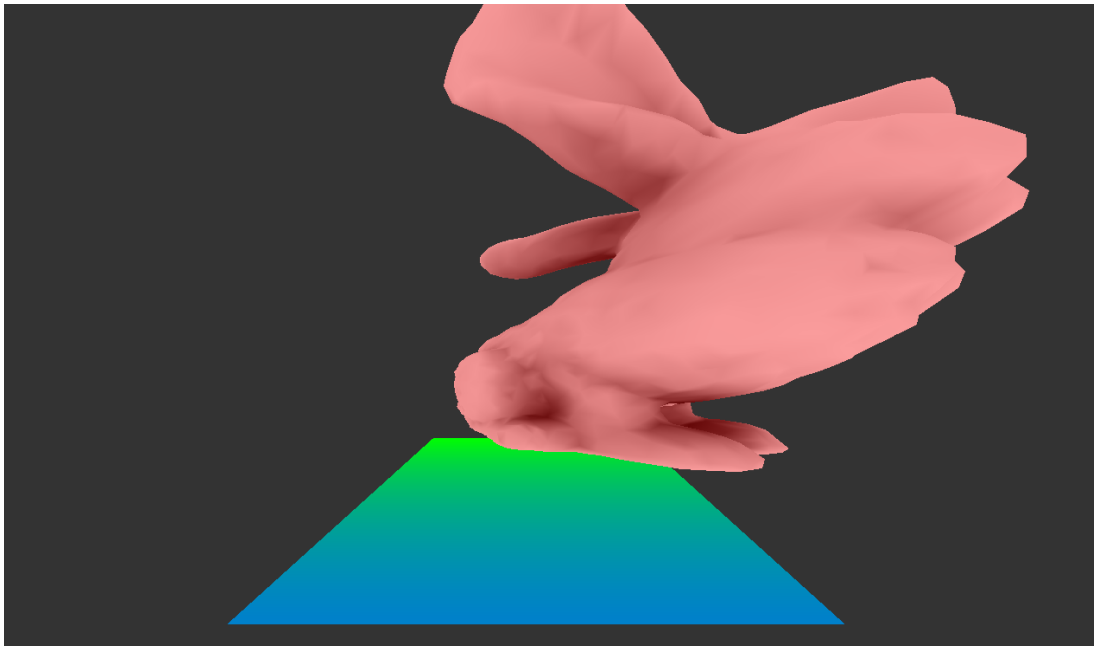
- **S (Switch to scale mode)**

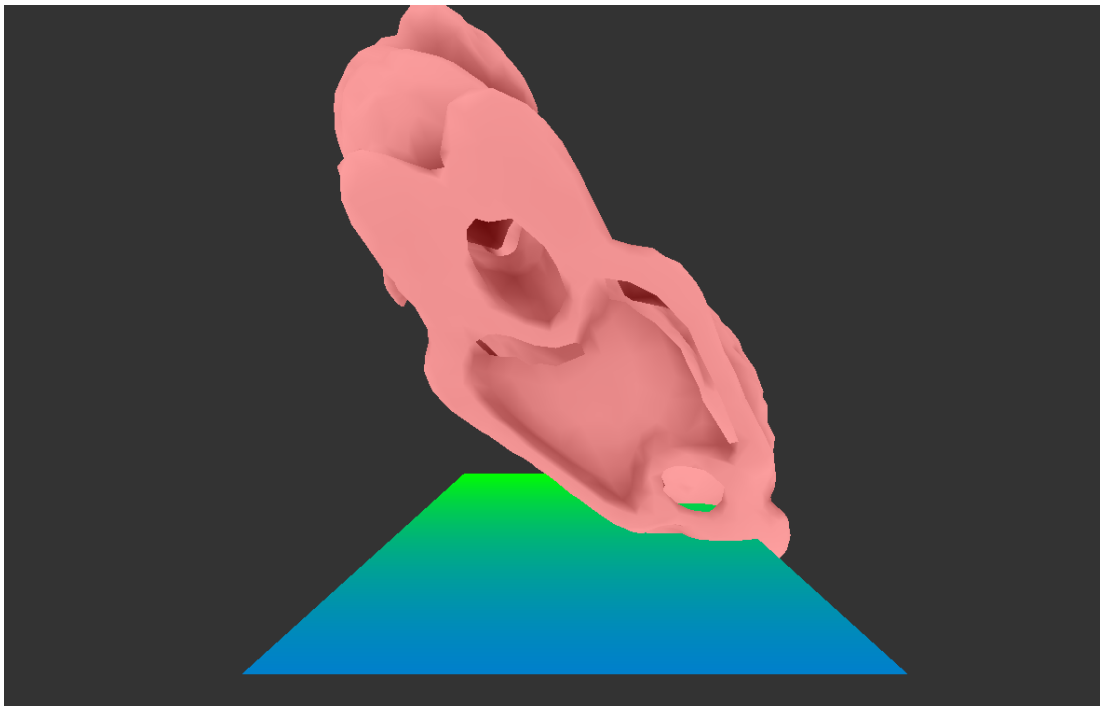
  (Using the S key to switch to scaling mode, same as translation, only the model can be rescaled.)



- **R (Switch to rotation mode)**

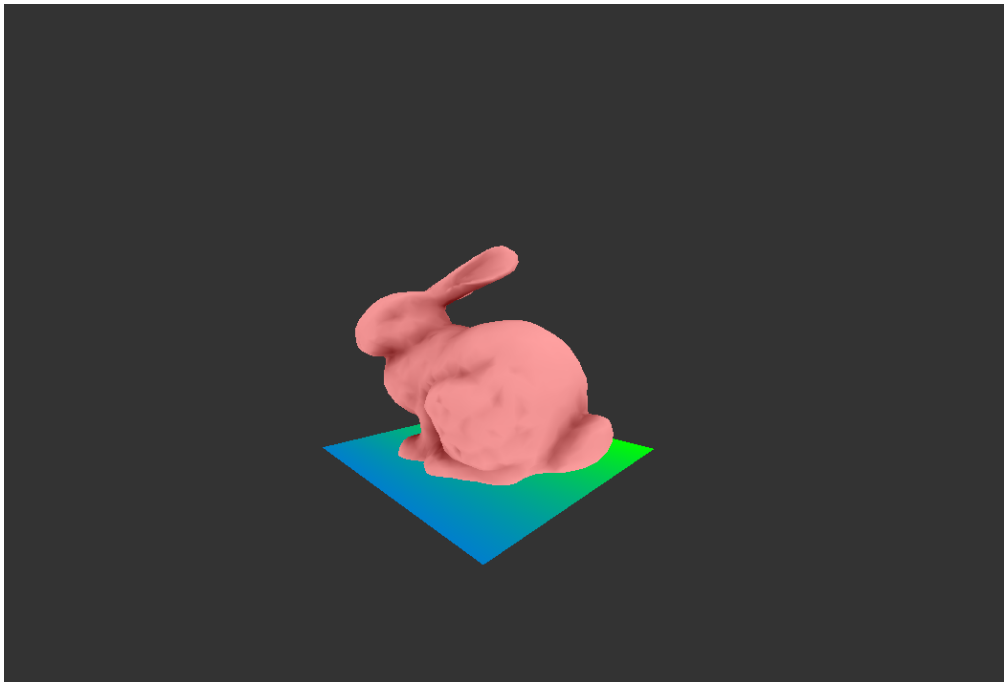
  (Using the R key to switch to rotation mode, only rotate the model, you can try to rotate it in x-axis or y-axis ways. Multiply the original matrix with the different axis matrix with sin(val) or cos(val) to calculate a new form of model.)

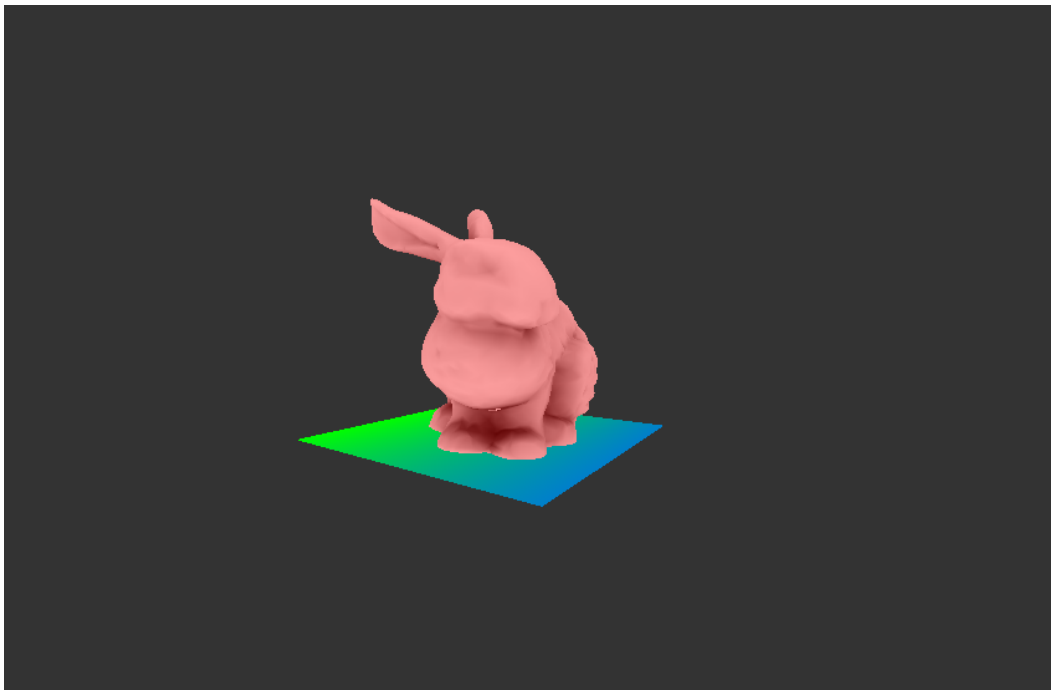




- **E (Switch to translate eye position mode)**

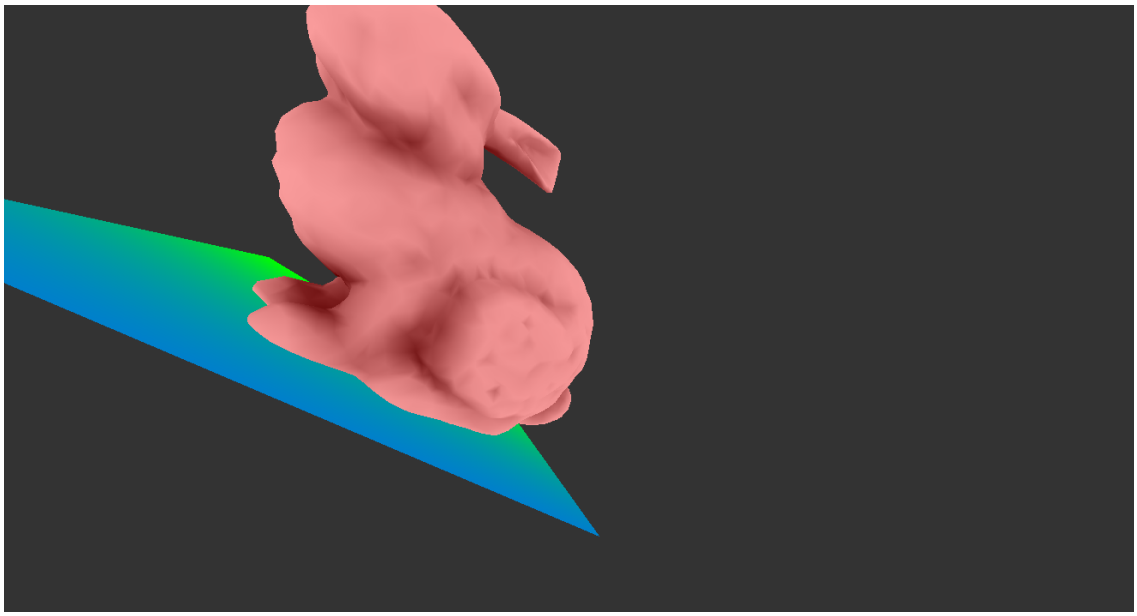
  (Using the E key to change the camera view as eye position. When the camera view is changed, the model and plane will have different perspectives.)

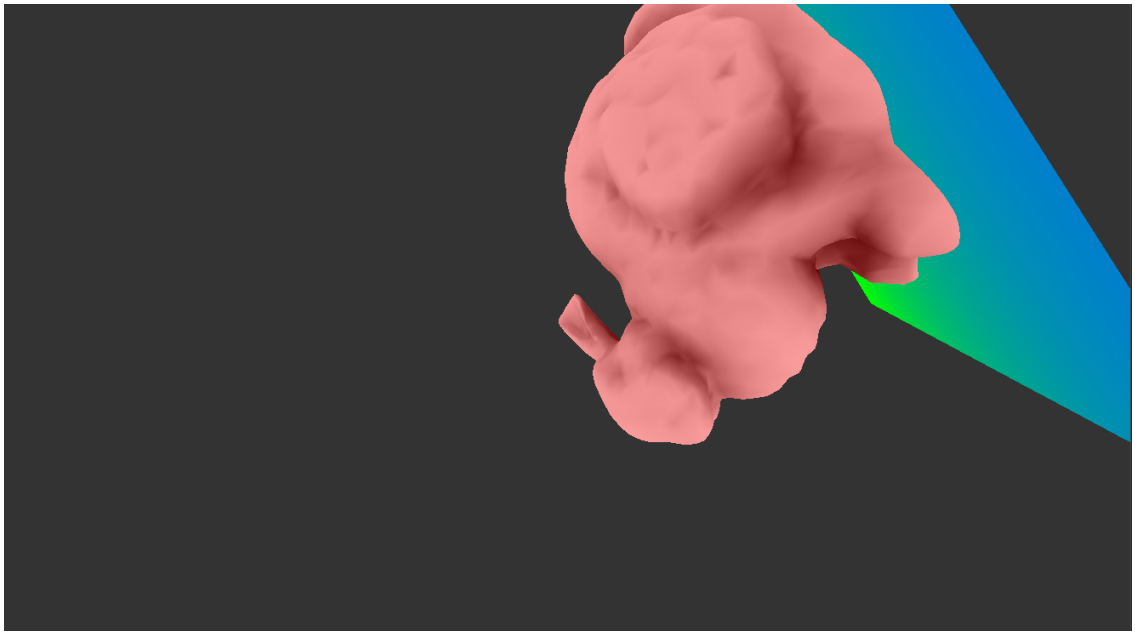




- **C (Switch to translate viewing center position mode)**

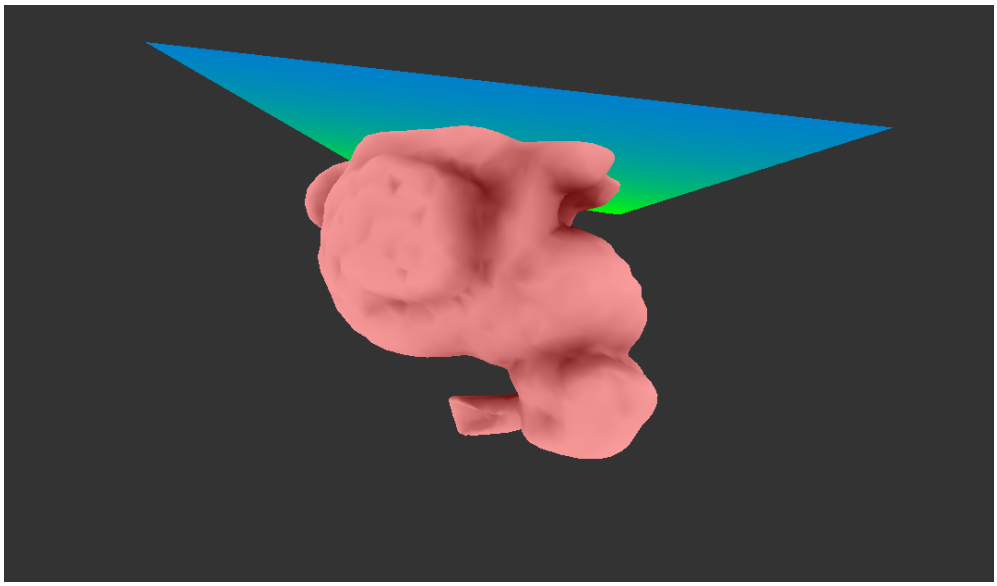
  (Using the C key to change the camera view as center position mode. When the camera view is changed, the model and plane will have different perspectives.)





- **U (Switch to translate camera up vector position mode)**

  (Using the U key to change the camera view as up vector position mode. When the camera view is changed, the model and plane will have different perspectives.)



- **I (Print information (Translation Matrix, Rotation Matrix, Scaling Matrix, Viewing Matrix, Projection Matrix)**

  (Using the I key to print and show the corresponding matrix values in the terminal.)

```
Left button pressed
Left button release
Translation Matrix :
(1,     0,      0,      0.055)
(0,     1,      0,      -0.035)
(0,     0,      1,      0)
(0,     0,      0,      1)

Rotation Matrix :
(0.982041,      0,      0.188668,       0)
(0.0168534,     0.996002,       -0.087724,      0)
(-0.187913,     0.0893282,      0.978115,       0)
(0,     0,      0,      1)

Scaling Matrix :
(1.005, 0,      0,      0)
(0,     0.855,  0,      0)
(0,     0,      1,      0)
(0,     0,      0,      1)

Viewing Matrix :
(-0.983355,     -0.145366,      -0.109004,      0.0309554)
(0.166518,      -0.961053,      -0.220566,      0.00461522)
(-0.0726957,    -0.235046,      0.969262,       -2.05889)
(0,     0,      0,      1)

Projection Matrix :
(0.511476,      0,      0,      0)
(0,     0.895083,       0,      0)
(0,     0,      -1.00002,       -0.00200002)
(0,     0,      -1,     0)
```

- **Change window size with ratio**

  (Here I update the project_matrix with the new aspect_ratio(width/float) instead of proj.aspect)