Assignment 1

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March 10, 2019

1 Getting Started with OpenGL, SDL, GLM, and Transformations

1.1 Task 1: Panning

We can use $glm :: translate$ to pan the objects.

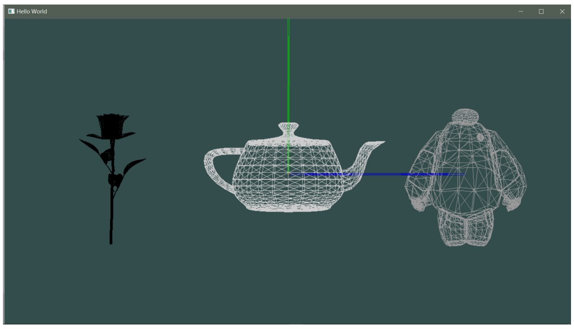

Figure 1: The screenshot of default screen

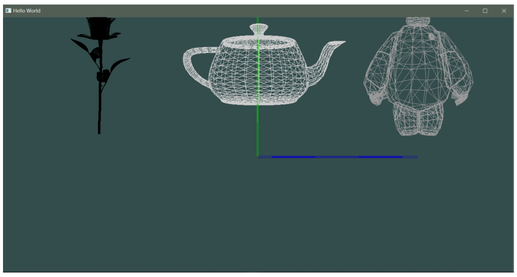

Figure 2: Touching top edge

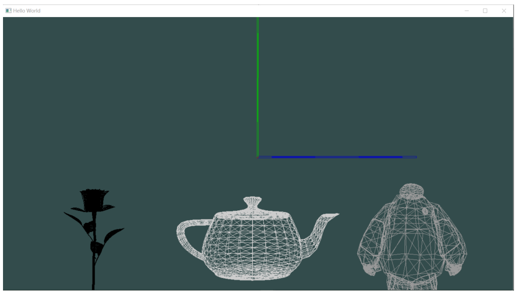

Figure 3: Touching button edge

1.2 Task 2: Z-translation

We can use $glm :: translation$ to do z-axis translation.

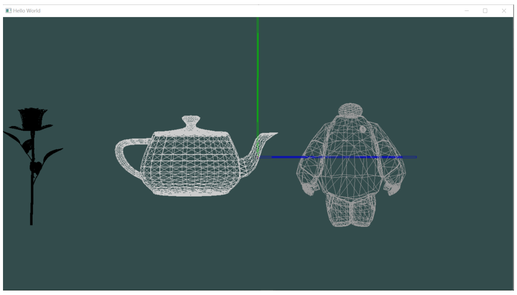

Figure 4: Touching left edge

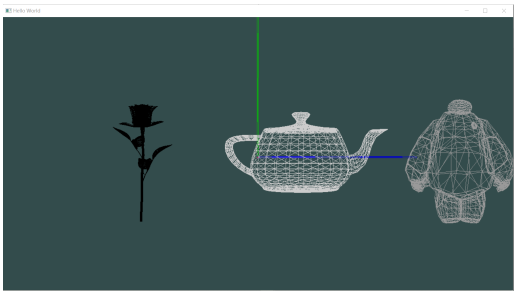

Figure 5: Touching right edge

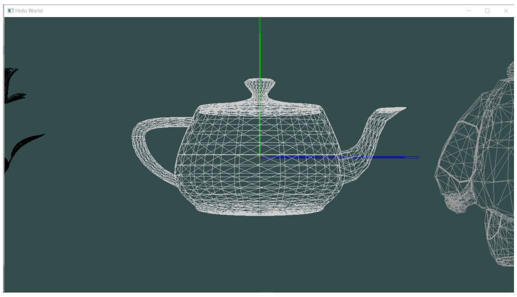

Figure 6: Zoom In

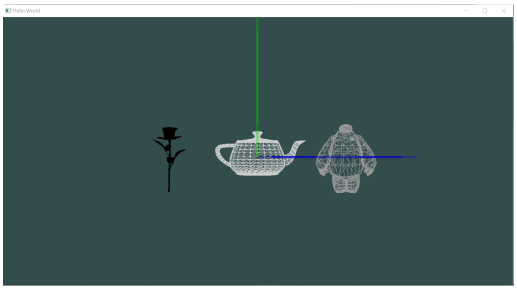

Figure 7: Zoom out

1.3 Task 3: Rotation

We can use $glm :: rotate$ to do rotation.

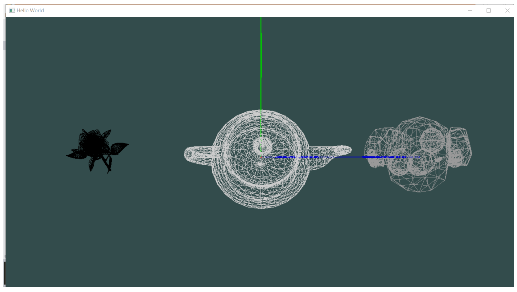

Figure 8: The top of the objects

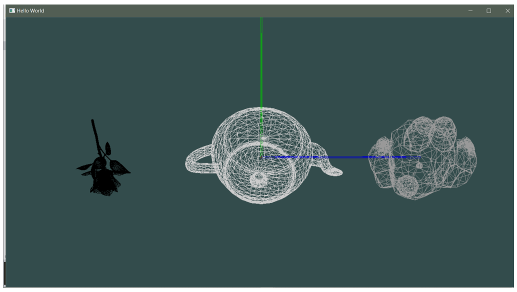

Figure 9: The button of the objects

1.4 Task 4: Extend 3D scene

I add a baymax model to the right of the original teapot and a rose model to the left of the original teapot.

1.5 Experience

We use $SDL\_MOUSEBUTTONDOWN$ and $SDL\_MOUSEBUTTONUP$ to detect whether the mouse button is pressed, and SDL_BUTTON_LEFT, SDL_BUTTON_RIGHT and SDL_BUTTON_MIDDLE to differentiate which button is pressed.

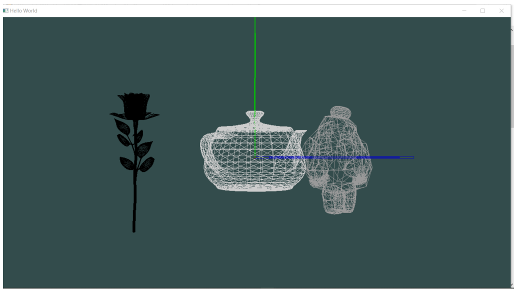

Figure 10: Rotate counter clockwise

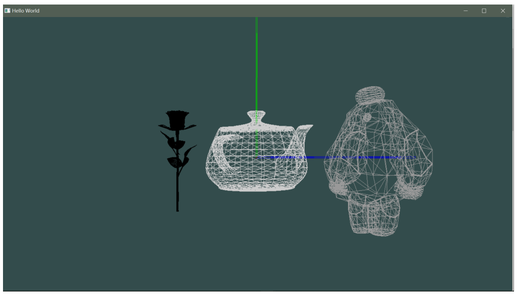

Figure 11: Rotate clockwise

We use $evt.motion.x$ and $evt.motion.y$ to record the position of mouse in x-xis and y-axis. Then we can calculate the difference to the coordinate where the mouse button was pressed using defined variables $lastXOffset$, $lastYOffset$. We should reset $lastXOffset$ and $lastYOffset$ to zero as long as we released the button (otherwise, the previous offset value will affect the following panning, translation and rotation).

To set model matrix, we can use $glm :: translate$ to do spanning and z-axis tranlation, use $glm :: scale$, to do scaling (which is not required in this project, but we can use it to amplify our objects) and use $glm :: rotate$ to do rotation.

After setting projection matrix, view matrix and model matrix, we attach them to shader uniform and then we can render all those objects.

1.6 Note

I print out the x, y, z-axis value of the objects and the rotation angles, whether the mouse button is pressed or released for debugging and checking.