

# CS7GV5 Report Assignment 1

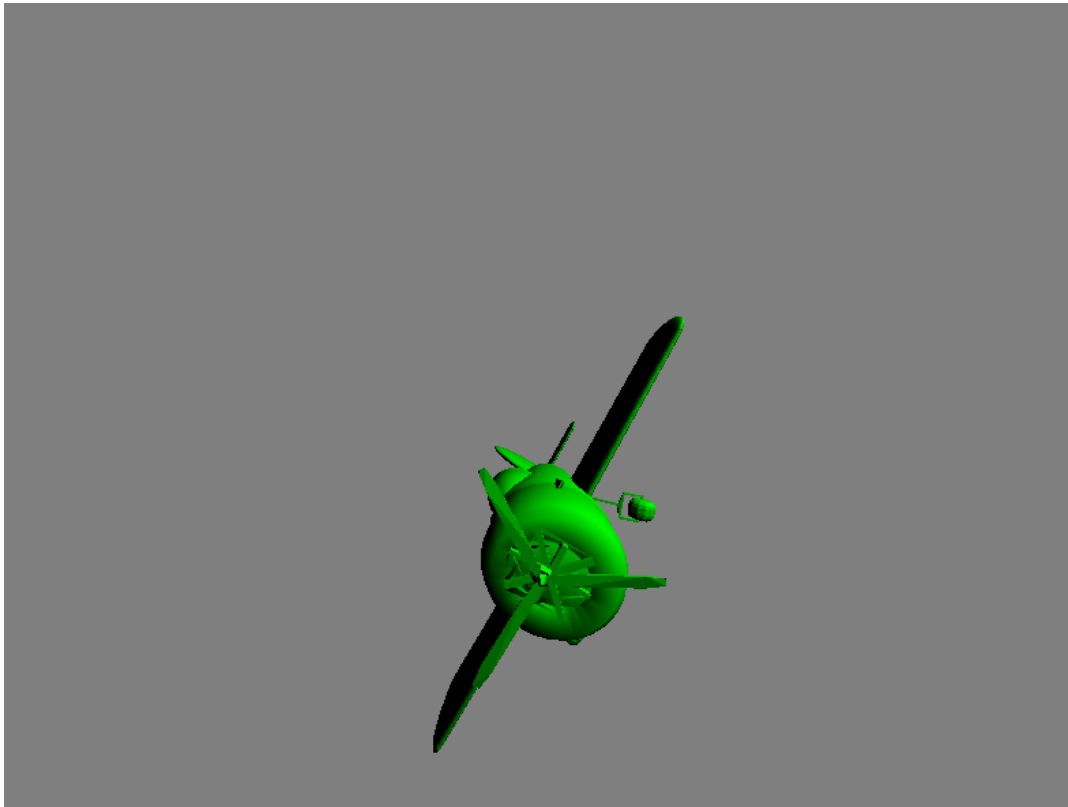
LINK TO VIDEO DEMONSTRATION → [https://youtu.be/n\\_FK-5obHd8](https://youtu.be/n_FK-5obHd8)

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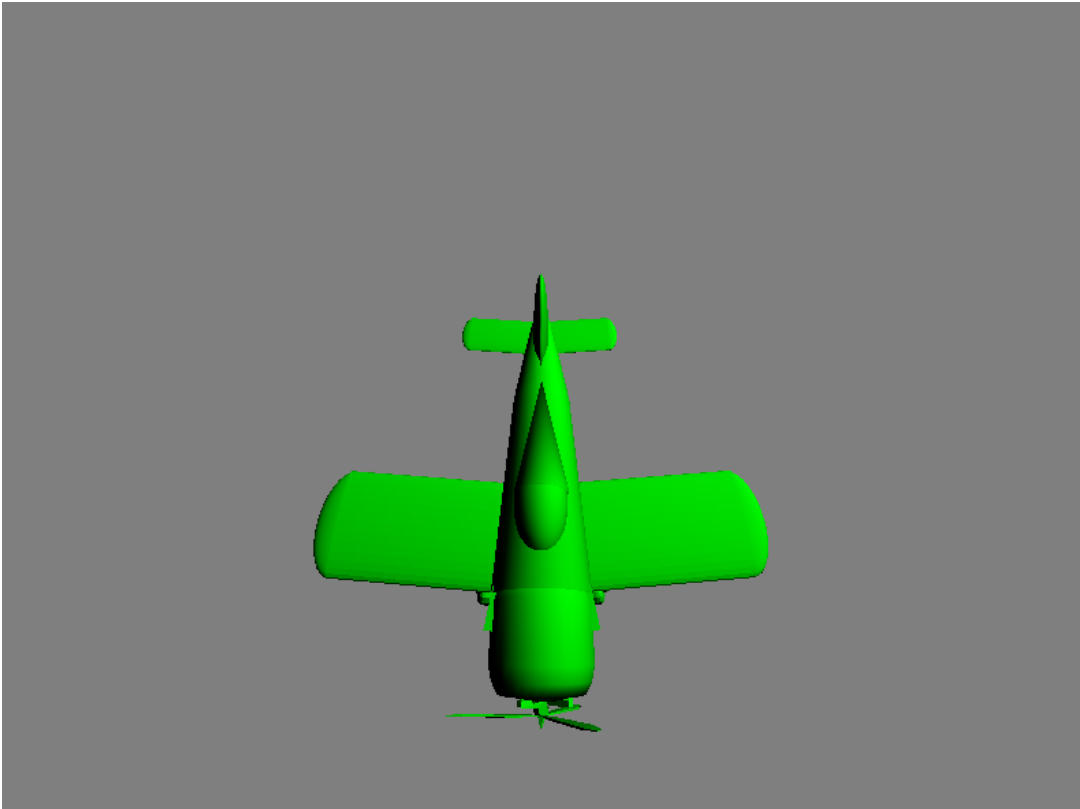
**Required feature:** pitch, roll, and yaw rotations, using Euler Angles, demonstrate gimbal lock

**Screenshot(s) of feature:**

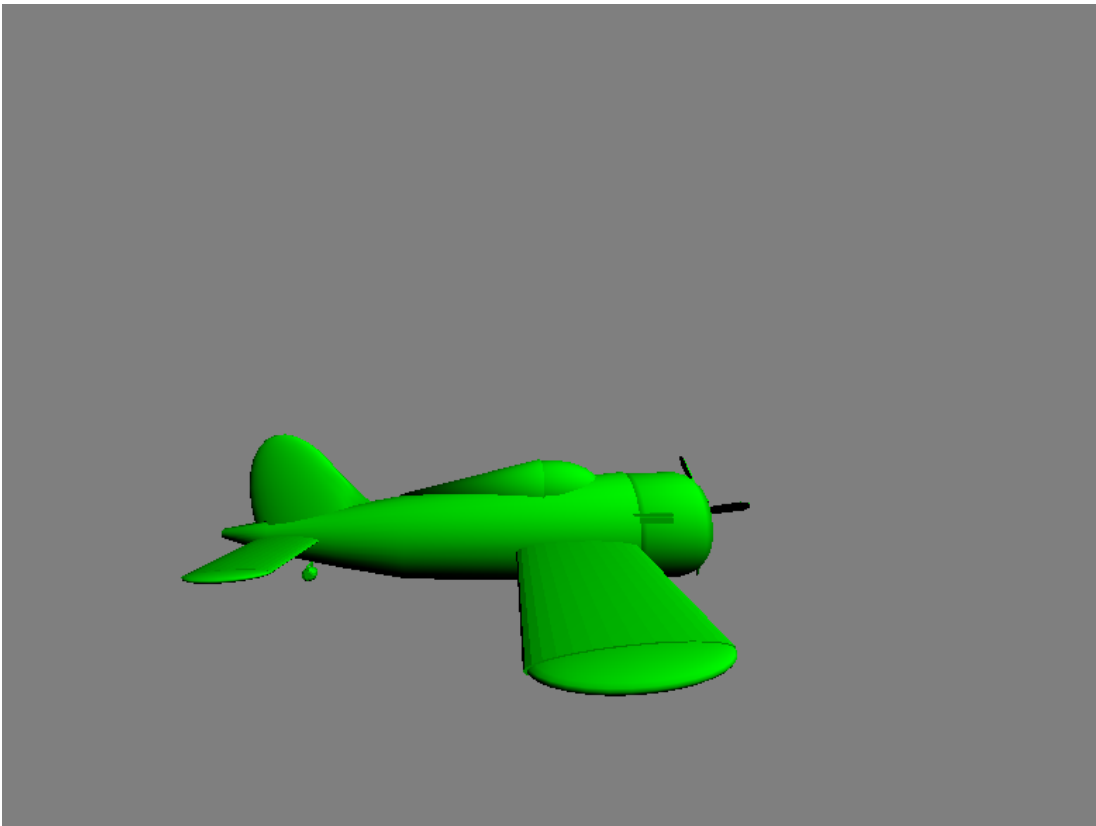
Roll



Pitch



Yaw



Code Snippet:

```

void keypress(unsigned char key, int x, int y) {

    if (key == 'c') { angles = !angles;}
    if (key == 'f') { FPV = !FPV;} // Change camera

    if (key == 'p') { // Pitch
        update_x += 20.0f;
        versor quaternion_x = quat_from_axis_deg(20, 1, 0, 0);
        QuaternionRotation = QuaternionRotation * quaternion_x;
    }

    if (key == 'y') { // Yaw
        update_y += 20.0f;
        versor quaternion_y = quat_from_axis_deg(20, 0, 1, 0);
        QuaternionRotation = QuaternionRotation * quaternion_y;
    }

    if (key == 'r') { // Roll
        update_z += 20.0f;
        versor quaternion_z = quat_from_axis_deg(20, 0, 0, 1);
        QuaternionRotation = QuaternionRotation * quaternion_z;
    }
}

```

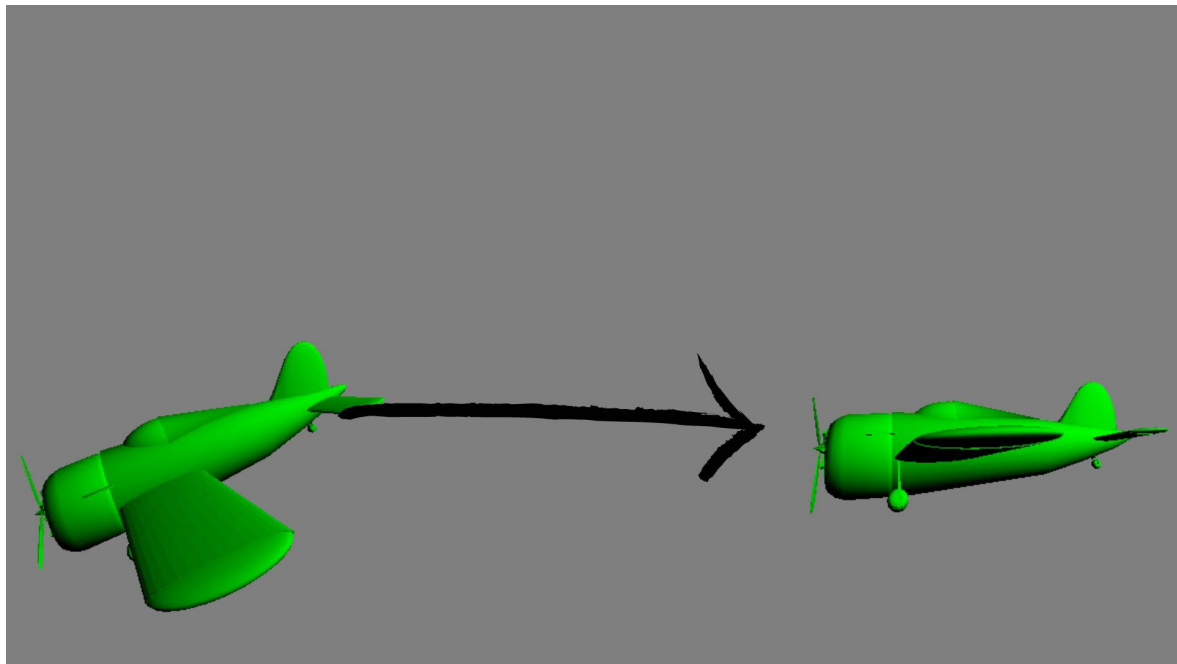
```

//Euler
if (angles == false) {
    model = rotate_x_deg(model, rotate_x);
    model = rotate_y_deg(model, rotate_y);
    model = rotate_z_deg(model, rotate_z);
}

```

### Extra Feature 1: Overcoming gimbal lock

Screenshot(s) of feature:



### Pseudocode and Code Snippet(s):

```
//Quaternions
mat4 view = identity_mat4();
mat4 persp_proj = perspective(90.0f, (float)width / (float)height, 0.1f, 1000.0f);
mat4 model = identity_mat4();
mat4 rotationMatrix = quat_to_mat4(QuaternionRotation);

if (angles == true) {
    model = model * rotationMatrix;
}

vector QuaternionRotation = quat_from_axis_deg(0, 0, 0, 1);
```

### Extra Feature 2: hierarchical structure



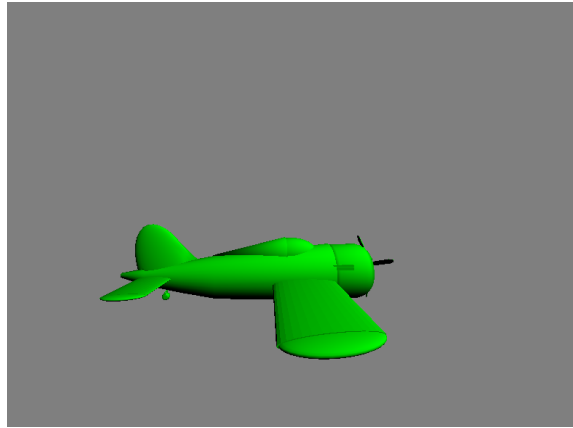
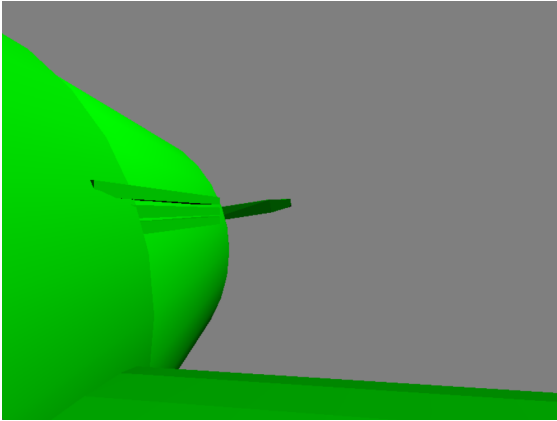
Screenshot(s) of feature:

### Pseudocode and Code Snippet(s):

```
//child propeller
mat4 propeller = identity_mat4();
propeller = rotate_z_deg(propeller, propeller_rotation);
propeller = translate(propeller, vec3(0.0f, 0.0f, 2.41859f));
propeller = model * propeller;
```

### Extra Feature 3: First person view

Screenshot(s) of feature:



### Pseudocode and Code Snippet(s):

```
if (FPV == false) {  
    view = translate(view, vec3(0.0, -1.5, -6.0f));  
}  
if (FPV == true) {  
    vec3 move = vec3(-1.0, -0.1, 0.6);  
    view = rotate_y_deg(view, 180);  
    view = model * view;  
    view = translate(view, move);  
}
```

```
if (key == 'f') { FPV = !FPV; } // Change camera
```