

## Week 4 Milestone 3 List of Enhancements

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SNHU CS-499

### Drone Movement Initialization

Variables for initial drone position.

```
79  □// -----
80  □// CS-499 Category 2 changes - 1 of 6
81
82  // variables for drone positioning
83  float dronePosX = 0.0 - numObjects + 1;
84  float dronePosY = 3.0;
85  float dronePosZ = 0.0 - numObjects + 1;
86  float lastDronePosZ = 0.0 - numObjects + 1;
87  bool moveRight = true;
88
89  □// end of changes
90  □// -----
91
```

### Drone Movement Logic

Drone movement logic is called during main method. Drone moves right every main loop until right edge of plane mesh is reached, then drone moves down one row and restarts on left. When drone reaches bottom right it resets to top left.

```
454  □// -----
455  □// CS-499 Category 2 changes - 2 of 6
456
457  // Drone Movement Logic
458  □ if (dronePosX < 0.0 + numObjects - 1) { // moves right until end of plane
459  |     dronePosX = dronePosX + droneVelocity; // CHANGE VALUE TO INCREASE DRONE SPEED
460  | }
461  □ else { // starts on next row after reaching end of plane
462  |     dronePosX = 0.0 - numObjects + 1;
463  |     dronePosZ = dronePosZ + 1.0;
464  | }
465  // reset after reaching end
466  □ if (dronePosX >= 0.0 + numObjects - 1 && dronePosZ >= 0.0 + numObjects - 1) {
467  |     dronePosX = 0.0 - numObjects + 1;
468  |     dronePosZ = 0.0 - numObjects + 1;
469  | }
470
```

## Drone View Toggle

When P key is pressed, switches view between free roaming mode and drone view. Object color detection only works in drone view mode.

```
593 // -----
594 // CS-499 Category 2 changes - 3 of 6
595
596 // function to toggle drone view
597 void key_callback(GLFWwindow* window, int key, int scancode, int action, int mods)
598 {
599     if (key == GLFW_KEY_P && action == GLFW_PRESS)
600     {
601         droneView = !droneView;
602     }
603 }
604
605 // end of changes
606 // -----
```

## Drone Color Reader

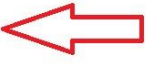
Color reader function checks color of objects in drone view. When a red flagged object is found position coordinates are output to console.

```
645 // -----
646 // CS-499 Category 2 changes - 4 of 6
647
648 // Function to read pixel color and output coordinates of flagged objects
649 void ReadColor(int x, int y) {
650
651     unsigned char pixel[4];
652     glReadPixels(x, y, 1, 1, GL_RGB, GL_UNSIGNED_BYTE, pixel);
653
654     // Prints coordinates of objects with greater Red color value
655     if ((int)pixel[0] > (int)pixel[1] && (int)pixel[0] > (int)pixel[2]) {
656         cout << "Flagged object at position: " << (int)dronePosX << ", " << (int)dronePosZ << endl;
657     }
658 }
659
660 // end of changes
661 // -----
662
```

## Drone Object Generator

Drone object is generated with position determined by drone movement logic.

```
858 // -----
859 // CS-499 Category 2 changes - 5 of 6
860
861 // Drone Object mesh
862 glBindVertexArray(meshes.gBoxMesh.vao);
863
864 // 1. Scales the object
865 scale = glm::scale(glm::vec3(0.5f, 0.5f, 0.5f));
866 // 2. Rotate the object
867 rotation = glm::rotate(0.0f, glm::vec3(1.0, 1.0f, 1.0f));
868 // 3. Position the object
869 translation = glm::translate(glm::vec3(dronePosX, dronePosY, dronePosZ));
870 // Model matrix: transformations are applied right-to-left order
871 model = translation * rotation * scale;
872 glUniformMatrix4fv(modelLoc, 1, GL_FALSE, glm::value_ptr(model));
873
874 // bind textures on corresponding texture units
875 glActiveTexture(GL_TEXTURE0);
876 glBindTexture(GL_TEXTURE_2D, texture4);
877
878 // Draws the triangles
879 glDrawElements(GL_TRIANGLES, meshes.gBoxMesh.nIndices, GL_UNSIGNED_INT, (void*)0);
880
881 // Deactivate the Vertex Array Object
882 glBindVertexArray(0);
883
884 // end of changes
885 // -----
```



## Drone View Render

When in drone view mode, view is determined based on current object position with camera pointed down.

```
895 // -----
896 // CS-499 Category 2 changes - 6 of 6
897
898 // Function called to render drone view
899 void DroneRender()
900 {
901     // camera/view transformation
902     glm::vec3 cameraPos = glm::vec3(dronePosX, 2.85f, dronePosZ); // view changes based on drone position
903     glm::vec3 cameraFront = glm::vec3(dronePosX, 0.215f, dronePosZ); // view changes based on drone position
904     glm::vec3 cameraUp = glm::vec3(0.0f, 0.0f, -1.0f);
905     glm::mat4 view = glm::lookAt(cameraPos, cameraFront, cameraUp);
906 }
```

