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    // ------------------------------------------------------------------------------------------
```

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     // Functioned called to render drone view
899     void DroneRender()
900     {
919         // camera/view transformation
920         glm::vec3 cameraPos = glm::vec3(dronePosX, 2.85f, dronePosZ); // view changes based on drone position
921         glm::vec3 cameraFront = glm::vec3(dronePosX, 0.215f, dronePosZ); // view changes based on drone position
922         glm::vec3 cameraUp = glm::vec3(0.0f, 0.0f, -1.0f);
923         glm::mat4 view = glm::lookAt(cameraPos, cameraFront, cameraUp);
924
```