COSC363 Assignment 1

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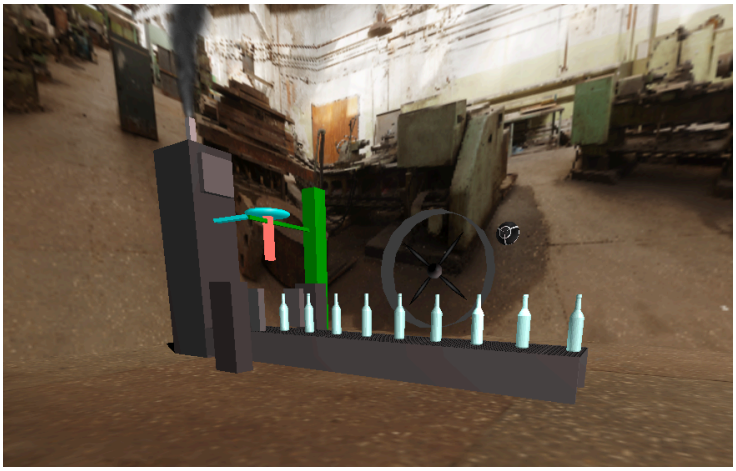
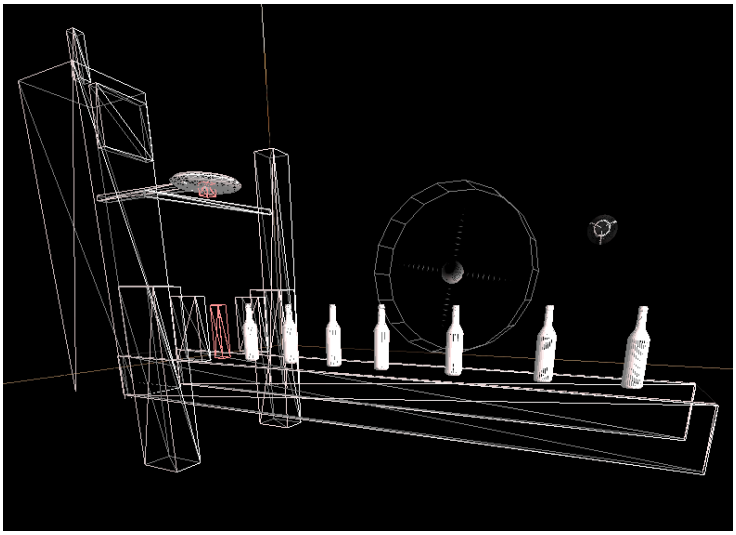
Scene Description

The scene is situated in a glass bottle factory, where the machines are hard at work producing glass bottles. Upon entering, the viewer will see a moving conveyor belt with glass bottles on top of it. The process of the factory started in the furnace that is melting sand into gob. These gob coming out of the furnace pipe is cut in fixed sizes by the cutting machine. The cut gob then falls down into the conveyor belt where it is then molded by the molding machine into glass. A fan in the scene is also crucial to cool down the glass bottles. A flying supervisor is seen monitoring the bottles production. The bottles are designed using Blender. The scene is located in a 200 * 200 cube.



Controls

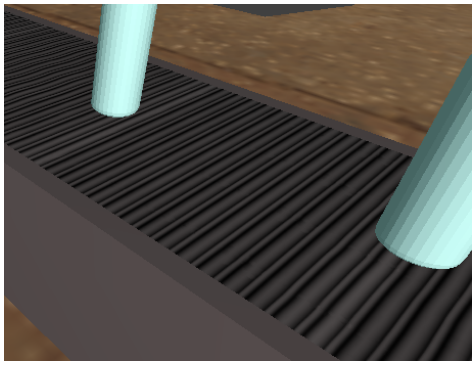
To have different views of the scene,the viewer can use arrow keys.
To enter and exit wireframe mode, toggle F1 key.



Extras

Below are the list of all extras that have been implemented in the scene:

1. Planar shadows
   2 planar shadows are implemented on the scene, one for the furnace, and the other for the cutting machine.
   

2. Moving conveyor
   Dynamic texture mapping is used to make it seem like the conveyor belt is moving.
   

3. Sky box
   The scene is designed as a 200 * 200 cube, and the wall texture is mapped into each wall.

4. Dynamic Spotlight
   A flying supervisor depicted as a sphere is flying in a fixed path and acting as a dynamic spotlight. The spotlight is facing downward on the floor.

5. Fan generated using mathematical formula
   An industrial fan is depicted using a fan casing, and fan blades.
   The fan casing is generated using GL_QUAD_STRIP to make a whole circle. The calculation for the circle is given as the equation below.

```
// Calculation for the vertices for the fan casing which is a circle
void makeCircle() {
    for (int i = 0; i < 18; i++) {
        float theta = (2.0 * M_PI * i) / 18;
        vx[i] = r * cos(theta);
        vy[i] = r * sin(theta);
    }
}
```

   The fan blades are generated with a sphere in the center and then the actual blades are drawn with GL_QUAD_STRIP. The calculation for the vertices to generate almond eye like shape for the blades are given as below.

```
// Inner for loop for drawing each blade shaped like almond eye
glBegin(GL_QUAD_STRIP);
    for (int i = 0; i <= 12; i++) {
        float t = (float)i / 12;
        float x = 12 * t;
        float y = 5 * sin(t * M_PI) / 8;
```

6. Particle System
   Smoke coming out of the furnace is implemented like in lab 5.

Process

The program is developed using Visual Studio Code on Windows PC at home. It has been tested and also runs on CSSE lab machines. AI (ChatGPT) is used to answer my questions about opengl2 functions, and answer questions about debugging, especially in the part about loading the OFF mesh file of the bottle that I have designed using Blender.

Running the Program on CSSE lab machine

To run the program, a CMakeLists.txt has been provided to compile the program file assignment1.cpp. To compile using the terminal, navigate to the build directory using “cd build” and then once inside, run “make && ./assignment1.out”.

Declaration

I declare that this assignment submission represents my own work (except for allowed material provided in the course), and that ideas or extracts from other sources are properly acknowledged in the report. I have not allowed anyone to copy my work with the intention of passing it off as their own work.

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