CSE251: Graphics - Spring 2016:

Assignment 2: Moving in a 3D World

Due Dates. Part 1: Jan 31st, 10 pm. and Part 2: Feb 14th, 10pm.

1 The Problem

This time, we will make a 3D world. The world will be an adventure course where a person has to go from their current position to a destination, while avoiding obstacles. During this journey, your program should allow the action to be viewed from multiple positions, which is controllable from the keyboard/mouse. The assignment submission is divided into two parts. The first part (2.1), which is due before Mid-1, includes creating a moving person (or robot) with limited camera views and a simple world. Part-2 (2.2) will be the final submission, which will include the complete obstacle course and all camera views.

The requirements mentioned below is the minimum set. It is recommended that you include additional objects/elements in the world according to your imagination and ability.

2 The 3D World

The world consists of a flat square tiled land of 10×10 tiles, surrounded by water. You start on $Tile_{1,1}$ and has to reach $Tile_{10,10}$ (see Fig. 2). Some of the tiles are missing, and if you step on these spots, you will fall down and the adventure will be over. Some of the tiles keep moving up and down. You cannot jump too high or too deep, and jumping too deep will cause injury and game termination.

In your world, the obstacles will appear and disappear at different tiles and you are supposed to traverse the obstacle course and reach the destination. Use your imagination to create different obstacles and the penalties for stepping on each type of obstacle.

You should be able to control the adventurer character, both using a keyboard and the mouse. Define your own controls keys. For the sake of uniformity, keep the arrow keys to move the character to the four adjacent tiles and the spacebar to jump. Other keys may be defined as per your imagination and described in your readme file.

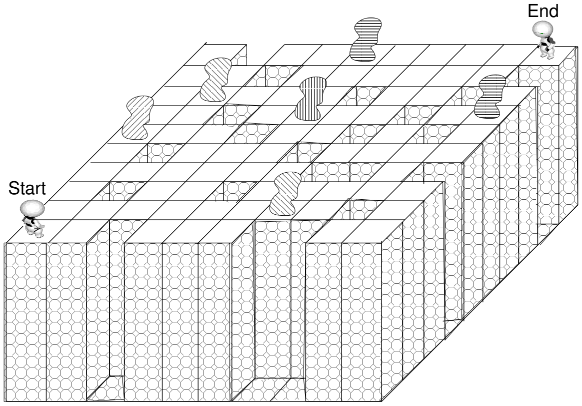

Figure 1: Mock-up of a sample world with missing tiles and the start and end positions of the person.

The character is wearing a headlight on his helmet, which can be switched on if the obstacle course becomes dark. The headlight is a spotlight that will illuminate a limited region in front of the person depending on his position and the direction that he faces.

3 Controls and Camera

The keyboard controls include direction of movement of the person (left,right arrow keys) and the speed of movement (f and s for faster and slower). In addition, one should also be able to control the position of the camera to the following positions:

1. *Adventurer View:* View from the adventurers head position, where one can see part of the obstacle course in the front.

2. *Follow-cam View:* A view of the person and the region in front of him from a location above and be-

hind the person as if a camera is following him from above.

3. *Tower View:* The camera sitting on a tower to the side of the obstacle course observing it at an angle.

4. Top View: A simple view from directly above, looking down. While this view is good to see the whole course, it does not reveal rising and lowering tiles very clearly.

5. Helicopter Cam: Here the camera is movable with the mouse in an intuitive manner. Click and drag should change the look angle, up vector is always up, and scroll wheel will move the camera close or away from the scene.

Note that one should be able to switch views, and then control the cameras and the person as per their wish.

4 Optional

Feel free to include additional objects, animations, textures, etc. to make the world more realistic and rich. You may have a more complex obstacle course than the one described. Additional interesting camera views may be provided. You may also add sound effects, which can significantly change the user experience.

5 Submission

You submissions should include your source code, a makefile and a compiled executable. You need to include a readme file that describes any additional information that is needed in compiling/executing you code. Do not use any non-standard libraries.

The submission will be in two stages: The first, due on the Jan.31st should contain at least a simple fixed obstacle course and a simple shaped character (such as a rectangular box) with at least the top-view and tower-view camera positions working and the person controllable from the keyboard. You are welcome and advised to do more by this deadline.

The final submission, on Feb. 14th, should contain the complete obstacle course with the corresponding controls and movement, the remaining camera views and game elements, and any optional items you may choose to add.

6 Grading

You will be graded based on the correctness and efficiency (speed) of the implementation of the minimum elements described above. This will contribute to 90% of your grade. Remaining 10% will be given based on the improvements that you do over the basic world. In addition, submissions that are found to be exceptional by the graders, will be showcased, and will be awarded extra credits up to 10%.

30% of the grades will be based on the submission on Jan. 31st and the remaining 70%, based on the final submission.