Subject : CSCI420 - Computer Graphics

Assignment 2: Simulating a Roller Coaster

Author : Nikhil Johny Karuthedath

USC ID : 2900797907

Description: In this assignment, we use Catmull-Rom splines along with OpenGL core profile shader-based texture mapping and Phong shading to create a roller coaster simulation.

Core Credit Features: (Answer these Questions with Y/N; you can also insert comments as appropriate)

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1. Uses OpenGL core profile, version 3.2 or higher - **Y**

2. Completed all Levels:

Level 1 : - **Y**

level 2 : - **Y**

Level 3 : - **Y**

Level 4 : - **Y**

Level 5 : - **Y**

3. Rendered the camera at a reasonable speed in a continuous path/orientation - **Y**

4. Run at interactive frame rate (>15fps at 1280 x 720) - **Y**

5. Understandably written, well commented code - **Y**

6. Attached an Animation folder containing not more than 1000 screenshots - **Y**

7. Attached this ReadMe File - **Y**

Extra Credit Features: (Answer these Questions with Y/N; you can also insert comments as appropriate)

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1. Render a T-shaped rail cross section - N

2. Render a Double Rail - **Y**

3. Made the track circular and closed it with C1 continuity - N

4. Any Additional Scene Elements? (list them here) – **Y (Cross Bars)**

5. Render a sky-box - N

6. Create tracks that mimic real world roller coaster - N

7. Generate track from several sequences of splines - N

8. Draw splines using recursive subdivision - N

9. Render environment in a better manner - N

10. Improved coaster normals - N

11. Modify velocity with which the camera moves - N

12. Derive the steps that lead to the physically realistic equation of updating u – **Y (attached below)**

Additional Features: (Please document any additional features you may have implemented other than the ones described above)

NA

Open-Ended Problems: (Please document approaches to any open-ended problems that you have tackled)

NA

Keyboard/Mouse controls: (Please document Keyboard/Mouse controls if any)

NA

Names of the .cpp files you made changes to:

**1. hw2.cpp**

**2. basic.vertexShader.glsl**

**3. basic.fragmentShader.glsl**

**4. texture.vertexShader.glsl**

**5. texture.fragmentShader.glsl**

Comments : (If any)

**The roller coaster track is saved in rollerCoaster.sp**

**Run: ./hw2 track.txt**

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Description automatically generated

A close up of a whiteboard

Description automatically generated