CS 174A Final Group Project Proposal

Team 49: Sailing The Spectrum

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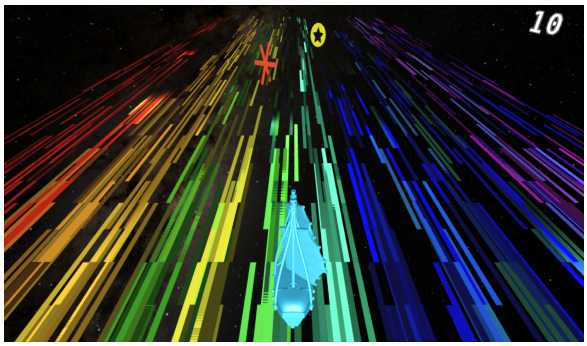
The Theme of Animation:

The theme of our project is a game of collecting rewards on the rainbow river. Players sail a sailing boat on the rainbow river in the galaxy. There is a steady stream of rewards that fall from the sky along with some obstacles. Players control the sailing boat by using the left and right keys to collect rewards to score points while avoiding obstacles to survive. Once the sailing boat hits an obstacle, the player loses the game.

Players score points for collecting different types of rewards, for example, easter eggs represent 2 points, coins represent 5 points, and diamonds represent 10 points. Running into an obstacle (spikes) will result in all points being lost.

Furthermore, the player can reset the game (by pressing the ‘r’ key), move the sailing boat (by using the left and right keys), speed up and down the game (by using the up and down keys), and play and pause the background music of the game (by pressing the ‘m’ key).

The left image is a photo from our project. The right image is the logo of our game.



Topics learned in the course used:

- **Matrices Transformations:**
  We will use combinational matrices and transformation to move, scale, and rotate objects like rewards, obstacles, the sailing boat, and spectrums.
- **Shapes:**
  We will use classes of shapes in the Tiny Graphics Shape class to set the shapes of rewards and obstacles, such as Subdivision_Sphere(), etc.
- **Material:**
  We will set the material properties for each object, such as the object color, the coefficient of ambient, diffuse, and specular, and the texture.
- **Texture Mapping:** We will load a galaxy image (galaxy.jpg) as texture into the material of a big sphere to generate the background of the game, load a star image (stars.png) as texture into the material of rewards, and load a line image (lines5.png) as texture into the material of the spectrum to generate the rainbow river.
- **Lighting:**
  We will employ ambient, diffuse, and specular lighting to illuminate the spectrum, the boat, the rewards, and the obstacles.

Interactivity:

Button Controls:

- [Left Arrow] Go Left
- [Right Arrow] Go Right
- [Up Arrow] Speed up the game
- [Down Arrow] Speed down the game
- [r] Restart the game
- [m] Play/Pause the background music

Advanced Features:

- **Collision Detection:**
  - When the spaceship hits the obstacle, the game ends.
  - When the spaceship hits the reward, the texture of the spaceship will be changed and the game score will increase relative points based on the shape of the reward.
- **Physic-based simulation:**
  - Apply gravity to the objects when they fall from the sky
  - Simulate the phenomenon that objects bounce up and down when they fall into the river surface.
  - Use the idea of Angular interpolation and Verlet interpolation to make the sailing boat's motion smoother.