

App Design and Functionality:

The snooker game application is designed with an intuitive mouse-based cue function to enhance user interaction. The decision to use mouse-based interaction for the cue stick was driven by the need for precision and ease of control, which are critical in a game like snooker. The user can aim and control the power of their shots using simple mouse movements and clicks, making the game accessible and engaging for players of all skill levels.

The cue stick appears when the user clicks near the cue ball and adjusts its angle based on the mouse position. Dragging the mouse controls the power of the shot, which is visually represented by the cue stick's movement. Upon releasing the mouse button, the cue stick applies force to the cue ball, simulating a realistic snooker shot. Additionally, users can fine-tune the angle and power of their shot using the arrow keys, providing precise control for more experienced players:

- Left/Right Arrows: Adjust the aiming angle.
- Up/Down Arrows: Increase or decrease the shot power.

Collision Handling:

A significant challenge in the development was ensuring realistic ball collisions. We leveraged Matter.js, a robust 2D physics engine, to simulate the interactions between the balls and the table's cushions. Custom collision handling functions were implemented to ensure that balls do not stick together upon collision but instead bounce off each other with appropriate restitution and friction values. The user is also prompted with the type of impact, such as cue-red, cue-colour, and cue-cushion, to provide immediate feedback on the game events.

Modes of Play:

The game offers three modes, selectable via the '1', '2', and '3' keys:

1. Standard Mode: Balls are positioned in their traditional spots.
2. Random Red Ball Positioning: Red balls are placed randomly.
3. Fully Random Positioning: All balls are positioned randomly.

Ball Potting and Reset Scenarios:

- Cue Ball Potting: When the cue ball is potted, it is returned to the user to be placed within the 'D' zone.
- Colored Ball Potting: Colored balls are reset to their designated spots if potted.
- Error Handling: An error prompt is displayed if two colored balls are potted consecutively without potting a red ball in between, simulating a foul.

Table Design:

Perlin noise is used to create a realistic green felt texture for the table, enhancing the visual appeal and immersiveness of the game. The table's design, combined with the realistic physics, provides an authentic snooker experience.

Extension:

The extension involves implementing advanced collision physics and realistic ball behavior using custom vector mathematics. This unique idea enhances the realism of the game, offering a more immersive experience for players. The custom collision handling ensures that balls interact with each other and the cushions in a lifelike manner, addressing the limitations of the physics engine and providing a more accurate simulation of real snooker.