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CS 330 - 13648

8-1 Assignment

3/1/2025

Code Modifications and Development Process

To create an engaging 2D animation system, I implemented several key improvements focusing on physics, visual feedback, and gameplay balance. My approach prioritized creating intuitive player interactions while maintaining technical stability.

**1. Enhanced Physics System**

I completely redesigned the movement mechanics to incorporate velocity-based physics with gradual slowdown (friction coefficient = 0.95). By implementing delta time calculations, I ensured consistent circle speeds across different computer specifications. The boundary collision system was refined using position correction and velocity reversal, preventing circles from escaping the play area while maintaining natural-looking bounces.

**2. Visual Feedback Systems**

The color system was transformed to provide clear gameplay signals:

New circles spawn in a rotating 4-color sequence (red→green→blue→yellow)

Merged circles blend parent colors (average RGB values)

Bricks visually degrade through color desaturation when damaged

The paddle remains neutral gray to avoid visual clutter

**3. Strategic Gameplay Elements**

I introduced differentiated brick behaviors to encourage tactical play:

Reflective bricks (gray) redirect circles based on impact position

Destructible bricks fade through 3 damage states before breaking

Lower brick rows require more hits (1-4 based on row depth)

The circle merging system creates risk/reward decisions:

Combined circles grow 30% larger (capped at 25% screen width)

Merged entities inherit combined speed/momentum

Color blending shows merger history

**4. Input Optimization**

Control schemes were streamlined for accessibility:

SPACEBAR: Spawns circles with cycling colors

ARROW KEYS: Move paddle with frame-rate independent speed

ESC: Immediate exit option

**5. Playtesting Balance**

Through iterative testing, I adjusted key values:

Reduced base circle speed (0.5 → 0.15) to prevent chaos

Added merge size limit to prevent overpowered circles

Scaled brick durability by row for progressive difficulty

**Resulting Experience**

The final implementation creates an engaging loop: players strategically break color-coded bricks, manage merging circles that gain mass/velocity, and defend their space with the paddle. Visual cues like color blending and brick fading provide immediate feedback, while the physics system ensures predictable yet dynamic movement. This combination of technical systems and aesthetic design results in gameplay that's easy to learn but challenging to master.