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Air Hockey Game
6.111 Final Project Checkoff Checklist

Below is a plan for the deliverables that we plan to demonstrate at the final project checkoff. The commitment highlights the bare minimum that we hope to achieve to demonstrate an adequate understanding of digital systems and Verilog. The goal we listed is to have a fully functioning project that demonstrates a superior understanding to digital systems and implementing complex systems. And finally the stretch goal is what we hope to obtain to demonstrate a high level of complexity, innovation, and risk if the projects runs smoothly that will get achieved only if we have extra time before the deadline to polish the final project and everything else we listed in the commitment and goal is working properly.

Commitment:

1. Game FSM
   - Simple Start new game screen
   - One player game with basic form of air hockey that keeps track of score
   - Victory screen when game has concluded
   - Pause game feature
   - Reset puck in the center of the screen after scoring
2. Physics/Collision
   - Puck movement reflects friction effects
   - Realistic puck movement through the board
   - Puck will just bounce off paddle using only momentum with no external forces
3. Buttons on labkit to control paddle
   - Up, Down, Left, and Right buttons control the paddle movement
4. Visual
   - Basic rectangle with opening as goal for air hockey table
   - Basic circle for puck and paddle
   - Score displays only as a block number

Goal:

1. Sound
   - Basic sounds for ball collisions with wall and paddle, sound for scoring, sound for winning the game, sound for barely missed shot
2. Game FSM
   - Start screen with a one or two player mode
   - Add a timer feature
3. NES controller
   - User inputs for paddle movements will be controlled by NES controller
   - Add new button to represent "charging" paddle before hitting puck resulting in greater force

4. Visual
   - Add better visuals making the overall game look more aesthetic (possible ideas include: decorate the board, add shading to paddle and puck, fancier score display)
5. Physics
   - Implement weights for movement to make it easier to move in directions that would correspond to you standing at the edge of the table (e.g. harder to move paddle to center of the table than it is to move it closer to defend your goal). More than likely implement this using time as the weight

Stretch:

1. Sound
   - Add background music, change music when a player is close to winning, different music for different boards
2. Game FSM
   - Add various different board layouts some that include various obstacles such as sprites that players must interact with along with playing the basic air hockey game
   - Implement a start screen with a load saved game feature
3. Camera input to labkit
   - Camera will track up to two IR LEDs, one placed on each player's paddles and return player1 and/or player2 paddle positions to the labkit