Team 16 Project Proposal

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CS 4361.001 Computer Graphics

Project Title: Pong^3

("Cubed" because of the 3 additional game modes, and within each mode, you have 3 different types of opponents to choose from.)

Project Goals

- Simulate a game of pong in three dimensions
- Offer player the choice to enable temporary power-ups and power-downs
- Provide three additional ways to play game (described under "Specifications")
- Incorporate online multiplayer functionality

Specifications

- Player paddle movement:
  - Should be able to move in the x and y directions (z is going in and out of screen)
  - Should be able to rotate 45-ish degrees to the left, right, up, or down to deflect ball at different angles
  - Should be able to quickly push slightly forward briefly to increase force/speed of ball deflection
  - Should be able to do a combination of the above two bullet points
- 3 different opponent types to choose from:
  - Another person using the same computer
    - One person uses keyboard while another uses joystick controller
  - Another person using a different computer via online connection
    - Both players can use either keyboard or joystick controller
  - A programmed computer opponent
    - Its difficulty setting can be set to beginner, intermediate, or advanced
- Power-ups and power-downs
  - If enabled, they will periodically appear in random locations within the bounds box as shiny floating orb-like things
  - If the ball passes through one, player who last hit the ball gets that power-up/-down
  - Power-ups should consist at least of the following
    - "Divide and Conquer"
      - Next time your pad hits the ball, the ball splits into two balls bouncing off in opposite directions
      - One is the real ball while the other is just a fake
      - The opposing player must guess which is the real one
    - "Slow Mo Cam"
      - The next 3 times the opposing player hits the ball back, the speed at which the ball comes back in your direction slows down significantly
    - "Government Handout"
      - Your opponent doesn't score a point the next time the ball hits your side
  - Power-downs should consist at least of the following:
    - "Dazed and Confused"
      - Movement control directions are reversed for you
        - This does not have to also include rotation directions
    - "Speed Demon"
      - The next 3 times the opposing player hits the ball back, the speed at which the ball comes back in your direction slightly increases
    - "Shark Week"
      - For the next 7 seconds, you must keep moving your paddle (like a shark keeps swimming), or else you automatically lose a point
- 3 additional game modes:
  - "Dodge Ball"
    - Each player tries to hit a floating monster with the ball
    - The monster could move around or be stationary (or switch between both)
    - Every time a player hits it, it respawns in a new random location within the "bounds box"
    - A player gets a point any time the ball that hit the monster was last touched by that player's pad
    - First player to score ten/fifteen/whatever points wins
    - A player loses a point any time the ball hits their "side"
      - But the opposite player does not gain a point from it
  - "Shoop Da Whoop"
    - A laser beam emits from the top side of the bounds box and strikes a reflective object that directs the beam in a certain direction
    - There are other reflective objects which do the same and are scattered in the x, y and z directions
    - Any time the user hits one of these objects, it rotates clockwise to change the direction that the beam is directed

        - Each player's goal is to rotate them such that the beam hits a certain designated region of the opposing player's side
        - Each player gets their own set of reflective objects such that they affect only theirs when hit
            - The ball passes through the opposing's reflective objects
    - "Simon Says"
        - This game mode consists of a set of rounds and a time limit
        - Each player starts with 10 points and whoever has the most remaining when the time expires, wins
        - For each round, prior to ball being released
            - The screen briefly flashes for a few seconds a sequence of N rotations that the player must remember to make in that order when striking the ball with their paddle the next N times
            - For example, it could be a sequence of 3 rotations with the order LEFT, RIGHT, DOWN
                - The player must then remember to rotate the pad to the left the first time they bounce the ball back.
                - Then to the right the second time, and so on
        - The round will continue (the ball will keep moving) if a player rotates their paddle in the wrong direction when hitting the ball back
            - But that player will lose a point
        - The round is over (disappears until the start of the next round) when either
            - The ball hits either of the players' side
                - The player whose side is hit loses half a point
            - A player's score reaches zero (from hitting ball back with wrong rotation direction)
            - Time countdown reaches zero
        - If each player successfully bounces the ball back N times while maintaining the correct sequence of rotations, neither player loses any points for that round
        - Note that you are punished more for forgetting the rotation order than you are for letting the ball slip past you
            - This game mode focuses more on memory
- Online functionality:
    - The player should be able to link to another specific player as their online opponent (from one IP address to another probably – must research more)
    - Alternatively, the player should be able to find a random opponent waiting and then automatically link to that player

Tools/system/software to be used

- Unity game engine for putting everything together
- Visual Studio for script editing
- Adobe Photoshop for model/texture creation
- Windows & Mac as OS for system foundation
- C# for programming language of choice
- GitHub for sharing and updating the files between team members

Timeline

- Sep. 15 – Begin model/texture designs and paddle/ball interaction logic
- Sep. 30 – Begin programming computer opponent behavior and power-up functionality
- Oct. 15 – Begin developing alternate game modes from the base normal mode
- Oct. 30 – Begin process of making game playable online
- Nov. 15 – Begin rough draft of the Final Report
- Nov. 30 – Finalize and prepare the Final Report for submission

Responsibilities

- Barnette
    - Create and texturize the 3d models
    - Design the interactive game menu
- Ghafori
    - Implement movement mechanics for player paddles + ball
    - Simulate ball reflection logic by applying game physics
- Whitehead
    - Develop alternative game modes
    - Make game playable against others online
- Zhang
    - Program artificial intelligence of computer opponent
    - Integrate temporary player "power-ups" into game