3D Virtual Table Tennis

Angel and Sarah
Block Diagram

- Accelerometer
- Gyroscope
Accelerometer/Gyroscope Module

• Sensors will be attached to each paddle
• A/D converter for the sensor data
• Accelerometer data gives speed for the ball
• Gyroscope data gives direction for the ball
• Testing:
  – Use likely output readings from the sensors as inputs to the modules
Block Diagram

Paddle
Recognition/Projection
Paddle Recognition/Projection

• This module will have two functions:
  – Determine paddle location in the frame of the camera
  – Determine the coordinates of the center of the paddle to be represented on the VGA display
Paddle Recognition/Projection

• Testing:
  – Display camera video using VGA
  – Compare the location of the paddle on the feed to the output coordinates that specify the location of the paddle
Ball Module
**Ball Module**

- Manages the Ball mechanics
  - 3D coordinate system to 2D monitor Display
  - Camera Projection Matrix
  - Outputs Ball coordinates and size

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  c_{31} & c_{32} & c_{33} & c_{34}
\end{bmatrix} \begin{bmatrix}
  \mathbf{WP_x} \\
  \mathbf{WP_y} \\
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Ball Module

• Falling
  – Sense of Gravity

• Bouncing
  – Reversing the correct coordinates

• Coloring
  – Displaying who last hit the ball

• Paddle Hits
  – Manipulate trajectory
Block Diagram
Background Module

- Downgrading/Downscaling camera image
- Producing the table and net
  - Deciding images to be projected
- Producing the surrounding environment
  - Deciding images to be displayed
Block Diagram
Rules Module

- **Referee**
  - Serve mode/ Return mode
- **Bounce Tracker**
  - Needs ball coordinates
- **Hands the ball off to the right person**
- **Awards points to players**
  - Points will be displayed
- **Decides winner**
Block Diagram

Display
Display

• Compiles all images and visual elements
  – Ball image and Paddle crosshair
• Synchronize its inputs
• Alpha blend everything together
Timeline

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Questions