Improv Tetris

Scott Bezek
Ray Li

11/15/11
Classic Tetris

- Piece together blocks
- 7 possible blocks, picked randomly
Classic Tetris

- Clear complete rows
Classic Tetris

- Clear complete rows
Classic Tetris

http://www.hackphone.co.il/2011/03/images/NES_controller.jpg
Improv Tetris
I/O

Left/Right buttons
Image Processing

Current Frame VS Reference Frame
Image Processing

Subtract

Silhouette
Image Processing

Silhouette
Image Processing

Silhouette
Image Processing

Quantized Block
Image Processing

- Pixel-by-pixel subtraction (2 px per clock cycle)
- 4x4 pixel “blocks” - increase SNR
Image Processing
Image Processing
Image Processing

- Do image processing
- Display video preview
- Save frame to ZBT memory
FSM (Game Logic)
Game State

Settled

Falling
Display Module

ROM

- Background Sprite
- Block Sprite
- Font Sprites (score)
- Silhouette
- Playing Field

Display
Major Challenges

- Timing constraints
  - Pixel clock speed – ROM sprite lookup
  - Image processing takes many cycles
  - Memory address forecasting

- Noise from NTSC camera

- Shared memory access
  - ZBT – camera write vs. processing read
  - BRAM – FSM write vs. display read
  - Only one module can read/write at a time
  - Must arbitrate access
# Timeline

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<th>Week</th>
<th>Ray’s goals</th>
<th>Scott’s goals</th>
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<tr>
<td>November 14</td>
<td>Implement FSM</td>
<td>Implement Silhouette Image Processing</td>
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<td>November 21</td>
<td>Finish FSM. Test FSM and begin Display Module</td>
<td>Implement Block Quantization</td>
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<td>November 28</td>
<td>Finish Display</td>
<td>Test and fine-tune Image-Processing Algorithms</td>
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<td>December 5</td>
<td>Debug [Add audio effects] [Improve graphics]</td>
<td>Debug [Add Gyroscope] [Add two-player support]</td>
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