“Let’s Take This Outside” Boxing

David A. Blau
Uzoma A. Orji
Reesa B. Phillips
Motivation

Uzoma  Reesa
Overview

- One or two player boxing game
- 3 Modules
  - User Interface
  - Control Unit
  - Imaging & Audio
User Interface

• Camera
  – horiz. & vert. position of gloves
  – dist. between gloves
• Colored gloves
  – green for easy detection
• 2 axis accelerometers
  – detection & force of a punch
• Outputs positions of hands & force of a punch to Control Unit module
Control Unit

• Inputs from Camera and Accelerometers
• Inputs from AI module or other Labkit
• Updates player state
  – Movement
  – Punches
  – Life and Energy
• Outputs to Imaging & Audio modules and other Labkit
Control Unit Data Flow

Player 1 Input → AI → Control Unit (Player 1) → Display → Player 1 Display

Player 2 Input → AI → Control Unit (Player 2) → Display → Player 2 Display

Labkit 1 → Control Unit (Player 1) → Control Unit (Player 2) → Labkit 2
Control Unit Computation

• Determine if each player is:
  – Standing
  – Blocking
  – Punching (and if the punch connects)
  – Recoiling from Punch

• Update:
  – Positions of hands and head
  – Picture of opponent
  – Life bars and Energy bars
Imaging Block Diagram

Fighter 1 data from CU

Fighter 1 Address Controller

fl_address
fl_data
fl_RGB

Fighter 1 ROM

VGA

line_count
pixel_count
vga_signals

Display Field

vga_out_red
vga_out_green
vga_out_blue

Fighter 2 Address Controller

f2_RGB
f2_address
f2_data

Fighter 2 ROM

Fighter 2 data from CU
Audio Block Diagram

- Audio address
- Audio ROM
- Upsample 48kHz
- AC97 Controller
- AC97 Codec Chip
- DAC 48kHz
- Gain
- To speakers
Questions?