Enhanced Gaming and Pointing

6.111 Final Project
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Overview

- Main Idea: Convert Video gaming into a more virtual experience, and allow the disabled to more easily use their computer.
- Project will replace the existing joystick functionality of the Xbox controller with a physical body sensing interface.
- 5 degrees of control: 3 for head movement and 2 for body movement.
- The composite xbox video will be partitioned into 4 different VGA outputs to be displayed on separate screens, allowing for a better multiplayer experience.
Overall Block Diagram

- Computer
  - Mouse Interface
  - Headset
    - 2 accelerometers
    - Compass Sensor
  - PS/2
- XBOX
- Xbox Controller
  - Composite
  - 4 Megadisplay VGA
- FPGA
  - Body Movement Cameras
  - ADCs
  - ADCs
Division of Labor

- Headset Interface – Andrew
- Video Interface – David
- VGA Splitter – Andrew and David
- Data Conversion – Andrew and David
Headset

- Includes 2 sensors:
  - Hall-effect compass sensor to measure rotation
  - A 2-axis accelerometer to measure inclination
- Computer control signals will be generated to replace photosensors in a ball mouse, as well as PS/2
Headset Block Diagram

Input

- AD X angle
- AD Y angle
- AD compass

XY, XZ angle lookup

Rotational angle algorithm

Aiming Generator

Output
Video Interface

- Will consist of a camera with a top-view of the player’s position.
- Will use edge detection to determine the player’s direction/position.
- Will map the analyzed information into the correct format for the Xbox/PC.
Video Block Diagram

- Encoder
- Video FSM
- Composite Video
- Output Position
- Frame Comparator (XOR)
- SRAM Current
- SRAM Past
VGA Splitter Diagram

Composite 
1920 x 1080
xbox video
8-bit 4:2:2
YCrCb pixel out

7185

1 MB SRAM

WR

2 960 x 1080
VGA outputs
RGB DACs +
syncs

7194

8-bit 4:2:2 multiplexed
YCrCb pixel port

1 MB SRAM
Timeline

- April 25 – Working simulations of all modules
- May 2 – Functional interface with Xbox/PC
- May 9 – Completed Testing → Fully functional system