

Slap the Ninjas!

Giovanni Reveles

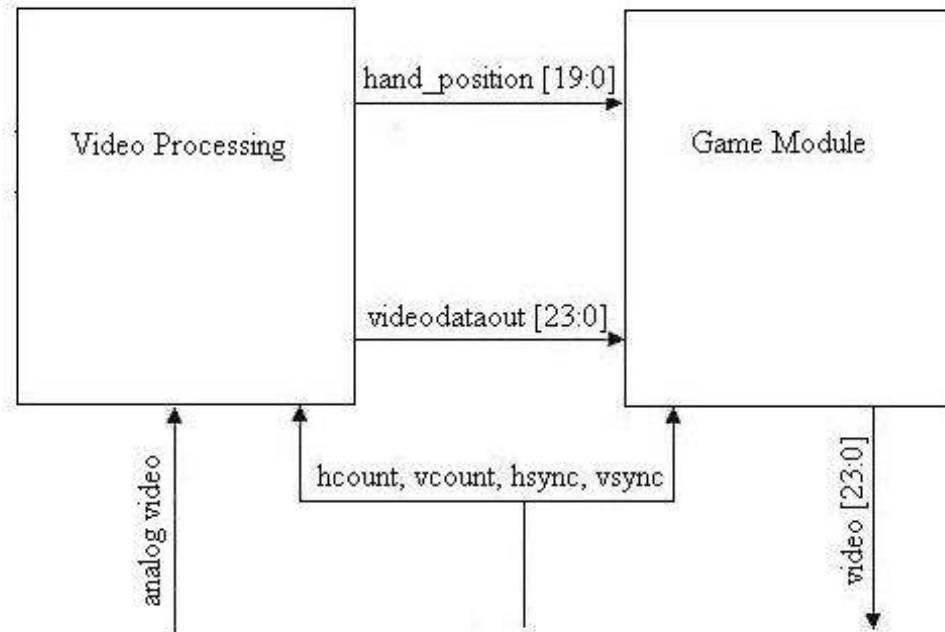
Chuan Zhang

Gameplay

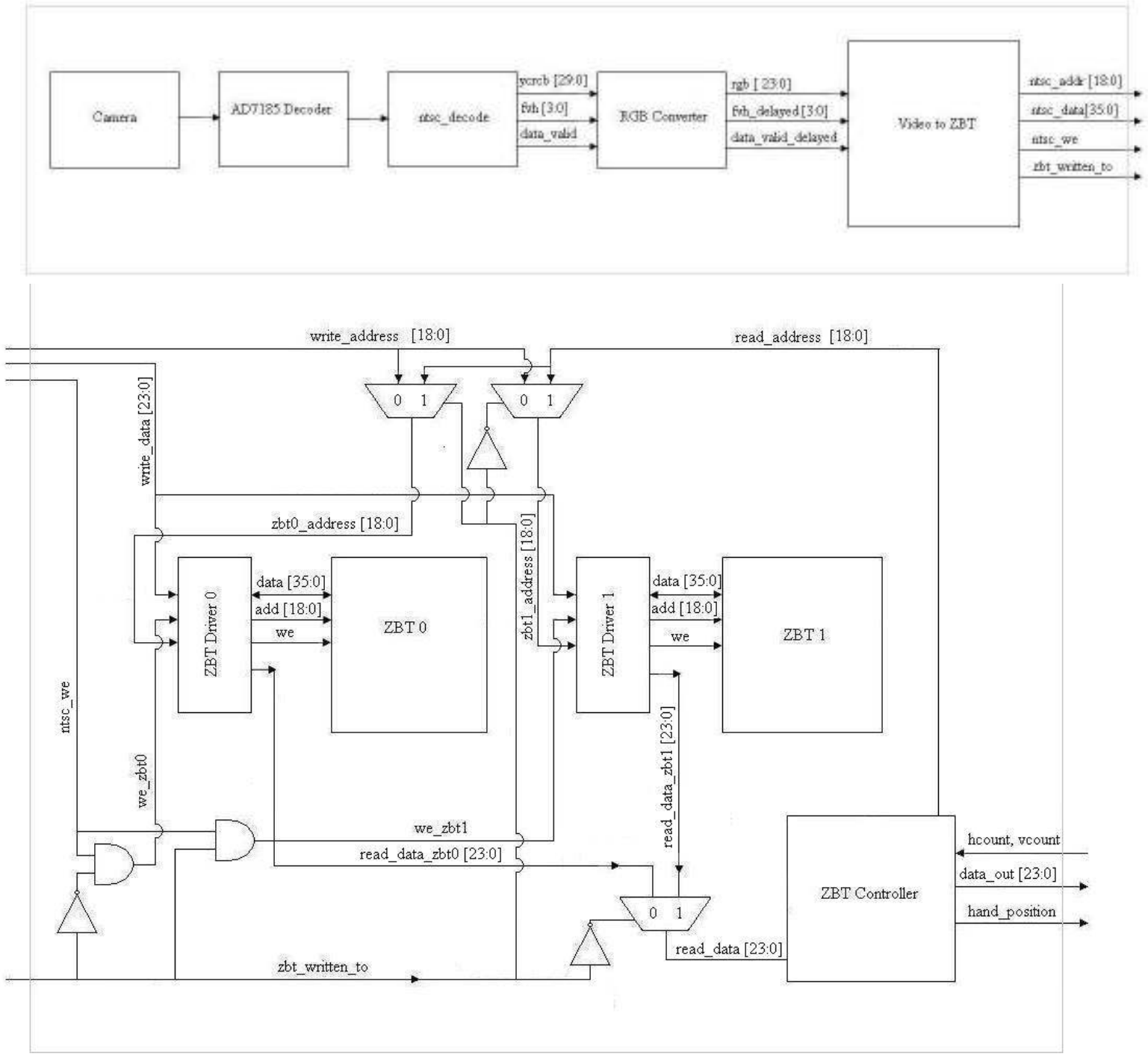
- Ninjas appear on screen and attempt to move towards center
- Camera detects players' hand which tries to slap the ninjas away from center.



Design

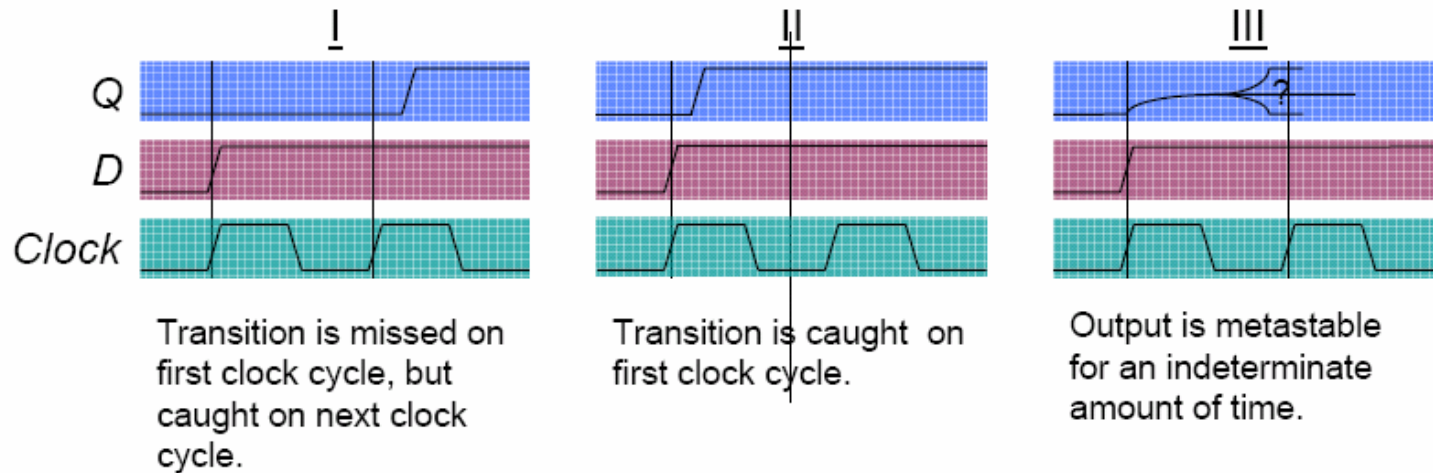


Video Processing



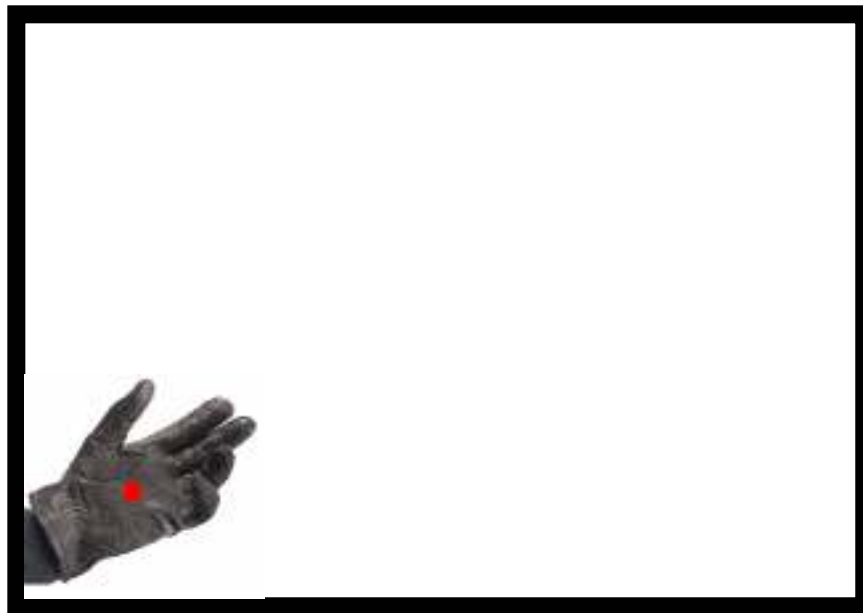
Issue #1: Synchronization

- Video camera and decoder run on 27 Mhz clock
- ZBT and FPGA run on 65 Mhz clock
- Use series of flip flops to synchronize video data



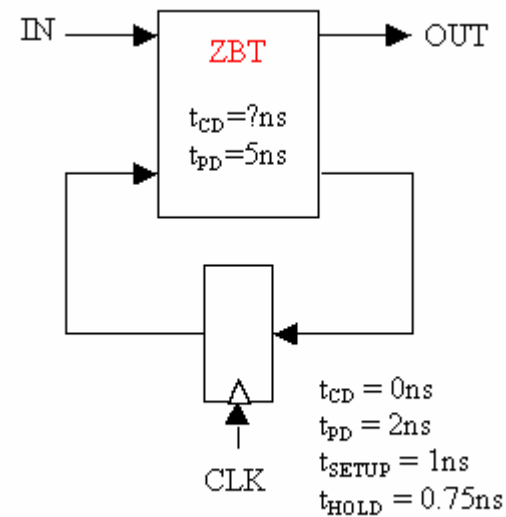
Issue #2: Hand Detection

- Wear green gloves, use blue background
- Filter out pixels not in valid color range
- Average coordinates of pixels in intensity range to find center of mass of hand

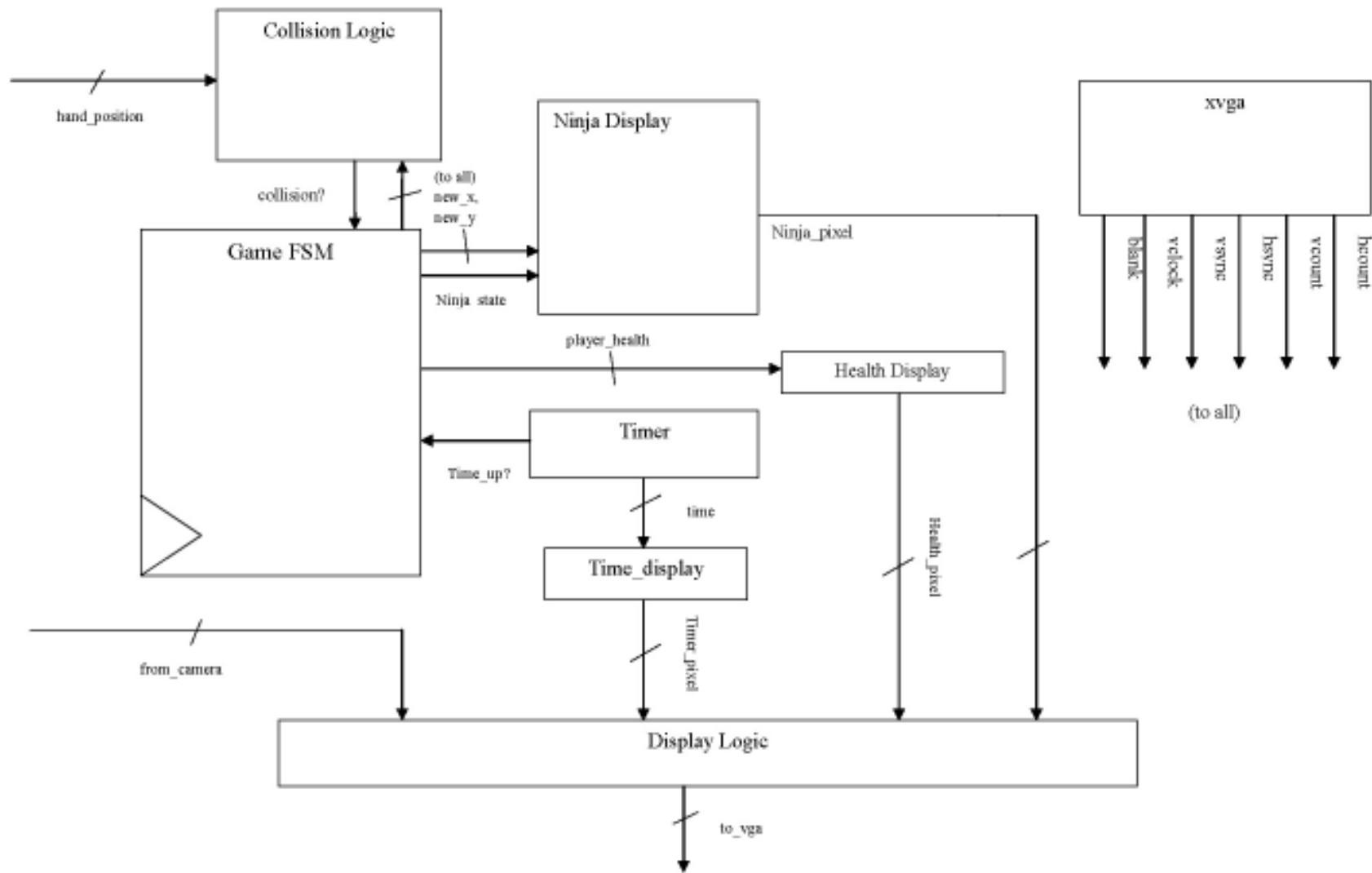


Issue #3: Timing

- hcount, vcount run at 65 Mhz
- Propagation delay from hand detection
- Latency for reading from ZBT
- Total Time access frame's pixel data < 7.5 ms



Game Module

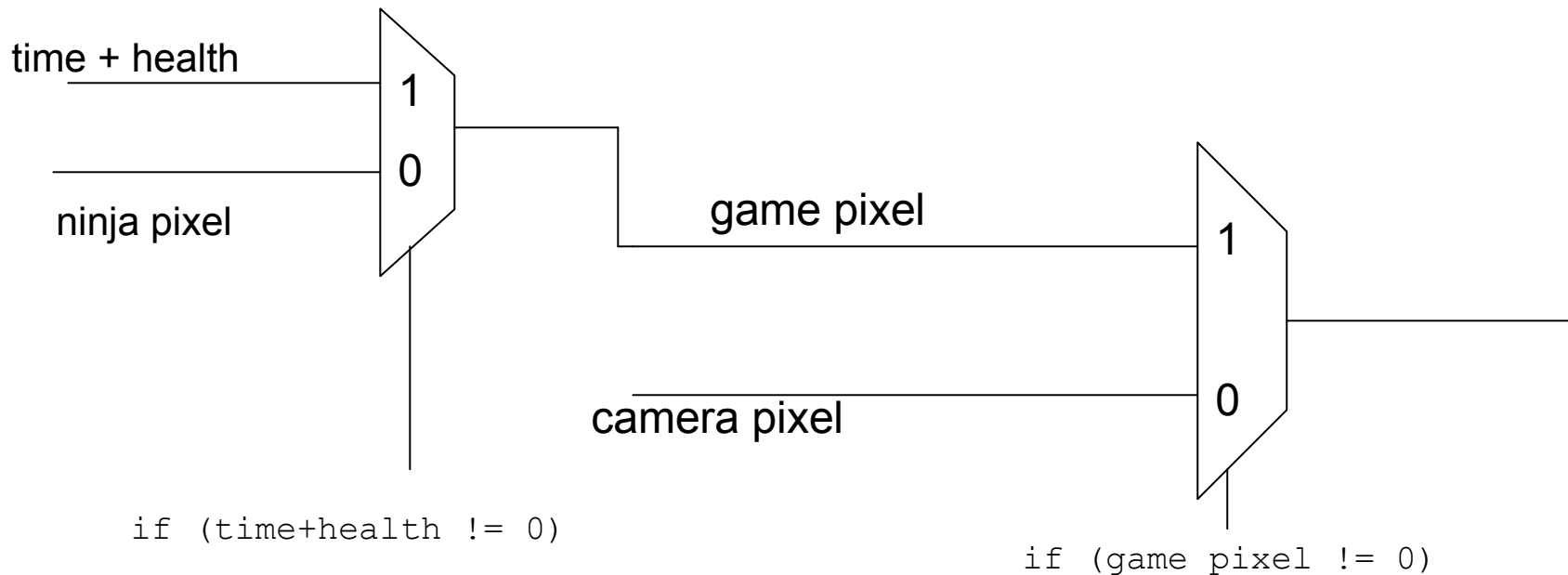


Game issues

- Ninja Display
 - Several ROMs to represent animation.
 - A “depth” parameter will be use to determine display priority
 - Initially simple stick figures, will try to implement more complex sprites using portable grey maps and `pgm2coe.py` provided online
- To test as stand alone game
 - Generate two button controlled paddles on screen that behave the same way as if hands were detected
 - To implement game, hand center of mass will be represented as a paddle

Display logic

- Gives priority to game graphics.
- Essentially a MUX where if there are any game graphics, display them otherwise display the camera pixel.



Timeline

- Video
 - Dual-ZBT write/read functionality 11/17/2006
 - Live video feed 11/22/2006
 - Hand position detection 12/1/2006
- Game
 - Animated ninja graphics 11/17
 - Game FSM w/ health and time display 11/22
 - Collision logic and stand-alone game implementation 12/1
- System Integration
 - Last Week