Duck Hunt

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For our hardware design project, we propose reimplementing the classic NES game, duck hunt. This is the game that came bundled with the original Mario. Basically, some ducks fly around on the screen and the player attempts to shoot them all using a toy gun with a limited amount of time and a limited number of shots. Depending on whether you hit all the ducks, a dog pops out and brings you the ducks or mocks you. The number of ducks starts at one and keeps increasing until you miss one. The game will use the monitor, the sound-port, and some kind of gun peripheral. There are three options for implementing the gun depending on ease and availability of parts:

1. We can use the original Nintendo Zapper (about $10 on ebay) which is basically a photo resistor inside of a barrel with a trigger. The technology behind this is simple, upon pulling the trigger, the screen goes black and the targets are illuminated in white for one frame. If the photoresistor senses white, it hit a target. Then, a binary search is used to determine which target was hit.

  Advantage: Proven system with simple technology.
  Disadvantage: Minor wiring between the NES plug and the FPGA (7 wires) would be required. Lower performance because of the need to blank the screen.

2. We can use the Wiimote with the sensor bar on top of the monitor. Similar to the zapper, the Wiimote works by sampling two ultraviolet lights which shine from the sensor bar.

  Advantage: Limited amount, if any, wiring for the sensor bar. A way to detect position without blacking out the screen.
  Disadvantage: Need to implement a Bluetooth interface for the Wiimote and struggle with what is sure to be a crazy protocol.

3. We can use a USB-webcam with a button. Some orientating markers,

like grid-lines, would be drawn on the screen. When the button is activated, the hardware could find the pixel the webcam is pointed at by sampling the webcam, finding the grid-lines and doing a quick calculation.

 Advantage: Simple USB interface. Limited wiring for the button.
 Disadvantage: Some image processing would be required.

Milestone 1: Interfacing the Zapper hardware with the display and being able to tell when the trigger is pulled (ex. lighting an LED)
Milestone 2: Displaying simple 2D graphics using chosen method
Milestone 3: Game working with possible bugs