

Hardware User Guide:

NES Controller:

Our NES controller uses the same protocol as the original Nintendo Entertainment System. Our Verilog is completely original but followed the specifications found at <http://www.mit.edu/~tarvizo/nes-controller.html>. The protocol involves our computer system to send a Latch signal high for 12 μ s and then goes low. At that point, a Pulse signal with a 50% duty cycle and 6 μ s wide is sent. There are 7 of these signals. The controller samples each button being pressed and sends a low signal on it's Data wire once the appropriate pulse input signal is received. The NES controller is connected to the FPGA extender board.

MP3 Trigger:

The MP3 trigger has 18 triggers on it labeled 1 – 18 triggers. The triggers are active low. Our MP3 trigger controller takes a 16 bit unsigned integer value between 1 and 18 and sends a low signal to the corresponding trigger. The triggers also support other functions: stop, play, volume up, and volume down. The MP3 trigger has 18 triggers that can be activated to perform a function like play a song or change the volume. The action that each trigger performs is specified with a .ini file. We used the following triggers in our project:

- 1: Play opening Pacman song
- 2: Play Pacman waka-waka sound
- 3: Play Pacman siren sound
- 4: Play Pacman death sound
- 5: Play Pacman eats cherry sound
- 6: Play intermission sound
- 7-11: Not used
- 12: Next track
- 13: Random track
- 14: Previous track
- 15: Restart last track
- 16: Stop current track
- 17: Volume down
- 18: Volume up

Seven Segment Display:

The seven segment display shows between 0x00 and 0xFF in hex. The controller displays whatever 8 bit binary value is asserted on its input. To display a value on the seven segment display the processor writes a value to the corresponding memory address. The seven segment display has an 8 pin interface. There is one pin for each segment and digit select line. When digit select is low the first digit is updated. When digit select is high the second digit is updated. Inputs must oscillate at ~1KHz to keep the segment lights on.