Hamming Code 1-bit and 2-bit Error Detection and Correction

This project was spurred from my purchase of a workstation PC. My coworker informed me that this workstation only uses ECC Memory. I immediately dove down a rabbit hole in learning about error correcting codes and more specifically the Hamming (7,4) code! I implemented the project using the Artix-7 on the Basys 3 development board.

Functionality

Encoder Input: Switches 0-3

Noise Input : Switches 4-8

Encoder Output: LEDs 0-3

Parity error : LED 7

2-bit error : LED 8

1-bit error : LED 9

The 7-segment display shows the bit which has an error reported by the code called the “symptom” in my Verilog code