Mastermind

Modes

In each mode, the input controls and output LEDs behave differently.

History

The inputs/outputs behave as follows:

- up/down cycles through history
- switch leds should display the number of the turn being viewed
- SSD should display hit/miss of the turn being viewed

Guess

The inputs/ouputs behave as follows:

- up/down changes the color
- left/right changes the led being edited
- the current led being edited should blink
- middle button will send the guess to be evaulated

Modules:

prng.v

This is a standalone module that randomly generates 4 3 bit numbers, and stores them. It takes an input that, when high, will cause the PRNG to regenerate the numbers. Outputs wires to its internal register storing the random code.

ssd_driver.v

This module takes 4 4-bit integers as input and a high-speed clock, and will display these integers on the seven segment display.

This module depends on:

- ssd_converter

led_driver.v

This module will provide an interface for selecting colors for the LEDs. It takes a pair of 4 3-bit inputs (pair for each of history and guess outputs, 4 for the colors of four LEDs, and 3 bits to represent a color) and a blink selector to choose an LED to blink when in guess mode, and a blink enable wire to choose whether to blink at all. Also a selector to choose between guess and history modes.

This module depends on:

- led_blink: responsible for blinking an individual LED.

history.v

This module takes an enable switch, button up, button down, a guess, and a submit input. When the submit input goes high, it reads in a guess and stores it into a register. If enable is set high, the button up/down inputs change which guess the module is displaying (sends the guess to feedback module and display). History also will update the current switch LED with the turn that the player is taking.

guess.v

This module takes left/right/up/down buttons, and an enable wire. It allows the user to edit a register internal to guess with specific colors that they wish to guess. It outputs the current state of the guess to the leds through mode_selector.

feedback.v

This module takes an input guess (from history) and a register containing the hidden code and compares them to determine how many corresponding Xs and Os to display on the SSD.

debouncer.v

borrow from last time without toggle state

clock_div.v

- 4Hz clock for blinking
- 400Hz clock for debouncing/display

mastermind (top)

Contains all the other modules. Takes the buttons/switch as input, outputs to the switch LEDs, GPIO pins, and seven segment display.