“Simon…on a breadboard!”
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Overview:

“Simon…on a breadboard!” is a throwback to the hand-held game “Simon” released in the late 70’s. “Simon” is a memory game, requiring you to duplicate the random series of light patterns displayed by the computer. On each successive round, a new light is added to the series for you to copy. Once you fail to copy the series correctly, it’s game over!

Hardware Components:

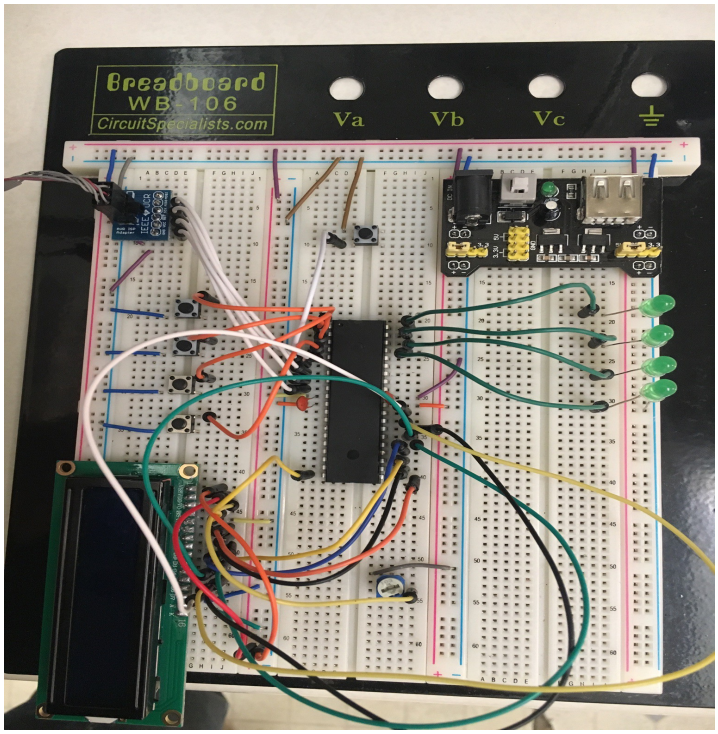
-4 LED’s (used to display the lighting sequence)
-5 buttons (4 to trigger each their respective LED and one as a start/continue button)
-LCD display (to display the player’s score and whether they won or lost)
-AtMega1284 microcontroller

How to Play:

Once the breadboard is powered on, you will be met with the welcome screen on the LCD Display. When you are ready to play, press the start button. The game will now begin by showing the first the LED for the random sequence. Each round, you will try to replicate the LED sequence shown by pressing the corresponding buttons. If you survive to round 9, you win the game. After the game ends, you may press the start button to start a new game.

Technical Design:

PORTA -> LED Output
PORTB -> Input Buttons and Continue Button
PORTC and PORTD -> LCD Display



Logic consists of four concurrent state machines:
(1) LCD Display
(2) Continue Button
(3) Show Sequence
(4) User Input

A Technical Challenge:

One technical challenge I faced was getting the input correctly. As the clock ticks are naturally very fast, the input from the buttons had a tendency to “bleed” over to the next input cycle, resulting incorrectly capturing a wrong sequence. The solution to this problem was wait for each button to be depressed again so the button is not captured as input more than once.