Nexys Says

ECE 2700 Final Project

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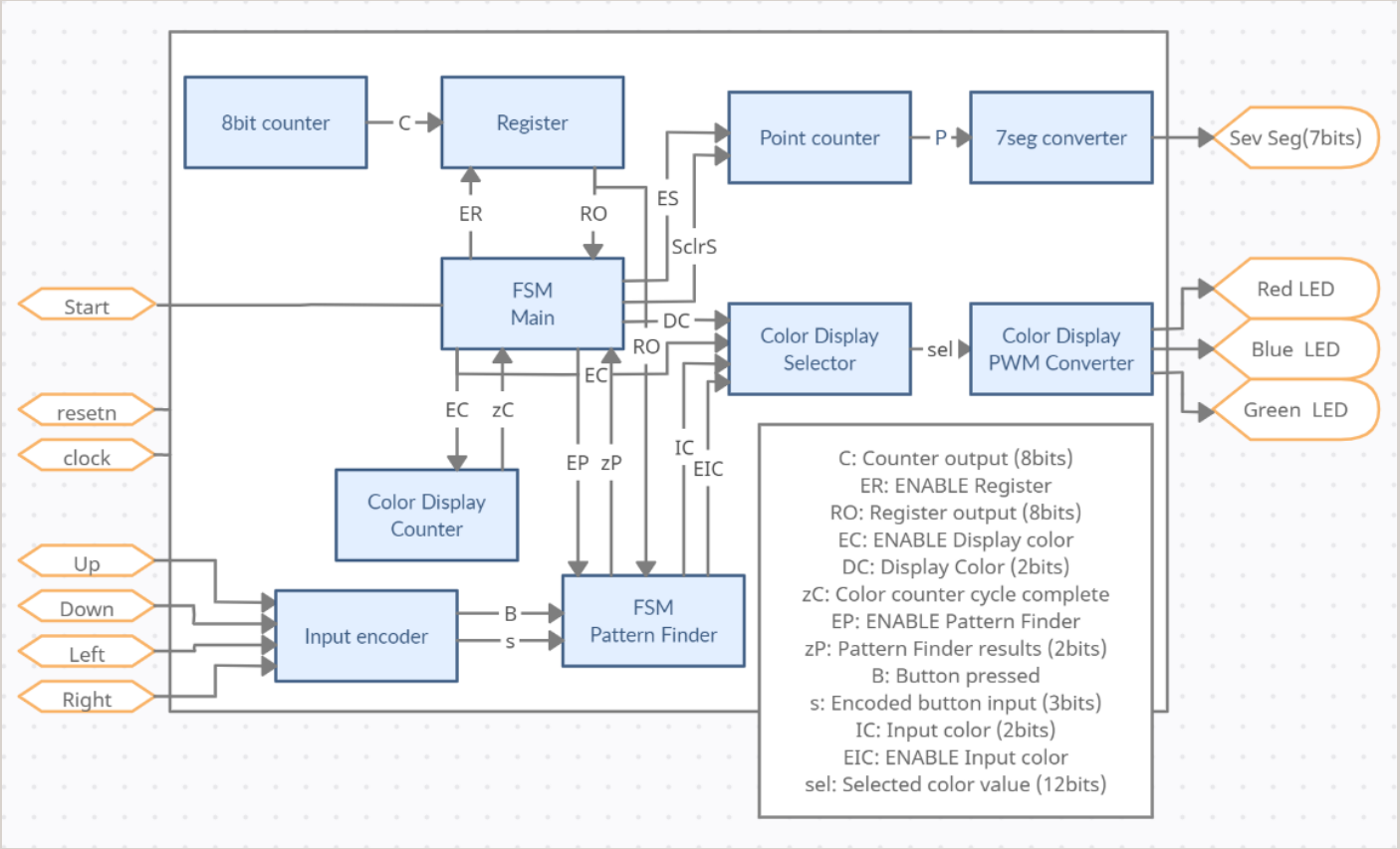
01 Introduction

Our project "Nexys Says" is based off of "Simon Says", a memory-based game.

The objective of the game is to repeat the pattern given. If the pattern is repeated correctly, the user is given a point. The goal is to gather as many points as possible before the user incorrectly inputs a pattern.

02 Block Diagram



Inputs

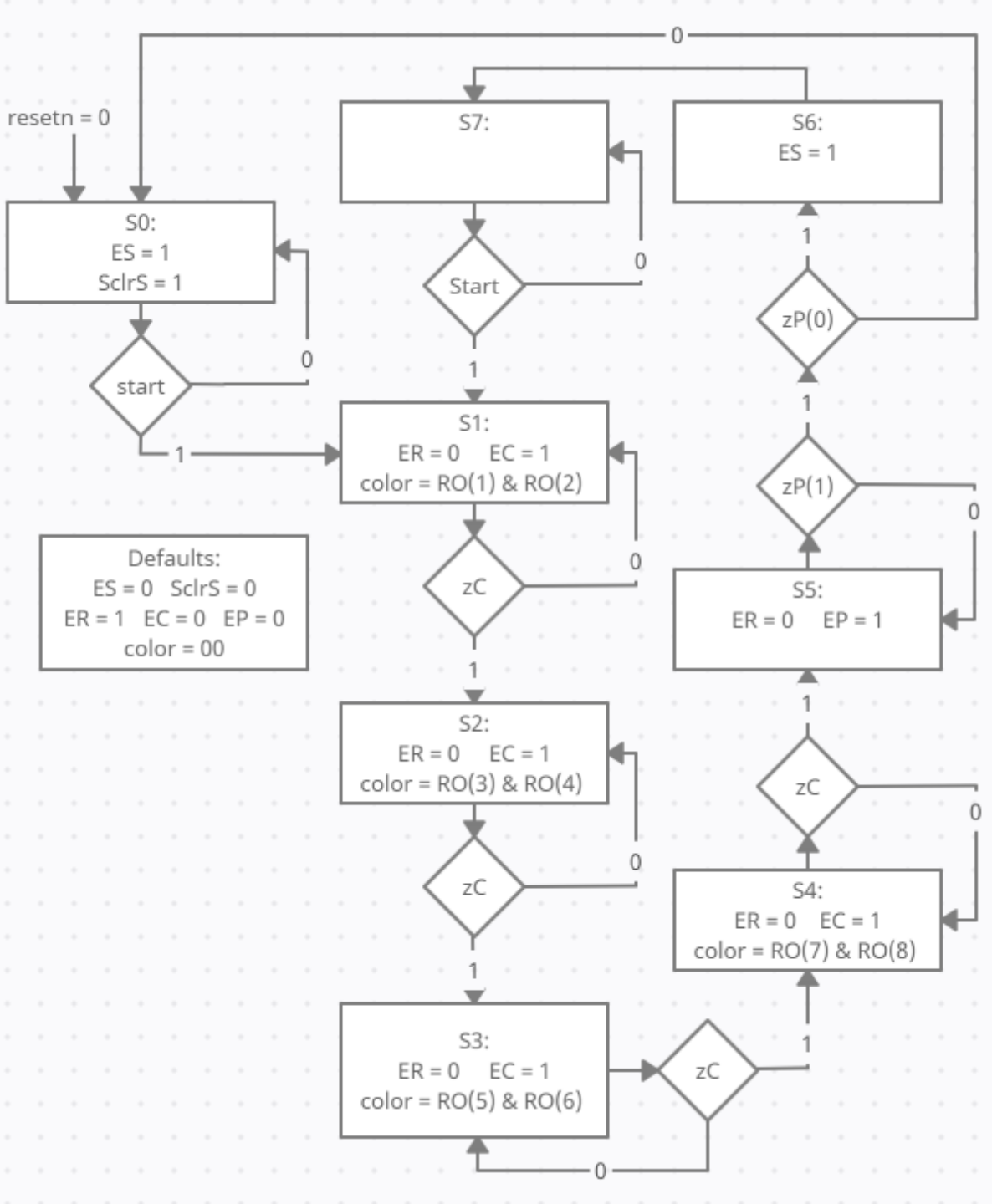
- "Start" is pressed at the beginning of each round to start the pattern
- "Resetn" is pressed when the game needs to be restarted
- "Clock" is given to each component to keep the circuit synchronous
- "Up", "Down, "Left", and "Right" are the four buttons that represent a color

Outputs

- "Sev Seg" is the output of the first decoder and is displayed on the Seven-Segment display
- "___ LED" is a PWM output of the color we want to display through the RGB LED built into the Nexys Board

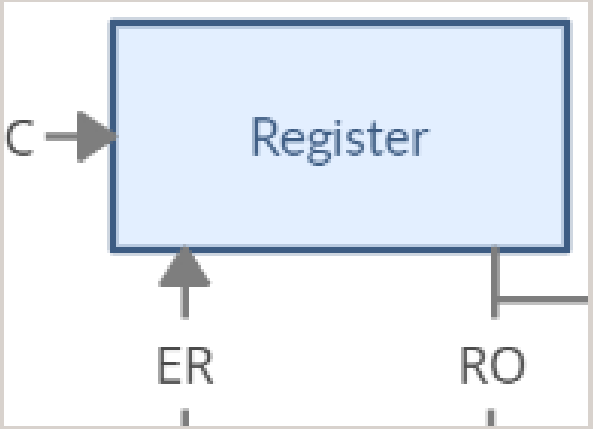
03 Main FSM

- This component is used to activate or disable the various other components for the game to function.
- Inputs: Resetn, Clock, Start, Register Output (the pattern), Counter Pulse, and Pattern Finder Results.
- Outputs: Various Enables, Score Reset, Display color value



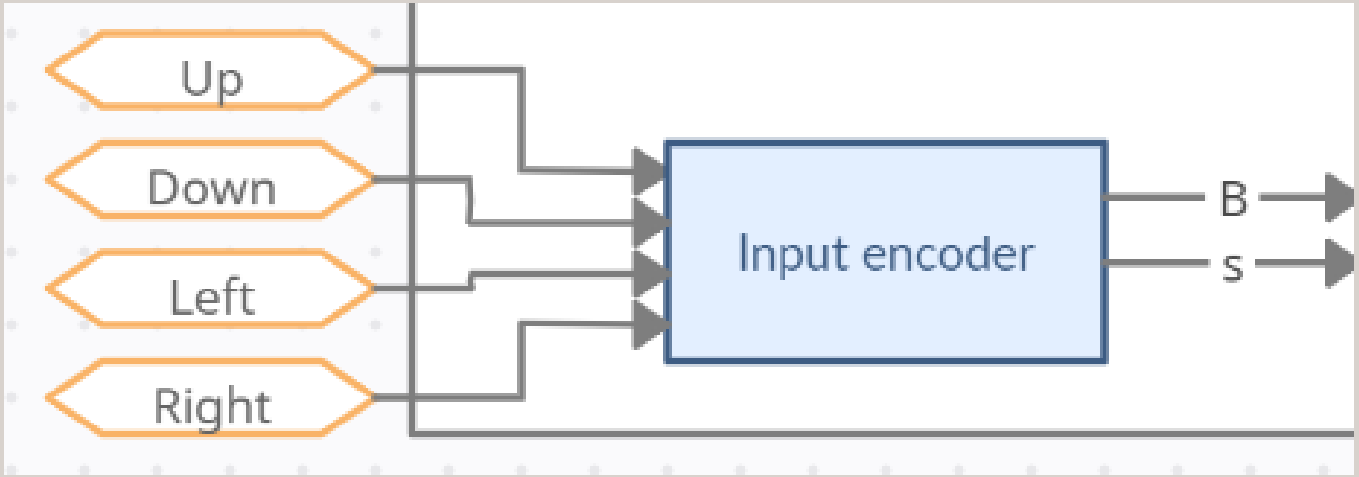
04 Register

- This component holds a pseudorandom number generated by the 8-bit counter that represents the pattern.
- Inputs: Resetn, Clock, Enable, Input number
- Output: Saved number



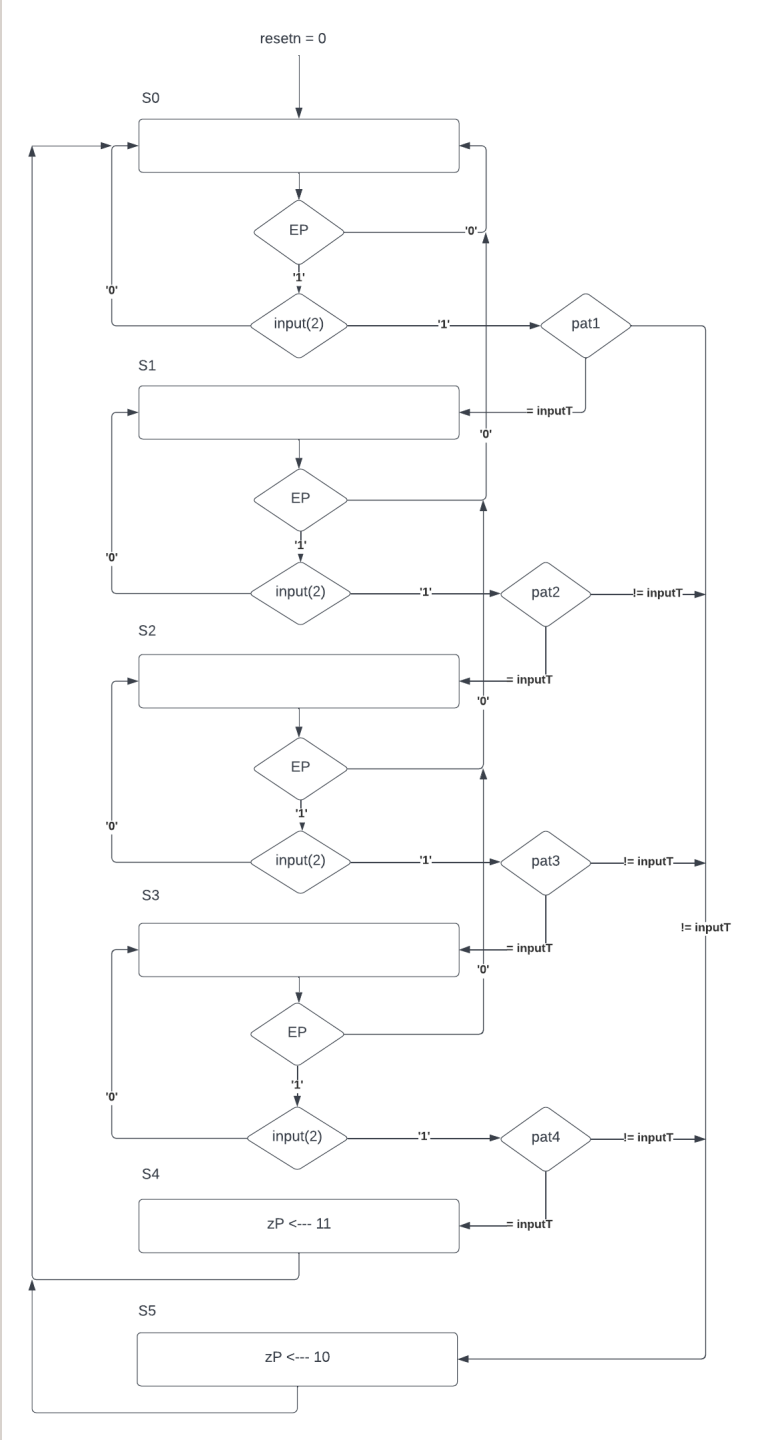
05 Input Encoder

- This component converts the button presses into a 2 bit signal.
- Inputs: Resetn, Clock, Up, Down, Left, Right
- Outputs: Button press, Encoder results (one tick pulse)



06 Pattern FSM

- This component detects whether the inputs are correct
- Inputs: Resetn, Clock, Encoder Output, Register Output, Enable
- Outputs: Results, Color of input, Enable for the Color Display Selector

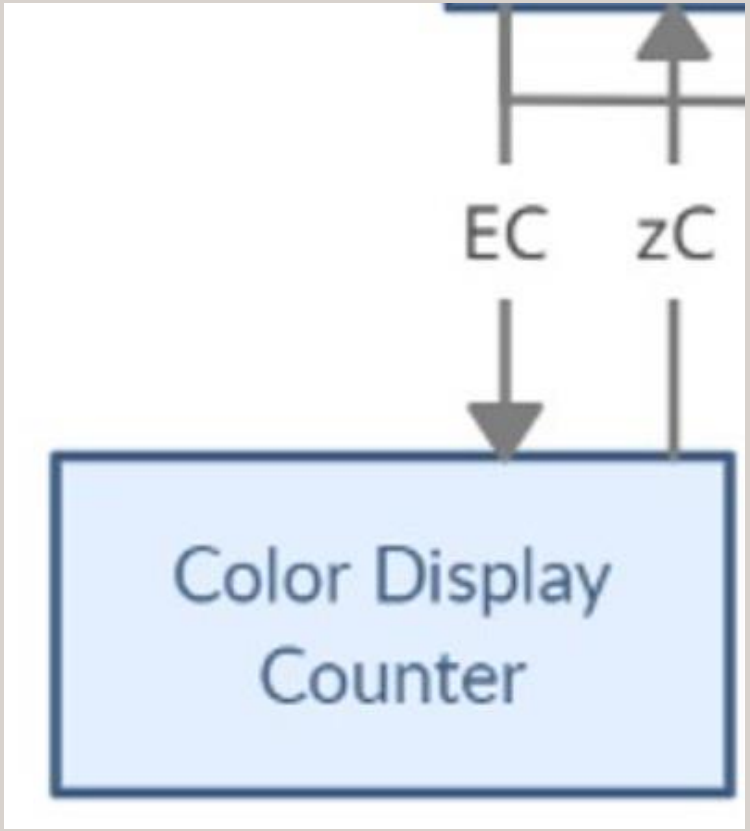


07 8 bit Counter

- This component outputs a pseudorandom 8 bit number.
- Inputs: Resetn, Clock
- Output: 8 bit signal 'C' that is sent to the register

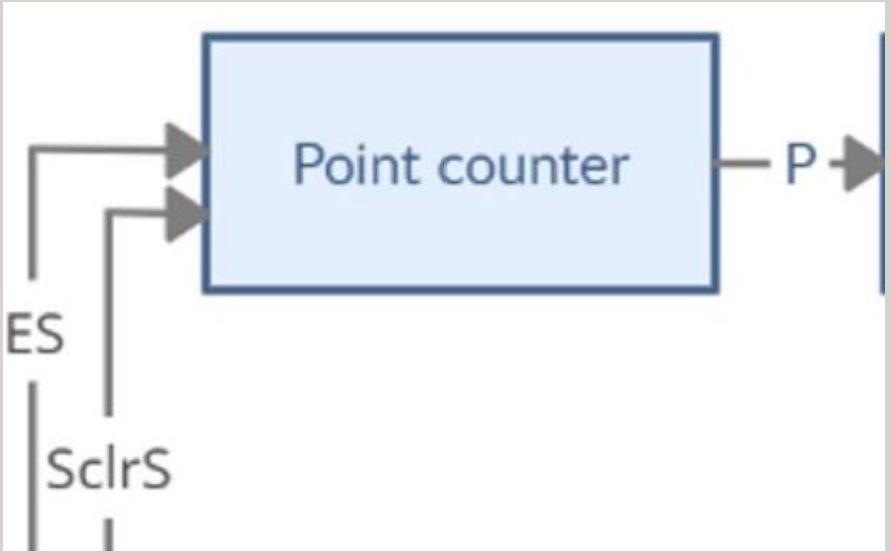
08 Color Counter

- This component counts for 0.5 seconds for the timing of the color patter display.
- Inputs: Resetn, Clock, Enable
- Output: Pulse signal 'zC' that is sent to FSM Main.



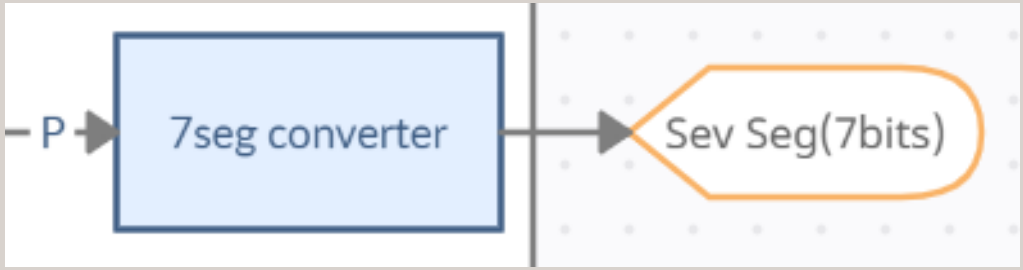
09 Point Counter

- This component outputs the number of points scored by the player
- Inputs: Resetn, Clock, Enable, and Synchronous Clear
- Output: Point value 'P' that is sent to the seven segment converter



10 Seven Segment Converter

- This component converts the binary point value into signals for the seven segment display
- Inputs: Resetn, Clock, Point value
- Outputs: Seven Segment Display values

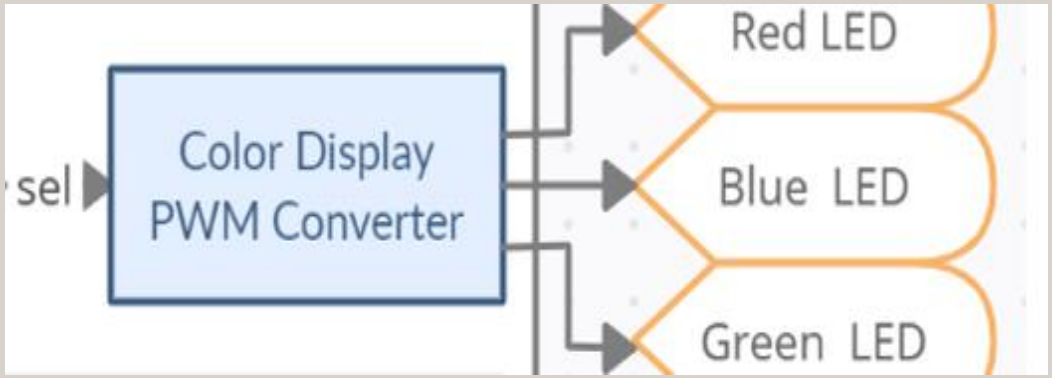


10 Color Selector

- This component selects and outputs the correct color value that needs to be displayed.
- Inputs: Display Color (DC), Enable Display Color (EC), Input Color (IC), Enable Input Color (EIC).
- Output: Selected Color Value (sel).

Color Converter

- This component converts the color value to a PWM signal which the corresponding LED(s) output.
- Input: Selected Color Value (sel).
- Outputs: Red LED, Green LED, Blue LED.



12 Live Demo

Video Link: