Banner on a 7-segment Display

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Project Description

- Circuit outputs to a series of 8, 7-segment displays on a Nexys A7-50t board
- The circuit has two messages loaded onto it that the user can select from. The first message being “HELLO” and the second message being “ECE2700”
- The user has access to two switches on the board: one that controls the holding and scrolling of the message on the display, and another that allows the user to pick between the two messages.

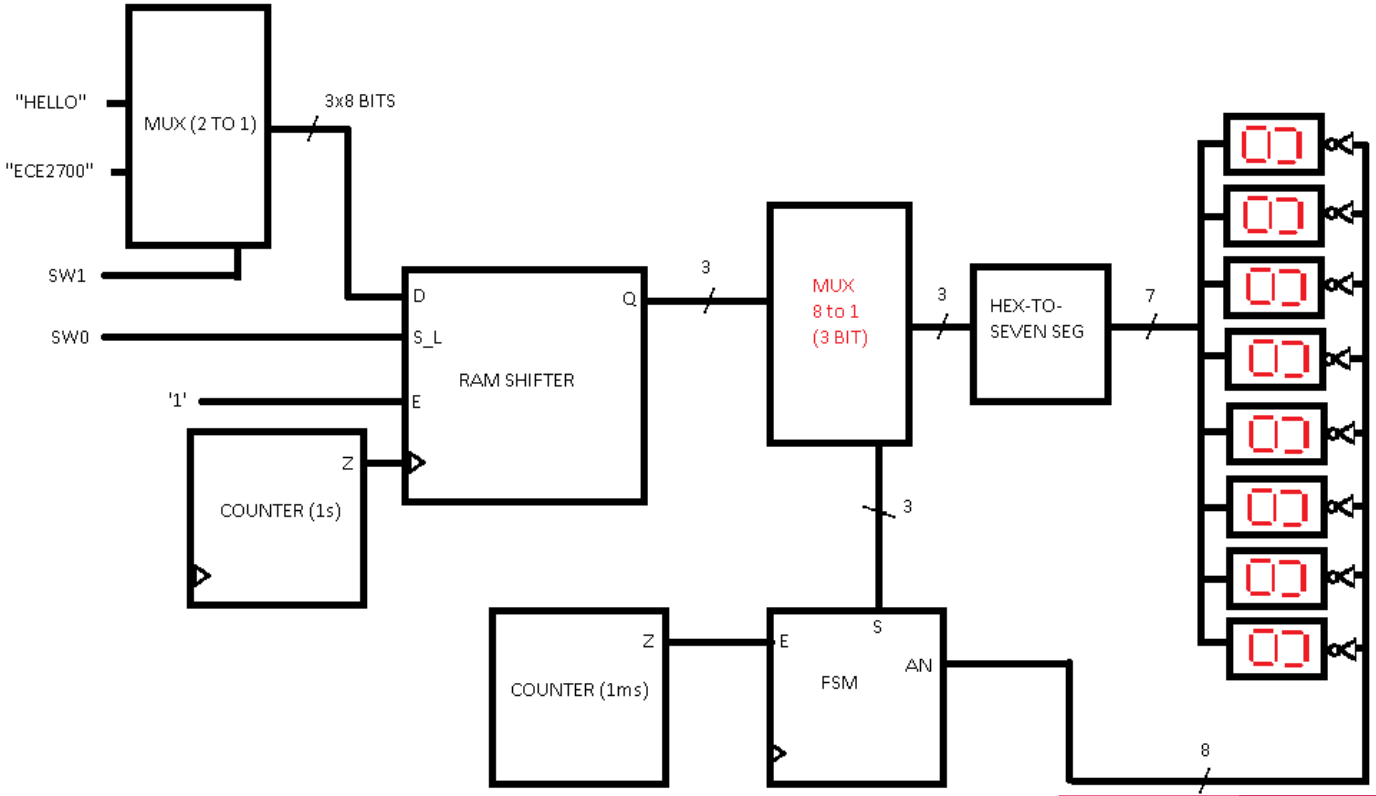
Design & Components

Output: Eight 7-Segment Displays, 8 Anode Enable Signals.

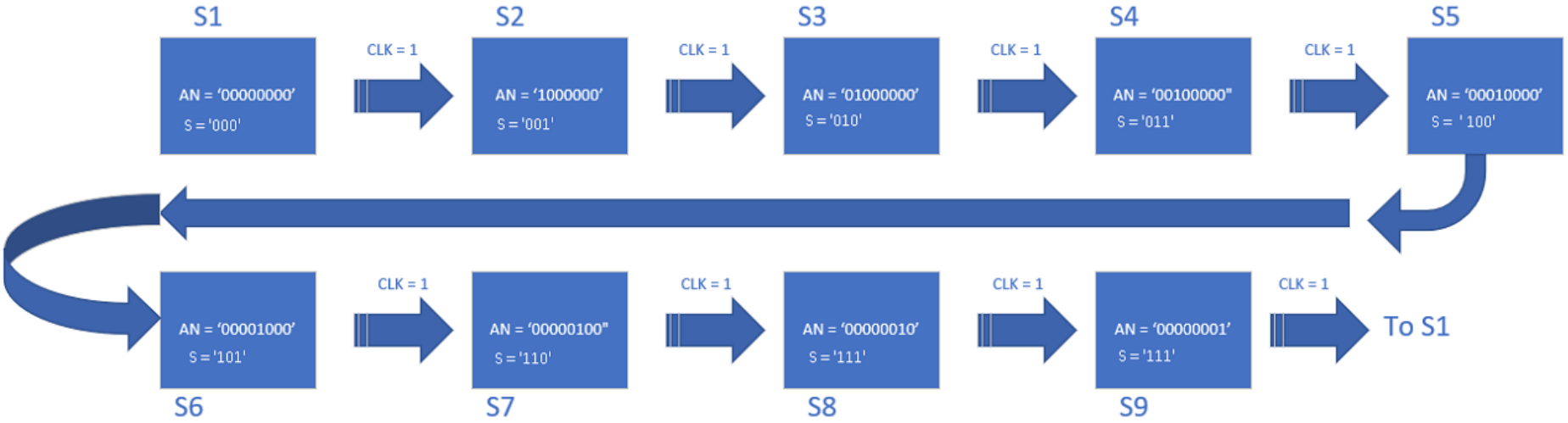
Internal Components:

- Eight Registers, Chained together to make a shift RAM module
- One 8-to-1 7-Bit Bus MUX for controlling the display
- One 2 to 1 8-bit MUX for selecting the message the user wants
- One FSM to control Anode enable
- Two counters, one for registers and another for FSM control

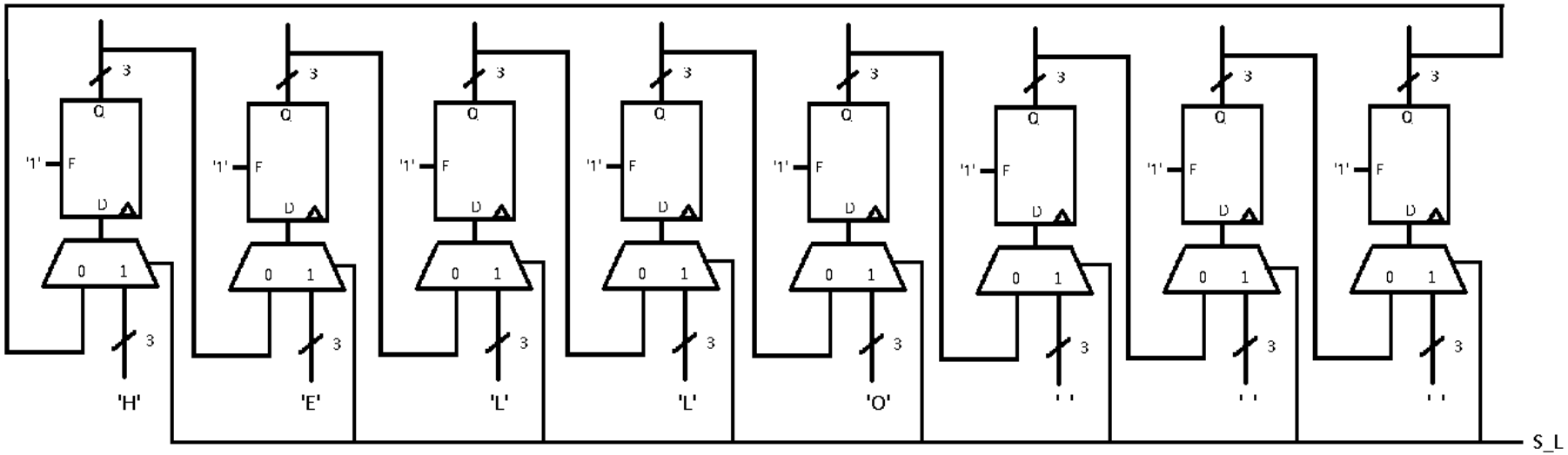
Circuit Diagram (TOP LEVEL)



Circuit Diagram (FSM FLOWCHART)



Circuit Diagram (RAMshifter)



Challenges

- Designing a custom data type for an array of STD_LOGIC_VECTORs
- Deciding on a method for shifting the letters across the displays
  - FSM or no FSM?
- Issue implementing the counters into the top file
  - Dealing with generics
  - Math involved to get the timing to work properly (1 second and 1 millisecond)
- General Debugging
  - Waiting for a long time for the program to generate a bitstream while debugging issues.

DEMONSTRATION