COL-215P ASSIGNMENT-6

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Contents

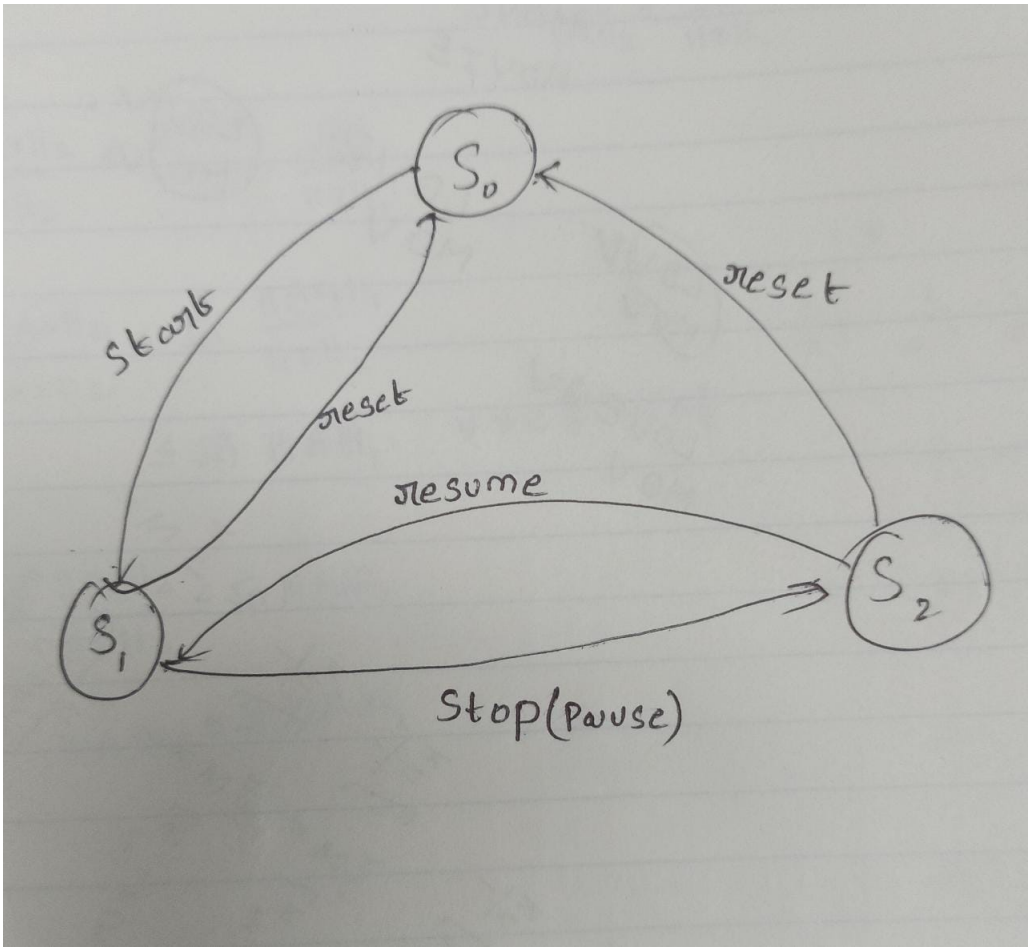
1 Implementation and Work Done

We implemented a stop-watch that displays time upto one-tenth of second(deciseconds) with functionalities for pause,resume and reset in addition to start.For this we divided the 100 MHz present on Basys board into a clock of 10 Hz frequency using counter.Since we need to use push buttons to change modes,we also used a debouncer circuit that prevents any disturbances.We also used the seven-segment display we built earlier to display the time and it is driven by a 381.4 Hz clock derived from the 100 MHz clock on the board.

2 Details of Circuit

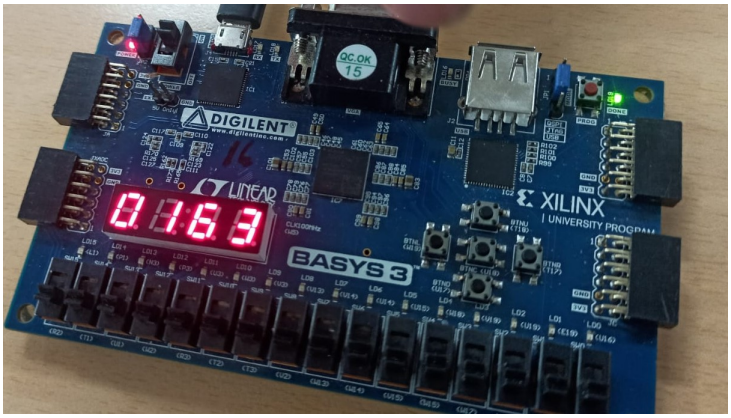
We used a seven segment display component built in the last assignment,a 4:1 multiplexer, a Debouncer circuit made in the last assignment and a timing circuit to build the circuit.The timing circuit counts the number of minutes,seconds,deciseconds elapsed and gives the count which is passed as 4-bit vector inputs to seven-segment display and that displays the time on board.We used a finite-state machine having three states to handle state switching when buttons corresponding to pause,reset and resume are pressed.

2.1 Details of FSM Used

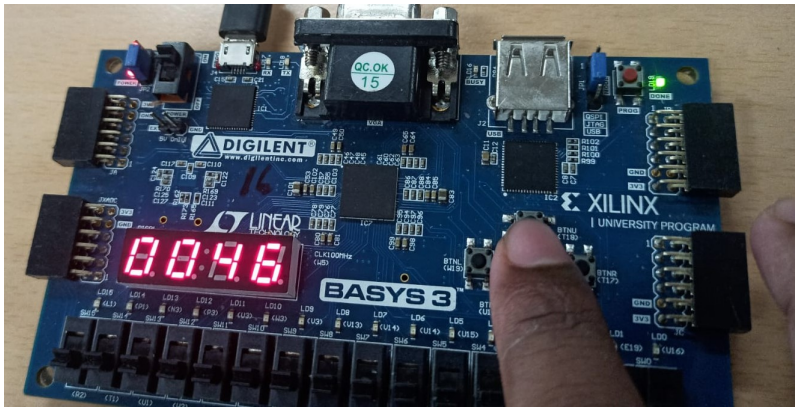


We can see that the FSM we used consists of three states S_0, S_1, S_2.When we start the stop-watch,it goes into state S_1.If we reset the stop-watch,it goes back into S_1.If we pause the stop-watch,it goes into state S_2 and it comes back to S_1,if we press resume and goes back into state S_1,if we press the reset button.

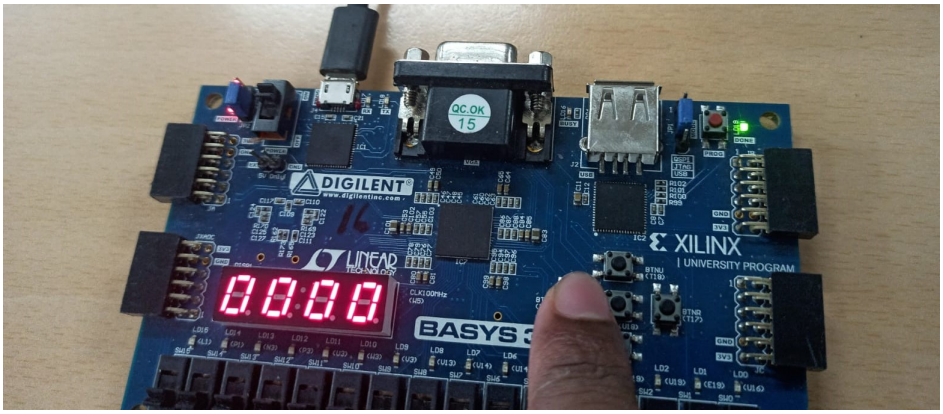
2.2 Snaps at Random Instants



Snap after 15 seconds has elpased

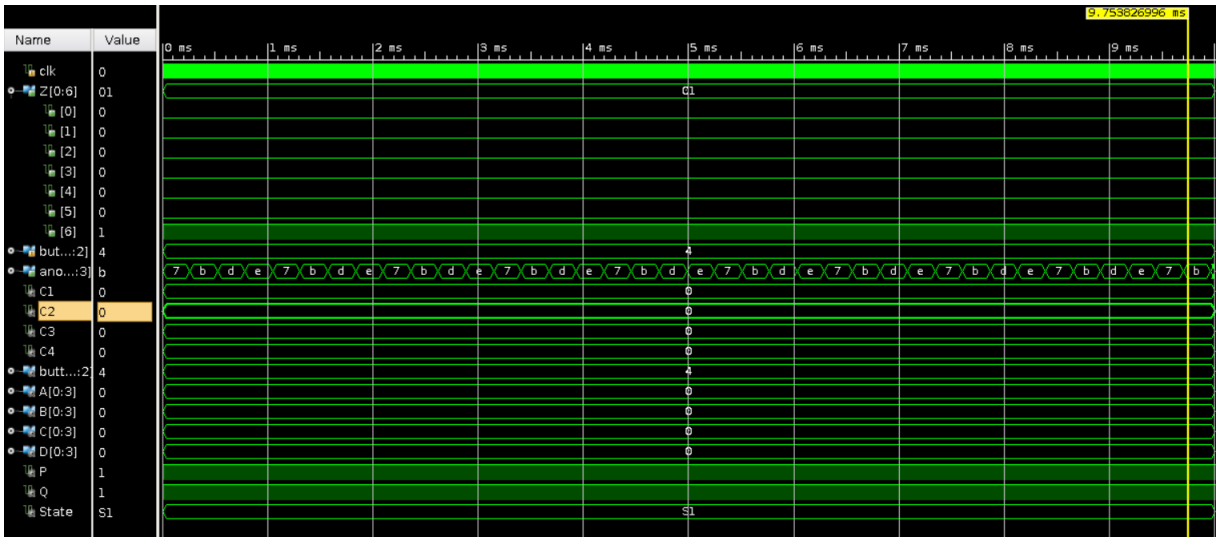


Snap after pressing Start



Snap after pressing Reset

2.3 Waveform Obtained



2.4 Utilization Report

Site Type	**Used**	**Utility %**
LUT as Logic	356	1.71%
LUT as Memory	0	0%
Register as Flip Flop	183	0.44%
Register as Latch	4	<0.01%
DSP	0	0%
BRAM	0	0%