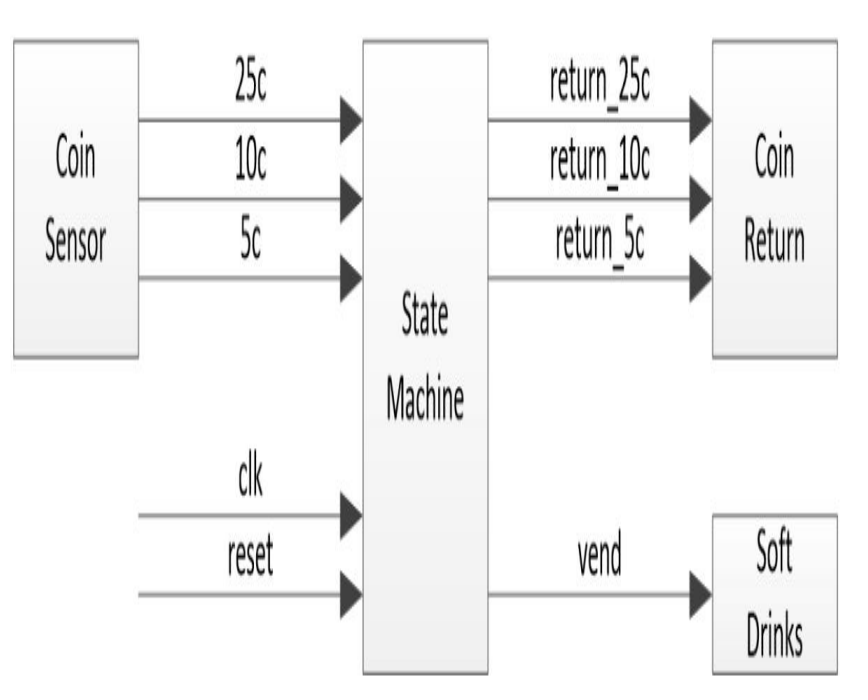
Vending Machine

Prepared for: Dr. D. Llamocca

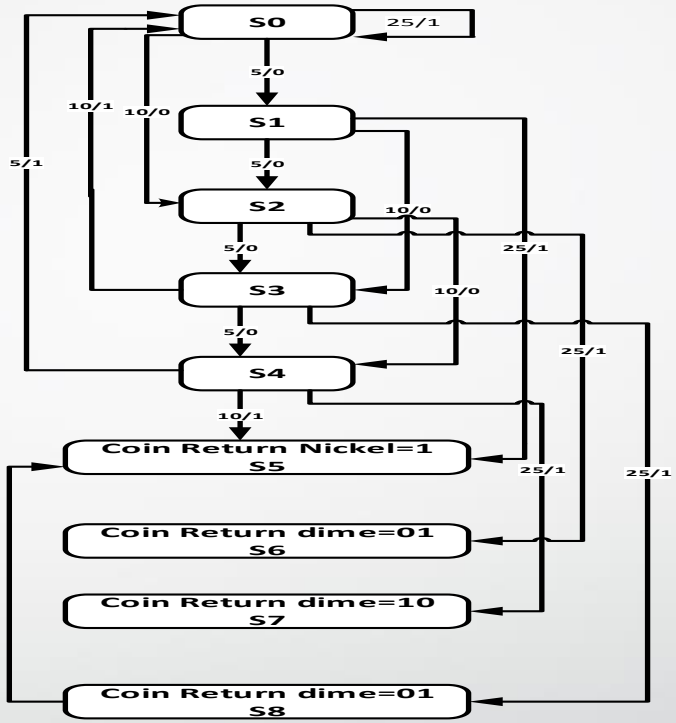
ECE 2700-–Fall 2017--

Khodur Dbouk, Basil Jajou, Kouder Abbas, Stevan Nissan

METHODOLOGY & STATE DIAGRAM



Block level diagram of the vending machine

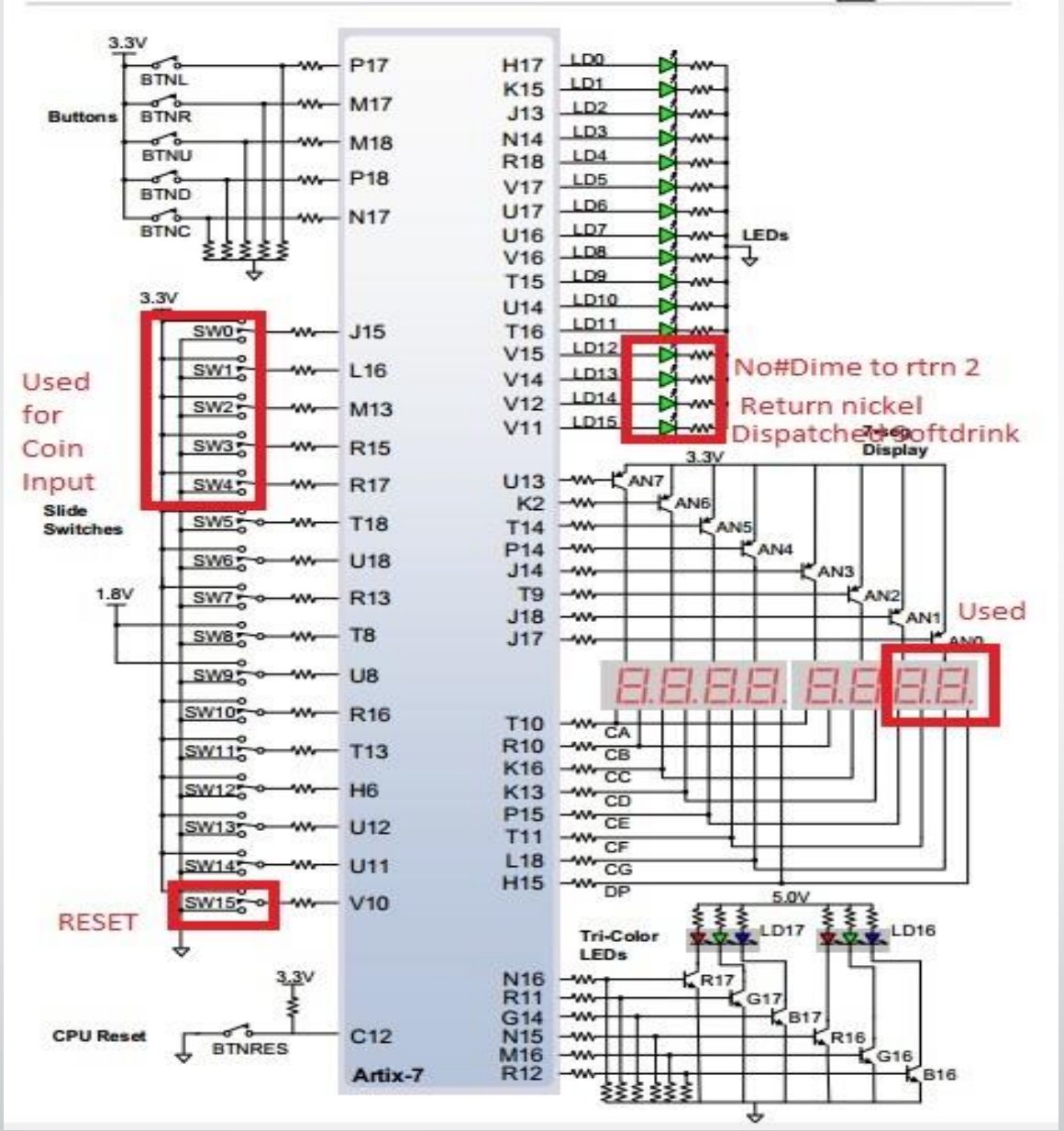


IMPLEMENTATION:

- State register and Non-clock process :

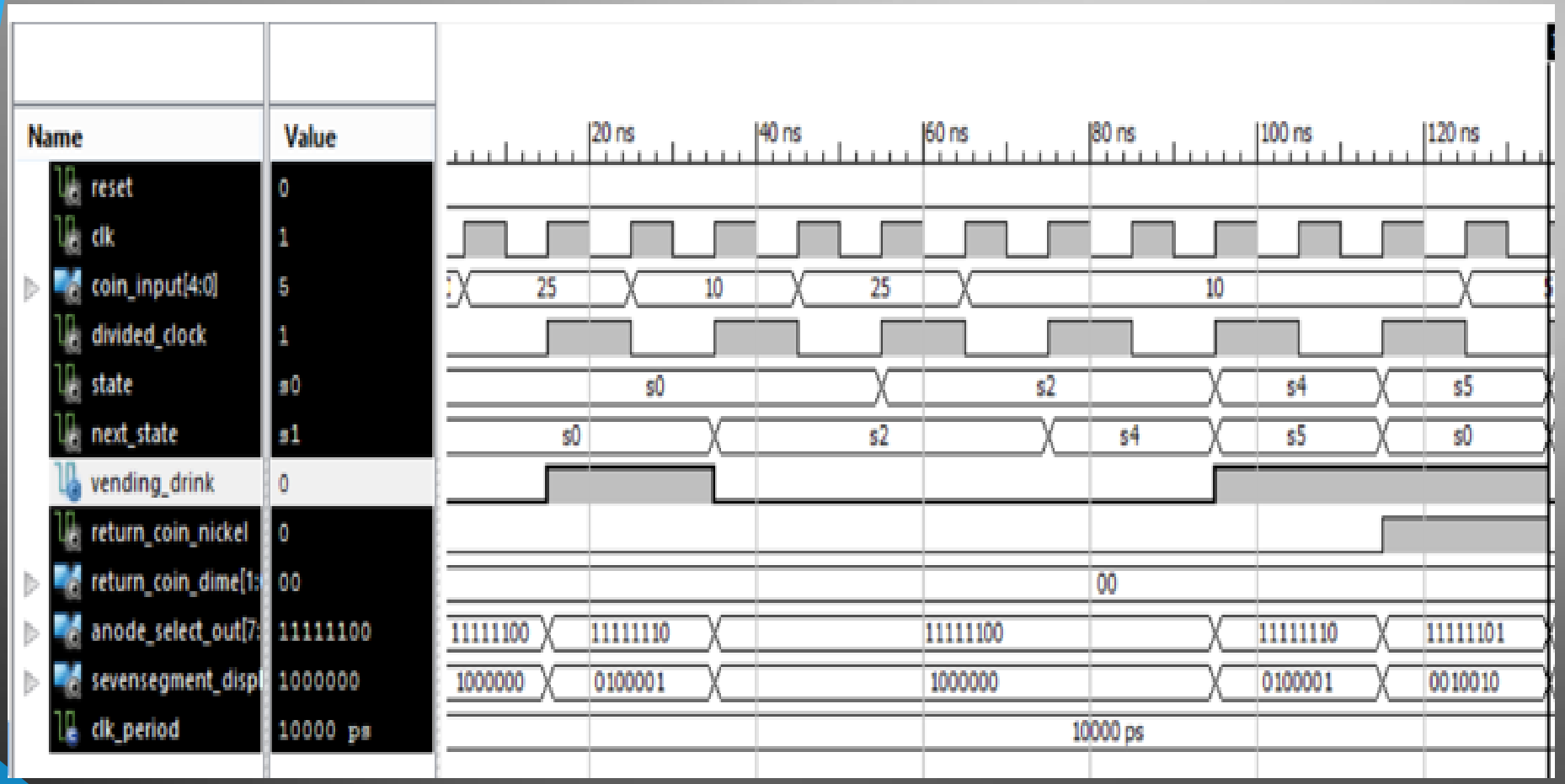
1. **Synchronous Process for State Machine**
2. **Asynchronous Process for Next State Logic**
3. **Clock Divider Process**
4. **Switches, LEDs, and Seven-Segment Display**

Inputs/Outputs	FPGA resources	Description
Coin_input(4 downto 0)	Coin_input[4]= SW4 Coin_input[3]= SW3 Coin_input[2]= SW2 Coin_input[1]= SW1 Coin_input[0]= SW0	This is coin input which is 5 bit and implemented using switches of the FPGA board. We have only three type of coin in our vending machine 5c, 10c and 25c so these 5, 10 and 25 will be inputs but in form of their binary equivalent. E.g. 5 will be inputted as 00101.
vending_drink	vending_drink=LED15	This LED show that a soft drink is been vended.
return_coin_	return_coin_nickel=LED14	This LED will display return a coin nickel
Push Button	BTNC N17	Change states
sevensegment_display_out(6 downto 0)	sevensegment_display_out[6] = CG sevensegment_display_out[5] = CF sevensegment_display_out[4] = CE sevensegment_display_out[3] = CD sevensegment_display_out[2] = CC sevensegment_display_out[1] = CB sevensegment_display_out[0] = CA This is used to on-off the corresponding seven segments from the array of 8 seven segments. These seven segment are common anode.	There are total 8 seven segments in our FPGA we are using only one for to show dispatching and another one to show remaining amount/change. The output of the machine is a soft drink which will be dispatched when input money >=25c and this output is displayed in our case on a seven segment of the FPGA. The output will be 'd' on the seven segment display which will indicate that soft drink is been dispatched.
return_coin_dime(1 downto 0)	return_coin_dime[1]= LED13 return_coin_dime[0]= LED12	These are again the output which will show that how many coin dime of 10c should be returned to make the proper change, for example, total input of the system was 45c then the output will be 2 dimes of 10c coins to return 20c back.
RESET	RESET= SW15	This is reset button which will reset the vending machine to its initial state to accept a new when its value is one and will have no effect when it will be 0.
CLK	CLK=E3 which is connected to 100MHZ crystal oscillator	This will provide a clock signal to run the whole system properly.



Pin detail and used resources of FPGA

Timing Diagram



Time for Demonstration

Thank you