

Recitation Material for Week 15

Tasks to do in the recitation section

Assigned Date: Fourteenth Week

T1. Review HW11 problems and solve any problems that the students point out they had difficulties with.

T2. Answer any general questions about HW12 and Final Project.

T3. Solve the following problems.

1. Design a sequence detector for 011 as a Moore FSM with four states (i.e., two bits can be used to represent the state). The FSM should continually look for 011 in the input sequence without stopping and output a 1 whenever 011 is detected. Draw the state diagram for the FSM.
2. This question considers an alternative design of the 011 sequence detector using three state bits. The state keeps track of the last three bits of the input sequence. For example, if the current state is 011 and the current input is 0, the next state will be 110. If the current state is 000 and the current input is 1, the next state will be 001. Design the circuit using D FFs and draw the circuit diagram.
3. In this problem, we would like to design a 3-bit stop watch. The stop watch has the following control inputs:
 - (a) Start/Stop: starts counting when 1, and stops counting when 0.
 - (b) Clear: clears the counter when 1 no matter what the value of Start/Stop is.
 - (c) Freeze: captures a snap shot of the count when 1, and goes back to normal counting when 0.

Please make your stop watch design as simple as possible.

4. Design a Moore state machine that accepts only 1 or 2 quarters and can dispense items A and B that costs 40 and 45 cents, respectively. There are three inputs, A, B, and Z. Z = 1/0 means a new quarter is inserted/not inserted in the coin slot. The machine should reject a quarter if more than 2 quarters are inserted in the slot. Inputs A and B represent request to dispense items A or B, respectively. Only one item can be requested. An item is only dispensed if the machine already has received sufficient money. After an action is taken as described next, the machine returns to the original (reset) state. The machine generates two bits output, Q1 and Q2, implying the following.
 - a. Q1Q2 = 00 means do not do anything
 - b. Q1Q2 = 11 means reject a coin (return any quarter inserted)
 - c. Q1Q2 = 01 means dispense item A and return 10 cents
 - d. Q1Q2 = 10 means dispense item B and return 5 cents.