

Assignment 10

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January 7, 2021

1 Question 1

The state diagram of Finite State Machine (FSM) designed to detect an overlapping sequence of three bits as shown in figure. The FSM has an input 'In' and an output 'Out'. The initial state of FSM is S_0 .

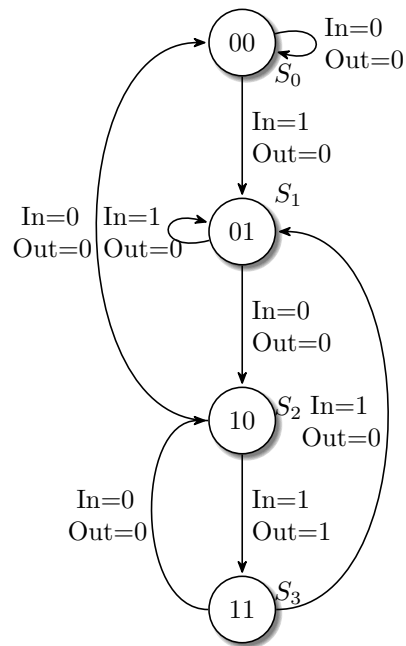


Figure 1:

If the input sequence is 10101101001101, starting with leftmost bit, then how many number of times 'Out' will be 1 is _____

2 Solution

We are required to find output sequence of Finite State Machine(FSM) and number 1's in output sequence.

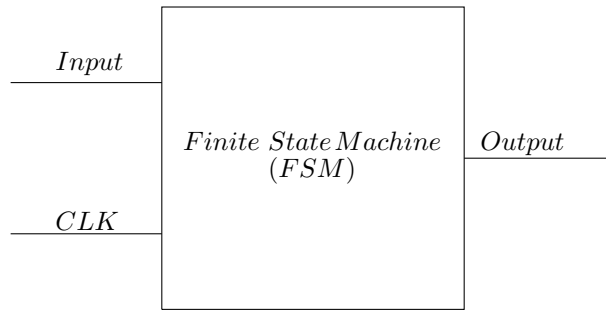


Figure 2:

If the CLK is not applied, there will be no difference between input sequence and the output sequence.

The mechanism that should take place in Finite state machine is mentioned in Figure 1. We will take few parts of figure in question.

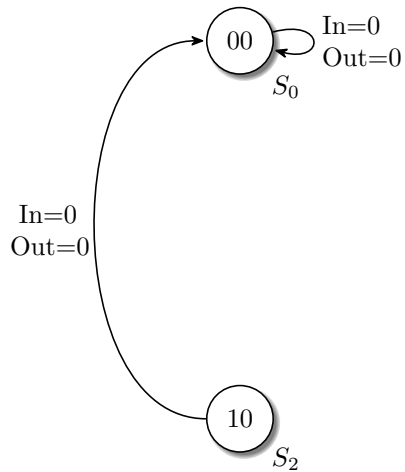


Figure 3:

In the finite machine we are required to find the output in current state for corresponding input. We have to see Input value at current state to get the Output. For example if we are at current state S_0 with input=1 then Output =0 and state changes to S_1 .

We are now looking at another example. If the current state of FSM is S_2 with input=0 then it gives output=0 and state changes to S_0 .

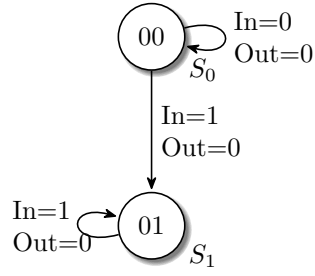


Figure 4:

State Transition Table			
Present state	Input	Next state	Output
S_0	1	S_1	0
S_1	0	S_2	0
S_2	1	S_3	1
S_3	0	S_2	0
S_2	1	S_3	1
S_3	1	S_1	0
S_1	0	S_2	0
S_2	1	S_3	1
S_3	0	S_2	0
S_2	0	S_0	0
S_0	1	S_1	0
S_1	1	S_1	0
S_1	0	S_2	0
S_2	1	S_3	1

Table 1: State Transtion Table

Output sequence of corresponding current state of given input sequence is

00101001000001 that is represented in Table 1 Current state,Input and output.

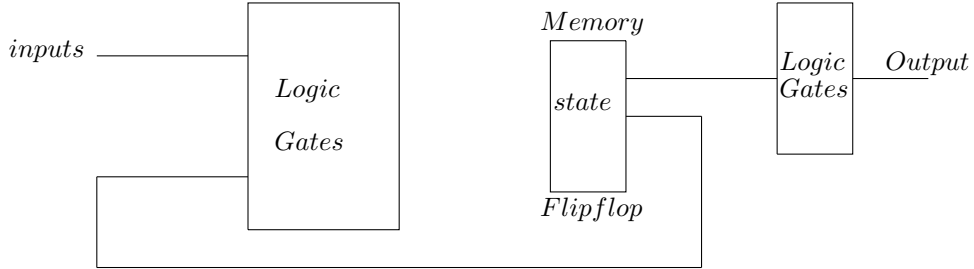


Figure 5:

<i>Current State</i>	S_0	S_1	S_2	S_3	S_2	S_3	S_1	S_2	S_3	S_2	S_0	S_1	S_1	S_2
<i>Input</i>	1	0	1	0	1	1	0	1	0	0	1	1	0	1
<i>Output</i>	0	0	1	0	1	0	0	1	0	0	0	0	0	1

Table 2: Table for States,Input and Output of finite state machine

The Output sequence of FSM is 00101001000001 from Table 1.
Then number of times 'Out' will be 1 is 4
Answer = 4