FPGA ASSIGNMENT

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CONTENTS

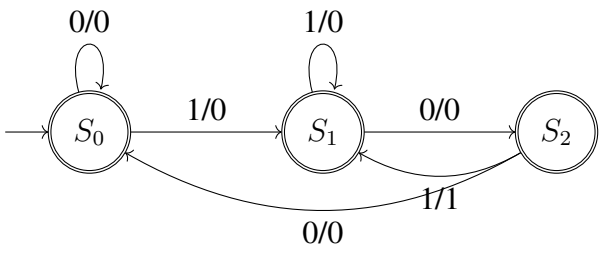
I. PROBLEM

(GATE2020-QP-EE)
Q.15 A sequence detector is designed to detect precisely 3 digital inputs, with overlapping sequence detectable. For the sequence $(1, 0, 1)$ and input data $(1, 1, 0, 1, 0, 0, 1, 1, 0, 1, 0, 1, 1, 0)$

1) 1,1,0,0,0,0,1,1,0,1,0,0
2) 0,1,0,0,0,0,0,1,0,1,0,0
3) 0,1,0,0,0,0,0,1,0,1,1,0
4) 0,1,0,0,0,0,0,1,0,1,0,0

II. SOLUTION

The above question can be solved by using State diagram, Truth Table and karnaugh-map.



A. Truth Table

p	q	x	$\bar{p}$	$\bar{q}$	y	$D1$	$D2$
0	0	0	0	0	0	0	0
0	0	1	0	1	0	0	1
0	1	0	1	0	0	1	0
0	1	1	0	1	0	0	1
1	0	0	0	0	0	0	0
1	0	1	0	1	1	0	1
1	1	0	x	x	x	x	x
1	1	1	x	x	x	x	x

Truth table for Boolean function

B. K-Map Implementation of y

p \ qx	00	01	11	10
0	0	0	0	0
1	0	1	X	X

Table. 1
herefore, the Boolean function is $y = px$.

C. K-Map Implementation of $D1$

p \ qx	00	01	11	10
0	0	0	0	1
1	0	0	X	X

Table. 2

Therefore, the Boolean function is $D1 = q\bar{x}$.

D. K-Map Implementation of $D2$

p \ qx	00	01	11	10
0	0	1	1	0
1	0	1	X	X

Table. 3

Therefore, the Boolean function is $D2 = x$.

III. Components

Components	Values	Quantity
Vaman	-	1
Jumper Wires	M-F	5
Breadboard		1
LED		2
Resistor	220 ohms	2

IV. Implementation

Vaman PIN	INPUT	OUTPUT
18	manual	
21		LED
22		$LED(clk)$

Procedure

1. Connect the circuit as per the above table.
2. Connect the vaman to the PC and dump the code.
3. Change the values of **Inputs** in the Hardware and verify the sequence.

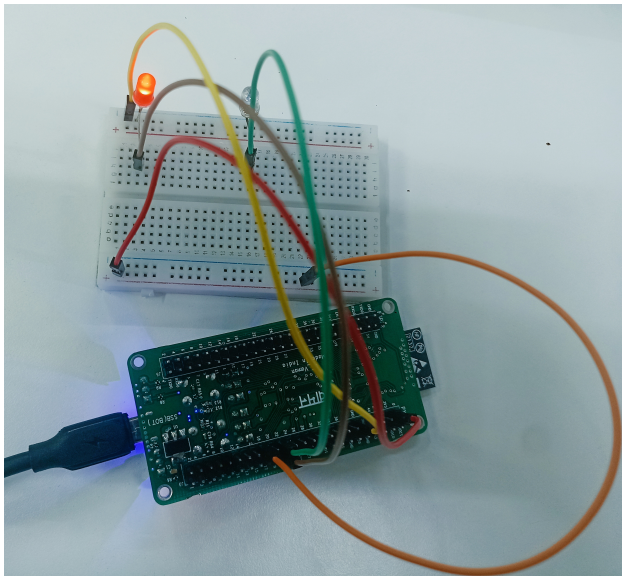


Fig. 1. Connections

V. Software

Execute the code which is given in below path and configure the quickfeather.pcf file with respect to the pins in vaman which is available in the same path before uploading it to the vaman.

https://github.com/Pavan2k01/Digital-Design/blob/main/FPGA

VI. Conclusion

Hence, We have executed the above Problem using Vaman in FPGA environment.