Assignment I
design of non overlapping sequence detector

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CONTENTS

***Abstract*—This manual shows how to design a sequential circuit for non overlapping sequence of110011.**

I. COMPONENTS

Components	Value	Quantity
Resistor	220 Ohm	1
Arduino	UNO	1
Seven Segment Display		1
Decoder	7447	1
Flip Flop	7474	2
Bread Board		1
Jumper Wires		20

II. HARDWARE

1) Make connections between the seven segment display in Fig 1 and the 7447 IC in Fig 2 as shown in Table I
2) Connect the Arduino, 7447 IC and the two 7474 ICs according to Table 2 and Fig 3.
3) Input is given from Arduino D8.

7447	a’	b’	c’	d’	e’	f’	g’
Display	a	b	c	d	e	f	g

Table I: Connection Table

III. FINITE STATE MACHINE

1) A sequential detector is a sequential state machine that takes an input string of bits and generates an output 1 whenever the target sequence has been detected.
2) The Input is changed to 0 and 1 to display the Next state.
3) The LED glows when the sequence 110011 is detected.

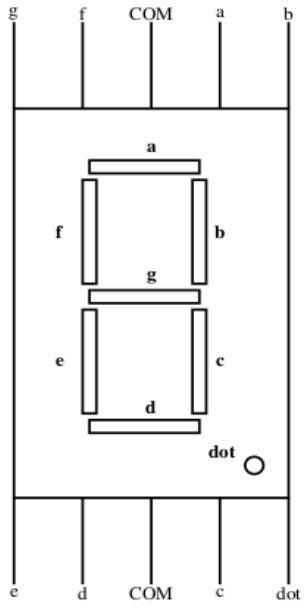

Figure 1: Seven Segment Display

Figure 2: Pin Diagram of 7447 IC

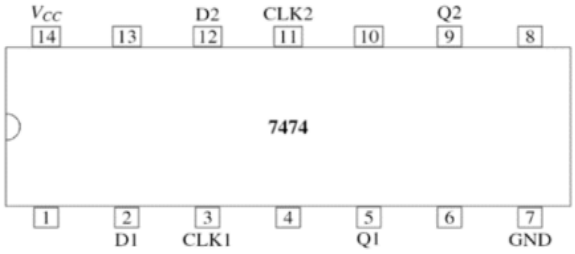

Figure 3: Pin Diagram of 7474 IC

$$A = X'P'QR + XPQ'R' \quad (1)$$

PX \ QR	00	01	11	10
00	0	0	0	1
01	0	0	X	X
11	0	0	X	X
10	0	1	0	1

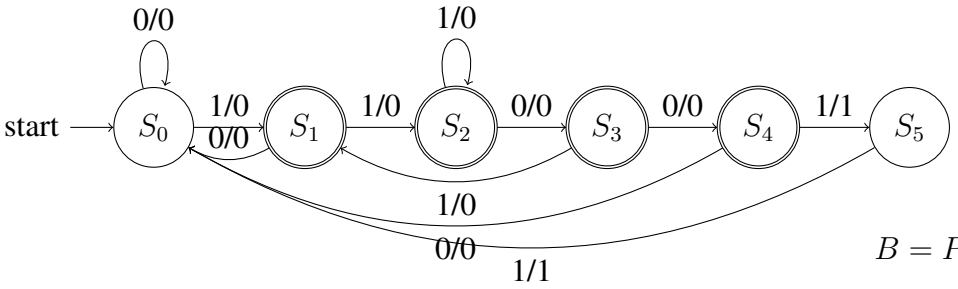

Figure 4: State Diagram

$$B = P'QR' + XP'Q'R \quad (2)$$

	INPUT		OUTPUT				CLOCK		5V			
	P	Q	D	C	B	A						
Arduino	D6	D7	D10	D11	D4	D5	D13					
7474	2	12			9	5	CLK1	CLK2	1	4	10	13
7474			5	2			CLK1	CLK2	1	4	10	13
7447					1	7			16			

Table II: Connection Table

Present State	Input	Next State	Output
A B C	X	P Q R	Y
0 0 0	0	0 0 0	0
0 0 0	1	0 0 1	0
0 0 1	0	0 0 0	0
0 0 1	1	0 1 0	0
0 1 0	0	0 1 1	0
0 1 0	1	0 1 0	0
0 1 1	0	1 0 0	0
0 1 1	1	0 0 1	0
1 0 0	0	0 0 0	0
1 0 0	1	1 0 1	0
1 0 1	0	0 0 0	0
1 0 1	1	0 0 0	1

Table III: State Table

PX \ QR	00	01	11	10
00	0	0	1	0
01	0	0	X	X
11	1	0	X	X
10	0	0	0	0

PX \ QR	00	01	11	10
00	0	0	0	1
01	0	0	X	X
11	1	0	x	x
10	1	0	1	0

$$C = XQ'R' + XP'QR + X'P'QR' \quad (3)$$

$$D = XPQ'R \quad (4)$$

CONCLUSION

The detection of 110011 sequence is implemented using

https://github.com/sireesha1602/sireesha/blob/main/ide/code.cpp