भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

Finite State Machine

Shaik Mohisena Tabassum
Roll No: FWC22279
shaikmohisena123@gmail.com

I. ABSTRACT

The document explains a state machine by deconstructing the decade decoder.

II. COMPONENTS

The required components list is given in Table: I. The state diagram of the deade counter is shown in Fig.1.
The decade counter FSM implementation using D-Flip Flops is shown in Fig.2.

Components	Value	Quantity
Seven Segment Display		1
IC	7447	1
IC	7474	2
Arduino	UNO	1
Jumper Wires		10
Breadboard		1

TABLE I

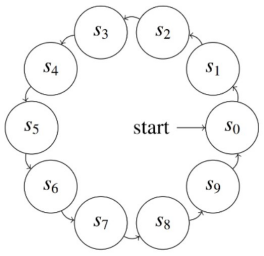

Fig. 1.

III. PROCEDURE

1) Make the connections between 7447 and Seven segment display as per the Table: II and connections between Arduino and 7447 as per the Table: III.

2) The truth table for the increment decoder is shown in Table IV.

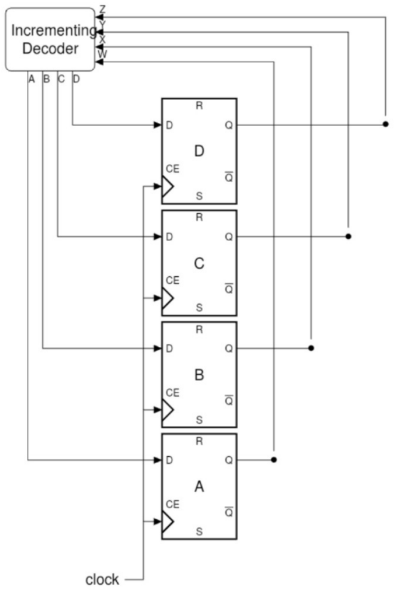

Fig. 2.

7447	$\overline{a}$	$\overline{b}$	$\overline{c}$	$\overline{d}$	$\overline{e}$	$\overline{f}$	$\overline{g}$
Display	a	b	c	d	e	f	g

TABLE II

3) The truth table for the increment decoder is shown in Table IV and decrement decoder is shown in Table V.
4) Run the code. And observe the output in the display as in Fig.3.

7447	D	C	B	A
Arduino	5	4	3	2

TABLE III

Z	Y	X	W	D	C	B	A
0	0	0	0	0	0	0	1
0	0	0	1	0	0	1	0
0	0	1	0	0	0	1	1
0	0	1	1	0	1	0	0
0	1	0	0	0	1	0	1
0	1	0	1	0	1	1	0
0	1	1	0	0	1	1	1
0	1	1	1	1	0	0	0
1	0	0	0	1	0	0	1
1	0	0	1	0	0	0	0

TABLE IV

Z	Y	X	W	D	C	B	A
0	0	0	0	1	0	0	1
0	0	0	1	0	0	0	0
0	0	1	0	0	0	0	1
0	0	1	1	0	0	1	0
0	1	0	0	0	0	1	1
0	1	0	1	0	1	0	0
0	1	1	0	0	1	0	1
0	1	1	1	0	1	1	0
1	0	0	0	0	1	1	1
1	0	0	1	1	0	0	0

TABLE V

IV. RESULTS

Download the codes given in the link below and execute them to see the output as shown in Fig.3 and Fig.4 by observing in seven segment display.
https://github.com/Tabassum4930/FWC-1/tree/main/Ide/Fsm

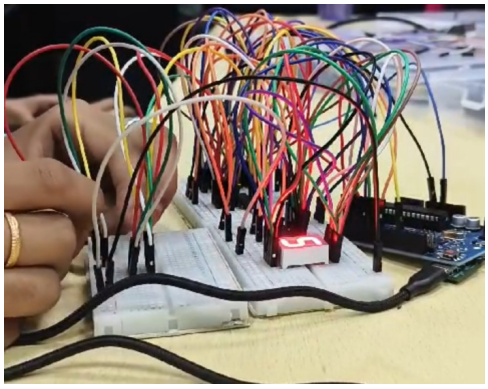

Fig. 3.

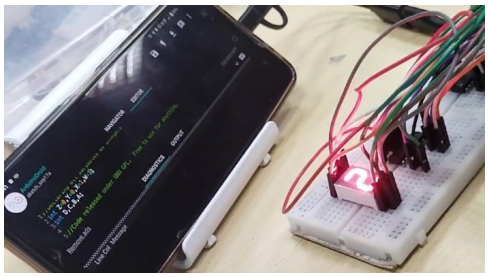

Fig. 4.

V. CONCLUSION

Therefore, it is an essential component in the experimentation of digital circuits. FSMs are widely used in digital circuits, software development, and various control systems due to their simplicity and clarity in modeling sequential logic.