IDE

JOHNSON COUNTER

Manoj Chavva- FWC22055

CONTENTS

***Abstract*—This Manual shows the design and Implemantation of four bit Johnson counter.**

I. COMPONENTS

S.No	Component	Number
1.	Arduino	1
2.	Bread Board	1
3.	Jumper Wires(M-M)	6
4.	LED	4

II. INTRODUCTION

1) Johnson counters are used to store or process or count the number of events occurred within the circuit.
2) It is designed with a group of flip-flops, where the inverted output from the last flip-flop is connected to the input of the first flip-flop.
3) In Johnson counter
   No. of states = No. of flip-flop used
   Number of used states=2n
   Number of unused states=2n - 2*n
4) Here, the functionality of D flip flop is used for the program.

III. CIRCUIT DIAGRAM

1) The inverted output of the last flip-flop '$\bar{Q}$n' is fed back to the first flip-flop in the sequence bit pattern.
2) The counter registers cycles in a closed-loop i.e circulates within the circuit.

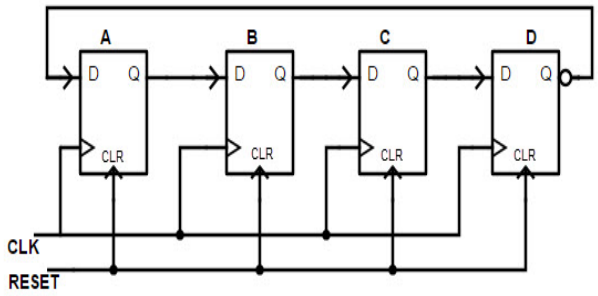

Fig. 1: Four bit Johnson Counter

3) Reset pin acts as an on/off switch. So, the flip-flops can be enabled by clicking the Reset switch.
4) CLK pin is used to observe the changes in the output of the flip-flops.

IV. PROCEDURE

1) Connect the 4 LED's and Aurdino according to table I
2) Observe the states of LED and verify the truth table using the code from the link.

Arduino	D2	D3	D4	D5	GND
LED's	LED1	LED2	LED3	LED4	

TABLE I: Connection Table

URL – https://github.com/ManojChavva/FWC/blob/main/IDE/JohnsonwithoutIC/code.cpp

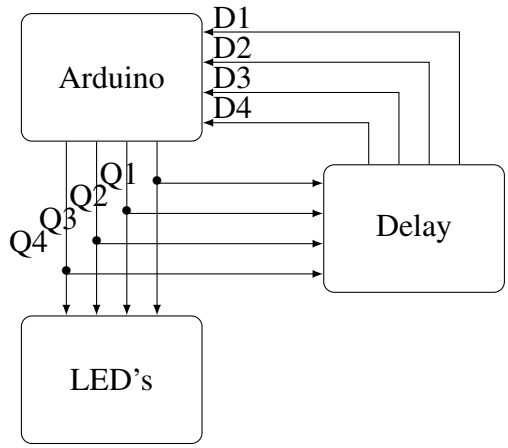

Fig: 2 Sequential Circuit

V. TRUTH TABLE

CLK	D1	D2	D3	D4	Q1	Q2	Q3	Q4
0	0	0	0	0	0	0	0	0
1	1	0	0	0	1	0	0	0
2	1	1	0	0	1	1	0	0
3	1	1	1	0	1	1	1	0
4	1	1	1	1	1	1	1	1
5	0	1	1	1	0	1	1	1
6	0	0	1	1	0	0	1	1
7	0	0	0	1	0	0	0	1

Table II: Truth Table.

- The above table state that

1) The counter produces the output 0000 when there is no clock input passed(0).
2) The counter produces the output 1000 when the 1st clock pulse is passed to the flip flops.
3) The counter produces the output 1100 when the 2nd clock pulse is passed to the flip flops.
4) The counter produces the output 1110 when the 3rd clock pulse is passed to the flip flops.
5) The counter produces the output 1111 when the 4th clock pulse is passed to the flip flops.
6) The counter produces the output 0111 when the 5th clock pulse is passed to the flip flops.
7) The counter produces the output 0011 when the 6th clock pulse is passed to the flip flops.
8) The counter produces the output 0001 when the 7th clock pulse is passed to the flip flops.

CONCLUSION

Thus the Johnson counter designed and Implemented.