

# IMPLEMENTATION OF JOHNSON COUNTER USING ARM

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**Abstract**—This Manual shows the design and Implementation of four bit Johnson counter by vaman board.

## I. COMPONENTS

S.No	Component	Number
1.	Vaman board	1
2.	Bread Board	1
3.	Jumper Wires(M-M)	6
4.	LED	4
5.	USB cable	1

## II. INTRODUCTION

- Johnson counters are used to store or process or count the number of events occurred within the circuit.
- 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.
- In Johnson counter  
No. of states = No. of flip-flop used  
Number of used states= $2n$   
Number of unused states= $2n - 2^n$
- Here, the functionality of D flip flop is used for the program.

## III. CIRCUIT DIAGRAM

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

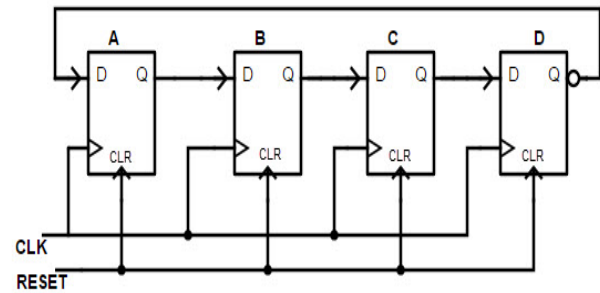


Fig. 1: Four bit Johnson Counter

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

## IV. PROCEDURE

- Connect the 4 LED's and vaman according to table I
- Observe the states of LED and verify the truth table using the code from the link.

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

TABLE I: Connection Table

URL – <https://github.com/ManojChavva/FWC/blob/main/avr-gcc/codes/main.c>

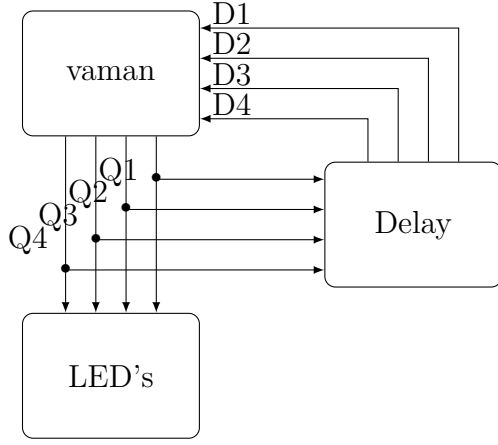


Fig: 2 Sequential Circuit

### 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.

### VI. SETUP

- 1) Connect the Vaman to the Laptop through USB.
- 2) There is a button and an LED to the left of the USB port on the Vaman. There is another button to the right of the LED.

- 3) Press the right button first and immediately press the left button. The LED will be blinking green. The Vaman is now in bootloader mode.

#### STEPS FOR IMPLEMENTATION:

- 1) Login to termux-ubuntu on the android device and execute the following commands: Make sure that the required installation of pygmy-sdk had done prior executing below commands

```

proot-distro login debian
cd /data/data/com.termux/files/home/
mkdir arm
cd codes/GCC_Project
make
scp /data/data/com.termux/files/home/
arm/codes/GCC_Project/output/bin/codes.
usernameofpc@IPaddress:/home/username

```

Make sure that the appropriate username, IP address of the Laptop is given in the above command.

- 2) Now execute the following commands on the Laptop terminal  
Make sure that required installation of programmer application and modification of bash file had done prior executing below command  

```
bash flash.sh codes.bin
```
- 3) After finishing the process of flashing with the programmer application press the button to the right of the USB port to reset. Vaman is now flashed with our source code