



# BOOLEAN LOGIC IN VAMAN ESP

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ASSIGNMENT

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## 3 Circuit Diagram

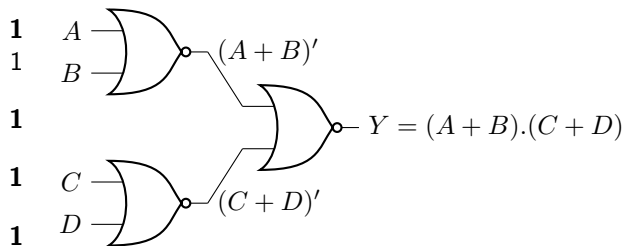


Figure.a

## Abstract

This manual explains logic Circuit for the following Boolean Expression using only NOR Gates :

$$(A+B).(C+D)$$

**Evaluation of Output Y :** In Digital Electronics the De Morgan's Laws are :

First Law:  $(AB)' = A' + B'$

Second Law:  $(A+B)' = A' . B'$

The output  $Y = ((A+B)' + (C+D)')'$

$= ((A+B)')' . ((C+D)')'$  (From De Morgan's Second Law)

$= (A+B).(C+D)$  since  $((A)')' = A$

## 1 Introduction

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

Truth Table for NOR Gate

### 1.1 NOR Gate:

Use two input NOR Gate. The Logic symbol and truth table for NOR gate is shown above. In the truth table above A,B are inputs and Y is the output.

## 2 Components

Component	Values	Quantity
Arduino	UNO	1
JumperWires	M-M	6
Breadboard		1

## 4 Truth Table

D	C	B	A	Y
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

TABLE 1

## 5 K-map

		BA			
		00	01	11	10
DC	00	0	0	0	0
	01	0	1	1	1
	11	0	1	1	1
	10	0	1	1	1

Figure.b

**Karnugh Map for Y:** Draw k-map for the truth table shown in Table 1 .The Given expression  $(A+B).(C+D)$  is obtained by using the K-map in Fig.b The implicants in boxes 5,7,13,15 result in "AC", the implicants in boxes 9,11,13,15 result in "AD", the implicants in boxes 6,11,14,15 result in "BC", the implicants in boxes 10,11,14,15 result in "BD", The output is expressed in terms of inputs D,C,B,A as:  
 $Y = AC + BC + AD + BD$   
 $= C(A+B) + D(A+B)$   
 $= (A+B).(C+D)$   
 2,4,5,10 GPIO Pins of Vaman Board are configured as input pins and the required Logic for A,B,C,D are drawn from 5V (Digital '1'), GND (Digital '0'). Built in led will glow based on Y satisfying the Table-1

### 5.1 The steps for implementation:

1. Connect the USB-UART pins to the Vaman ESP32 pins according to Table

VAMAN LC PINS	UART PINS
GND	GND
ENB	ENB
TXD0	RXD
RXD0	TXD
0	IO0
5V	5V

2. Flash the following setup code through USB-UART using laptop

```
https://github.com/pavan170850/Fwciith2022/blob/main/iot/codes/setup/src/main.cpp
```

```
svn co https://github.com/pavan170850/Fwciith2022/trunk/iot/codes/setup
cd setup
pio run
pio run -t upload
```

after entering your wifi username and password (in quotes below)

```
#define STASSID "..." // Add your network
                           credentials
#define STAPSK "..."
```

in src/main.cpp file

3. You can notice that vaman will be connected to the network credentials provided above. Connect your laptop to the same network ,You should be able to find the ip address of your vaman-esp on laptop using

```
ifconfig
nmap -sn 192.168.6.1/24
```

where your computer's ip address is the output of ifconfig and given by 192.168.6.x

4. Login to termux-ubuntu on the android device and execute the following commands:

```
proot--distro login debian
cd /data/data/com.termux/files/home/
mkdir iot
svn co https://github.com/pavan170850/Fwciith2022/trunk/iot/codes/ota
cd codes/ota
```

5. Assuming that the username is jeevan and password is jeevan12345, flash the following code wirelessly

```
https://github.com/pavan170850/Fwciith2022/blob/main/iot/codes/ota/src/main.cpp
```

through

```
pio run
pio run -t nobuild -t upload --upload-port
ip_address_of_esp
```

where you may replace the above ip address with the ip address of your vaman-esp.