Verification of Distributive Laws of Boolean Algebra Using ARM Processor-VAMAN Board

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1 Problem statement

Verification of **Distributive Law**of Boolean Algebra using **ARM** Processor-**VAMAN** Board

2 Abstract

Distributive laws of Boolean Algebra is expressed by the following expression.

Distributive Law: **X.(Y+Z) = X.Y + X.Z**

In this program, Two LEDs are used for checking the output. The outputs of both RHS and LHS parts of above expression must be same with the random inputs.

3 Truth Table for Distributive Laws

Truth Table for Distributive Law: X.(Y+Z) = X.Y + X.Z

X	**Y**	**Z**	Y+Z	**X(Y+Z)**	XY	XZ	**XY+XZ**
0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0
0	1	0	0	0	0	0	0
0	1	1	0	0	0	0	0
1	0	0	0	0	0	0	0
1	0	1	1	1	0	1	1
1	1	0	1	1	1	0	1
1	1	1	1	1	1	1	1

Table 1: Truth Table for Distributive Law1

4 Considerations

As per given data, the following table has been prepared.

Symbol/Device	**Value**	**Description**
X, Y, Z	Pin 2, 4, 6	Input Variables
A,B	Pin 18, 21	Output Variables
VAMAN Board	1	
LEDs	2	For Output
Connecting wires	10	For Output

Table 2: Considerations

5 Logic diagram of gates

Logic diagram of gates is shown in the figure 1.

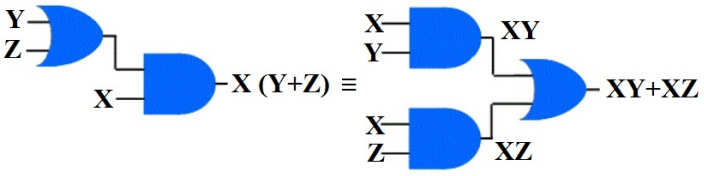

Figure 1: Logic diagram of gates

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6 Solution

1. Apply the inputs X, Y, and Z (either HIGH or LOW) to the Pin no.s 2, 4 and 6 of **Vaman Board(Pigmy side)** as per the Truth tables.
2. Randomly vary the inputs and note the the results.

7 SOFTWARE

1. Download the codes given in the link below and execute them.

https://github.com/meertabresali-FWC-IITH/project/blob/main/Asgn9.Arm/codes/src/main.c

8 CONCLUSION

1. Distributive law is expressed by

X(Y+Z)=XY+XZ with LHS = X(Y+Z), RHS = XY+XZ, and

2. Codes are written for both Distributive laws and are executed using Vaman Board(Arm processor).
3. Result has been displayed on LEDs (i.e. LED1, LED2).
4. LED1 is assigned for LHS of the Boolean expression of Distributive Law.
5. LED2 is assigned for RHS of the Boolean expression of Distributive Law.
6. For random digital inputs X, Y and Z as per Truth tables (at Vaman Board(Pigmy side) pins 2, 4 and 6), it has been noticed that, the output pins (18 and 21) of Vaman Board are at the same level.