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Distributive Law of Boolean Algebra

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I. ABSTRACT

Distributive law of Boolean Algebra is expressed by " 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 must be same with random inputs.

A. Logic Gates configuration

Logic Gates configuration is shown in figure 1.

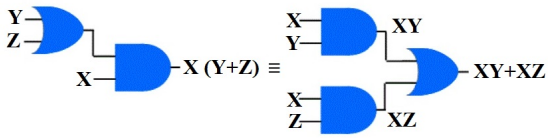

Fig. 1. This frog was uploaded via the file-tree menu.

B. Truth Table for Distributive Law

Truth Table for Distributive Law is given in Table 1.

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 I
TRUTH TABLE FOR DISTRIBUTIVE LAW

II. COMPONENTS

Required components list has been given in Table 2

Components	Value	Quantity
Resistors	220 ohm	2
LEDs		2
Arduino	UNO	1
Jumper Wires		20
Breadboard		1

TABLE II
COMPONENTS

	INPUT	**INPUT**	**INPUT**	**OUTPUT**	**OUTPUT**
	X	Y	Z	X(Y+Z)	XY+XZ
Arduino	2	3	4	5	6
LEDs				LED1	LED2

TABLE III

III. HARDWARE

Make the connections between Arduino and LEDs as per the Table 3 and Figure 3.

IV. SOFTWARE

1. Download the codes given in the link below and execute them. 2. Apply the inputs X, Y, and Z (either HIGH or LOW) to the Digital Pin no.s 2, 3 and 4 of Arduino as per the Truth table (Table 1).

V. FINDINGS

After the execution of codes, for different input variables (X, Y and Z), the output pins (5 and 6) of Arduino will be at the same level (both output pins will be at either HIGH or LOW simultaneously), and it causes both LEDs either to glow or off.

VI. CONCLUSION

1. Distributive law is expressed by "X(Y+Z)=XY+XZ", and here LHS = X(Y+Z), RHS = XY+XZ. 2. Codes are written for

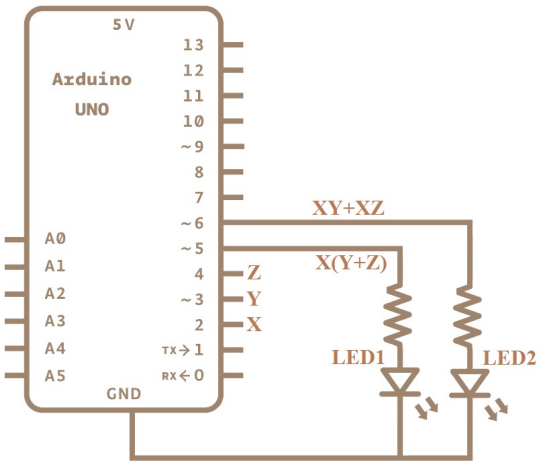

Fig. 2. Connections between Arduino and LEDs.

Distributive law and are executed. 3. Result has been displayed on Two LEDs (i.e. LED1 and 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 table (at Arduino digital pins 2, 3 and 4), it has been noticed that the output pins (5 and 6) of Arduino are at the same level.