Logical Expression through avr-gcc

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Contents

1 Abstract

In the ciruit A,B,C and D are digital inputs, Y is digital output.The equivalent circuit shows the logical expression Y=AB+CD.

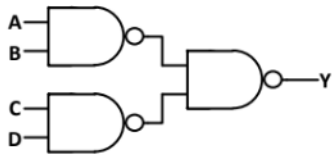

Fig. 1: Y=AB+CD

2 Components

Component	Value	Quantity
Resistor	220 Ohm	1
Arduino	UNO	1
Seven Segment Display		1
Decoder	7447	1
Jumper Wires	M-M	20
Breadboard		1

TABLE I

3 Solution :

3.1 Theoretical Solution

Based on Demorgans Law

$$\overline{AB} = \overline{A} + \overline{B} \tag{1}$$

$$\overline{\overline{A}} = A \tag{2}$$

As per the boolean circuit A,B,C and D are inputs and Y is the output. The equivalent expression of the boolean logic is

$$Y = \overline{\overline{AB}.\overline{CD}}$$

By using equation(1) then the output Y is

$$Y = \overline{\overline{AB}} + \overline{\overline{CD}}$$

Again by using equation(2) then the output Y is

$$Y = AB + CD$$

4 Procedure

4.1 LED Blinking

1) Connect Arduino ground to the led - resistor end
2) Connect Arduino 13 pin to the LED Positive
3) Execute the following code
4) Observe the results as per below TABLE III by changing input values

4.2 Truth table for Boolean Logic

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

TABLE II

Observe the circuit and verify the program by executing the link provided below.

https://github.com/naveed790/FWC/assembly