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Implementation of Boolean Logic using OR and Inverter Gates

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Abstract

This manual shows how to implement Boolean Logic with OR and Inverter Gates through 7447 BCD-Seven Segment Display Decoder

1 Introduction

There are many different ways to implement a Boolean Logic through different Gates.In this manual, we implement the Boolean expression, F=xy+x'y'+y'z using OR and Inverter Gates.

2 Components

Component	value	quantity
Resistor	220 ohm	1
Arduino	UNO	1
decoder	7447	1
Jumper wires	M-M	20
sevensegment display		1
Bread board		1

Table 1:

3 Hardware

3.1 Connection between the sevensegment display and 7447 IC in Figure 1 using Table 2.

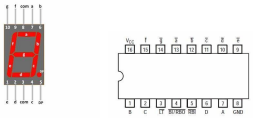

Figure 1:Sevensegment and 7447 IC.

3.2 connection of lower pins of 7447 IC to the Arduino according to Table 3 and connecting VCC,GND of IC to 5V,GND of Arduino respectively.

7447	a'	b'	c'	d'	e'	f'	g'
Display	a	b	c	d	e	f	g

Table 2:

7447	D	C	B	A
Arduino	5	4	3	2

Table 3:

3.3 Finally, Giving 1 as input to the arduino through making the connections in table 4.

	X	Y	Z
Input	0	0	1
Arduino	8	7	6

Table 4:

4 Implementation

4.1 By making Logic circuit for the Boolean Logic, F=xy+x'y'+y'z,we get the circuit as in figure 2. And the thruth table for the circuit is given in Table 5.

4.2 The code below realizes the Boolean Logic for F in table 5.

https://github.com/kumarg9999/IITH_FWC/blob/main/main.c

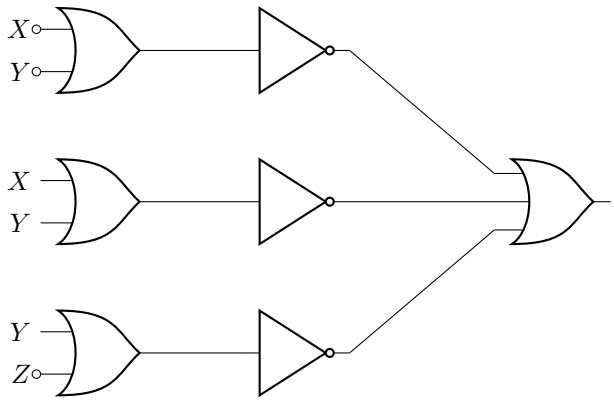

Figure 2

X	Y	Z	F	D	C	B	A
0	0	1	1	0	0	0	1
0	1	0	1	0	0	0	1
0	0	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	0	0	0	1
1	1	0	1	0	0	0	1
1	1	1	1	0	0	0	1