

Boolean Expression to its simplest form using K-map

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IITH - Future Wireless Communication-(FWC22032)

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1 Introduction

K maps are used to Simplify Boolean Expressions. The given Expression to solve is $F(S3, S2, S1, S0) = (1, 5, 6, 7, 11, 12, 13, 15)$

2 karnaugh-map

		S1S0			
		00	01	11	10
S3S2	00	0	1	0	0
	01	0	1	1	1
	11	1	1	1	0
	10	0	0	1	0

$$Y = S0S1'S3' + S1S2S3' + S1'S2S3 + S0S1S3$$

3 Components

Component	value	quantity
Resistor	220 ohm	1
Arduino	UNO	1
LED		1
Bread board		1
Jumper wires	M-M	10

Table 1:

4 Truth table for given expression

S3	S2	S1	S0	Y
0	0	0	0	0
0	0	0	1	1
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	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	0
1	1	1	1	1

Table 2:

5 Connections and results

Also make connections to arduino UNO ,led and inputs based on table3.

Arduino UNO	5	4	3	2	8	gnd
Input	S3	S2	S1	S0		
led					+	-

Table 3:

Sample input	S3	S2	S1	S0	LED
1	0	0	0	0	OFF
2	0	0	0	1	ON

Table 4:

Code Link:

<https://github.com/19pa1a04e9/FWC-IITH/blob/main/Assignment-1/main.cpp>

6 Logic Circuit

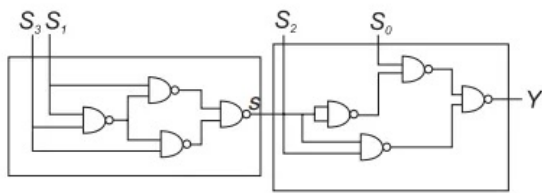


Figure 1: Logic circuit using four 2-input NAND gates