BCD to GRAY CONVERSION

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Assignment No.1
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Contents

Abstract

This manual explains BCD to GRAY code conversion by finding boolean equations.

1 BCD to GRAY Conversion

The BCD to GRAY code converter takes the numbers 0, 1, . . . , 9 in binary as inputs and generates the converted number as output. Make connections as shown in table 1. Gray code – also known as Cyclic Code, Reflected Binary Code (RBC), Reflected Binary (RB) or Grey code.

Problem : - Implement BCD to GRAY conversion

Connections :-

Arduino	2	3	4	5	6	7	8
Display	a	b	c	d	e	f	g

Table 1

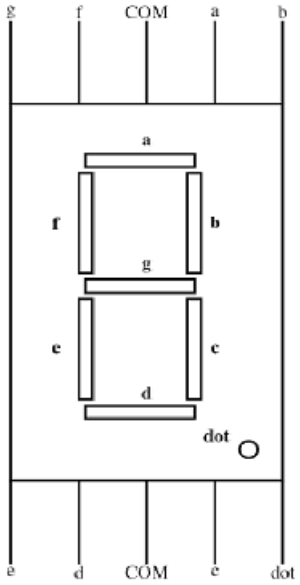

Figure 1

2 Karnaugh Map

Using Boolean logic or kmaps, G0, G1, G2, G3 in the truth table can be expressed in terms of the inputs A,B,C,D

AB \ CD	00	01	11	10
00	0	1	0	1
01	0	1	0	1
11	0	0	0	0
10	0	1	0	0

Kmap for G0

$$G0 = A'C'D + A'CD' + AB'C'D \quad (1)$$

AB \ CD	00	01	11	10
00	0	0	1	1
01	1	1	0	0
11	0	0	0	0
10	0	0	0	0

kmap for G1

$$G1 = A'BC' + A'B'C \quad (2)$$

AB \ CD	00	01	11	10
00	0	0	0	0
01	1	1	1	1
11	0	0	0	0
10	1	1	0	0

kmap for G2

$$G2 = A'B + AB'C' \quad (3)$$

AB \ cD	00	01	11	10
00	0	0	0	0
01	0	0	0	0
11	0	0	0	0
10	1	1	0	0

Kmap for G3

$$G3 = AB'C' \quad (4)$$

Using Boolean logic or kmaps, a,b,c,d,e,f,g in the truth table can be expressed in terms of G0,G1,G2,G3 as:

$$a = G0'G1'G2G3' + G0G1'G2'G3' \quad (5)$$

$$b = G0'G1'G2G3 + G0'G1G2G3' + \text{G0G1'G2G3'} \quad (6)$$

$$c = G0'G1G2'G3' + G0'G1'G2G3 \quad (7)$$

$$d = G0'G1'G2G3' + G0G1G2G3' + \text{G0G1'G2'G3'} \quad (8)$$

$G0G1$ \ $G2G3$	00	01	11	10
00	0	0	0	1
01	0	0	0	0
11	1	0	0	1
10	1	0	0	1

Kmap for e

$$e = G0G3' + G0G2G3' \quad (9)$$

$G0G1$ \ $G2G3$	00	01	11	10
00	0	0	0	0
01	1	0	0	0
11	1	0	0	1
10	1	0	0	0

Kmap for f

$$f = G0G2'G3' + G1G2'G3' + G0G1G3' \quad (10)$$

$G0G1$ \ $G2G3$	00	01	11	10
00	1	0	0	0
01	0	0	0	0
11	0	0	0	1
10	1	0	0	0

Kmap for g

$$g = G1'G2'G3' + G1'G2G3 + G0G1G2G3' \quad (11)$$

Truth Table :-

A	B	C	D	G3	G2	G1	G0	a	b	c	d	e	f	g
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
0	0	0	1	0	0	0	1	1	0	0	1	1	1	1
0	0	1	0	0	0	1	1	0	0	0	0	1	1	0
0	0	1	1	0	0	1	0	0	0	1	0	0	1	0
0	1	0	0	0	0	1	1	0	1	0	0	0	0	0
0	1	0	1	0	1	1	1	0	0	0	1	1	1	1
0	1	1	0	0	1	0	1	0	1	0	0	1	0	0
0	1	1	1	0	1	0	0	1	0	0	1	1	0	0
1	0	0	0	1	1	0	0	0	1	1	0	0	0	1
1	0	0	1	1	1	0	1	0	0	0	0	0	0	1

Make the connections and execute the following code. And verify the truth table.

https://github.com/NavyaValmeekam/Assignment-1/blob/main/A1$_gray/src/main.cpp$