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# BCD to 2'S Complement

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IITH - Future Wireless Communication(FWC22040)

## Abstract

This objective of this document is to show Conversion between BCD to 2's Complement

## 1 Components

Component	Value	Quantity
Arduino	UNO	1
Resistor	220ohm	4
Bread board	-	1
Jumber wires	M-M	20
Led	-	4

## 2 BCD to 2's Complement

The Converter takes 4-bit boolean number as input and produces 2's complement as output. The corresponding truth tables is available

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

## 3 Boolean logic

Using Boolean logic, output A in table 0 can be expressed in terms of inputs W,X,Y,Z as

$$A = Z'W + Z'X + Z'YX' + ZY'X'W'$$

$$B = Z'YX'W' + Y'X'W + Z'Y'X$$

$$C = Z'X'W + Y'X'W + Z'XW'$$

$$D = Z'W + Y'X'W$$

## 4 karnaugh-map

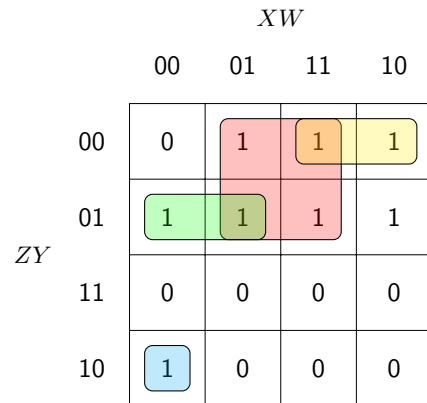


FIG 1: K-map for A

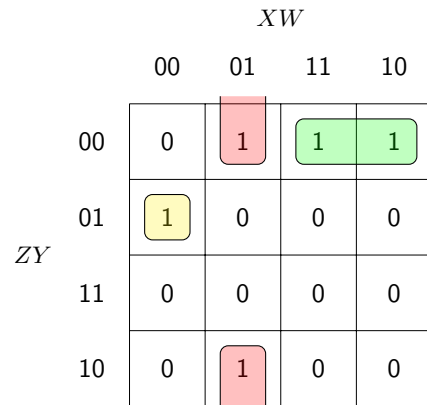


Fig 2: K-map for B

		XW			
		00	01	11	10
ZY	00	0	1	0	1
	01	0	1	0	1
	11	0	0	0	0
	10	0	1	0	0

Fig 3: K-map for C

		XW			
		00	01	11	10
ZY	00	0	1	1	0
	01	0	1	1	0
	11	0	0	0	0
	10	0	1	0	0

Fig 4: K-map for D

## 5 Hardware Connection

Arduino	2	3	4	5
Leds	led1	led2	led3	led4

Fig :4

Give the connections as per Table 4. For taking the inputs connect 5V of arduino to +ve line of bread board to consider it as logic 'HIGH'.connect GND pin of arduino to -ve line of bread board to consider it as logic 'LOW'.

## 6 Software

- 1.Connect the arduino to the computer
- 2.Download the follwing code

<https://github.com/Vamsi9849/iithfwc/blob/main/avr-gcc/a1avr-gcc/codes/main.c>

- 3.The led will ON and OFF according to the given input