

# XNOR Gate in Arduino

Ahilan R - FWC22090

**Abstract**—We implement XNOR logic in Arduino by getting the boolean expression from it's K-map for it's truth table by writing our sketch in avr assembly language.

## I. THEORY

Let  $A$  and  $B$  be the inputs to the gate,  $Y$  be the output. The truth table for XNOR gate is given below.

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

K-map for the above mentioned truth table:

		B	
		0	1
A	0	1	0
	1	0	1

Simplified K-map:

		B	
		0	1
A	0	1	0
	1	0	1

Collecting minterms from the kmap, i.e., where  $Y = 1$ , we get the boolean expression in sum of products form for XNOR gate as following.

$$Y = A'B' + AB \quad (1)$$

And for product of sums form, we get maxterms, where  $Y = 0$ , we get the boolean expression as following.

$$Y = (A' + B)(A + B') \quad (2)$$

## II. IMPLEMENTATION

Components Required:

Components	Qty.
Arduino UNO	1
Breadboard	1
Jumper wires	4

Connections:

Arduino	2	3
Inputs	A	B

In addition to the above table, we connect 5V and GND pins of Arduino to different bus strips of breadboard to input binary values back to the input pins of Arduino.

### A. Sketch

We set the digital pins D2, D3 as inputs and feed A, B into those. We utilise the builtin LED at D13, by setting D13 as output. So, when  $Y = 1$ , LED glows and when  $Y = 0$  LED doesn't glow. This sketch in assembly code is given in the below link.

<https://github.com/ahilan22/fwc-1/tree/main/assembly/assignment/code/asm.asm>

### B. Software

We use avra assembler to convert the code to machine language. Uploading the code to Arduino depends on the host system, if it's a computer or a phone, refer the following steps:

- 1) Download the source code in the desired location from the link given above.
- 2) Convert the assembly code into machine code.
- 3) Upload the generated eep.hex file to Arduino using Arduino Droid if the host is a android phone, or use avrdude if the host is a linux computer.

We've successfully implemented XNOR logic in Arduino.