XNOR Gate in Arduino

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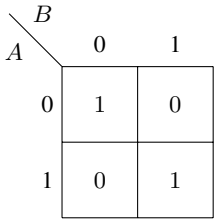
***Abstract*—We implement XNOR logic in Arduino by getting the boolean expression from it's K-map for it's truth table.**

I. Theory

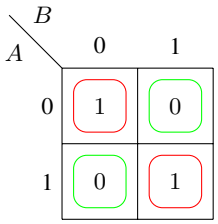
Let A and B be the inputs to the gate, Y be the output. The truth table for XNOR gate is given below.

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

K-map for the above mentioned truth table:



Simplified K-map:



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.

$$Y = A'B' + AB \tag{1}$$

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

$$Y = (A' + B)(A + B') \tag{2}$$

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 is given in the below link.

https://github.com/ahilan22/fwc-1/tree/main/ide/assignment/code/src/main.cpp

B. Software

We use platformIO to compile and upload the code to Arduino.

1) Download the source code; from a desired directory run the command
   - `svn export https://github.com/ahilan22/fwc-1/trunk/ide/assignment`
2) Compile the sketch; from appropriate directory run the command
   - `pio run`
3) Upload the sketch to Arduino
   - `pio -t nobuild -t upload`

We've successfully implemented XNOR logic in Arduino.