



IMPLEMENTATION OF 2-INPUT AND XOR LOGIC ON ARDUINO

L. Kiran Kumar Reddy

levaku.fwc1@iiitb.ac.in

COMETFWC027 IITB Future Wireless Communication (FWC) ASSIGNMENT

July 06, 2025

Question

Q.37 What are the minimum number of 2-to-1 multiplexers required to generate a 2-input AND gate and a 2-input Ex-OR gate?

- (A) 1 and 2
- (B) 1 and 3
- (C) 1 and 1
- (D) 2 and 2

Truth Table for 2-input AND and XOR using MUX

| A | B | AND (A·B) | XOR (A \oplus B) |
|---|---|-----------|--------------------|
| 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 0 |

Components

| Component | Value | Quantity |
|-------------------|-----------------------------|----------|
| Arduino Board | – | 1 |
| Jumper Wires | M-F | 10 |
| Push Buttons | – | 2 |
| Breadboard | – | 1 |
| USB Cable | – | 1 |
| LED (Optional) | – | 1 |
| 7-Segment Display | Common Cathode | 1 |
| Resistors | 220 Ω , 10k Ω | 1, 2 |

Setup

1. Connect two push buttons to digital pins D2 and D3 with 10k Ω pull-down resistors as inputs A and B.
2. Connect a common cathode 7-segment display to Arduino digital pins D4–D10 for segments a–g.
3. Write code to read button states using `digitalRead(D2)` and `digitalRead(D3)`.
4. Use logic to calculate A AND B and A XOR B and store results.
5. Display AND output on one digit and XOR output on another using segment encoding.

Implementation

1. Define input pins for push buttons A and B and output pins for 7-segment display segments.
2. Initialize all pin modes in `setup()` using `pinMode()` for inputs and outputs.
3. Read button values using `digitalRead()` and store them in variables `a` and `b`.
4. Compute `and_result = a & b` and `xor_result = a ^ b`.
5. Use `digitalWrite()` to display `and_result` and `xor_result` on respective 7-segment digits.