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Batch: COMETFWC019
Date: 06 july 2025

GATE 2009, EEE Question Number 13

Abstract

This project demonstrates the behavior of the NAND gate using Pico2w, push buttons as logic inputs, and an LED to indicate output. It validates the concept that NAND is a universal gate.

1. Components

Component	Qty
Pico2w	1
Push Buttons	2
LED	1
220Ω Resistors	3
Breadboard	1
Jumper Wires	10
Laptop with Thonny IDE	1

Table: Components used

2. Setup Instructions

- Connect button A to GP14 with pull-down logic.

- Connect button B to GP15 similarly.

- Connect LED anode to GP13 through a 220 resistor.

- Common ground for both buttons and LED cathode.

- Use Thonny IDE to upload the code.
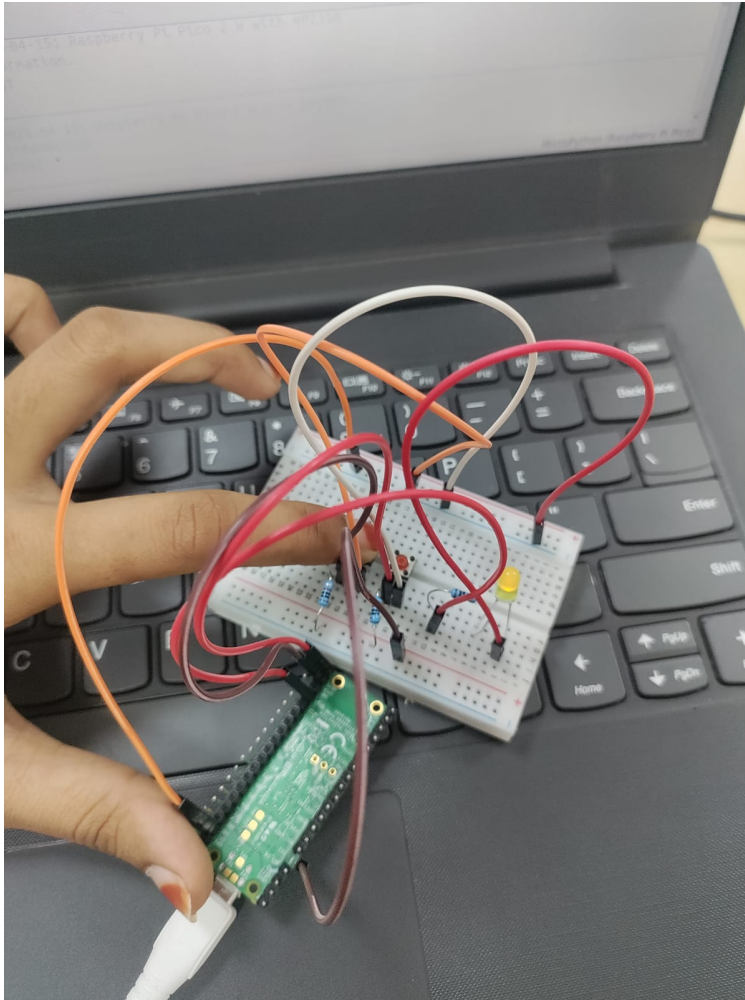
3. NAND Gate Logic

$$\text{NAND}(A, B) = \overline{A \cdot B}$$

$$\text{Output} = \begin{cases} 1 & \text{if } A = 0 \text{ or } B = 0 \\ 0 & \text{if } A = 1 \text{ and } B = 1 \end{cases}$$

4. Observation Table

A	B	$LED(Output)$
0	0	1
0	1	1
1	0	1
1	1	0

5. Circuit Image

6. GitHub Code Link

https://github.com/amuru052004/Likhitha_fwc/tree/main/Hardware/platformio

7. Conclusion

This implementation verifies the behavior of a NAND gate using Pico2w.