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# GATE 2009, ECE Question Number 38

## Abstract

*Simulation of latch behavior using Raspberry Pi Pico to demonstrate NAND and NOR latch transitions for the input combinations (0,1) → (1,1).*

## 1. Components

| Component | Qty |
|---|---|
| Pico2w | 1 |
| Push Buttons | 2 |
| LEDs | 2 |
| 220Ω Resistors | 4 |
| Breadboard | 1 |
| Jumper Wires | 10 |
| Laptop with Thonny IDE | 1 |

Table: Components used

## 2. Setup

- GP15: Input P1 (Push Button)
- GP14: Input P2 (Push Button)
- GP16: NAND Q Output (LED)
- GP17: NOR Q Output (LED)
- GND and VBUS properly connected

## 3. Observation

- **NAND Latch:** (0,1) → (1,0) → holds at (1,0)
- **NOR Latch:** (0,1) → (1,0) → transitions to (0,0)

## 4. Truth Tables

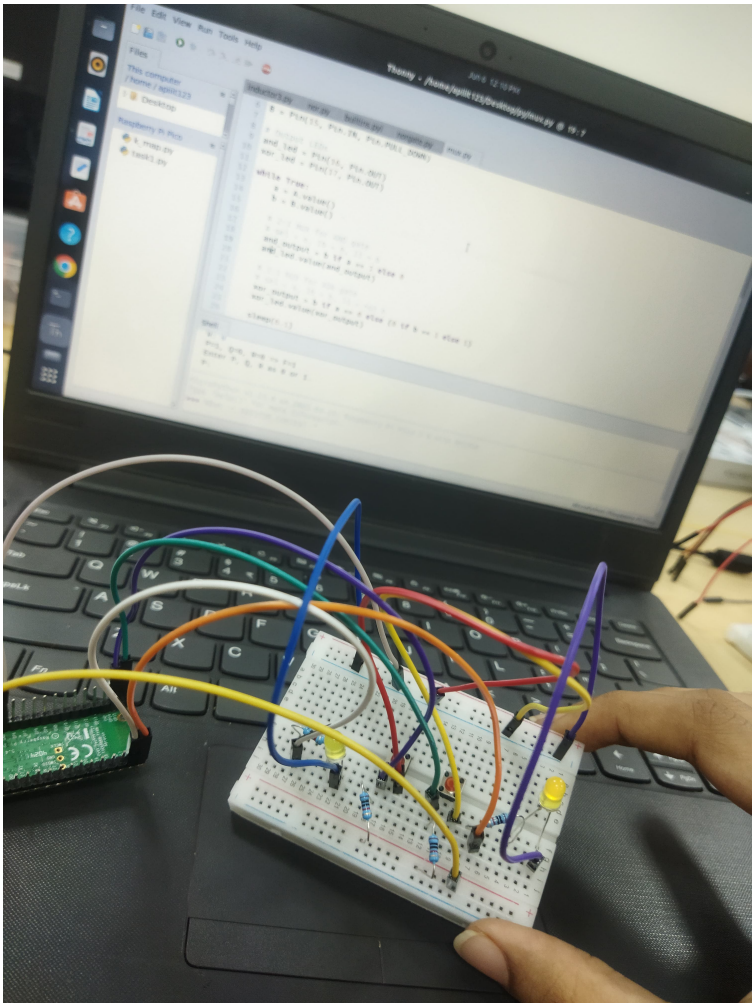
### NAND Latch

| $P1$ | $P2$ | Output (Q1, Q2) |
|---|---|---|
| 0 | 1 | $(1, 0)$ |
| 1 | 1 | $(1, 0)$ (holds) |

### NOR Latch

| $P1$ | $P2$ | Output (Q1, Q2) |
|---|---|---|
| 0 | 1 | $(1, 0)$ |
| 1 | 1 | $(0, 0)$ |

## 5. Circuit Image



## 6. GitHub Code Link

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

## 7. Conclusion

This project successfully demonstrates latch behavior for NAND and NOR gates using MicroPython and Raspberry Pi Pico.