Water Level Indicator

Name: Mujeeb U Rehman
Reg No : 2023558

Name: Muhammad Bin waseem
Reg No: 2023403

ABSTRACT:
This project presents the design and implementation of a water level detection system leveraging digital logic gates and basic electronic components. The system detects water levels in a container using probes and provides visual feedback through an *LED indicator*. By ensuring reliable monitoring, the system prevents resource wastage and potential damage caused by overflow or dry tanks. This project serves as a practical application of digital logic principles in real-world scenarios.

1: INTRODUCTION:

Water level monitoring systems are vital for efficient water resource management in various fields, including residential, industrial, and agricultural settings. These systems prevent overflows and shortages, ensuring optimal resource usage. This project proposes a cost-effective solution using digital logic design principles and readily available components. The main feature is a system capable of detecting water levels using probes and providing feedback through LED indicators.

2: PROJECT DESCRIPTION:

A. Objectives

- Design and implement a water level detection system using digital logic gates.
- Use LED indicators to provide real-time feedback on water levels.
- Ensure cost-efficiency and reliability in operation.

B. Background

Water level indicators are integral in preventing overflows and maintaining adequate water levels. Existing systems often rely on advanced sensors, but this project emphasizes simplicity and cost-effectiveness by using basic digital logic components.

.
z

3: PROJECT REQUIREMENTS:

1. *IC 7404 (NOT Gate IC):* Processes inputs from water level probes to determine water level status.
2. *BC 547 Transistor**:*** Acts as a switch to control the LED indicator based on NOT gate outputs.
3. *Resistors:* Limits current to protect transistors and LEDs.
4. *Breadboard:* Provides a platform for circuit assembly.
5. *Jumper Wires:* Facilitates connections between components.
6. *LED:* Indicates water level status visually.
7. *11.1V Battery***:** Powers the system.
8. *7805 Voltage Regulator**:*** Maintains a stable 5V output for circuit components.

4: System Design:

*A. Water Level Probes**:***

Probes placed at varying heights detect water levels by completing or breaking a circuit.

B. Digital Processing :

NOT gates invert signals from probes to determine high/low water levels. Outputs drive the transistor to control the LED.

C. LED Feedback:

The LED provides a clear visual indication when the water level crosses specific thresholds.

*D. Voltage Regulation**:***

A 7805 regulator ensures consistent 5V supply for circuit stability.

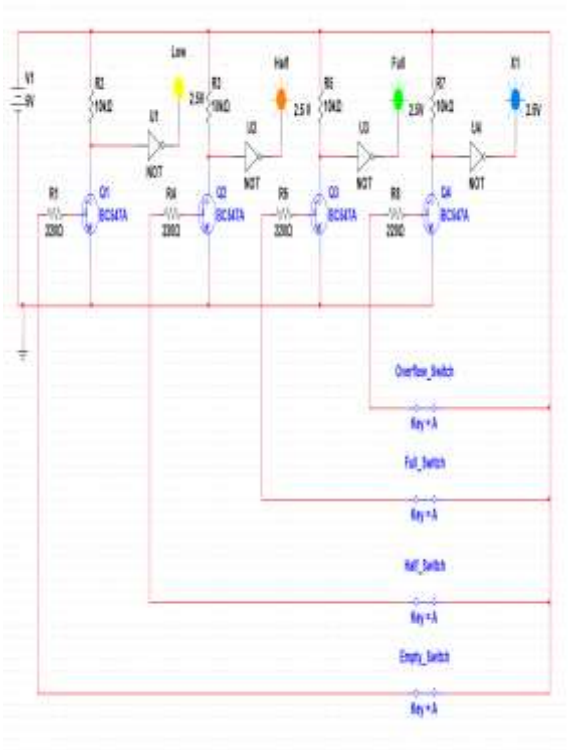
5: Working Principle

- *Low Water Level***:** When water is below the first probe, the circuit outputs a HIGH signal, inverted to LOW, keeping the LED off.
- *High Water Level***:** When water contacts the probe, the circuit outputs a LOW signal, inverted to HIGH, turning the LED on.

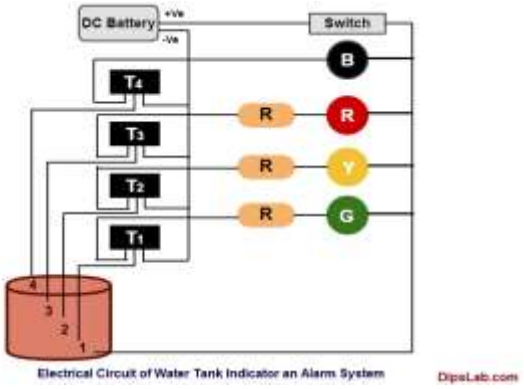
6: Workflow

1. *Circuit Design:* Create schematic using NOT gates and probes.
2. *Component Assembly:* Arrange components on the breadboard as per design.
3. *Testing and Calibration:* Ensure accurate water level detection.
4. *Troubleshooting:* Optimize circuit reliability.

7: Simulation and Circuit Diagram



8:BLOCKDIAGRAM:

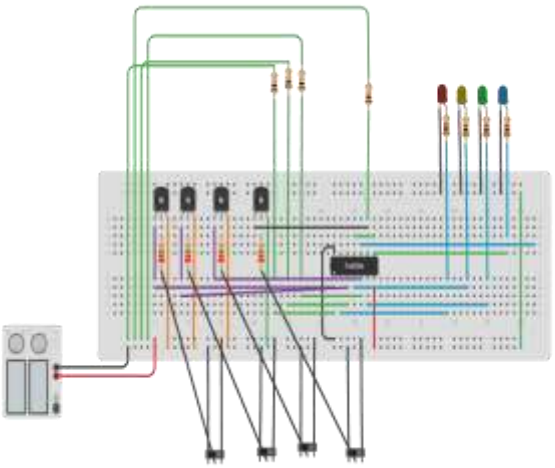


9: Hardware Component Specification:

Detailed specifications of all components are as follows:

- *IC 7404:* 6 NOT gates.
- *BC 547 Transistor:* NPN type for amplification.
- *Resistors***:** 10kΩ and 220Ω.
- *LED***:** Standard red indicator LED.
- *Voltage Regulator***:** 7805 for 5V stabilization.

10:Bread Board implementation **:**



11: Conclusion:

This project demonstrates a reliable and cost-effective water level monitoring system using digital logic principles. The simplicity of the design ensures ease of assembly and maintenance, making it an ideal choice for resource-constrained environments.

12: References

1. "Digital Design: Principles and Practices" by John F. Wakerly.
2. Datasheet of IC 7404: https://www.ti.com/lit/ds/symlink/sn74hc04.pdf
3. Datasheet of BC 547 Transistor: https://www.onsemi.com/pdf/datasheet/bc547-d.pdf
4. "Digital Logic Design" by M. Morris Mano.
5. https://www.youtube.com/watch?v=uxkl6ag9nB4

13:Acknowledgment:

We express gratitude to GIK Institute and Faculty Especially “Sir Mehran Ali” for their guidance and resources facilitating this project.