



MAKERERE UNIVERSITY

**COLLEGE OF COMPUTING AND INFORMATION SCIENCES**

**CONCEPT NOTE: SMART WATER LEVEL MONITORING SYSTEM FOR TANKS**

**EMBEDDED SYSTEM GROUP 3**

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**INTRODUCTION**

Water is a critical resource, yet its mismanagement leads to significant waste and inefficiency. Many households, industries, and agricultural setups rely on water storage tanks, but manual monitoring often results in overflows, dry runs, and water shortages.

The Smart Water Level Monitoring System is an automated solution that tracks water levels in real-time using sensors, provides visual/audible alerts, and can even integrate with mobile apps for remote monitoring. By preventing wastage and ensuring optimal water usage, this system promotes sustainability, cost savings, and convenience.

This system is designed to detect and monitor the water level inside a tank or drum using ultrasonic sensors or a series of float/switch sensors, then display the level through LEDs, an LCD. It can also be configured to alert users when the tank is full or nearly empty.

**PROBLEM STATEMENT**

Manual monitoring of water levels in tanks often leads to wastage due to overflows, dry tanks, and inefficient water management. An automated solution would save water, time, and effort while providing real-time visibility.

## **HOW THIS SYSTEM SOLVES THE PROBLEM**

The Smart Water Level Monitoring System addresses these challenges through:

### **a) Real-Time Level Detection**

- Ultrasonic Sensors (non-contact) or Float Switches (contact-based) measure water levels accurately.
- Sensors send data to a microcontroller (Arduino/ESP32) for processing.

### **b) Instant Alerts & Notifications**

- Visual Indicators: LEDs or LCD screen shows water level (e.g., Low/Medium/Full).
- Audible Alarms: Buzzer triggers when water reaches critical levels.
- Mobile Alerts (Optional): WiFi/GSM module sends notifications via apps (e.g., Blynk, Telegram).

### **c) Automated Water Control (Optional Enhancement)**

- Can be integrated with solenoid valves or pumps to:
  - Stop inflow when the tank is full (prevents overflow).
  - Start refilling when water is low (prevents dry runs).

## **CONCLUSION**

The Smart Water Level Monitoring System offers a practical, efficient, and scalable solution to water management challenges. By automating level detection and alerting users before problems occur, it:  
Prevents water wastage (saving costs and resources).  
Protects equipment (avoiding pump damage).  
Eliminates manual checks (saving time and effort).