

## **Water Level Indicator: IoT-based system (Hardware)**



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## Abstract

This project, **Water Level Indicator**, focuses on developing an **IoT-based** monitoring system to track water levels in real time. Using an **ESP32** microcontroller paired with ultrasonic sensors and the **Blynk platform**, the system enables users to view tank water levels remotely via a smartphone app and locally on an **OLED** display. The system includes essential features like alarms for critical water levels and optional automation capabilities for pump control, providing a comprehensive solution for water management.

## 1. Introduction

Effective water management is essential for both domestic and industrial use to prevent waste and ensure availability. This proposal aims to address water monitoring challenges through an **IoT-based** solution utilizing **ESP32** and the **Blynk** platform. This system allows remote and local monitoring and control, offering users critical information on water levels and enabling automatic management through programmable thresholds.

## 2. Problem Statement

Managing water levels in residential and industrial settings often requires manual monitoring, leading to inefficiencies and potential water wastage. By developing an automated solution, this project will allow for real-time water level tracking and automated control, which can be crucial for optimized resource management.

## 3. Objectives

- **Real-time Monitoring:** Use an ultrasonic sensor and ESP32 microcontroller to accurately measure and display water levels.
- **Local & Remote Alerts:** Display water levels on an OLED screen and send notifications to the Blynk app.
- **Alarm Activation:** Trigger alarms when water levels reach critical thresholds.
- **Automation:** Integrate a relay to enable automatic pump control based on real-time water levels.

## 4. Scope

The **Water Level Indicator system** is suitable for a wide range of applications, including households, apartment buildings, and industries. It aims to enhance water conservation and reduce operational costs associated with manual monitoring.

## 5. Existing Systems

Current solutions offer basic water level indicators but often lack IoT integration for remote monitoring and automated control. By combining these features, our system provides a robust and user-friendly alternative.

## 6. Methodology

The project will follow the Waterfall model for structured development. Key phases include:

- **Requirement Analysis:** Define water level thresholds and system configuration.
- **Hardware Setup:** Connect ESP32, ultrasonic sensor, OLED display, and buzzer.
- **Software Development:** Program monitoring and control logic using Arduino IDE.
- **Testing:** Verify real-time data accuracy, alarm functionality, and Wi-Fi connectivity.
- **Deployment:** Install and observe system performance in a real environment.

## 7. Expected Outcomes

The Water Level Indicator is expected to provide a functional, IoT-enabled solution for real-time water monitoring with both local and remote access, notifications, and optional pump automation.

## Technical Specifications

- **Hardware:** ESP32, ultrasonic sensor, OLED display, buzzer, relay (optional)
- **Software:** Arduino IDE, programmed in C++
- **Connectivity:** Wi-Fi enabled for Blynk platform integration
- **Power:** Optimized for low-power consumption

## 8. Conclusion

This **IoT-based Water Level Indicator** offers a reliable and automated solution for water tank management. By providing real-time monitoring, critical alerts, and automation options, it ensures efficient water use and helps mitigate waste, making it ideal for diverse applications.