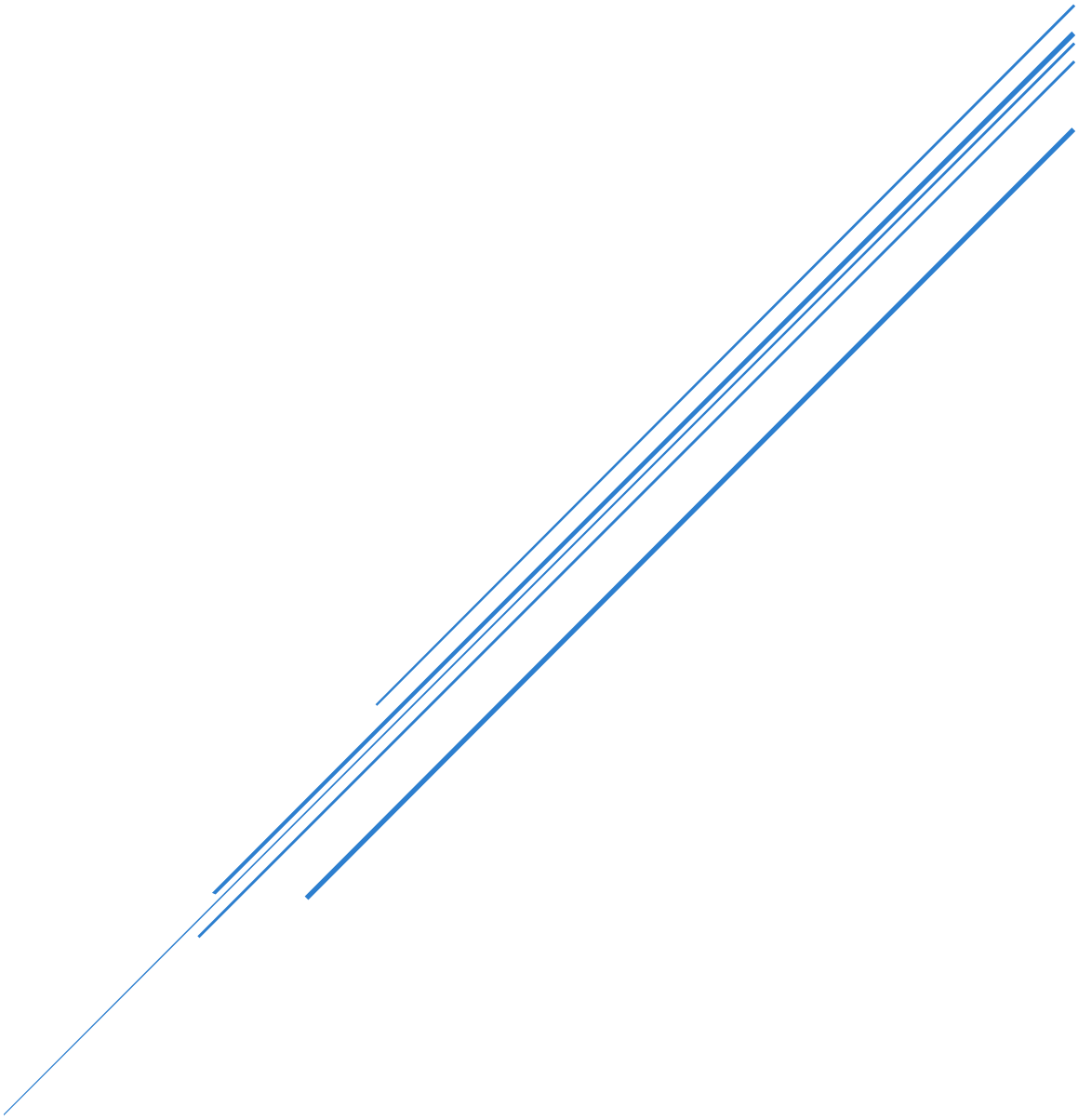
SMART WATER TANK MONITORING SYSTEM

User guide



1. Introduction

This guide explains how to set up, use, and maintain the Smart Water Tank Monitoring System. The system helps you monitor water level, water quality, and control the motor remotely through a mobile app.

2. System Features

- Automatic Water Level Monitoring using an ultrasonic sensor.
- Water Quality Monitoring using TDS and Turbidity sensors.
- Flow Rate Measurement using a water flow sensor.
- Visual feedback via LCD display.
- Motor Control (automatic and manual). Mobile App Dashboard with real-time updates (via Blynk).
- Alerts for low water level and poor water quality.

3. Hardware Components

- ESP32 Microcontroller
- Ultrasonic Sensor (HC-SR04)
- TDS Sensor
- Turbidity Sensor
- Water Flow Sensor (YF-S201)
- Relay Module
- Water Pump
- Power Supply (adapter or battery)
- Jumper Wires & Enclosure Box

4. Software Requirements

- Arduino IDE (for uploading code)
- Blynk Mobile App (Android/iOS)
- Wi-Fi Connection

5. System Setup

5.1. Hardware Setup

- Connect the ultrasonic sensor to the ESP32 for water level measurement.
- Connect the TDS sensor and turbidity sensor to analog pins.
- Connect the water flow sensor to a digital pin.
- Connect the relay module to control the water pump.
- Power the ESP32 with a stable power supply.
- Place sensors properly: Ultrasonic sensor above tank, TDS and Turbidity sensors in water, Flow sensor on water inlet.

5.2. Software Setup

- Install Arduino IDE and add ESP32 Board in Board Manager.
- Install required libraries: Blynk, WiFi, Sensor libraries.
- Upload the code to ESP32 via Arduino IDE.
- Configure Wi-Fi SSID and password in the code.

- • Download and install the Blynk IoT app from Google Play or App Store.
- Set up the Blynk Project on your mobile app and copy the Authentication Token into the code.

6. How the System Works

6.1 Pump ON/OFF Conditions

- **Pump ON**: When water level is **below 40 cm**.
- **Pump OFF**:
    - When water level reaches **45–50 cm**
    - OR if **no water flow is detected** (dry-run protection.)

In the Blynk app you will see the water level.

6.2 Water Quality Decisions

The system checks **two main parameters**:

- **TDS (Total Dissolved Solids)**
- **Turbidity (Cloudiness)**

Based on these two, the system decides:

3. **Good for Drink** → TDS ≤ 150 ppm AND Turbidity ≤ 50 NTU
4. **Not Good for Drink** → Any higher value (too many dissolved solids or cloudy water)

On the LCD Display you will see the status of water “Good for drink” or “Not Good for drink”.

7. Alerts and Notifications
    - Low Water Alert
    - Water Full Alert
    - Poor Water Quality Alert

8. Troubleshooting

Issue	Possible Cause	Solution
No data in app	ESP 32 not connected to Wi-Fi	Check Wi-Fi credentials and signal strength
Pump not turning ON/OFF	Relay not connected properly	Check wiring and relay module
App not updating	Internet issue or Blynk app token error	Check network and Blynk app settings

9. Maintenance Tips
    - Clean sensors regularly for accurate readings.
    - Ensure ESP32 and relay are kept in a dry enclosure.
    - Check wiring and connections periodically.
10. Safety Precautions
    - Do not touch sensors while the system is powered.
    - Keep electronic parts away from water.