

# Team Aqua Guardians

- Team Members:
- • V. Durgaprasad — Embedded & IoT Developer
- - ESP32, Arduino, Embedded C
- - Sensor Interfacing, Firmware Development
- - IoT Prototyping

# Problem Statement

- Households and small buildings face undetected water contamination.
- Pipe leakage causes major water loss and increased water bills.
- Existing solutions are expensive and complex.
- Need for a low-cost, real-time monitoring device with alerts.

# Proposed Solution

- ESP32-based device measuring TDS, pH, temperature, flow & pressure.
- Detects contamination and leakage using rule-based logic.
- Sends real-time alerts via Wi-Fi.
- Cloud dashboard for monitoring trends.

# How the System Works

- Sensors read TDS, pH, temperature, flow rate & pressure.
- Rule engine:
  - High TDS or abnormal pH → Quality Alert
  - Low pressure + high flow → Leak Detected
- ESP32 sends data to MQTT/HTTP cloud.
- Dashboard displays live and historical data.

# Tech Stack & Components

- Hardware:
  - ESP32, TDS Sensor, pH Sensor, Flow Sensor (YF-S201), Pressure Sensor, DS18B20.
- Software:
  - Arduino (ESP32 core), MQTT/HTTP, Node-RED/Blynk dashboard.

# Prototype & Feasibility

- Prototype with PVC pipe + sensors.
- Demo: contamination simulation + leak simulation.
- Instant dashboard/mobile alerts.
- Cost: ₹1500–₹2500.
- Easy to convert into compact PCB.

# Impact & Future Scope

- Impact:
  - Prevents contamination & water wastage.
  - Useful for homes, apartments, schools, industries.
- Future Scope:
  - Multi-node building monitoring.
  - Battery/solar power.
  - Automatic valve shut-off.