

IoT-Based Water Monitoring and Cleaning System

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INTRODUCTION

- IoT-Based Water Monitoring and Cleaning System is an innovative solution for maintaining clean water reservoirs.
- Combines sensor-based monitoring with semi-automated cleaning to reduce manual effort and improve water quality.
- Uses TDS, ultrasonic, and turbidity sensors with an ESP32 microcontroller to monitor:
 - Total dissolved solids
 - Water level
 - Water clarity
- A motorized cleaning mechanism, controlled via Bluetooth and a mobile app, cleans the surface and bottom sediments.
- A dashboard displays real-time sensor data for efficient water management.
- Designed for use in household tanks, industrial reservoirs, and agricultural water storage.
- Aims to make water quality management efficient, cost-effective, and user-friendly through IoT and automation.

PROBLEM STATEMENT

- Water reservoirs (household, industrial, agricultural) often accumulate impurities and sediments.
- Manual water quality monitoring and cleaning are:
 - Time-consuming
 - Labor-intensive
 - Often neglected
- Contaminated water can lead to health hazards and inefficient water usage.
- Lack of real-time monitoring makes it hard to detect issues early.
- There is a need for:
 - A system that continuously monitors water quality
 - Semi-automated cleaning to reduce manual effort
 - Efficient, cost-effective, and user-friendly operation

SYSTEM DEVELOPMENT

- **ESP32 and Arduino Nano**
- **TDS and Turbidity Sensors**
- **Ultrasonic Sensor**
- **Bluetooth Module**
- **Submersible Pump and Cleaning Motor**
- **Power Supply**

WORKING

1. Core Components

- **ESP32, Arduino Nano, TDS sensor, turbidity sensor**
- **Submersible pump, relay module, gear motor**
- **Bluetooth module** for wireless control

2. Monitoring Phase

- **TDS and Turbidity sensors** collect data on water purity
- ESP32 processes sensor data to check impurity levels
- Thresholds:
TDS > 500 ppm , Turbidity > 5 NTU

3. Cleaning Activation

If thresholds are exceeded:

- **Arduino Nano** activates **gear motor**
- **Scrubbing mechanism** cleans settled debris

WORKING

4. Water Removal

- **Submersible pump** activated via relay module
- Contaminated water is drained from the tank

5. Control Logic

- **Arduino Nano controls motor & pump via relay module**
- **module**
Components run only when required

6. Wireless Monitoring & Control

- **Bluetooth module** enables smartphone connectivity
- Users can view real-time data and control cleaning
ESP32 Wi-Fi supports cloud data storage & analysis

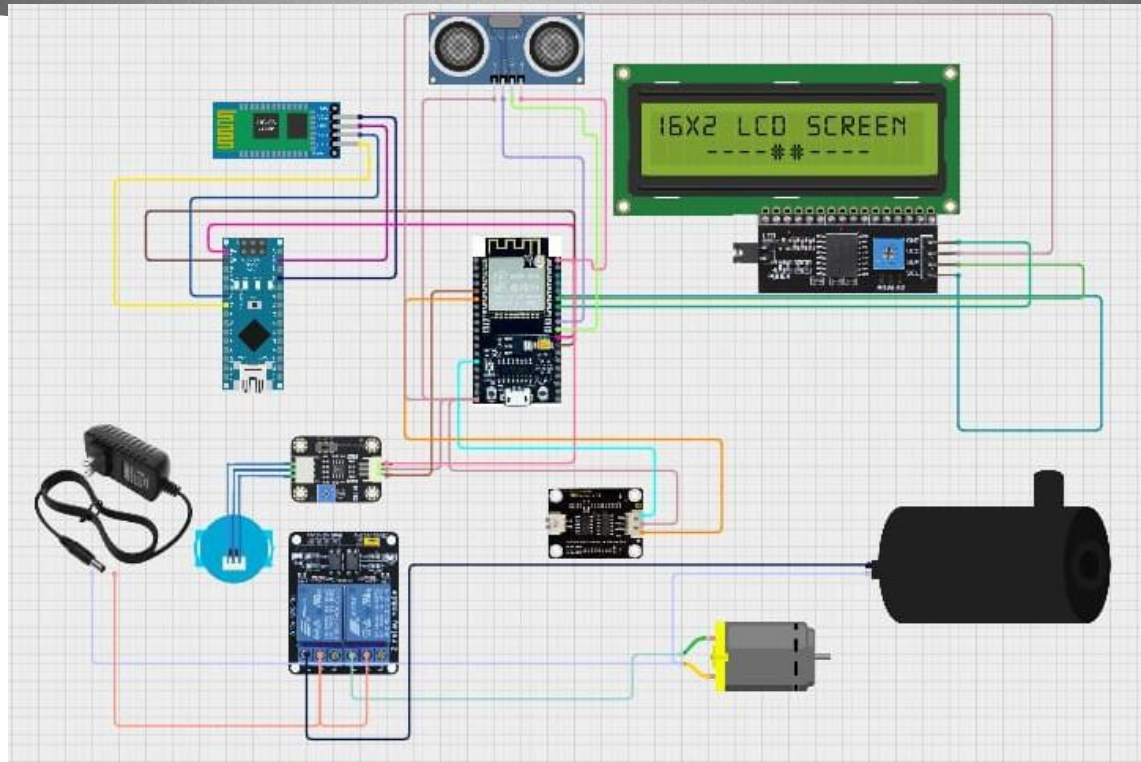
7. Power Efficiency

- System auto-deactivates after cleaning
- Prevents unnecessary power usage
Extends component lifespan

BLOCK DIAGRAM



CIRCUIT DIAGRAM



FEATURES

- **Real-Time Water Quality Monitoring**

- Uses TDS, turbidity, and ultrasonic sensors

- Continuously tracks water purity, clarity, and level

- **Smart Microcontroller Integration**

- ESP32 for data processing and communication

- Arduino Nano for controlling motors and actuators

- **Semi-Automated Cleaning Mechanism**

- Gear motor drives a scrubbing unit to clean tank bottom

- Submersible pump removes contaminated water

FEATURES

- **Threshold-Based Automation**

- Cleaning activates when TDS > 500 ppm or turbidity > 5 NTU

- Relay module controls pump and motor operation

- **Mobile Application Control**

- Bluetooth module enables wireless control

- Users can manually trigger cleaning and view sensor data

- **User-Friendly Dashboard**

- Displays real-time readings of TDS, turbidity, and water level

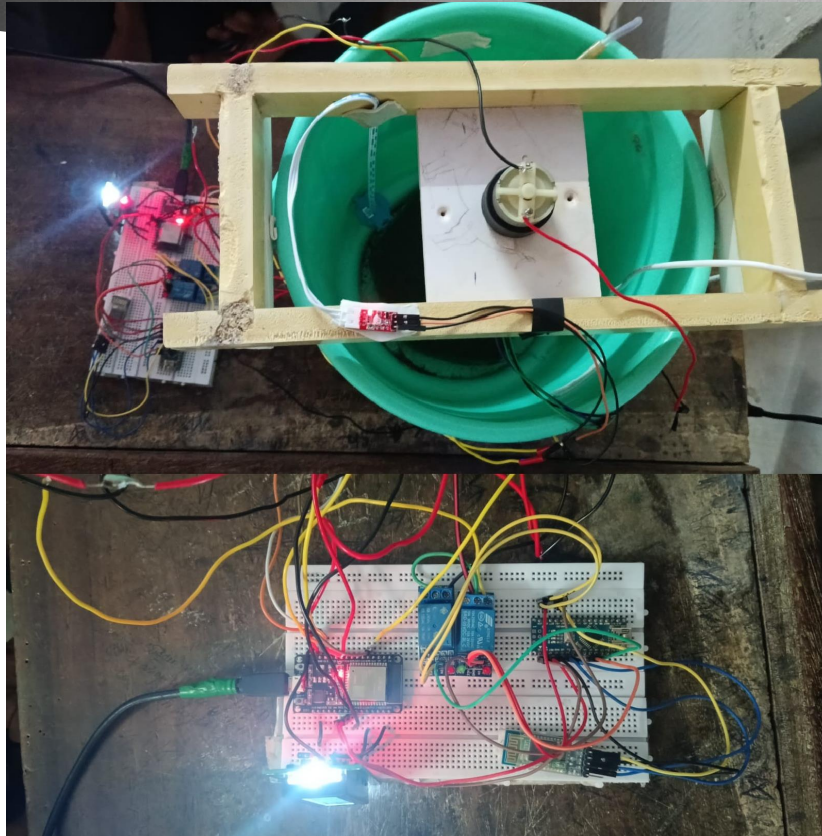
- **Wide Application Scope**

- Suitable for household water tanks, industrial reservoirs, and agricultural storage systems

APPLICATIONS

- Household Water Purity Monitoring
- Industrial Tank Cleaning
- Agricultural Water Maintenance
- Rainwater Tank Cleaning
- Community Tank Management
- Aquaculture Water Quality Control
- Remote Water Monitoring

RESULTS



Esp32 •

Turbidity
50.0 NTU



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THANK YOU!