PROJECT PRESENTATION

GREY WATER MANAGNMENT SYSTEM

BY RANJITHA P

Introduction

- Industrial wastewater pollution is a major environmental issue.
- Traditional treatment methods are costly and lack real-time monitoring.
- Our work offers a low-cost, automated grey water management solution.

Problem Statement

- Industries produce large volumes of wastewater, leading to pollution and resource depletion.
- Current treatment methods are costly, energy-intensive, and lack real-time monitoring.
- This offers a cost-effective, sensor-based IoT solution for efficient grey water recycling and sustainable management.

Objectives

- Develop a low-cost, real-time grey water management system using BOD, pH, turbidity, and gas sensors.
- Automate filtration with migration and soil filters along with UV treatment for effective purification.

Literature Survey

S.NO	YEAR	AUTHOR	TITLE	DESCRIPTION
1	(2021)	Shindhal, Toral, Parita Rakholiya, Sunita Varjani, Ashok Pandey, Huu Hao Ngo, Wenshan Guo, How Yong Ng, and Mohammad J. Taherzadeh	A critical review on advances in the practices and perspectives for the treatment of dye industry wastewater	Discusses advancements in dye industry wastewater treatment. Focuses on biological and chemical processes, which can be adapted to industrial wastewater treatment.
2	(2022)	Jan, Farmanullah, Nasro Min-Allah, Saqib Saeed, Sardar Zafar Iqbal, and Rashad Ahmed	IoT-based solutions to monitor water level, leakage, and motor control for smart water tanks	Explores IoT solutions for water level monitoring and leakage detection in smart water tanks. Focuses on smart motor control for efficient water usage.

3	(2022)	Manoj, M., V. Dhilip Kumar, Muhammad Arif, Elena-Raluca Bulai, Petru Bulai, and Oana Geman	State of the art techniques for water quality monitoring systems for fish ponds using IoT and underwater sensors: A review	Reviews IoT-based water quality monitoring for fish ponds, highlighting underwater sensors for parameter tracking. Relevant to the development of sensor-based water treatment systems.
4	(2023)	Ranganathan, Chitra Sabapathy, Virendra Singh Thakur, Ramakrishnan Raman, S. Sujatha, and Swapnil Parikh	IoT and Real-time Data Analytics Optimize Greywater Recycling	Examines IoT and data analytics to optimize greywater recycling systems. Emphasizes real-time monitoring and smart systems for efficient water reuse.

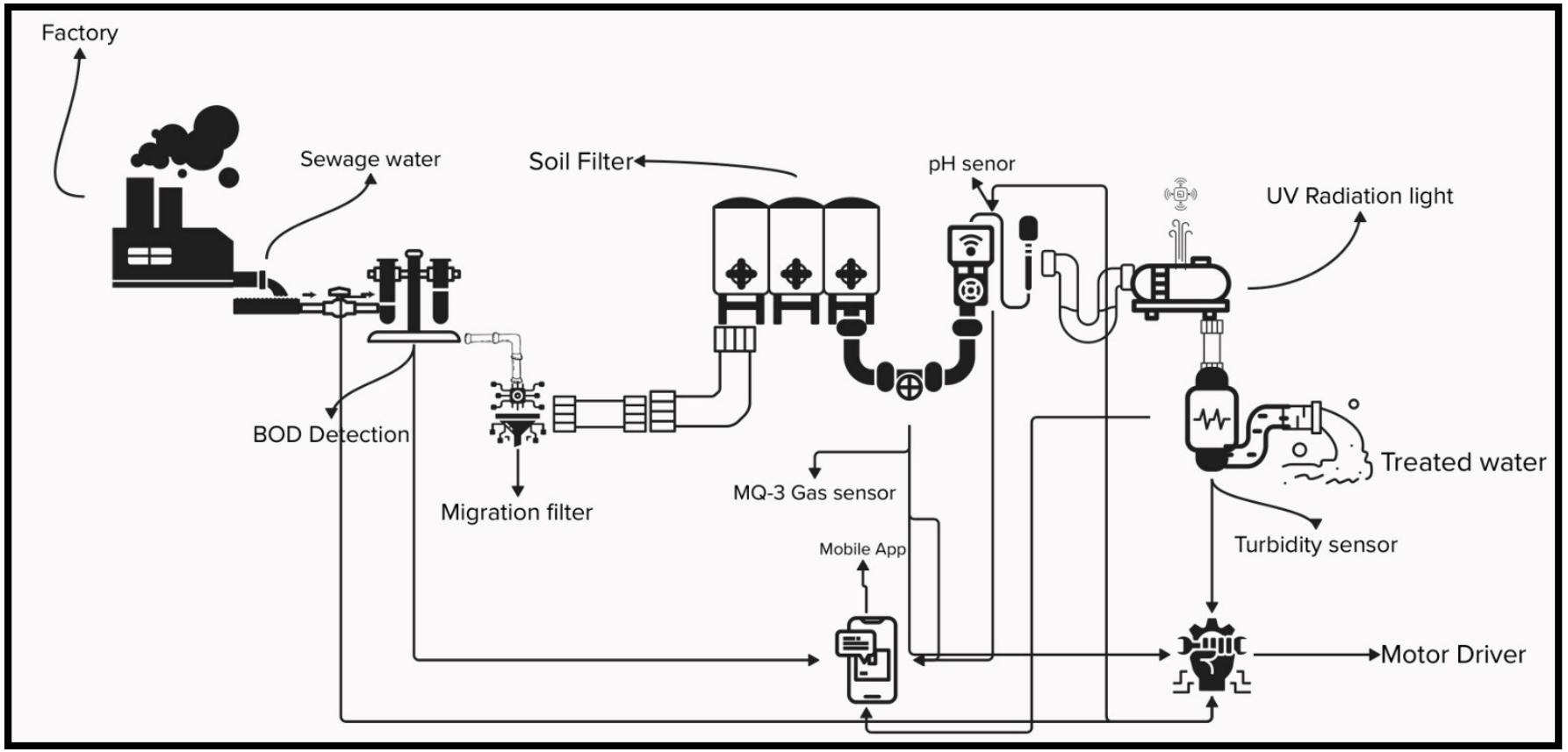
Proposed System

- Real-time monitoring of pH, turbidity, and temperature ensures automated water quality control.
- IoT integration enables remote monitoring, control, and real-time alerts via a centralized platform.
- The system ensures continuous water purification with minimal manual intervention.

Proposed System (contd…)

Parameter	Existing System	Proposed System
pH	6.2 - 9.4	6.5 – 8.5 (More controlled through sensors)
Turbidity (NTU)	20 - 444 NTU	<5 NTU (Due to filtration & UV radiation)
BOD (mg/L)	42.1-6250 mg/L	<30 mg/L (Strict threshold with automated flow control)

System Architecture



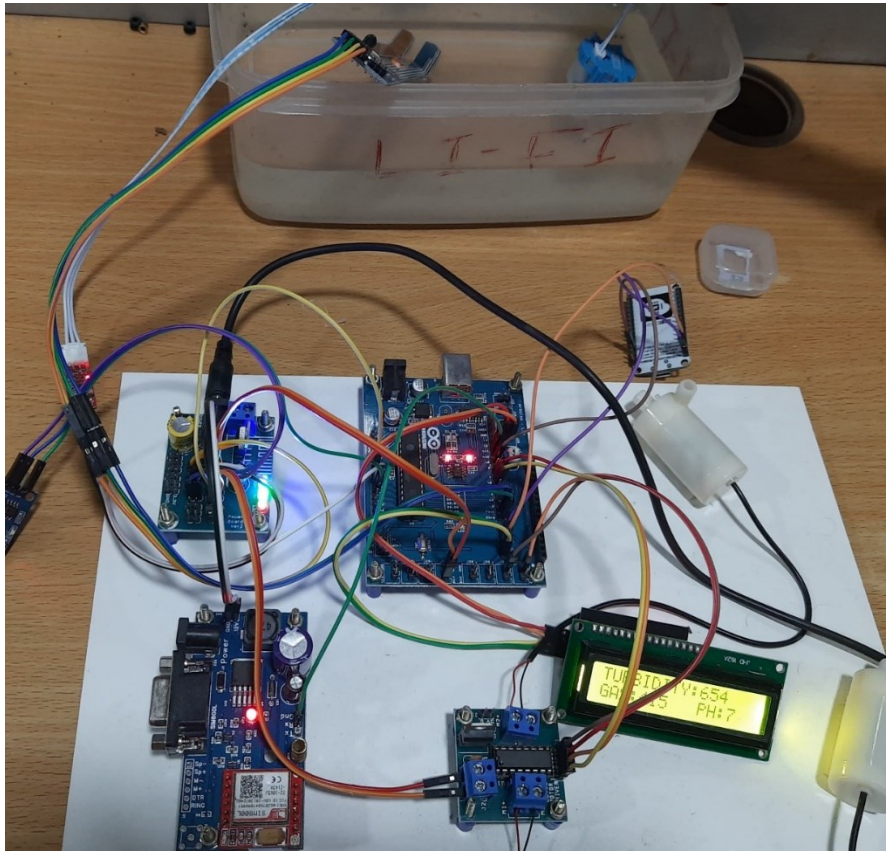
System Modules

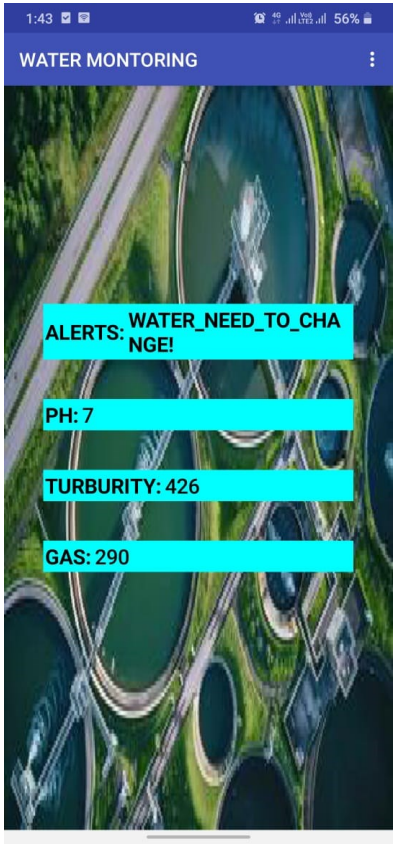
Module No	Module Name	Description	Key Components
1	Water Input & Detection	Initiates the system by detecting incoming industrial grey water and monitoring basic parameters.	Inlet pipe, Ultrasonic sensor, BOD Detector
2	Filtration & Gas Detection	Filters solid waste and detects harmful gases in the water.	Migration filter, Soil filter, MQ-3 Gas Sensor
3	Chemical Parameter Monitoring	Monitors pH level and turbidity of treated water to ensure chemical safety.	pH Sensor, Turbidity Sensor
4	Disinfection & Flow Control	Final treatment using UV light and motor driver to control flow based on all sensor feedback.	UV Radiation Light, Motor Driver
5	Smart Monitoring & Alerts	Real-time monitoring and reporting via application; alerts maintenance team when any abnormal condition is detected.	Mobile App, IoT server, Wi-Fi/Bluetooth Module

Methodology / Technology Used

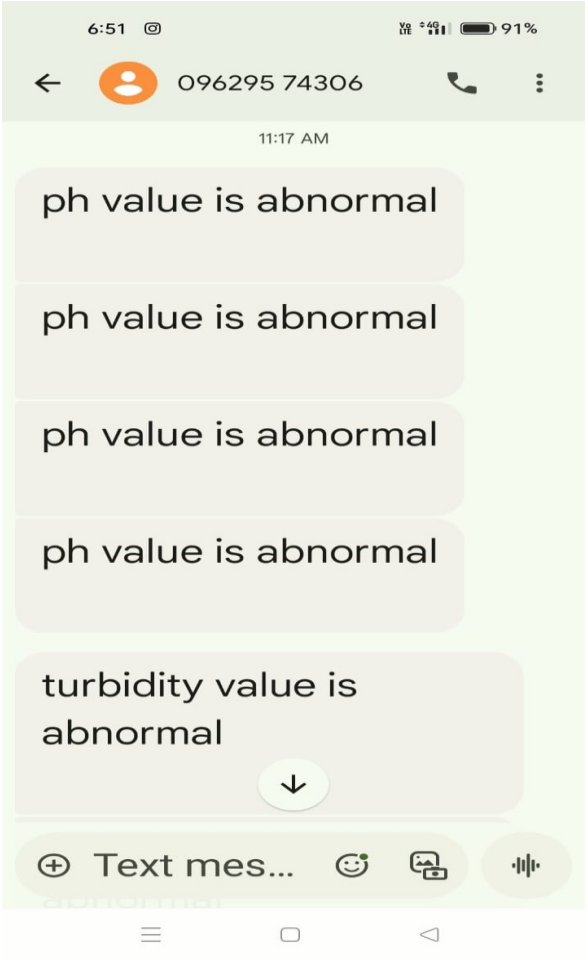
Category	Technology / Tool	Purpose
Sensors	pH Sensor	Monitors acidity/alkalinity
	Turbidity Sensor	Measures water clarity
	MQ-3 Gas Sensor	Detects harmful gases
Microcontroller	Arduino / ESP32	Controls sensors and processes data
Software Tools	Arduino IDE	Sensor programming and interfacing
IoT Platforms	Firebase	Real-time monitoring
Mobile App	MIT App Inventor	Displays sensor data and alerts
Other Hardware	UV Disinfection	Kills bacteria and pathogens
	Motor & Flow Control	Regulates water flow

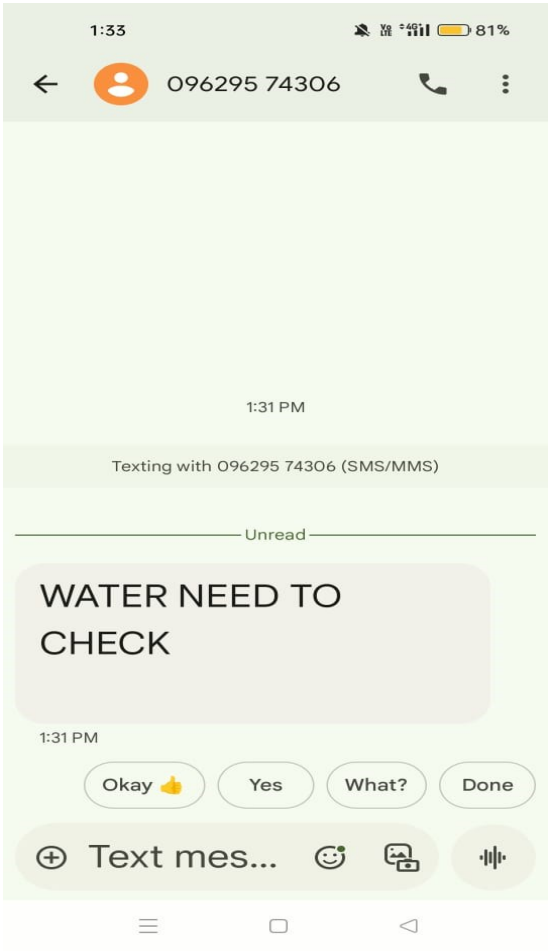
Results and Testing





Results and Testing (contd...)





Challenges Faced

- Ensuring accurate sensor readings (BOD, pH, turbidity, gas) required repeated calibration and testing.
- IoT integration faced challenges with real-time data transmission and app synchronization.
- Consistent filtration using migration and soil filters needed iterative design enhancements.

Future Enhancements

- Advanced Filters: Utilize nano-materials or bio-filters for higher efficiency and durability.
- AI Monitoring: Apply machine learning to predict contamination and optimize treatment in real time.
- Remote Diagnostics: Use IoT analytics for predictive maintenance and fault detection.

Conclusion

- Efficient grey water treatment using sensors and automation.
- Maintains safe pH, turbidity, and BOD levels.
- Real-time alerts via app for abnormal conditions.
- Auto-stop motor control for safety.
- Supports sustainable and eco-friendly water reuse.

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