

# WATER POLLUTION MONITORING BOAT USING IOT

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## **Keywords**

Water Pollution, Pollution Monitoring, pH, Turbidity, TDS, Conductivity

## **Introduction**

Water is a vital source for human life but due to population growth and the rate of civilisation have resulted in environmental degradation especially ground water. Around 40% of deaths are caused due to contaminated water in the world. Recent development in the field of sensor networks have been useful in monitoring water quality. Programs such as National Lake conservation plan, National wetland conservation programme are hosted by Government of India and are based on laboratory analysed results. This proposed project involves a system where water quality can be assessed and monitored on real-time basis, integrated with a mobile application.

Parameters that influence water quality are Turbidity, Total Dissolved Solids (TDS), pH, and conductivity. These parameters are acquired using Turbidity, TDS, pH and Temperature Sensor respectively. The acquired Analog data is converted in to digital before sending to the microcontroller using ADC. these data are communicated to Raspberry Pi 3B for processing the information regarding water quality and is made live to the MQTT Server, the same can be sent to Admin's Mobile Phone as an SMS. Hence the data acquired from the sensors can be used to study the status of water body.

The proposed system results will be very useful in saving the environment, and thus, improving the health of living creatures on Earth.

## **Objective**

The objectives of project are

- (a) Create a hassle-free system implemented on a boat to keep track of water pollutants.
- (b) To have minimal/no human intervention in maintaining the system.
- (c) Provide updates on data extracted via smart wireless communications.

## Methodology

The system can be subdivided into two parts

- a. Water Pollution Monitoring System
- b. Remote Navigation System

### a. Water Pollution Monitoring System:

The main parameters that play a vital role in monitoring water is its pH, turbidity, dissolved solids, and temperature. Therefore, water Pollution Monitoring system consists of four sensors viz. Turbidity, Total Dissolved Solids (TDS) sensor, pH, and temperature Sensor. The parameters that are being sensed from the water bodies by the sensors are in Analog form, and hence need to be converted into Digital format for Processor to process the data. Hence a 16bit A/D converter is used to achieve the same. A/D uses I2C interface to communicate the data to Raspberry Pi 3B. The data once processed in the Processor can be broadcasted in two channels

- i. Through Message Queued Telemetry Transport (MQTT) Protocol
- ii. Through GSM Module to the admin's Cell Phone, using cellular network

The block diagram of the Water pollution monitoring system is shown in Fig 1.

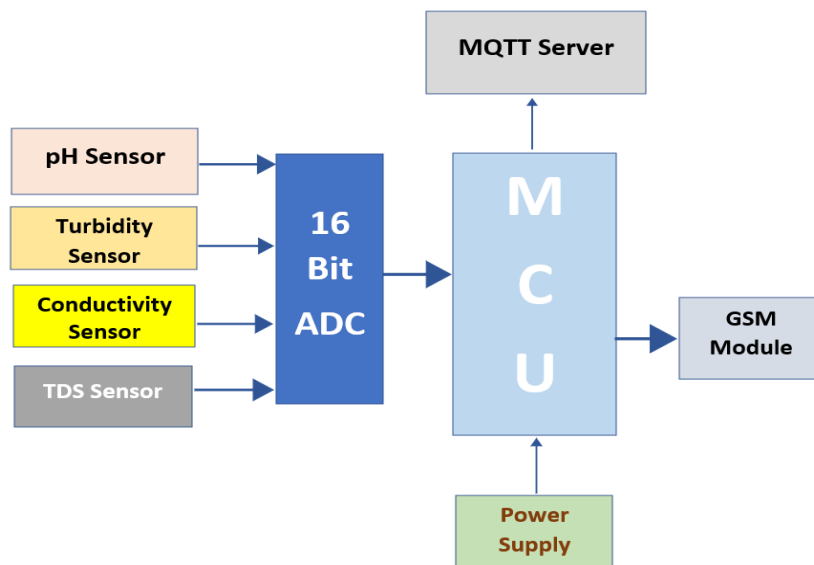


Fig 1: Block Diagram of Water Pollution Monitoring System

### b) Remote-Controlled Navigation System

The remote-controlled navigation system consists of two brushless DC motors with driver, Bluetooth, and Arduino UNO micro-controller. Two brushless DC Motors are interfaced to the Arduino via a motor driver circuit. The Bluetooth Module acts as a receiver for remote control action. The commands are sent from a BT based Android App. The motors are controlled based on the input received from the remote application. The Micro controller communicates with Bluetooth module using UART interface.

The block diagram of the RC Navigation system is shown in Fig 2.

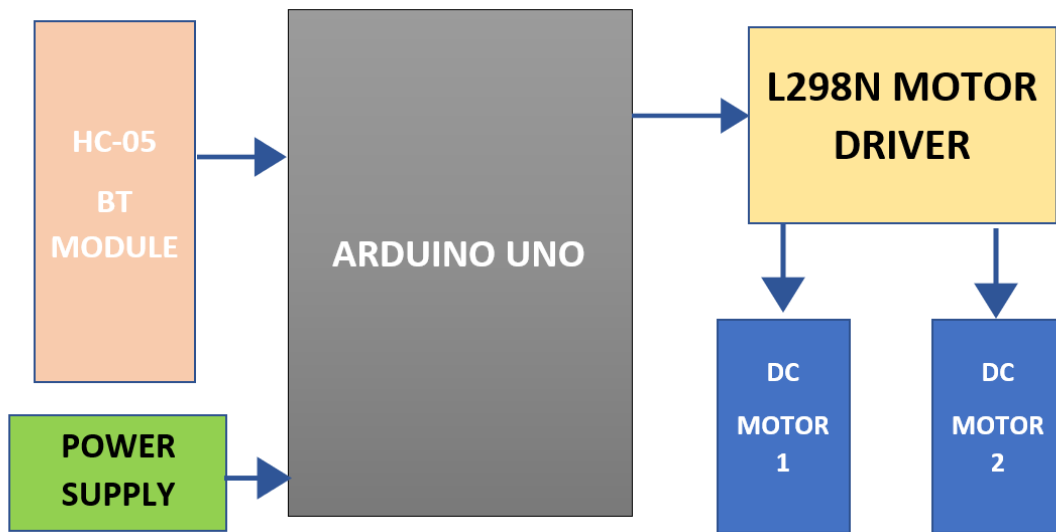


Fig 2: Block Diagram of Remote-Controlled Navigation System

### Results and Conclusions

The performance of the water pollution monitoring boat using IOT system is found to be satisfactory. This system provides the quality of water automatically to the users. Fig 3 shows the photograph of proposed model.

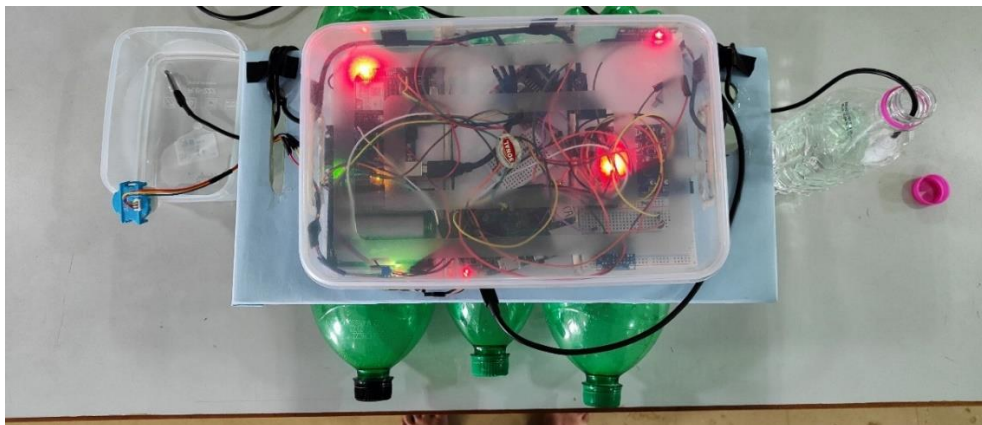


Fig 3: The photograph of Proposed system

Fig 4 and Fig 5 shows the screen shot of message sent to mobile and MQTT respectively about the quality of the water. This message gives the Turbidity, Total Dissolved Solids (TDS), pH, and conductivity of water.

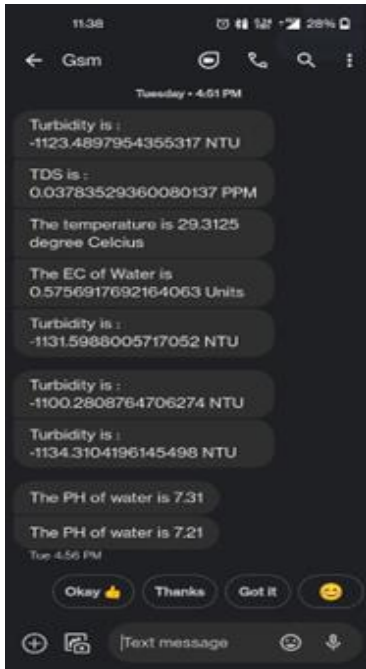


Fig 4: Screenshot of Data sent via SMS

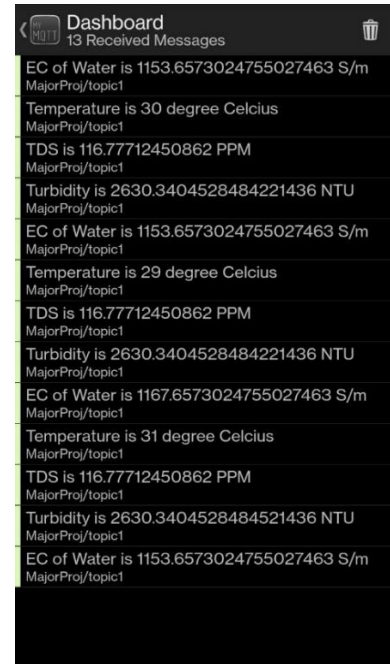


Fig 5: Screenshot of Data sent via MQTT

The proposed system results will be very useful in saving the environment, and thus, improving the health of living creatures on Earth.

### Scope Of Future Work

The present work has brought out the measurement of Turbidity, Total Dissolved Solids (TDS), pH, and conductivity of water and send same data to the user. However, there is ample scope to address the following issues.

- (a) Real time monitoring can be further improvised by either creating an app or hosting a dedicated website to display the sensor values.
- (b) Other parameters such as oxygen reduction potential, temperature (ORP), biological oxygen demand (BOD) and many more can be included in order to get precise value for water quality.
- (c) The RC Navigation system can be improved by using Zigbee Transceiver to extend range.