Project Design Phase-I

Solution Architecture

Team ID	PNT2022TMID28239
Project Name	Project - Real-Time River Water Quality Monitoring And Control System
Maximum Marks	4 Marks

INTRODUCTION:

To assists and monitor the quality of water with the support of information sensed by the sensors dipped in water. Using different sensors, this system can collect various parameters from water, such as pH, dissolved oxygen, turbidity, conductivity, temperature, and so on. The rapid development of WSN technology provides a novel approach to real-time data acquisition, transmission and processing. The clients can get ongoing water quality information from far away. Now a day's Internet of things (IoT) is an innovative technological phenomenon. It is shaping today's world and it is used in different fields for collecting, monitoring and analysis of data from remote locations.

SOLUTION REQUIREMENTS:

1. To avoid Water pollution which is one of the biggest and serious threats to society. Water has a significant impact on human health.
2. Safe water is becoming a scarce resource, due to the combined effects of increased population, pollution, and climate changes. Water quality monitoring is thus paramount, especially for domestic water.
3. In-stream water-quality measurements made available on the web in real-time
4. To assemble data from various sensor nodes and send it to the base station by the wireless channel.
5. To send SMS to an authorized person routinely when water quality detected does not match the preset standards, so that, necessary actions can be taken.
6. River water quality can be monitored by the web application.
7. Can be able to know if there are any dust particles present in the water.
8. The PH level of the water can be monitored.
9. Water temperature can be monitored.
10. Alerting the authorities if the water quality is not good so that they can go and announce the localities not to drink that water.

TECHNICAL SOLUTION:

- CDOM/FDOM levels can be measured using electrical optical sensors that use fluorometers and sapphire lens.
- Chlorophyll fluorescence, measured using algae toximeters, indicates the percentage of wet-chemical chlorophyll and active chlorophyll in the water sample under illumination.
- By using the technology of Internet of Things, the method of measuring water quality can be done automatically from far off locations via advanced telematics.
- The measured values from the sensors will be processed using a microcontroller, and alert message will be sent to the user via an android application developed using MIT app inventor in case of any abnormalities.

For communication between the measuring and notification nodes, ZigBee receiver and transmitter modules are used in this design. When the water quality parameters reach unsafe levels, the notification node displays the sensor readings and generates an audio alert. The sensors are shown to work within the accuracy ranges that they were designed for. The measurement node can send data to the notification node via ZigBee for audio and visual display. The sensor node is a piece of modular hardware that includes control, communication, and sensor module for measuring pH, conductivity, and temperature. All data is managed by a software platform built with opensource tools, which allows for the control of water pollution and its impact on pisciculture. presents a reconfigurable smart sensor interface device for a water quality monitoring system in an IoT environment. The smart WQM system is comprised of an FPGA design board, sensors, a Zigbee-based wireless communication module, and a personal computer (PC).

SOFTWARE REQUIREMENTS :

Current water quality monitoring system is a manual system with a monotonous process and is very time-consuming.Due to the fast growing urbanization supply of safe drinking water is a challenge.So these are the following technology is used:

- **IOT BASED COMMUNICATION**:

IoT network technologies to be aware of toward the bottom of the protocol stack include cellular, wifi, and Ethernet, as well as more specialized solutions such as LPWAN, Bluetooth Low Energy (BLE), ZigBee, NFC, and RFID

- **IBM WATSON IOT PLATFORM** :

IBM Watson IoT platform acts as the mediator to connect the web application to IoT device.In order to connect the IoT device to the IBM cloud, we create a device in the IBM Watson IoT platform and get the device credentials

- **IBM CLOUD**:

Python code is used to send random sensor data to the cloud and also to receive commands from the cloud.

REQUIREMENT OF THE PROJECT WORK

The traditional method for monitoring of the water quality is such that the water sample is taken and sent to the laboratory to be tested manually by analytical methods. Although by this method the chemical, physical, and biological agents of the water can be analyzed, it has several drawbacks. Firstly, it is time consuming and labor intensive. Secondly, the cost for thiscontrolled, displayed, and transferred. Compared to the conventional water quality testing techniques, sensor based water quality testing has many advantages such as accurate, high sensitivity, good selectivity, speed, fast response, low cost etc.

METHODOLOGY

The system functions automatically and independently according to the code uploaded In this system, three sensors are used to measure the essential water parameters. The four essential water parameters which are temperature, pH level and turbidity can be measured by this proposed system. Sensors circuits are connected to the microcontroller and the probes of the turbidity, pH, and temperature sensors placed inside the water.

- A water proof temperature sensor is used to avoid any damage or electrical shock to the system and the user.
- An ultrasonic sensor is used to measure the level of the water in thecontainer.

The ultrasonic sensor is connected in the system such that it will be placed on the top of the surface water.The ultrasonic sensor sends electromagnetic waves to the water surface and receives the wave back after touched the water surface. All sensors read the water quality parameters and send the data to the device in the form of electrical signals.

In case of any abnormality in a water parameter detected by the device, the buzzer will buzz to indicate that the water is not proper for use. To show the sensor readings (The water parameters) on the device itself, an LCD (Liquid Crystal Display) screen is used. The LCD screen is connected to the project, and through the wired connection, it receives the sensor readings and displays them accordingly.

CONSTRAINTS OF EXISTING SYSTEMS

1. The cost of analysis is very high.

2. The lab testing and analysis takes some time and hence the lab results does not reflect real time water quality measurement due to delay in measurement.

3. The method is prone to human errors of various forms.

4. It is difficult to collect the water samples from all the area of the water body.

5. The process is time consuming due to slow process of manual data collection from different locations of the water body.

SOLUTION ARCHITECTURE: