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AN ELECTRONICALLY CONTROLLED WATER MONITORING AND DETOXIFICATION TECHNIQUE

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Abstract: *Water contamination is one of the many serious concerns hindering the growth of green evolution. The purity of potable water must be monitored on a network in actual to assure its safety. A cost effective system for actual management of purity level of water is modeled and implemented using IoT technology. Conventional evaluation of water requires physically collecting a portion of contaminated water and submitting it to a research lab for assessment. Moreover, it is tedious and cannot currently fulfill the demands of modern water management needs. The study explains a remotely monitored water treatment management technique that examines physiochemical details of water such as: odor, volume of water, sediment, acidic or basic nature of water, and heating rate. Once the analysis is completed the processed information is forwarded to the user's Smartphone via wireless technology. If the presence of pollutants is detected in the water, then it is routed to the filtration unit for purification.*

Index terms: potable water management, sediment removal, wireless water treatment.

I. INTRODUCTION

Global climate change, scarcity of water, increasing populace, commercial advancements are the major problems restricting the appropriate management of potable water attributes. As a result, effective practices for monitoring water cleanliness metrics in real-time must be developed. Toxic wastes of many types combine with groundwater. Blending of groundwater with the various toxic wastes coming out of industries transmits illness and sometimes deaths. Interdependence of world's population, expanding of cities, farming practices forms the basis of diverse climatic changes. Vector-borne diseases cause almost 50 lakh deaths worldwide. Performing safety checks for cleanliness of water is done by gathering of information at predetermined sites and at prescribed intervals to produce data that can be utilized to describe latest situation. Suggested system comprises of several detectors that estimate the guideline values of groundwater in actuality for positive collaboration that is precise and requires little manpower. Groundwater resources metrics such as pH mainly assess the number of h+ ions. It indicates if the present water state is alkaline or acidic. Pure water has a pH of 7, below 7 pH is acidic, and greater than seven 7 is alkaline.

The pH values for potable water must be in the range of six to below nine. There are numerous undetectable floating particles present in the water bodies. The test conducted to mark their presence is called turbidity, one of the important factor governing qualities of water. Greater the turbidity more is the potential danger of cholera and diarrhea. Lower readings signify potable water. Thermal detector tests if the water is warm or chill. Wirelessly operating system checks for the cleanliness of groundwater. It compares the test values with the marginal set readings and if the detector readings are high an alarm is given to the mainframe system and appropriate actions will be undertaken by the concerned authority for purification of water. Two primitive filtration techniques are charcoal filtering and sand water processing. In the second technique, an IoT system manages the flow of water from pump motor.

Objective

The paper aims at designing a system for evaluating purity level of water, involving multiple detectors for the assessment of physiochemical water attributes. Proposed idea is useful for all living creatures including aquatic animals and plants. Mainly concentrates on examining the smell, water table, sedimentation, pH and thermal levels monitored regularly.

II. LITERATURE SURVEY

Several detectors are used to monitor multiple metrics by immersing them in selected water treatments. The information recorded is co-related to conventional values in the cloud, however if it surpasses, a signal is delivered from the cloud to the target phone. The presented article provides thorough insight into current studies in intelligent hydrological modeling. Also shown is a power-efficient, typical procedure for in-pipe water management relying on Iot technology. The method presented in this work is commonly utilized analyzing samples collected and processing information provided through the Web [1]. Real-time water management is becoming more popular across the globe. All qualities including drinking water to industrial wastewater are covered. Overall natural carbon, leftover Chloride, Permeability, acidity, and Sedimentation are basic characteristics of groundwater. Three modules are employed in total: Information Gathering module, Processing Subsystems, Module for Data Management [2]. Researches get an insight of earlier water management techniques. 1. GSM-based independent groundwater assessment 2. Application of computer vision technologies to, assess the cleanliness of water. 3. Implementing the Zigbee module. The suggested scheme in this research characterizes water cleanliness parameters utilizing different sensing devices with the help of a micro-controller and Wi-Fi [5]. We discovered that the widespread usage of fertilizers and other related enterprises such as labor-intensive industries had degraded the complete essence of water. This research examines the water essence in the Fiji Islands, necessitating a regular data collection system for water essence management using wireless detection and IoT [7].

III. PROPOSED SYSTEM

The authorized individual can observe the values in actual through a smart phone or home pc in this suggested scheme. As a result, timely action may be done to guarantee that the water is always pure to consume.

3.1 Supervision Unit

The framework comprises of detectors that measure thermal value of water, turbidity and pH level. The suggested process allows the implementation unit to track statistics and perform analyses for all errors that have happened so that serious situations do not arise in the coming times.

3.2 Filtration Unit

The idea is to utilize sand and charcoal for cleansing the groundwater. Charcoal is capable of removing pollutants from the water making it a significant material in the filtration unit, whereas the top covering of sand traps the particulates like filth and silt, making the water pure. The charcoal layer eliminates microorganisms as well as certain pollutants.

IV. SYSTEM DESIGN AND IMPLEMENTATION

4.1 Methodology

Adafruit applications are used to send relevant information to the Cloud server. The miscellaneous data received from detector devices is processed as to be used for device-to-device communication. The microcontroller analyzes information and displays it on the screen, which the authorized person may view via their cellular device or desktop pc. The Adafruit internet panel is comparable to a smart phone application. This panel allows you to examine and control actual data generated by sensing devices. The data is provided in graphical representations to aid the user's analysis.

4.2 Block diagram and working principle

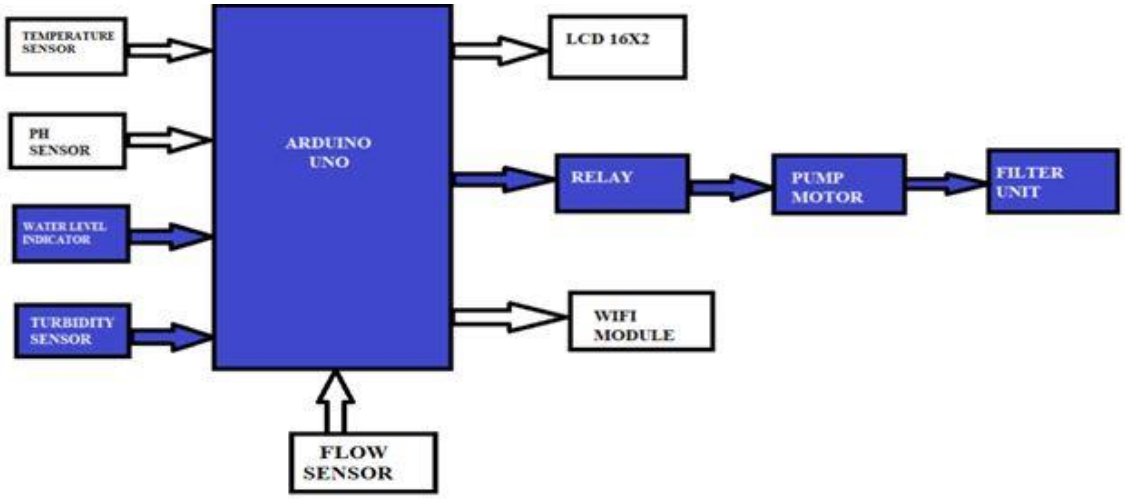

Figure 1: Block diagram for management of water cleanliness

Multiple sensor modules namely pH detector, flow detector, thermal detector, and turbidity detector together with an instrument for checking level of water, are interfaced with a microcontroller board. Collected information is not properly formatted for direct transmission to the main controller through the WIFI network. As a result, the microcontroller is incorporated in a suggested system for collecting sensed data and processing it in order to make it suitable with the WIFI module. If any pollution is discovered in the water, it will be subjected to additional purification using charcoal technique .A 16 by 2 liquid crystal display is used to display the real time values. The degree of hotness or coldness of the water is tested by a thermal detector. Wirelessly operating system checks for the cleanliness of groundwater. It compares the test values with the marginal set readings and if the detector readings are high an alarm is given to the mainframe system and appropriate actions will be undertaken by the concerned authority for purification of water. Two primitive filtration techniques are charcoal filtering and sand water processing. In the second technique, an IoT system manages the flow of water from pump motor.

4.3 Hardware and software requirements

- Node MCU controller
- Arduino UNO controller
- Temperature sensor DS18B20
- Turbidity sensor
- Flow sensor: HZ21WA
- Water level indicator: HC-SR04
- pH sensor module v2.0
- Relay
- Pump motor
- LCD Display

Software requirements:

- C++
- Arduino compiler
- Adafruit server
- Proteus simulator

V. RESULTS

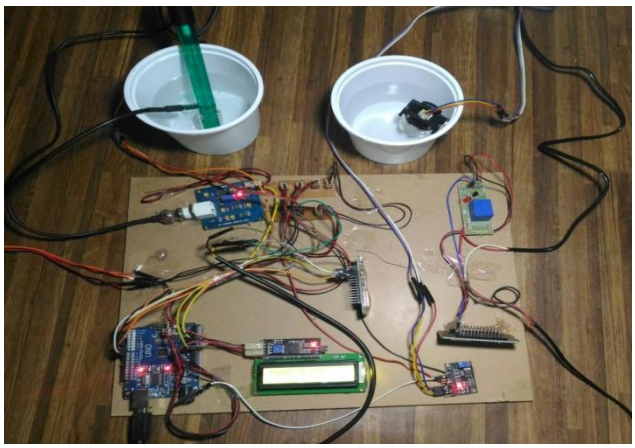

Figure 2: Working setup for management of water cleanliness

This project setup consists of sensors like pH, turbidity, level of water, thermal and flow detector. Testing different parameters of water all sensors are connected with Arduino Uno controller and the controller processes and sends the data to Nodemcu using wi-fi module for monitoring the data remotely on Adafruit server.

Figure 3: Display device showing the actual readings

A liquid crystal display deployed in the project shows temperature and level of water as detected by sensors for actual monitoring.

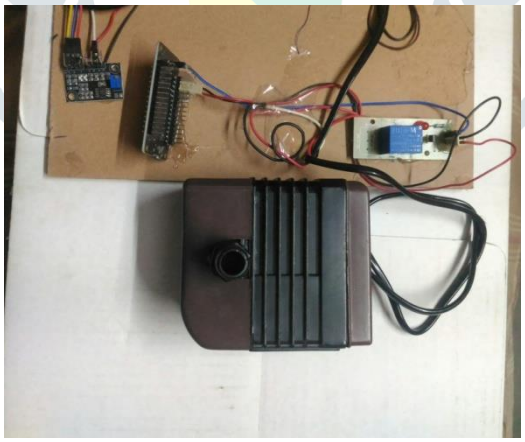

Figure 4: Pump Motor

This is the Pump motor connected with the Nodemcu through a relay device. With the help of Nodemcu we can control the motor from any location remotely.

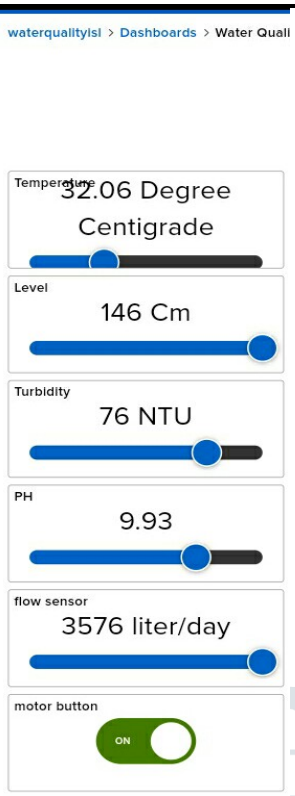

Figure 5: Real-time results on Adafruit server

All values are displayed on Adafruit server in mobile or laptop can be monitored remotely as portrayed in the above figure. The user can ON the pump motor for filtration from any remote location in case of contamination of water.

VI. ADVANTAGES AND DISADVANTAGES

6.1 Advantages

- The timeframe needed to test the values will be reduced as a result of computerization.
- It is financially viable for the average person.
- It protects against illnesses resulting from polluted water.
- Monitoring precision.
- The alarm signal is instantly transmitted to the individual's remote server.

6.2 Disadvantages

- Because we are employing many detectors and an Arduino Uno microcontroller, more careful handling is required
- Just the authorized individual will have accessibility to it.

VII. CONCLUSION AND FUTURE SCOPE

CONCLUSION

The designed system will sense the incoming data from every detector and reflects it on the digital display while also sending the information to the computer. The person may assist in monitoring the cleanliness of water out of any place. If the operator is dissatisfied with the cleanliness of the water, he turns on the engine, which sends it for filtration.

FUTURE SCOPE

The suggested methodology can be further extended with the addition of biological detectors for an even more accurate water cleanliness assessment. Another significant future effort on the suggested framework is the application of machine learning techniques allowing the network to be smarter.

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