WATER QUALITY MONITORING SYSTEM USING IOT

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Abstract

The standard method of checking the quality of the water requires manually by accumulating samples and sending them to a lab for analysis. A microcontroller, GPRS, and different sensors are used to assess the standard of leakage and water quality using the real-time monitoring system. The PIC microcontroller and GPRS are key components of the system.

Keywords: *IOT, Arduino UNO, Water, Automated temperature, pressure, turbidity sensor, Arduino ID.*

1. Introduction

There are numerous sensors that measure the water quality to be able to improve the standard of water, which depends on pH, conductivity, turbidity, and temperature. This ADC is also used by this technique. The measured value is then transmitted via GSM to the center, and the micro-controller additionally reveals it on the LCD. The system offers the benefits of potency accuracy and cost.

2.Overview

One of the most important natural resources used by humanity is water, however due to societal growth at an accelerated rate and a variety of human activities, the quality of the water resources has declined. So, it is necessary to check the water quality for once in a while. The central pollution control board (CPCB) has set up a number of monitoring stations on water bodies throughout the nation to regularly check the water quality. By doing this, the water quality is maintained at the desired level or improved.

Monitoring the quality of the water assists in assessing pollution prevention strategies. The CPCB intends to set up a network for monitoring water quality. Every station will function in real-time, and the central station can use GPRS or GSM to get data from any of the aforementioned units. in some cases both. A lot of information can aid in making the appropriate choice. The system's price is influenced by how many parameters will be measured. The system is designed to enable ongoing on-site sensing and real-time reporting of information regarding the water's quality and it is recommended that people use numerous sensors to measure the parameters that determine the water quality.

On January 9, 2014, at Charleston, West Virginia, USA4-Methylcyclohexanemethanol (MCHM), a tiny quantity of extra coal combustion chemicals, was discharged into the Elk River. this occurrence shows why it's important to keep an eye out for the large variety of currently available chemical substances. The MCHM storage tank's leak, which occurred about 2.4 kilometers upstream of a city of Charleston water intake, contaminated the Elk River. In Charleston's water supply system, MCHM-contaminated river water was pumped, leaving over 3,000 homes and nearby businesses without water for a few weeks. Research Doctor this form and Research chemist at the USGS stated that there was little to no published data about the skilled Toxins travelled in water, how to quantify them, or even their toxicity or stability. Therefore, it is essential to assess the water quality now and in the future in order to develop remedies, raise awareness of new issues that may affect drinking water standards, and defend alternate water-using methods.

3.Proposed Works

3.1 Proposed System

In order to prevent water body contamination, this work established a real-time water monitoring system. It is a purely automatic system. Multiple sensors, a microprocessor, and GPRS are used to measure the standard of leakage and water quality. the method relies on both Software and Hardware.

3.2 Working Principle

● By this project we can answer some
basic questions like the quality of the water
bodies whether it can be used for drinking or for swimming or for construction or for irrigation purpose. In which Restoration project are ensure environmental standards are being.
● The PH level in the water is measured which is the main purpose of the circuit. The PH of the water can be determined using a PH electrode. The voltage signal is produced based on the water's PH level. The operational amplifier can amplify the voltage signal because its range of voltage is in mV.
● The operational amplifier OP07 is used to erect the amplifier. the operational amplifier's inverting input terminal receives the signal after it has been amplified. An operational amplifier LF356 serves as the basis of the amplifier. D1 and D2, which are connected to non-inverting input terminals, then produce the +12 to-12volt reference signal.
● The output signal is then transmitted to the filter phase, where the output noise signal is filtered. The operational amplifier LM324 and the capacitors C1 and C2 make up the filter region.
● Then, when the comparator had compared the PH level to the reference level, it is given the noise-free signal, and the gain amplifier, whose feedback path includes a variable resistor, receives the final voltage. The circuit in question is then provided the final gain voltage in order to identify the water's PH level.

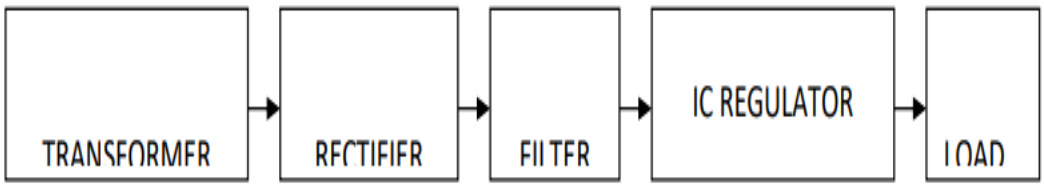

Fig 1.power supply

● The requisite dc output is achieved by scaling down the ac voltage, typically 220V rms, using a transformer. Up until a diode rectifier offers a full-wave rectified voltage, a straightforward capacitor filter is utilized to supply a dc voltage. The resulting dc voltage typically has some ripple or ac voltage volatility. A regulator circuit suppresses the ripples and ensures the constant dc value regardless of changes in the load connected to the output power supply or in the input dc voltage.

3.3 Block Diagram

The battery, Raspberry Pi mini-computer, Wi-Fi router, sensors associated to the Arduino platform, and these outcomes are generated and demonstrated with their observations and their graphical Analog signal metres through the graph user interaction GUI strategy, along with their nominal ranges, are all shown in the block

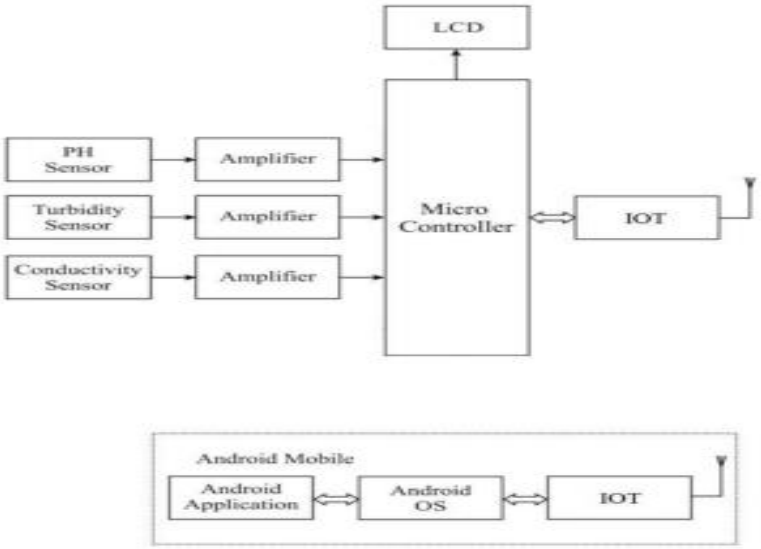

Fig: Basic Block Diagram of our project

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3.4 Circuit Diagram

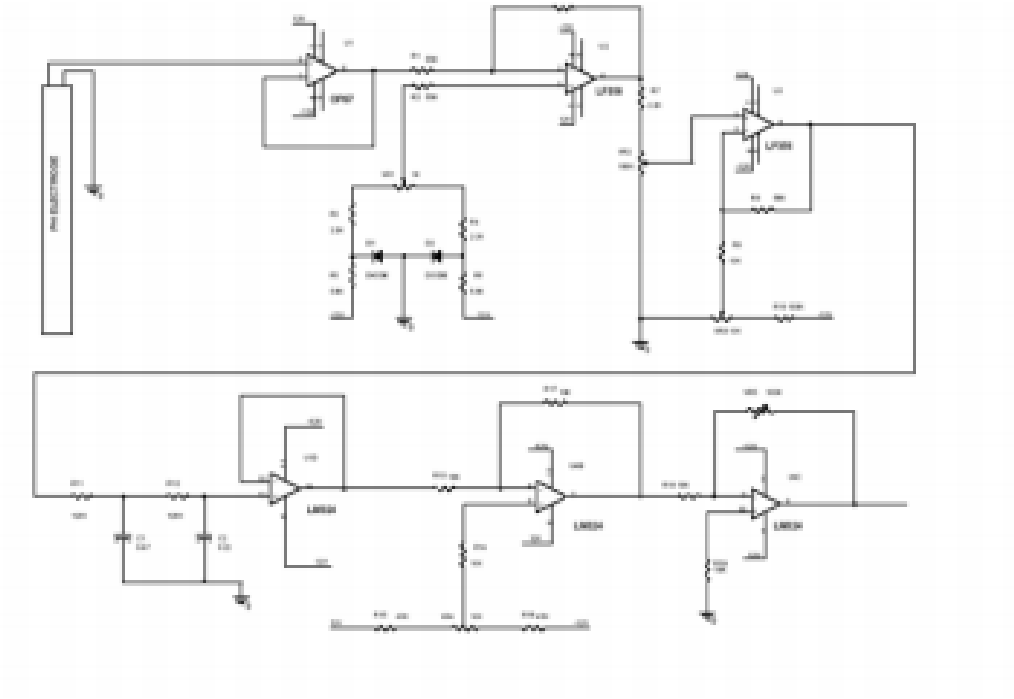

Fig 4.Circuit Diagram

The output signal is then supplied to the filter section, which contains a noise signal and filters the output. The conducting LM324 amplifier and capacitors C1 and C2 make up the filter section. After the comparator verifies the PH level with the reference level by using noise-free signal, the gain amplifier receives the final voltage with the variable resistor connected in the feedback path.

4.Hardware Used

4.1 Arduino UNO

Fig:Arduino UNO

Arduino is an open-source electronics platform with straightforward hardware and software. A tweet, a finger on a button, or a light on a sensor are examples of inputs that Arduino boards may read and translate into outputs that, for example, start a motor, turn on an LED, or publish something online. By providing a sequence of instructions to the board's microcontroller, messages about what to do can be communicated to the board. Numerous projects throughout the years, from basic home goods to complex scientific apparatus, have utilized Arduino as their brain. Arduino was developed by Ivrea Interaction Design Institute as a straightforward tool for participants without a background in electronics or programming to conduct fast prototypes.The Arduino board gradually changed as it gained more users, moving away from simple 8-bit boards and toward products for IOT applications, wearables, 3D printing, and embedded settings. Since every Arduino board is completely open-source, users can build them on their own and eventually customize them to meet their own needs. Additionally open-source, the application is expanding thanks to contributions from users throughout the globe.

4.2 ATMEGA328P–MICROCONTROLLER

Microchip's ATMEGA328P is a very efficient controller. Using AVR RISC architecture, the ATMEGA328P is an 8-bit microprocessor. Given that ARDUINO boards employ it, it is the most well-known AVR controller. Although we have numerous controllers, the ATMEGA328P is the most often used due to its functionality and price. Since this controller

has so many functionalities, ARDUINO boards are being developed on it. The ATMEGA328 can be utilized in the same way as any other controller. The only thing left to do is program. At any time, the controller merely runs the program that we have provided. Without programming, the controller does nothing but remain still. As previously stated, the controller must first be programmed. To do this, the relevant program file must be written to the ATMEGA328P FLASH memory. The controller runs this program code after it has been dumped and responds appropriately.

4.3 LCD - display:

Fig LCD Display

A liquid crystal display (LCD), which takes advantage of liquid crystals' capacity to regulate light, is a small, flat electronic visual display (LCs). LCs don't directly produce light. They can be found in many different applications, including as television, instrument panels, cockpit displays for aeroplanes, signage, and computer monitors. Consumer electronics including video players, gaming consoles, clocks, watches, calculators, and telephones frequently use them. In most applications, LCD displays have replaced CRT displays.

4.4 Conductivity Sensor

Sensors that detect soil moisture determine how much water is present there. An instrument for measuring soil moisture is called a soil moisture probe. One common kind of soil moisture sensor used in industry is a capacitance sensor, which operates in the frequency domain. The neutron moisture gauge is another sensor that makes use of the water's neutron moderator capabilities. Cheaper sensors, which are frequently used in homes, rely on two electrodes to measure the resistance of the soil. There are probes with wires embedded in gypsum, but occasionally this just consists of two bare (galvanised) wires.

Turbidity

Fig: 7 Turbidity

A resistor whose resistance falls off as the intensity of the incident light increases is referred to as a photoresistor, "LIGHT DEPENDENT RESISTOR," or Cds cell. Another name for it is a photoconductor.

5. Result

5.1Output images:

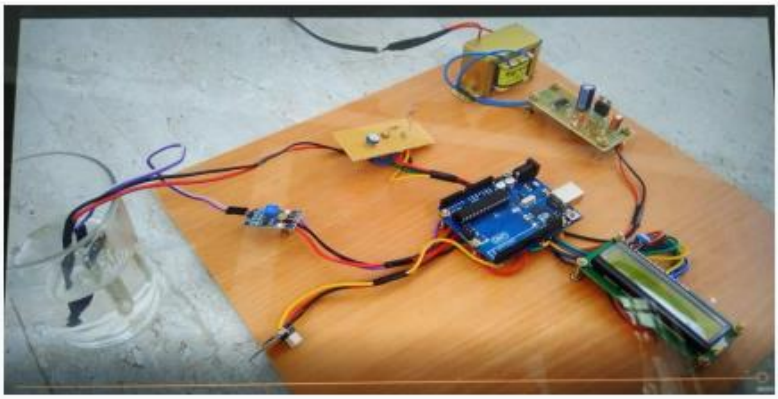

Fig .8 Demo Kit

We can infer from the circuit that it provides findings for water quality that are more accurate than the current manual detection technique .

Fig 9.Think Speak Display

This project's major goal is to automate the manual testing of drinking water's suitability and water quality.

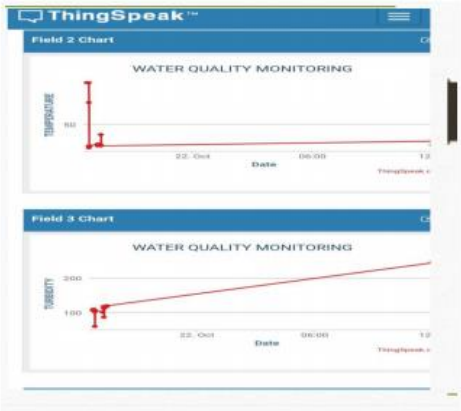

Fig 10. Water Quality Monitoring

In our technique, the properties of water will be exhibited automatically on screen without additional human effort. These characteristics allowed us to assess the water's quality. This study presents the design of a low-cost, wireless remote-controlled micro boat system that delivers real-time GPS navigation in addition to other water parameter information. This technology helps in the challenging aquatic environment.

6.Conclusion

An economical system that makes use of a large number of water detection devices and the GSM network is the GSM-based real-time system for measuring water quality. The technology is very cost-effective and customizable. It is a real-time system that uses a sensor to measure a range of water-related parameters and then mechanically transmits those measurements to the observing center. It is a flexible system since it can be made to measure a wide range of water qualities by changing out the sensors and the GSM-based real-time system for measuring water quality by changing out the sensors and modifying the computer code only slightly. The technology will be expanded to assess water pollution and other things because it is accurate and simple. It has a broad use.

7.Future Scope

The accuracy of the monitoring of water quality can be improved in the future, and our project has a lot of room for growth as well. Future upgrades to this system include a little robotic boat that gathers tests and performs analyses in various locations as well as other systems for preventing breakouts. They can detect and stop water contamination by transmitting the data to the government sectors. By utilizing these tools, individuals can increase their sense of security and guard against potentially fatal scenarios affecting future generations.

It is planned to try a number of deep learning and computer vision methods for water quality assessment on Raspberry Pi in the future to achieve a higher frame rate. Additionally, In order to provide adaptable water conditioning and filtration in buildings, we would like to improve this system with environment-sensing components.

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