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DESIGN OF AUTOMATIC DOMESTIC WATER QUALITY MONITORING & DISTRIBUTION CONTROL

Prof. S. A. Bagal[1],

Trishala Bhisikar[2], Aakanksha Nimje[3], Yogesh Nandanwar[4], Tanuja Patil[5]

Department Of Electronics and Telecommunication, K. D. K. Collage of Engineering, Nagpur, India[1-5]

Abstract: A water level monitoring system has been developed to combat the wastage of water, which is a major issue faced by many countries around the world. This system automatically detects and indicates the water level in reservoirs, overhead tanks, and other storage containers, and transmits this information wirelessly to registered users. Ultrasonic sensors, which use high- frequency ultrasonic waves to detect the level of liquids or solids, are often used to monitor water levels. These sensors are mounted at the top of a tank and transmit waves, measuring the time it takes for the return signal to be received by the sensor. The proposed project aims to use a webserver for the internal analysis of water dams, household/society water tanks, and municipality water towers to save energy and improve efficiency. Checking the water level in these containers can be a troublesome and time-consuming task. Furthermore, the project seeks to address the issue of water wastage, as people often forget to turn off the motor when the tank is full, resulting in water being wasted. The water level monitoring system can be used to monitor water levels and consumption, thereby reducing water wastage. To detect and indicate the water level in an overhead tank or any other water container, a Water Level Indicator is used. In this paper, we describe the design of a water level sensor device using NodeMcu. The device uses an ultrasonic sensor to generate ultrasonic waves, a water sensor to detect the water level, LEDs to indicate the water level, and a PC to observe the water levels. This circuit is highly efficient and can be used for monitoring the levels of any liquid in any application.

Keywords: IoT, Node MUC ESP8266, Arduino, PH sensor, TDS sensor, Solenoidal valve.

I. INTRODUCTION

Water is an essential resource for all living organisms, and its quality is of utmost importance for human health and ecosystem balance. The increasing pollution in the water bodies due to various sources like industrial waste, agricultural runoff, and human activities has raised concerns about water quality worldwide. Traditional water quality testing methods are time- consuming and require skilled personnel, making it difficult to monitor the water quality in real-time.

The advancements in technology have led to the development of a Water Quality Tester based on IoT, which can monitor the water quality in real-time. An IoT-based Water Quality Tester is a device that can monitor the water quality in real-time using IoT technology. The device consists of various sensors that measure the physical and chemical parameters of water like temperature, pH, dissolved oxygen, and turbidity. The data collected by the sensors is transmitted to a central server or cloud platform using wireless communication protocols like Wi-Fi, Bluetooth, or Lora WAN. The data is then analyzed using machine learning algorithms to identify any anomalies or deviations from the normal water quality standards.

The IoT-based Water Quality Tester has several advantages over the traditional water quality testing methods. Firstly, it provides realtime monitoring of the water quality, enabling quick detection of any contamination. Secondly, it eliminates the need for skilled personnel to conduct the tests, reducing the cost and time required for water quality testing. Thirdly, it can be easily deployed in remote locations, providing access to real- time water quality data in areas with limited resources.

Fourthly, the IoT-based Water Quality Tester can be integrated with other systems, such as water management systems, to enable better water resource management. The IoT-based Water Quality Tester has several applications in various sectors like agriculture, industry, and healthcare. In agriculture, it can be used to monitor the quality of irrigation water,

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ensuring the crops are not contaminated. In the industry, it can be used to monitor the quality of water used in manufacturing processes, preventing any contamination of the products. In healthcare, it can be used to monitor the quality of water in hospitals and other healthcare facilities, ensuring the safety of patients and staff. Additionally, the IoT-based Water Quality Tester can be used in monitoring the water quality of swimming pools, aquariums, and other water bodies.

However, the implementation of the IoT-based Water Quality Tester also presents some challenges. The sensors used in the device need to be calibrated and maintained regularly to ensure accurate measurements. The device also requires a stable and reliable network connection for transmitting the data to the central server or cloud platform. The data collected by the device needs to be secured to prevent any unauthorized access or tampering. Additionally, the use of the IoT-based Water Quality Tester needs to comply with regulations and standards set by the relevant authorities.

Challenges: The implementation of the IoT-based Water Quality Tester also presents some challenges. The sensors used in the device need to be calibrated and maintained regularly to ensure accurate measurements. The device also requires a stable and reliable network connection for transmitting the data to the central server or cloud platform. The data collected by the device needs to be secured to prevent any unauthorized access or tampering. Additionally, the use of the IoT-based Water Quality Tester needs to comply with regulations and standards set by the relevant authorities.

Iot- based water quality tester: An IoT-based Water Quality Tester is a device that can monitor the water quality in real-time using IoT technology. The device consists of various sensors that measure the physical and chemical parameters of water like temperature, pH, dissolved oxygen, and turbidity. The data collected by the sensors is transmitted to a central server or cloud platform using wireless communication protocols like Wi-Fi, Bluetooth, or Lora WAN. The data is then analyzed using machine learning algorithms to identify any anomalies or deviations from the normal water quality standards.

II. LITERATURE SURVEY

S. Gokulanathan, N. Prabu, T. Venkatesh “GSM based water quality monitoring system using Arduino”. International Journal of Arts, Science & Humanities ISSN (2019). Due to the rapid development and urbanization, the quality of water is getting degraded over year by year, leading to water-borne diseases, and creating a bad impact. In this study, a wireless sensor network-based system for keeping track of water quality is examined. Water is essential to human society, and as 65% of the drinking water in India is derived from underground sources, it is imperative to monitor the water's quality. This paper presents a power efficient and effective solution in the domain of water quality monitoring, where the water samples are tested using this model. Through data analysis, it assesses the quality of the water and also sends an alarm to a remote user in case of any deviation in water quality parameters.

Samia Ialam, Surajit Das Brman, Ahemad Warif Reza. “IOT Based smart water quality monitoring system”. IEEE 4TH International Conference on Computer & Communication System (ICCCS) 2019. His research describes a smart water quality monitoring (SWQM) system based on the Internet of Things that helps with continuous water condition measurement based on four physical parameters. i.e., temperature, pH, electric conductivity, and turbidity properties. To detect the water parameters, four sensors are discretely connected to an Arduino UNO. The proposed SWQM system successfully evaluates the test water sample's suitability for consumption by comparing the data from the sensors to a desktop application created on the.NET platform and employs a rapid forest binary classifier to assess the water characteristics.

S.Sai Kumar , B.V.Subba Rao, J.Rajendra Prasad “ Design and Development of a Water Quality Monitoring System by using IoT” International Journal of Emerging trends in Engineering Research 2020. The conventional method of testing water quality, which involves gathering water samples and sending them to the lab for analysis, is time-consuming, labor-intensive, and not cost-effective. However, we have put in place a system for evaluating water quality that makes use of real-time monitoring through a variety of sensors (one for each parameter: pH, conductivity, temperature, and turbidity). Any variation in these parameters indicates the presence of pollutants. The system includes a Wi-Fi module that transfers data collected by the sensors to a microcontroller, which in turn sends the data to a smartphone or PC. This system allows for strict monitoring of water pollution and provides a safe environment for drinking water.

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Vaishnavi V. Daigavane, Dr. M.A. Gaikwad "Water Quality Monitoring System Based on IoT". ISSN Advance in Wireless and mobile communication 2017. In this research, we propose the design and creation of a low-cost system for Internet of Things (IoT) real-time water quality monitoring. The system consists of many sensors that can monitor the temperature, pH, turbidity, and other physical and chemical characteristics of water. The core controller, which may make use of the Arduino model, can process the sensor measurements. To ensure the safe supply of drinking water, the quality needs to be monitored in real-time, as water pollution is one of the biggest concerns for green globalization. Finally, a Wi-Fi system can be used to see the sensor data online.

III. CIRCUIT DIAGRAM

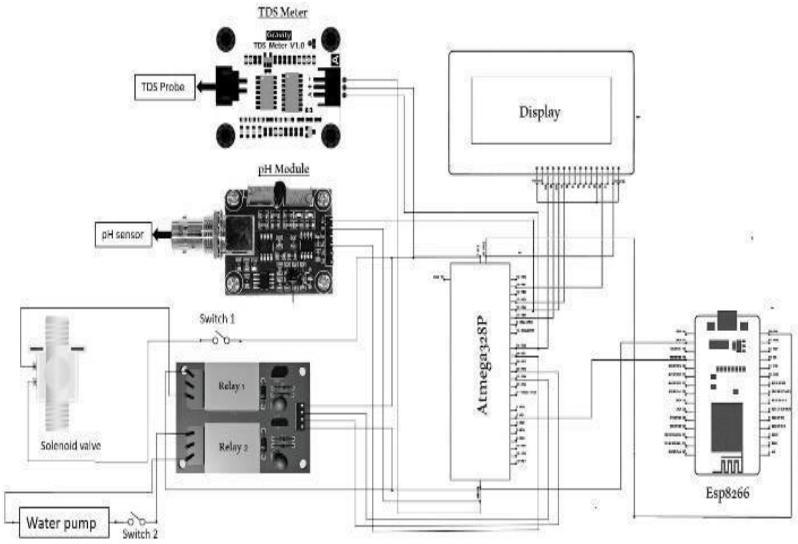

FIG. 1 CIRCUIT DIAGRAM OF THE PROJECT

The newly introduced concept in the world of development, the whole design of the system is based mainly on IOT. There are basically two parts included: the hardware and the software. The hardware part has sensors that help measure real-time values, and the Arduino ESP8266 converts the analog values to digital. The LCD displays the output from the sensors, and the Wi-Fi module provides the connection between the hardware and software. In the software, we developed a program based on embedded C language. The PCB is designed at the first level of construction, with components and sensors mounted on it. The BLYNK app is installed on the android version to view the output. When the system gets started, DC current is given to the kit and Arduino, and Wi-Fi gets turned on. The parameters of water are tested one by one, and their results are displayed on the LCD. The app, provided with a hotspot, gives the exact values as shown on the LCD display on the kit. So, if the kit is placed on a specific body of water and Wi-Fi is available, we may view its real-time values on an Android phone from any location at any time. The schematic circuit diagram of the hardware setup of the proposed SWQM system is provided. Except the temperature sensor, other three sensors are of analogy type. Each sensor has three different color wires such as red, black and others. Here, red wines are for +5V power supply, black wires are for ground and others are used for data estimation. A breadboard is used for creating common points for ground and power supply separately. The Arduino's ground is then linked to a common node of ground, and the process is repeated for the power supply. The analogy sensors are connected to the analogy pins and digital sensor is connected to digital pin of the controller.

IV. CONCLUSION

In conclusion, the Automatic Domestic Water Quality Monitor & Distribution System has the potential to make a significant positive impact on the health, safety, and overall quality of life of households. Providing real-time information on water quality, automatically detecting and rectifying any problems with the water quality and distributing water according to the specific needs of each area of the house and reducing the chances of water-borne diseases, the system can help to ensure that occupants always have access to clean and safe water. This is an important function, as

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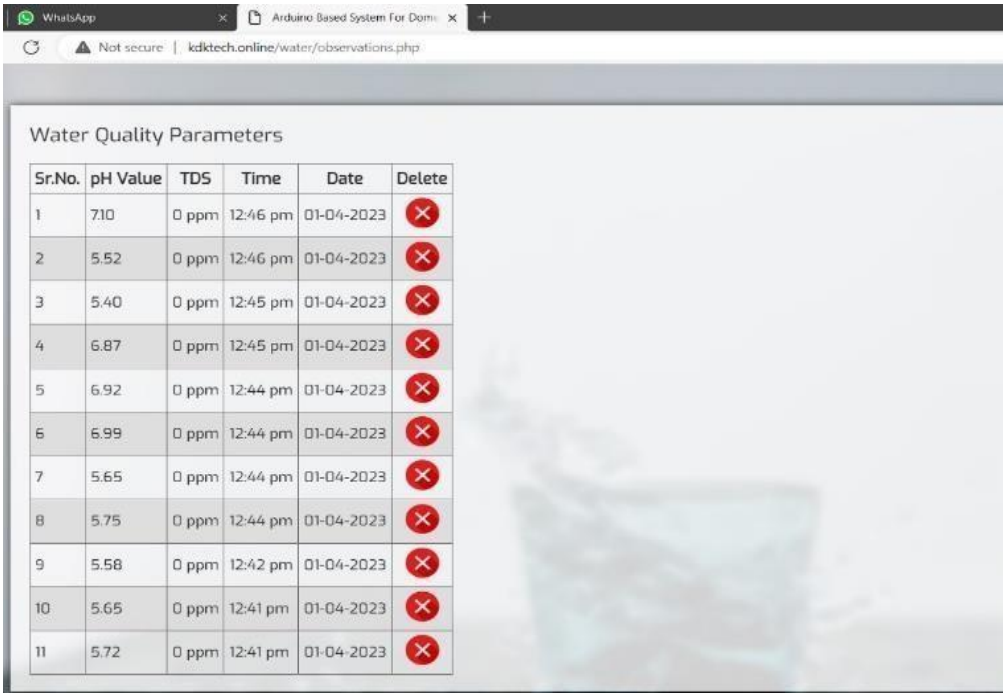
contaminated water can lead to serious illness and even death, making the Automatic Domestic Water Quality Monitor & Distribution System a valuable investment for households.

V. RESULT

We can use cloud computing in our proposed system to monitor the water quality metrics online. The values for the water quality metrics are kept on a different web server in the cloud. A different IP address can be used to access these parameters. The output results from the web server on the internet are displayed in the figure. Monitoring the water quality is crucial for a number of applications, including pond and ecosystem monitoring, drinking water distribution and measurement, and contamination detection in drinking water. For these applications, a different method of water quality monitoring is required. The system will be able to automatically identify any problems with the water quality, including high levels of pollutants or contaminants, and take the necessary actions to fix the problem.

The system will be able to automatically distribute water to different parts of the house according to the water quality needs of each area. For instance, the system may send water that has been treated and filtered through a different pipeline to be used for drinking and cooking purposes. Real-time information on water quality: The system will be able to provide real-time information on the water quality of the house to the occupants. This information can help the occupants make informed decisions about their water usage and consumption habits.



Sr.No.	pH Value	TDS	Time	Date	Delete
1	7.10	0 ppm	12:46 pm	01-04-2023	
2	5.52	0 ppm	12:46 pm	01-04-2023	
3	5.40	0 ppm	12:45 pm	01-04-2023	
4	6.87	0 ppm	12:45 pm	01-04-2023	
5	6.92	0 ppm	12:44 pm	01-04-2023	
6	6.99	0 ppm	12:44 pm	01-04-2023	
7	5.65	0 ppm	12:44 pm	01-04-2023	
8	5.75	0 ppm	12:44 pm	01-04-2023	
9	5.58	0 ppm	12:42 pm	01-04-2023	
10	5.65	0 ppm	12:41 pm	01-04-2023	
11	5.72	0 ppm	12:41 pm	01-04-2023	

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