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Water Quality Monitoring System Based on IOT Platform

To cite this article: Ahmed Abbas Fadel and Mohamed Ibrahim Shujaa 2020 *IOP Conf. Ser.: Mater. Sci. Eng.* **928** 032054

IOP Conf. Series: Materials Science and Engineering **928** (2020) 032054 doi:10.1088/1757-899X/928/3/032054

WATER QUALITY MONITORING SYSTEM BASED ON IOT PLATFORM

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Abstract
Water treatment monitoring systems are presently divided into manual and dynamic systems. Due to, the constant changes in water, either due to seasonal changes in water chemistry or due to the operative conditions of the industrial environment, the dynamic systems have to be utilized by the water manufacturers. However, water is very beneficial for life and human health, therefore to reduce the endangerment of pollution, by improving and increasing the plant operation in addition to production. This paper suggests a new technique for water factory manufacturers by adopting wireless sensor nodes. The monitor node connected with a microcontroller device using Esp32 as transmitter and receiver nodes. The node sends its statues over the wireless network utilizing a defined internet protocol (IP). The proposed system shows its effectiveness in water monitoring systems through synchronous water monitoring and simple configuration compared to traditional systems.

Keyword: IOT, ESP 32, water monitoring, PH, TDS.

I. Introduction

In the last decade, attracted several researchers the domain of water monitoring systems has because of the rise in environmental pollution with the rise in the amount of pollution [1-3]. Water quality monitoring is outlined as the method to get the data and knowledge about water from completely different regions to see water quality and in regular or continuous-time periods. [4, 5]. On the opposite hand, the massive development within the field of wireless sensor networks (WSN) helps to fuse the water monitoring system with the Internet of Things (IoT) [6, 7]. Where are, several kinds of research are introduced to improve and implement a water monitoring system utilizing wireless sensor networks over the internet of things (IoT).

The IoT outlined as network devices that hold the means to sense and collect completely different information from too various locations at a similar time [8, 9]. However, with the point sensing that given by the wireless sensing element network that is sprees over the IoT network many water parameters are monitored with readability and high efficiency. The basic introduction of water testing is notified of

this task with the utilize of IoT technology [10]. False positives, reading, are registered however not handle as Associate in the Nursing alert .

This paper is organized as follows. In section II, detection connected study. In section III, the performance analysis of the new projected system is completed, and at last, the conclusions square measure given in section IV.

II. Related study:

In the last decade, various researchers have deployed and proposed (WSN) for monitoring [11, 12]. The studies obtain worked on improving the system's aimed to increase response and performance.

- In M. H. Banna et al, 2013 [5], the authors present a literature survey on the spread of IoT with WSNs. various suggestions and motion discussed in this area of the smart monitoring system.

- where F. Adamo et al, 2014 [13], suggest a vast range of wireless sensor networks above the sea and lake to monitoring chlorophyll. While the concentration of the temperature level of water and dissolved oxygen proposed and suggested by [13, 14].

- Water level monitoring based on IoT has been suggested by P. P. Shah, 2017 [15] build on Android applications. The suggested system believes the limit water with fixed levels.

- However, one of the most alms in the field of water monitoring system suggest by S. Geetha and S. Gouthami, 2017 [16], where, the authors study and monitoring five parameters in real-time such as; conductivity, hydrogen potential (pH), turbidity, temperature, and water level. The measured parameters by sensors management and send to a cloud platform by Zigbee protocol.

In this work, we aim to overcome and fulfill the area of real-time water monitoring systems over the IoT environment. One of the main characterizes of the proposed system is low cost and easy-to-install comparing with the previews proposed systems in real-time monitoring. The proposed system implements to measures the pH, as well as TDS. The system also includes Encrypted data, To protect data from hackers and some bad people over the IoT environment. The proposed system compatible with the large, small, and variable water area.

III. IoT Architecture of Water Test

The proposed operation for the IoT system contains two steps. Fig 1 shows the block diagram of the proposed IoT system for water tests as a case study. The first step in the IoT system is the sensing data collection from sensors connected to the IoT control. In this work, we have two types of sensors used in collecting data from water. These sensors are (TDS) and (pH meter) These sensors are connected with control (ESP32) in the second stage, in (ESP32) control the collection data In

the third step after all information is sent to special web application, it can store information in the web site. The proposed IoT was applied to the collected data before sending them to the IoT server. Figure 1. illustrates the proposed IoT system (using component of IoT). It is shown that the steps of the IoT system operations, all parameters, and initial values will determine between the two sides (sender side, and IoT server-side).

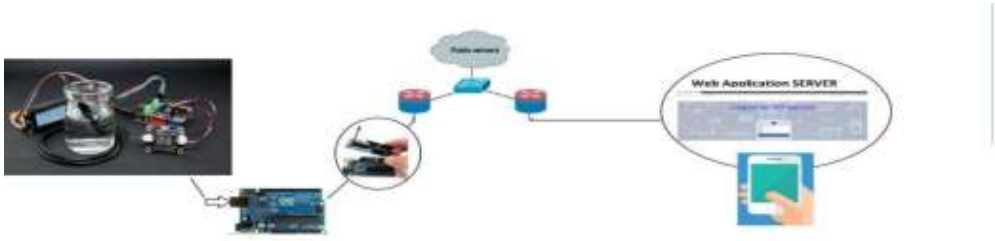

Figure 1. The suggestion IoT security system (water testing).

IV. Hardware Description of Water Test

In this section, we discuss about the implementation of IoT security system (water test) can evaluation result. We integrate and implement the designed system as shown in Figure 2. which shows the connection between ESP32 control, TDS, pH Sensors and web application.

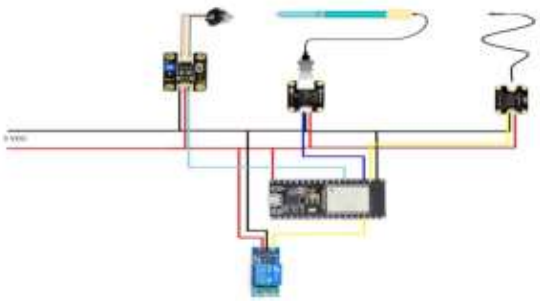

Figure.2: The schematic diagram of ESP32 control, TDS, pH Sensors and web application connections.

TDS Sensor Description: (Total Dissolved Solids) measures how many milligrams of soluble solids with one liter of water dissolved. The higher the TDS value in general, its most soluble solids mixed with water, and the less pure the water. The TDS value can therefore be considered one of the biggest references for reflecting water purity.

PH Sensor Description: Arduino Compatible, particularly designed for Arduino controllers that effectively interact the sensor with such a functional connection, for evaluate water quality and some other parameters inexpensively. This could allow your project to be extended to bio-robotics. It does have an LED which works as its Power Indicator, a BNC adaptor and a sensor interface with PH2.0. To be used, simply connect its pH sensor to a BND connector, and socket the PH2.0 interface in with any Arduino controller's analog input port. Once fully re-programmed, you'll easily get the PH value.

ESP32 Description: is the specifically built low-power consumption microcontroller for Internet of Things (IoT) projects. Fire Beetle Board-ESP32 combines a dual-core ESP-WROOM-32 module which supports dual-mode communication with MCU, Wi-Fi and Bluetooth. Throughout the deep-sleep mode the electrical current is only 10μA. Two power distribution methods are assisted by the main controller: the USB and 3.7V internal lithium batteries. The Lipo Battery can be charged directly by both USB and external DC.

Figure.3: pH, TDS and Web application connection

VI. Results

The results were obtained by collects different water samples from different sites of Tigris river. The Table.1 below shows the TDS and pH measured by the monitoring system.

Table.1. TDS and PH of Tigris river.

Water parameters	pH	TDS
Al-Kadhimiya	7.63	377
Al-Kiryat	7.88	354
Al- Adhamiya	8.06	345

VII. Conclusion

Several samples were collected from the Tigris River and compared with previous laboratory analyzed samples within the laboratories of the Ministry of Science and Technology/ Iraq. The results showed the extent to which the proposed system results match the laboratory results under the same conditions of the approved measurements. Through the results shown, this system has the ability to find water testing parameters such as pH and TDS with high accuracy and monitor quality of water automatically without intervention of human using wireless sensor networks nodes. Thus, we reduced the cost and time required to conduct laboratory analysis with propose system.

VIII. References

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