International Conference on Communication and Signal Processing, July 28 - 30, 2020, India

Analysis of the Water Quality Monitoring System

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***Abstract*—Now a days many people are suffering from dangerous diseases which are caused due to impure water. In our project we are doing analysis for water quality monitoring system, it gives data about the quality of water, on a webpage. The quality of water is determined using various sensors like PH sensor and turbidity sensor, connected to the Arduino family microcontroller. The Arduino software is written in embedded C and GSM module is connected to the Arduino. The data will be transferred constantly from the remote sensor organize through microcontroller and wifi. Wifi module is used to send data to the webpage via internet which is connected to the microcontroller. The total data regarding the purity of water is displayed in the webpage and is analysed in the form of graph, pie chart and values are given in the table. We transfer this information to cloud and clients can get to this information through web page application, client from anyplace can screen the data whenever.**

***Index Terms*—Microcontroller, PH sensor, turbidity sensor, GSM and cloud storage.**

I. Introduction

In the present days and current period, we are moving towards making our urban communities as the brilliant urban areas, because many innovative research and developments throughout the decades. So the present period is said to be time of creations, time of improvement, time of globalization and the time of astuteness and so on. In any case, the counter side of the equivalent is that the present time is time of the contamination, a dangerous atmospheric deviation, weakness and hopeless wellbeing factors. One of the inborn and prime hindrance is total population does not have purified and safe water for drinking. This is increasing unsafe circumstances in some nations like India, where grimy water is being utilized for drinking with no appropriate water treatment before drinking. The fundamental driver for this are the numbness of individuals and government area and the inadequate water quality checking framework, which results in genuine medical problems.

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The inspiration of the proposed framework was to plan a remote framework to screen water quality in a most straightforward and practical way. This framework can break down some essential variables of water to take preventive measures for water quality support. The pH sensor and turbidity sensor are utilized to gather the pH and turbidity dimension of the water. With the utilization of wifi module, we can get the information from the rural and less developed areas. The sensors have the simple yield, consequently they are interfaced to simple contribution of the Nodemcu microcontroller and the information are exchanged through the wifi module. The PH and turbidity parameters thus calculated are stored in a tabular format and is shown on pc. The parameters that are utilized to decide the nature of the water are the pH level and turbidity level.

The rest of the paper is organized as follows. The related works are explained in Section II. Section III, Section IV and Section V describes about the system architecture, software and hardware specification respectively. The system design and analysis are discussed in Section VI and VII respectively. At last, Section VIII concludes the paper with conclusion of the work.

II. Related Works

Said M.F. et al describes the possibility of submerged remote sensor organize is the water quality monitoring utilizing remote sensor arrange innovation controlled by sunlight based board [1]. The hubs and the base stations are associated utilizing WSN innovation like Zigbee Data assembled by various sensors at the center point side, for instance, pH, Information gathered from the remote site can be shown in visual configuration a well as it very well may be examination utilizing distinctive reenactment instruments at base station. Lakshmanan et al indicates the significance of IoT and their benefits and also threats handled by IoT [2].

Ayushi S jaiswal, vaidehi Baporikar The data which is very difficult for humans to gather can be done by underwater robots. They are utilized broadly by mainstream researchers to think about sea submerged condition. Zigbee is a productive and viable remote system standard for remote control and checking applications. They displayed a reasonable and productive model of embedded remote information resource framework utilizing Zigbee which will be constrained by the PIC microcontroller [3].

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F Ntambi,CP kruger,BJ silva,GP Hancke,This idea implements the structure of a water the board framework that can log pH and weight readings remotely. This likewise decides a water spill in the pipe framework or water is sufficiently sheltered or human utilization.

A graphical UI was additionally actualized to show the information got and alert if any anomalies happened [4]. Jesudoss et al show how different types of sensors can be effectively implemented in safe driving [5].

Ji Wangi proposed A remote sensor systems for water quality checking. In which a novel arrangement of remote water quality estimating and observing dependent on remote sensor system and CDMA innovation [6].

Cheng-liang lai proposed utilizing picture preparing innovation for water quality checking framework. In which the effectively fabricated a water quality checking framework by using the picture handling framework and fluffy induction in auto perceiving the motion of fish [7]. The work done by Lakshmanan et al highlights the possible innovative communication methodologies and technologies for IoT [8]. Aravindan et al proposes the water quality management for real-time data [9]. Doukkali et al proposes MAC protocol using underwater acoustic sensor [10]. Akyildiz et al proposes underwater sensor nodes for autonomous underwater vehicles [11]. Jesudoss et al describes how IoT sensors are used in designing a smart helmet for accident avoidance [12]. Vasilescu et al also used underwater sensor networks for tracking coral reefs and fisheries [13] . Niel Andre Cleote et al explains the techniques for designing smart sensors for checking quality of the water [14]. Jiang P. et al proposes another efficient design for checking the water quality using wireless sensor networks [15]. Fisher et al provides a complete insight about the wireless sensor networks and its effective implementation [16]. Lambrro et al experiments the water quality for nephelometric turbidity systems and provides a different approach [17]. Vinod Raut et al uses an innovate wireless technique for monitoring the water quality [18]. Yi Hong Wang is another motivational work done for monitoring the quality of the water [19].

III. System Architecture

The micro controller block diagram is shown in Fig. 2. Probably every individual is aware that water is one of the prime necessities for life of each living organism on the earth. The pH level and turbidity dimension of water assumes natural job in surveying the nature of water. Water quality assumes natural job in the medical problems of individuals, plants and living beings on the earth. Especially, the primary wellsprings of water are rivers, waterfalls, and lakes. Downpour water running over the grounds contains numerous impurities and polluting influences that might be dissolvable or insoluble. The primary point is to gauge the pH level and turbidity level in the drinking water just as in the sewage water from ventures that are crashed into the waterfalls and furthermore the water utilized for horticulture.

The goals of the framework are given beneath

To sketch the analysis of the water quality monitoring system.

To evaluate the pH and turbidity parameters in the real time environment using the sensors.

To collect data from rural and less developed areas and store that data in the web page.

Thus the data collected is sent to the cloud with the help of wifi module present in the Arduino family microcontroller board. To exhibit the real time data on PC.

IV. Hardware Specification

The pH and turbidity parameters are used for checking the quality of water. These are calculated using the pH sensor and turbidity sensor which are connected to the Node MCU Microcontroller esp8266 as shown in Fig, 1. GSM module is a circuit that will be utilized to convey between a cell phone or registering framework and GSM.

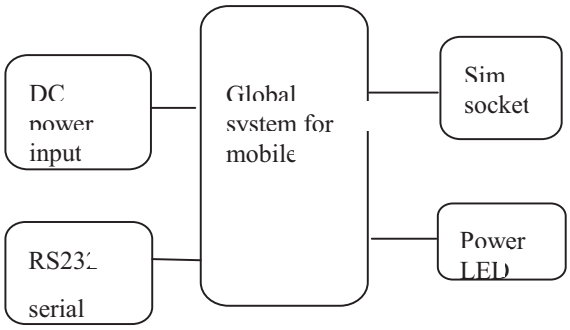

Fig 1. Block diagram for GSM

The SI unit for magnetic field strength H is A/m. However, if you wish to use units of T, either refer to magnetic flux density B or magnetic field strength symbolized as $\mu_0 H$. Use the center dot to separate compound units, e.g., "$A \cdot m^2$."

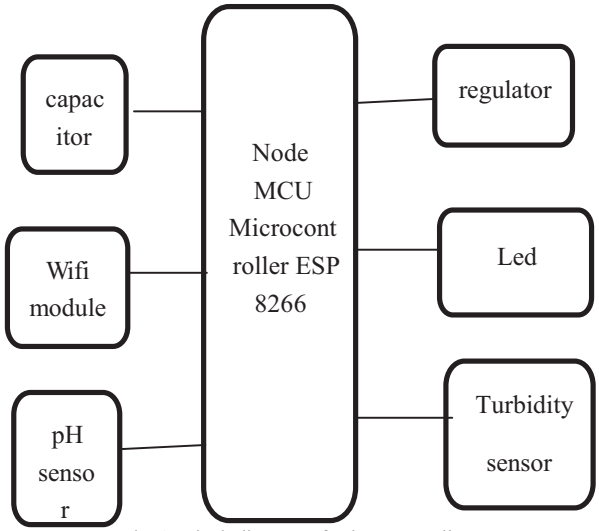

Fig. 2. Block diagram of Micro controller

A. pH Sensor

pH is the truncated type of potential hydrogen. The pH amplifier is used in combination with the pH sensor to calculate the acidity and alkalinity of the water or any other liquid. When kept in the water, the pH is calculated based on the movement of hydrogen and hydroxyl ions. The range of pH scale is from 0-14. The pH values range from 0-7 are considered as the acidic solutions. The pH of drinking water is 7, it is considered as neutral. The pH range from 7-14 is considered as alkaline.

B. Turbidity Sensor

The turbidity amplifier is used in combination with the turbidity sensor. The turbidity of water is calculated using turbidity sensor only. If the turbidity of the water is less than 60, then it is suitable for drinking, with some measures. The impurities which are invisible for human eye can also be detected using turbidity sensor in Fig. 3.

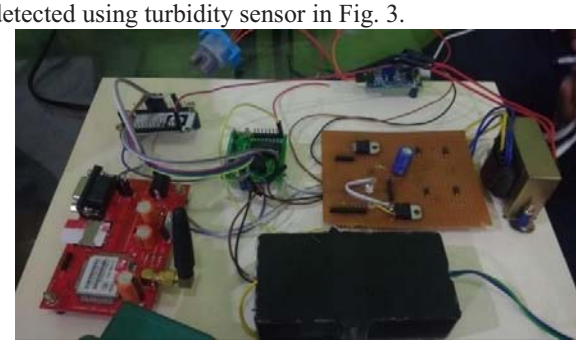

Fig. 3. Experimental setup

V. System Implementation

A. Existing System

The current Water Quality observing framework include human towards looking at the water Quality, Testing. At present many measures are taken and innovative development has been introduced in water quality checking. These are finished by utilizing automated fish, laser bar and advanced camera. Likewise enquiry about the fish has been done by utilizing remote sensors. Notwithstanding observing the water quality, restricted work is completed in applying AI strategy including the nature of water. The disadvantage of the current framework is that there is no completely robotized water Quality checking framework utilizing Sensors. Likewise framework does not have insight which takes into consideration dissecting the data for the forecast. These frameworks are worked for correspondence inside a little land zone.

B. Proposed System

In proposed system, the water quality will be checked by the Ph and turbidity sensors which are connected to the Node MCU microcontroller. The data is collected and is sent to the cloud for storage. The values are stored in a tabular format. We can get alert message notification to the registered mobile number through sms if the sensor reaches above the limit i.e Ph<7 and turbidity>60 using GSM. The values that are stored in a tabular form are analysed in the form of line graph and pie charts.

C. Advantages in Proposed System

The following are the advantages in the proposed system:

- Cloud storage.
- Efficient analysis in the form of bar graphs and pie charts.
- It can be constructed at minimum cost.
- Used in home applications.

VI. System Design

In this framework we present the structure of IOT Based Water Quality Monitoring System that screen the nature of water continuously which is shown in Fig. 4. It screens every 5 seconds and update the information. This framework comprises a few sensors which measure the water quality parameter, for example, pH, turbidity.

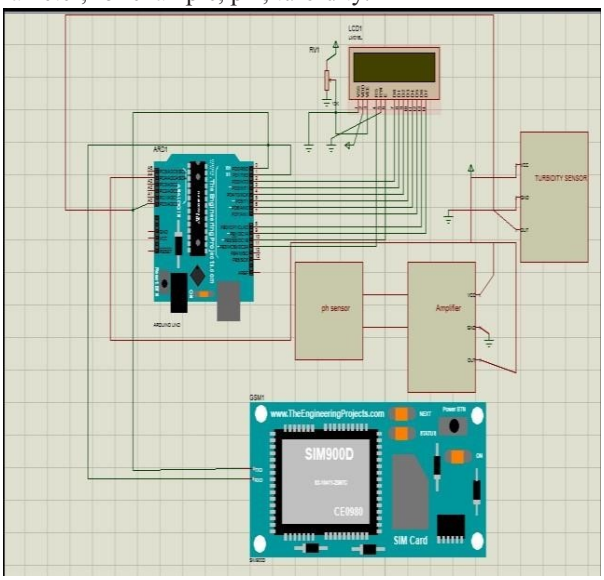

Fig. 4. Circuit Diagram

The deliberate qualities from the sensors are prepared by microcontroller to make the perfect for wifi module. These are transmitted remotely to the call controller, here it is the web page application, utilizing wifi convention. At last sensors information can be seen on the web browser application using the trending cloud computing.

VII. Analysis

The wifi module which is connected to the microcontroller update the sensors data continuously to the cloud. In the cloud it can be retrieved from anywhere. The web application with login credentials is created and the analysis of resultant values are declared in the form of line graph and pie chart. The pH values and turbidity values are shown as piechart in Fig. 5 and Fig. 6 respectively.

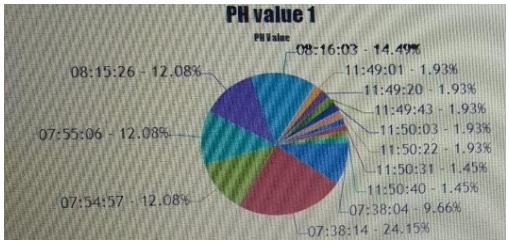

Fig. 5. pie chart for pH values

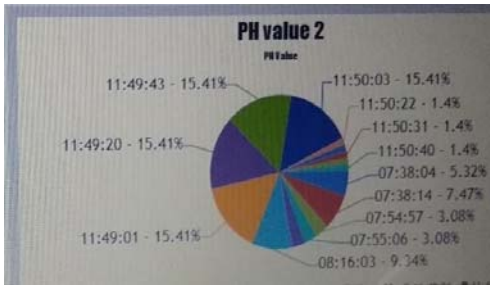

Fig. 6. Pie chart for turbidity values

VIII. CONCLUSION

The Project "An IoT based system for water quality monitoring" has been successfully designed and experimented. We have seen the success of sensors in various fields; the same idea has been applied to this water quality monitoring system. In this paper we have analysis different water quality monitoring systems to do the same. All these techniques are expensive and difficult in terms of analysis and collecting the data.

ACKNOWLEDGMENT

"This work has been carried out at DST-FIST sponsored Wireless Sensor Network and IOT Lab(sanction orderno. :SR/FST/ETI-413/2018 Dated:08th February, 2018), Department of Computer Science and Engineering, Sathyabama Institute of Science and Technology."

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