Smart Underwater Monitoring System through IoT – An attempt for improving Social Cause

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Abstract

With quickly rising population in India, Fresh Water Management is particularly basic which requests an expansion in agrarian, modern and different prerequisites. Customary water quality checking includes three stages to be specific water sampling, Testing and investigation. Additionally with the appearance of remote sensor innovations, some measure of research did in observing the water quality utilizing remote sensors conveyed in water and sending short message to rancher's about water. In order to ensure the quality of water, a huge research is always carried by the researchers. From lakes and streams to beachfront waters and estuaries, water quality watching is an basic practice finished in countries over the globe. Internet of Things (IoT) will helps in this process. This paper proposes a method using IoT and big data storage for monitoring underwater system for the civilized people.. This method uses various sensors like temperature sensor, pH level sensor, turbidity sensor for monitoring Turbidity, Physical and substance qualities of water and the data get stored in big data. The web server is planned to utilize Hypertext Transfer Protocol for correspondence between customer and server by setting up Remote Procedure Calls between customer and server.

Keywords: *Water quality monitoring, Internet of Things (IoT), PH sensor, temperature sensor, turbidity sensor, Hypertext transfer protocol.*

1. Introduction

Water is one the basic needs for human, not only for human living, water is one of the most important requirement for agriculture, industries and other works. Hence it is necessary to maintain quality of water bodies. Quality maintenance require continuous monitoring of water quality [1]. Conventional water quality monitoring method involves 3 steps, water sampling, testing samples and investigative analysis. So this paper aims to make use of the automation and IoT in water quality monitoring. By using IoT, machine to machine interaction is possible by making the devices communicating themselves without any human work. This method utilize PH sensor and TDS meter for getting the water parameters inorder to check the water quality [2]. All the collected parameter sent to the Arduino and Raspberry pi3 by using serial communication. Webpage of cloud is used for storing all the information so that the authorities can able to know them.

By monitoring the water quality it is easy to determine any contamination in the water. IoUT is the implementation of communication in underwater. Internet of Underwater Things (IoUT) majorly helps in underwater exploration [3]. IoUT is the world wide network for exploring underwater things. Here sensors are used to measure the parameters of water. Arduino act as the controller of the overall process. Remote Procedure call (RPC) is used for client-server communication. This method uses the HTTP protocol and commands and arguments are passed between the client and server. 70% of earth surface

is covered with water but most of them remain unexplored hence we are utilizing IoUT for studying about the underwater environments. This method can be used in smart cities and also the waterproofing system has become the developed field. This all favours the study of underwater environment [4].

2. Proposed method

This paper proposes a smart method for monitoring the water quality [5]. Hardware assembly of the proposed method is shown in figure 1. In order to collect the water quality parameter sensors like PH sensor, temperature sensor and turbidity sensors are used. All the sensors are get interfaced with the Arduino and a wifi module is also get connected with it. All the data connected from the sensors are get stored and shared by using cloud. Raspberry pi is used in another end to knowing the data through monitor.

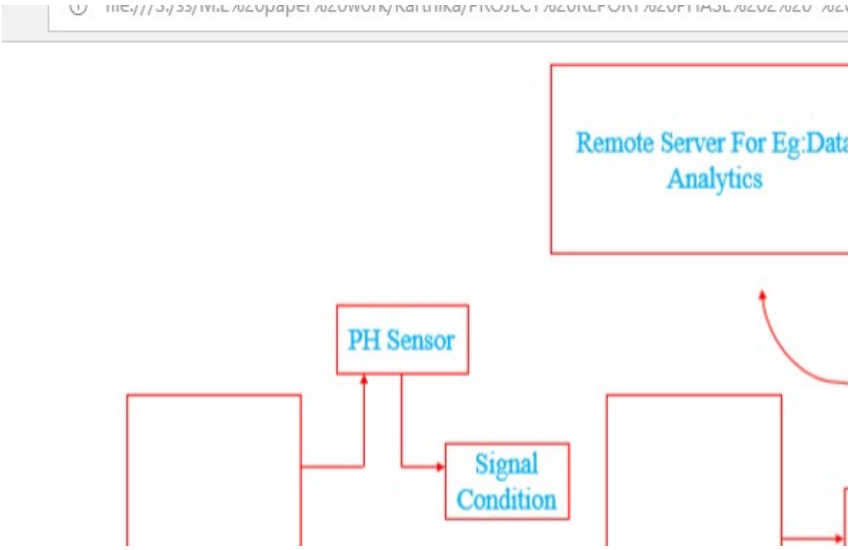

Figure 1. Block diagram for proposed method

All the sensors used here are underwater sensor (UNSN). UNSN can be place either in deep or shallow region of the water bodies. And all the UNSN consists of acoustic modem to transfer data. It will sense the surrounding and transfer the data to sink. Sink is nothing but the components in the water level. Sink will have both the acoustic and radio modem. It will receive the data and resend it the remote monitoring center. In the remote monitoring center, the data will get collected, analysed and used for further purpose [6].

In our proposed method, to measure the underwater environment various UNWN were used in the underwater environment. For temperature sensor LM35 is used. For increase in every Celsius the current requirement of this sensor increases by 10mV. PH sensors are used to measure the quality, acidic/basic level of the water. For transmitting data from the sensors to the controller, ESP8266 is used. It can be paired with any sensors for sending the data. The overall process is controlled by Arduino UNO R3, it uses Atmega328P. In the server side, raspberry pi is used for receiving the data from the Arduino and it will get displayed in the monitor.

Implementation of our proposed method starts with checking the internet connection. Serial terminal will display the IP address if the internet is working or else it will show error message. After server port configuration, TCP and RPC starts running [7]. Completion of TCP connection will starts the HTTP and HTML 5 code. Webpage will get displayed if the IP is given in the URL. Through the webpage all the data will get

monitored by the user. Sensing of the water parameter is done by various sensors in the water surface and all the sensors having acoustic modem for sending the data. All the data sent by the sensor get stored in the database. Arduino consists of the API key for updating the parameter value in the webpage. Between the client and server, commands and arguments are passed by using RPC [8]. And HTTP is also used here for communication. IP generation for the webpage can be done by interfacing ESP8266 with Arduino [9]. All the parameter measured by the sensors is displayed in the monitor of server side for continuous monitoring. Here all the methods are automated and does not require any human work.

Here all the process depends mainly on the concept called cloud. Through the cloud only all the data get transferred between the client and server for the monitoring purpose. By using cloud, data can be accessed from anywhere by using any device because all the data get stored in the data center. Basic structure of the cloud is shown in figure 2. Here all the data get stored in the cloud. Virtualization is the concept relies in the cloud. By using cloud, a virtual computer is created and stores all the data [10]. The main advantage of cloud is that all the data stored in the cloud can get accessed by any device.

and greatest.

3.2 CLOUD

Figure 2. Basic structure of cloud

3. Result

Our proposed method can be simulated in Proteus shown in figure 3. All the devices like sensors, Arduino can be simulated by using Proteus. After placing all the required device connection has to be made. Sensors are placed and connected to the Arduino. Then ESP8266 is interfaced with the Arduino for data transferring purpose.

RESULT A

OUTPUT SCREENSHOT

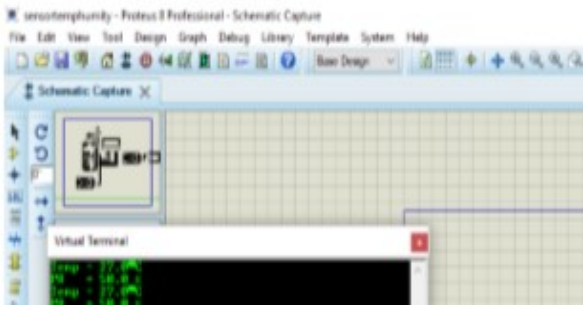

Figure 3. Simulation output of proposed method

API key is connected with Arduino for updating data in the web server. Communication between the client and server is done by using RPC. Communication protocol used in this method is HTTP. All the data obtained from the sensor is first given to the Arduino for passing the data to the server side. Data shared by using cloud. All the data sent to the Arduino from the sensor is transferred to the cloud database. And the user can monitor the data through the webpage shown in figure 4. All the real-time data get continuously transferred from the sensor to the server side through database.

Figure 8.1 Simul

Figure 4. Real-time output

4. Conclusion

Water is the precious resource, which serves the major requirement of human beings and also it is used in various purpose like agriculture, industrial needs. Hence is it necessary to maintain the quality of the underwater resources which is the real need for society. This paper implemented the advancement of technology for monitoring the water quality. Here all the process involved in water quality management is automated and need not require human intervention. IoT enables the advantage of monitoring the data even from the remote place. Since cloud based database is used for sharing the parameter value of water it is useful for storing and further retrieval of the data. This method gives high accuracy in real-time water quality monitoring process

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