Water Quality Monitoring in IOT Environment

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Abstract - *usually we here that water is nothing but life for human beings. It is true with respective to each and every sense. Though it is true although in India we are not that much serious about water management. This is proven by seeing at lots of water getting wasted everywhere; it is polluted with different sources of pollution especially industrial sectors. It should be taken on serious note to stop all these disastrous approach toward water management that is leading towards heavy loss of humankind. This paper is supposed to take one small step towards water quality management. This proposed system is supposed to be prototype model which can be used in water quality monitoring applications. We are implementing communication between sensors and web page with dynamic IP address. This web page will be developed in Php environment. Web page will be utilized to monitor different sensor values and initiating alerts in case of bad quality of water.*

Keywords - IOT, MQ6, Turbidity Sensor, Raspberry pi 3.

I. INTRODUCTION

Water essentiality has its own importance towards environment and especially at human kind. Without water it's impossible to survive for human being. It is basic need of survival. Hence it becomes our duty to look at water savage and water quality management. With increased industrialization; increasing population, the water problems like water pollution and water wastage has been substantially increased. It's not only duty of government but also citizens to take one step ahead to sort out the things related water.

We are taking this thought forwards by taking tiny step of water quality management with internet of things touch. Definitely internet of things (IOT)-the recent technology will enrich this effort to make water quality management more effective. In proposed system Automation at water quality monitoring system using an embedded Linux board that raspberry pi 3 with Linux operating system provides a web interface to the authenticated user so that the user can control and monitor the system remotely. In this paper, Raspberry Pi-3 is operating as chief controller that is designed using arm 11 microcontroller architecture. The goal of coordinator system is to collect the parameters like Water turbidity, Co2, PH value monitoring at water storage. Each sensor communicates with the embedded system. Raspberry Pi 3 displays collected data at webpage. In case of bad quality of water, system will indicate alert signal though webpage. The board has an Ethernet interface and runs the simple data web server using apache web server. Here embedded controller that is coordinator collects the data and allow user to monitor the data from a web browser. Here webserver plays an important role.

The basic function of a web server is to store, process and deliver web pages to clients. The communication between client and server takes place using the Internet of things. Pages utilized are most frequently HTML pages, it might include images, style sheets and supportable web scripts in with text content.

An authenticated user that is client supposed to use webpage initiates communication by sending a request for a specific resource using HTTP and the server responds with the information of that resource or an error message if unable to respond or do so. The resource is typically a readable file on the server's secondary storage, but this is not always mandatory necessarily case and depends on implementation of the web server hierarchy.

It's not necessary that Web servers always used for serving the World Wide Web. They can also be found at embedded system environment. Example of this environment in devices such as advanced controllers, mobiles, tablets, computers and serving only a local area network. At such situation web server could be used as an essential part of a system for monitoring and/or controlling the device on target. This frequently does mean that no extra software has to be installed on the slave computer, as only a web browser is required. In proposed system we are using embedded web server to access different sensors data for water quality monitoring purpose at IOT environment.

II. LITERATURE SURVEY

A. Paper Survey

In paper "IOT based water quality monitoring system" By Jayti bhatt published in International Journal of Industrial Electronics and Electrical Engineering it states that "To ensure the safe supply of drinking water the quality should be monitored in real time for that purpose new approach IOT (Internet of Things) based water quality monitoring has been proposed. In this paper, we present the design of IOT based water quality monitoring system that monitor the quality of water in real time[1]

In paper "Water Quality Monitoring System Based on IOT " by Vaishnavi V. Daigavane published in Advances in Wireless and Mobile Communications ,it states that " Water pollution is one of the biggest fears for the green globalization. In order to ensure the safe supply of the drinking water the quality needs to be monitor in real time. In this paper we present a design and development of a low cost system for real time monitoring of the water quality in IOT(internet of things). [2]

In paper" Online Monitoring Of Water Quality Using Raspberry Pi3 Model B" by M. B. Kalpana published in international journal of innovative technology and research

it states that" Water being a universal solvent varies from place to place, depending on the condition of source water from the treatment it receives, but it must reach Environmental Protection Agency (E.P.A) conditions. The normal method of challenging conductivity, Turbidity and pH is to collect samples manually and sent them to laboratory for water quality check. However, it has been unable to reach the water quality examining today of shortcut, perfection and using staffing requirements and material accumulation sparingly. The existing system will be suitable for a particular area but it does not cover for large systems. By clearly observing the above issues low cost system for Online Monitoring of Water Quality using Raspberry Pi3 model B has been developed." [3]

In paper "Detection of Water Level, Quality and Leakage using Raspberry Pi with Internet of Things" by Arjun K published in International Research Journal of Engineering and Technology (IRJET) it states that " Water is an essential resource. Quality of water is more important, it has to find whether the water is contaminated or pure. Pipe burst overflow of water from tank and a water leakage is another major reason for wastage of water. To monitor the quality of water with the help of information sensed by the sensors immersed in water, here pH sensor and Turbidity sensors are used to measure the quality of water, so as to keep the water resource within a standard described for domestic usage and to be able to take necessary actions to restore the health of the degraded water body [4]

In paper "Design of Low Cost System for Real Time Monitoring of Water Quality Parameters in IOT Environment" by Pavana N.R published in International Journal of Advance Research in Computer Science and Management Studies, it states that "Water is a fuel of life and no lives exist without water on this earth planet. The water has to be monitored regularly using smart technologies. There is various purification technologies proposed for monitoring of drinking water; but the hazards of different category are mixed with the drinking water which comes through industrialization, globalization, urbanization, agriculture etc. [5]

B. Raspberry pi-3

In recent embedded applications raspberry pi-3 has become integral part of embedded system being a main controller with wide scope and facilities like Ethernet controller; high speed ARM cortex controller; Audio port; USB port and mostly Bootable operating system creating it minicomputer to use. Its high speed is giving sharp edge for accessing real time data. The recent version raspberry pi-3 and raspberry pi-0 has become popular in short period. In proposed system also while looking at its advantage we have used raspberry pi-3.

III. SYSTEM DEVELOPMENT

The overall flow of proposed system with embedded system is shown in figure.1 at block diagram.

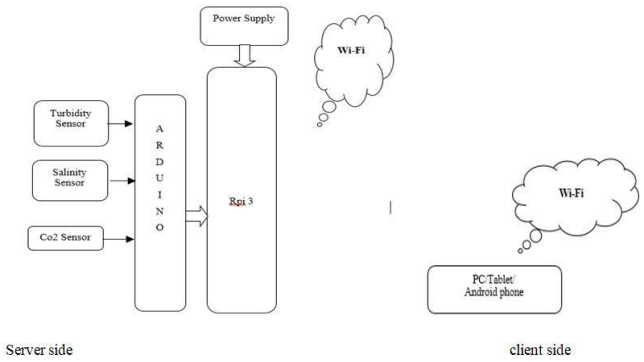

Figure: 1 Block Diagram

The proposed system is divided in to server side and client side respectively. They are explained as below:

A. Server side:

Server side includes following components-

1. Raspberry pi-3
2. Turbidity sensor
3. Co2 Sensor

At server side main controller has been integrated with Linux operating system. The recent version of 2018 jessie Linux operating system is used in raspberry pi-3.

The said operating system is uploaded at raspberry pi-3 using win32 disk imager software.

The web page is created using Notepad++ software at Php environment. This webpage is linked with raspberry pi-3 acting as an embedded web server.

Turbidity sensor is digital type which can directly interfaced with raspberry pi 3.

These sensors values are read using python language. The python program used for sensor values is programmed using python editor.

These sensors are used to read CO2 happening due to bad quality and turbidity level at water resources. All these values are updated on embedded server and ultimately client could see at webpage.

Buzzer is also used at server side. If threshold level of bad quality of water reaches its value the buzzer will be ON for a while for indication purpose.

B. Client side:

The clients which are having access to server with user id and password could access the embedded server by using personal computer, tablet or android phone. But it's mandatory for them to be in network area of embedded server.

IV. ALGORITHM

1. Initiate raspberry pi-3
2. Initiate wireless network components.
3. Set TCP/IP communication between Server and client.
4. Send sensor data to raspberry pi-3.
5. Check and display sensor data available on network using web page.
6. Check threshold values of each sensor.

7. If threshold value is beyond its limit initiate Buzzer otherwise go to step 3
8. End

V. RESULT AND CONCLUSION

The proposed system with its algorithm has been successfully implemented. The proposed system is tested and verified against varying data of all sensors. All sensors are working effectively. The communication between raspberry pi-3 and sensors is not showing delay. The communication between Server side and client server is also without delay. The sensor data is updated on webpage at real time. Simultaneously multiple clients are tested to access the webpage. Despite of multiple clients, server is not showing lack of speed. With all multiple test and versatile condition proposed system is giving very good response.

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VII. REFERENCES

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