2nd National Conference on Recent Innovation in Engineering, Science, Humanities and Management
REVA University, Yelahanka, Bangalore, (India)
29th-30th March 2019 www.conferenceworld.in ISBN : 978-93-87793-79-8

WATER QUALITY MANAGEMENT USING SMART WATER GRID SYSTEM

S PRADEEP SWETHEN, PRASANAMBIKA V, PRIYANKA KM ,

PRIYA BR

guided by Dr MRINAL SARVAGYA

School of ECE,REVA UNIVERSITY

ABSTRACT

Water is considered to be an undoubtable precious resource on the planet and safeguarding and sustaining it is of paramount importance from the economic, social and ecological aspects. Taking care of critical challenges faced by the human race pertaining to unstoppable industrialization at the cost of depleting natural resources, undesirable climate change and catastrophic population growth in some parts of the world the issue of water sustainability carries a lot of importance .To achieve it, it mandates availability of safe drinking water to all human race, maintaining proper hygiene and sanitization, improvement of water waste management and quality of water, eradicating the risk of human-induced and natural water-related diseases.

Keywords: pH sensor, Turbidity sensor, TDS sensor, Water leak sensor, Arduino UNO, WIFI module

I. INTRODUCTION

The drinking water quality maintenance has become one of the key concerns in the today's world with the diminishing sources of quality drinking water supply and manufacturing plants across the nations. The raw water taken from the different natural resources has to be treated to an extent of making it drinkable by carrying out different types of processes by water treatment plant operators. .

[1] The period of high economic growth is vigilant in India and at the same time, the water supply and sewerage infrastructure is also on continual rise with the unprecedented growth in population, there arises a need to maintain a safe and secure water environment.

[2] The environment challenges are many and the sensors are operated in remote places, thus the sensors must be of long life deployment, robust and easily reconfigurable and the sensors must autonomously operate in the required environment.

We have to continously monitor the water quality of drinking water as most of the disease are caused due to contamination of water. According to WHO about 80% of the diesases are caused by contaminated water. In this

paper we are monitoring the water quality with pH sensor, Turbidity sensor, Dissolved oxygen sensor, TDS sensor, Temperature sensor and Flow sensor. [3] The water quality factors such as pH determines the concentration of hydrogen ions. It gives the information about the water as it is alkaline or acidic. For drinking water the pH value must be 6.5 to 8.5 pH .Turbidity is the haziness of a fluid caused by more numbers of individual particles that are not visible to the naked eye. Turbidity should be less than 1 NTU (nephelometric turbidity units). Drinking water utilities maintain levels as low as 0.1 NTU . Dissolved oxygen analysis determines the content of gaseous oxygen (O2) dissolved in an aqueous solution. Environmental impact of total dissolved level in water should not exceed 110% (above 13-14 mg/l). A TDS sensor determines the total dissolved solids (TDS) of a solution .The period of high economic growth in the recent time is vigilant in India and at the same time, the water supply and sewerage utilities is also on continual rise with the increasing growth in population, this increases a need to maintain a safe and protected water environment, with a minimum workforce and constrained finances.

II. RELATED WORK

[4] This paper published gives details on drinking water quality that needs monitoring in real time. The Arduino is the main processor of the system which control and process the values or data calculated by the sensors.Water quality assessment provides the base line information on water safety. Since water quality in any source of water can change with time and other factors, continuous monitoring of water is essential. Cyber-Physical Systems (CPS) incorporated with processors, actuators and embedded sensors is capable enough to interact and also sense the water environment.

The term of water cyber physical system has been coined to deal with the technicalities associated with the same.With regards to water CPS sustainability issues, four major aspects of importance and opted for consideration are: instrumentation and sensing, communication and networking, computing and control. Water CPS are intelligently networked systems embodied with processors, embedded sensors and actuators, designed to interact and sense with the physical world and support real time, guaranteed performance in safety-critical applications, as dictated in CPS vision statement by the Federal Networking and Information Technology Research and Development (NITRD) Program's CPS Senior Steering Group in 2012

2.1 WIFI MODULE with THINKSPEAK

In this paper we use ESP8266 WiFi Miodule to tranfer data to IoT. ESP8266 is a cost effective WIFI module.The ESP8266 is capable of sending and receiving the data to all Wi-Fi networking functions from another application processor.

ThingSpeak is an open-source Internet of Things (IoT) application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network. The ThinkSpeak software is used to store the sensed data in the Internet and the data can be retrieved using any processor application .

III. PROPOSED WORK

We envisage the use of communication and networking, hydrodynamic modeling, data analysis, sensor technology for enabling of intelligently networked water cyber physical systems.
Introducing Real-Time Monitoring helps us to see the data in real time that would detect problems and take immediate action on them which reduces loss of data and thereby reducing the cost. It identifies and allows to monitor the appropriate parameters and system functions. Advantage of using Real-Time data is that it can abet in planning schedules based on need rather than pre-decided number of times.
When alarms are included in these systems faults are detected and notifications are sent through text messages or email to related authorities. Real-time Monitoring ensures better data quality at cheaper cost.

The Objective of the project is to develop the smart water grid network for underground pipelines and water bodies with cyber physical system.
1. Development of smart water grid using sensors to detect the Contamination and pollution of water .
2. Automatic Leakage detection in pipelines.
3. Monitoring of water quality (water temperature, pH level , conductivity, and dissolved oxygen).
4. The sensors outputs are integrated, transmitted and analyzed using a cyber physical network having the computing facilities for the analysis.
5. The feedback will be provided to the concern authorities for corrective measures.
6. This type of water contamination detection system can be of great use for military bases in the forward region near the border.
Internet of Things (IoT) is a network technology, which is based on information sensing equipments such as RFID, infrared sensors, GPS, laser scanners, gas sensors and so on, can make anything join the Internet to exchange information or data, according to the protocol, which gives intelligent identification, location and tracking, monitoring and management.

3.1 METHODOLOGY

To obtain the result the methodology is divided in to three major functions

- Stage I: To implement the conceptual design of a system for timely analysis and appropriate response to drinking water contamination incidents to save public health and economic causes;
- Stage II: To test and illustrate Continuous Monitoring System (CMS) with pilots at drinking water sources and municipalities and make implementation to the design based upon pilot outcomes;
- Stage III: To develop practical assistance and to promote self global adoption of improved and sustainable drinking water CMS.

ISBN : 978-93-87793-79-8

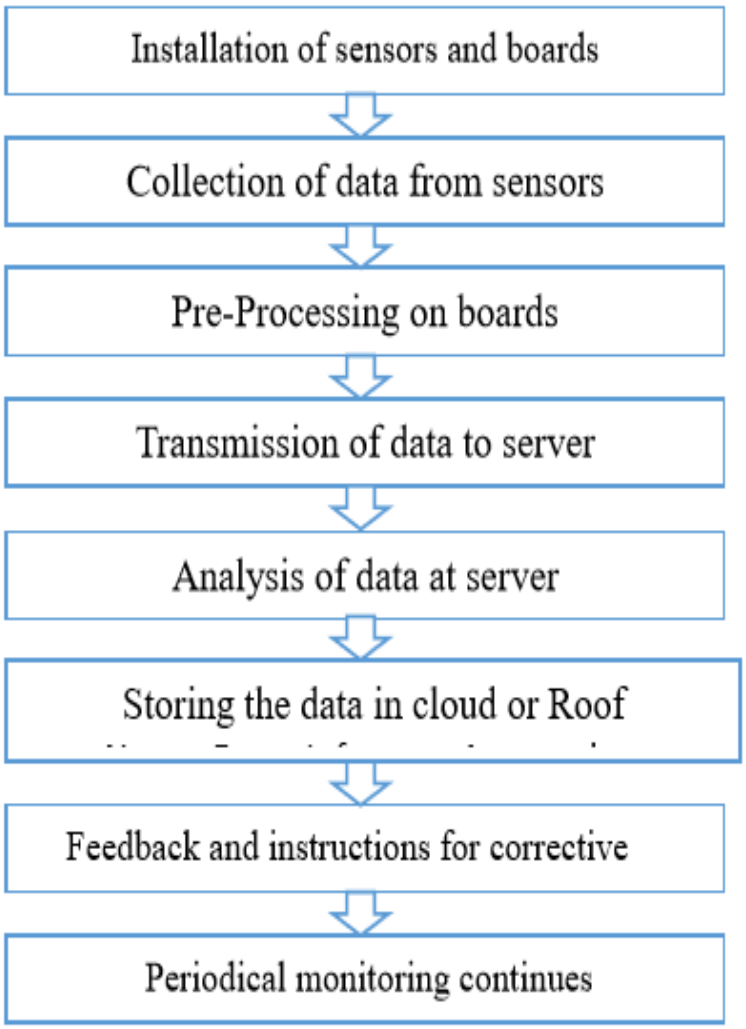

Fig 1. Proposed steps for operations

To achieve the end goal the methodology is split up in to different phases in coherence with the different objectives, described as above.

3.2 BLOCK DIAGRAM

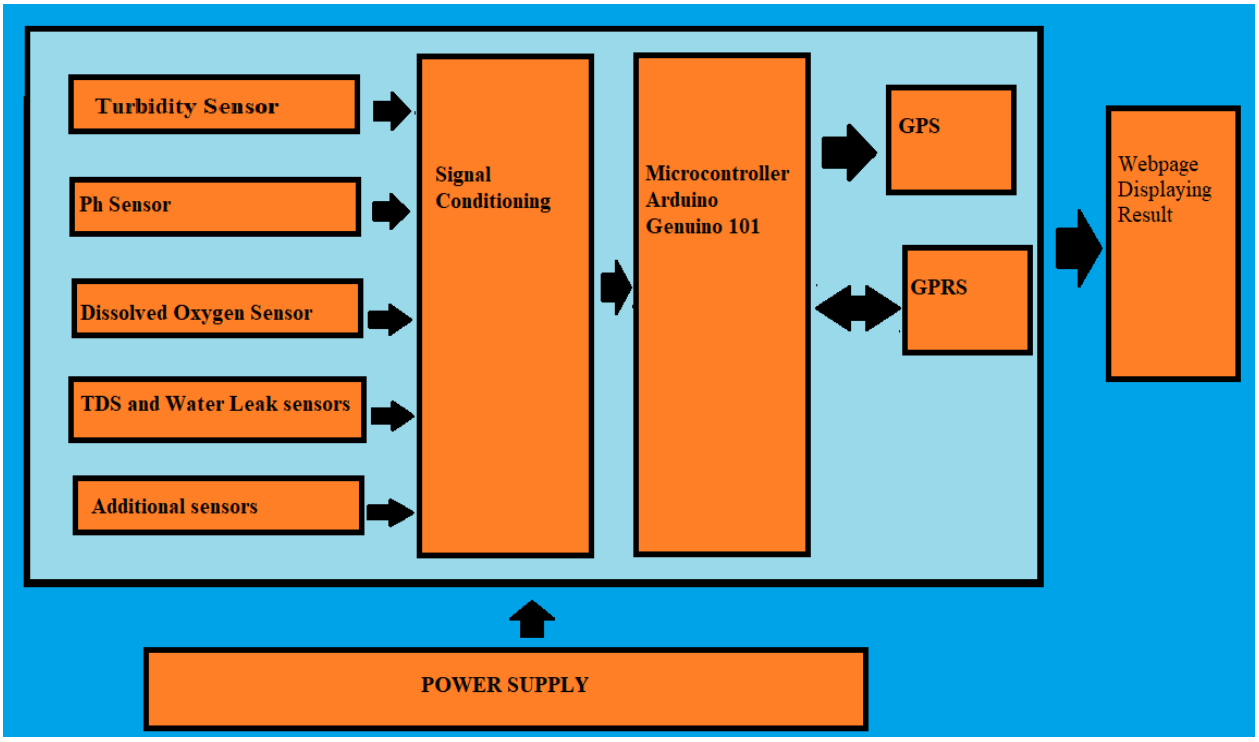

Fig 2. Overview of operation

IV. HARDWARE AND SOFTWARE REQUIREMENTS

Sl no	HARDWARE AND SOFTWARE REQUIREMENTS	DESCRIPTION
01	COMPUTER (server)	To use for simulations related to remote sensing applications as Cyber physical server
02	ARDUINO UNO	Used as Microcontroller to calibrate the sensor data
03	pH sensor, Turbidity sensor, TDS sensor, Water Leak sensor, Temperature sensor	Sensors used to sense various data
04	WIFI Module (ESP8266)	Used to collect data from sensors, Integration and pre processing the data for transmission
05	ThinkSpeak and ARDUINO IDE	For interfacing the sensors and data processing software

Table:4.1

ISBN : 978-93-87793-79-8

V. CONCLUSION AND RESULT

With the help of this we have determined a required implementation model that includes many sensors, devices and other modules, In this project we used ARDUINO UNO with Wi-Fi module. Inbuilt Analog to Digital Converter and Wi-Fi module connects the system or device to internet. Sensors are connected to Arduino UNO board for monitoring, Analog to Digital Converter will convert the corresponding sensor reading to its digital value and from that value the corresponding environmental parameter will be evaluated. After sensing the data from different sensor devices, which are placed in particular area of interest, then the values of the sensors are displayed in the LCD. We can add-on further more sensors which can determine further qualities of the water.

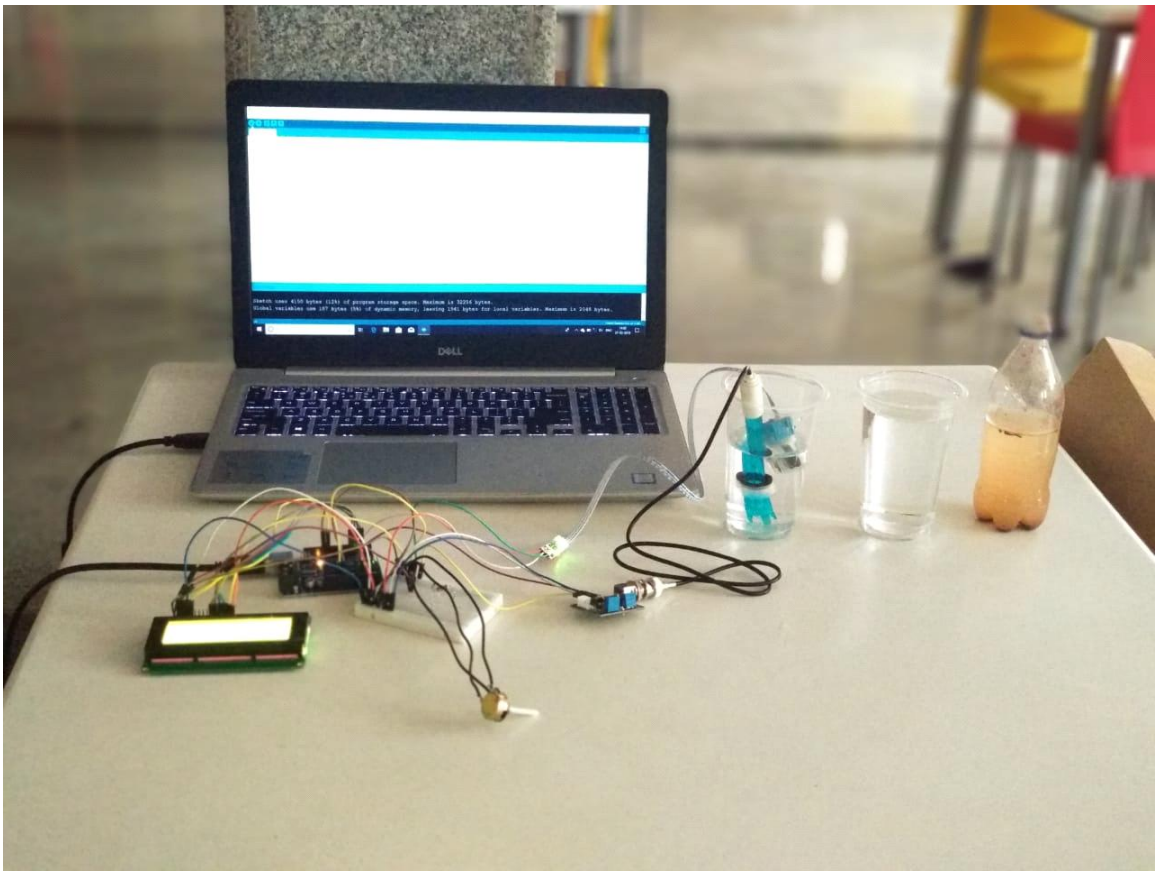

Fig: 5.1

In the above figure we have monitored the quality of different samples of water and calibrated to values and accessed the data through IoT. The calibrated data gives the quality of the water and it can also be used for monitoring specific application such as it can be used to monitor the Aquarium and swimming pool based on specific parameters and specific sensors.

REFERENCES

[1]. Nikhil R,**" Smart Water Quality Monitoring System Using IoT Environment",** JUN 2018.

[2].Ashwini D, Dr. M Z Kurian, Chidhanandhan , "**Water Quality Monitoring System using IoT** " , 2018

[3].Vaishnavi V and Dr.M.A Gailwad,**"Water Quality Monitoring System Based On IoT",** NOV 2017.

[4].Gautamy J, **"Smart Water Quality Monitoring System Using IoT Environment",** OCT 2018.

M. Weiser, R. Gold, and J. S. Brown, "**The Origins of Ubiquitous Computing Research at PARC in the Late 1980s**," IBM Systems Journal, vol. 38, no. 4, pp. 693–696, December 1999.

J. Gubbi, R. Buyya, S. Marusic, and M. Palaniswami, "**Building the common future we want**," United Nations Department of Economic and Social Affairs, 2013.

Mrinal Sarvagya , Rashmi N, " **Superposition coded Modulation for unequal error protection**,"IEEE International conference on emerging trends in communication, controls, signal processing and computing applications C2SPCA , Sept 2013.