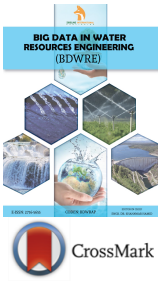
ZIBELINE INTERNATIONAL PUBLISHING

ISSN: 2716-5655 (Online)
CODEN: BDWRAP

Big Data In Water Resources Engineering (BDWRE)

DOI: http://doi.org/10.26480/bdwre.02.2020.49.51



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RESEARCH ARTICLE

A REVIEW ON TECHNIQUES FOR WATER QUALITY MONITORING USING IOT DEVICES

Ali Javaid[a], Ahthasham Sajid[a]*, Afia Zafar[b], Zaheer Ahemed[c]

[a] Department of Computer Science, Faculty of ICT, BUTIEMS, Quetta, Balochistan, PAKISTAN
[b] Department of Computer Science, NUTECH University, Islamabad, PAKSITAN
[c]Department of civil technology, Preston University Sector H-8/1 islamabad,Pakistan
**Corresponding Author Email: ahthasham.sajid@buitms.edu.pk, gullje2008@hotmail.com*

ARTICLE DETAILS

Article History:

Received 16 February 2020
Accepted 19 March 2020
Available online 9 April 2020

ABSTRACT

In this paper is discussed the different kinds of environment monitoring systems related to water goodness. Different parameters are discussed to elaborate each water monitoring system with different aspects. The technology aspects of different approach techniques related to water quality monitoring with their way of implementation with the IOT aspect has been evaluated of past four years. In this paper, the workflow of different approaches of the technologies exploited will be discussed critically and also that which approaches focused on what parameters.

KEYWORDS

IOT, WHO, Cloud Environment.

1. INTRODUCTION

Awareness and implementation of water quality monitoring system has become very important aspect of today. The Typical techniques are majorly used to put together results for example, samples of chemical conditions, and existence of small metals, oils, pesticides, mixed oxygen and nutrients. Physical conditions are also counted such as temperature, erosion and flow of water offer valuable insight and biological facts as well (Gunda, 2016). There are some common techniques for these parameters which are most commonly the condition monitoring which is used to identify environmental condition and trends by examining the condition of a water body and Problem investigation monitoring which involves learning problems or threats to determine specific causes of impairments and to quantify inputs of pollution (Islam, 2020). Another technique which involves the water quality monitoring is with the help of IOT and this paper focuses mainly on the IOT aspect of water quality monitoring. The *parameters which are mainly considered for water quality monitoring are as following and which are characterized by WHO.* The quick progress of industrialization (Bhatt and Patoliya, 2016) and greater dependence on agricultural growth are some of the main reasons of this hazard. The problem is sometimes increased due to the non-uniform distribution of rainfall. Other sources of contaminated water include floods and droughts and due to lack of awareness and education among users. World water assessment program reporting that every day an estimating two million tons of human waste is disposed into water.

2. MOTIVATION

Regulating the safety of water is a challenge because of the lot of sources of pollutants; many of these are human made. The main reasons for water impurity problems are unnecessary exploitation of natural resources. Regularly monitoring water quality is a crucial part of identifying water quality because it cannot be judged that how often water quality is disrupted. Today governments, Communities and businesses are required to meet a range of water quality goals. That's why there is always a need of large-scale water quality monitoring system.

Table 1: Important Parameters

Parameters	Units	Drinking water IS: 10500 - 1991	
		Desirable	Maximum
Turbidity	NTU	5	10
pH value	-	6.5 to 8.5	No relaxation
Total hardness (as CaCO3)	mg/l	300	600
Iron	mg/l	0.3	1.0
Chlorides	mg/l	250	1000
Calcium	mg/l	75	200
Copper	mg/l	0.05	1.5
Manganese	mg/l	0.1	0.3
Sulphate	mg/l	200	400
Nitrate	mg/l	50	No relaxation

3. RELATED WORK

In Thailand, 366 stations were installed in 49 rivers with in the country. The samples were fetched 3- 4 times a year including wet and dry periods. Each station (Low Cost Water Quality Monitoring System using IoT, 2019) processes only the particular water quality information like temperature, pH, and conductivity. Although installing so many stations is very costly. Meanwhile in Singapore, there engineers corporate a robot called

Quick Response Code	Access this article online	
	Website: www.bdwre.com.my	DOI: 10.26480/bdwre.02.2020.49.51

Cite the Article: Ali Javaid, Ahthasham Sajid, Afia Zafar, Zaheer Ahemed (2020). A Review On Techniques For Water Quality Monitoring Using Iot Devices. *Big Data In Water Resources Engineering, 1(2): 49-51.*

NUSWAN, the robot is designed to (Chavan and Mechkul, 2016) views a white swan and travel unmanned across the surface of water to perform water quality profiling at locations of interest. The data collected on-board the robot will be pour out in real-time to a command center, The NUSWAN carries standard information for determining parameters such as dissolved oxygen, turbidity, and PH. traversing a robot in to a river makes risk of security of the robot. In France the quality check is performed by the observation stations exerted either from or by implementation of warning systems. The automatic analysis evaluates timely a certain number of parameters (pH, temperature, resistivity, dissolved oxygen, turbidity) whose indications can indicate a total pollution. When the intensity of certain elements (mercury, chromium, lead, copper, cadmium etc.) increments with a given value, a distress signals set off. There are other warning systems, related to the total quality of water, the trout process, which reacts in a total way to the unit of the polluting elements, contained in water. These devices still are very less because of the operational and capital costs which they represent, and because of the limited technical ways of certain distribution companies. In Germany a national censoring program assessing rivers is also based on the information gathered by the Lander (a German institute) with the objective of determining environmental state and conditions. These monitoring network systems contained of 146 sampling sites primarily positioned in large rivers (Vaishnavi, 2018). At selected sampling sites, variables like temperature, pH, conductivity and dissolved oxygen are assessed uninterruptedly, whereas other variables like organic pollution indicators, heavy metals are considered based on monthly intervals.
not a sophisticated approach.

Table 2: Critical Analysis

No	Author name	Year	Technique	Problem focused	Limitations
1	[1]Shailaja.M.Gunda Nikkam1, Prof. Dr. V. R. Pawar	2016	use of multiple sensors with ARM based MCU controller	Polluted water due to industrialization, human waste and disasters is being assessed	optical sensor being used to monitor the turbidity which is not so reliable approach
2	A.N.Prasad, K. A. Mamun, F. R. Islam, H. Haqva	2015	System designed [2]in Neural Network model, system operated by the use of RS technology	Water impurity assessed in the aspects of PH,ORP(oxidation and reduction potential) and conductivity	No particular interface system used
3	JAYTI BHATT, JIGNESH PATOLIYA	2016	All the sensed [3]data from sensors is passed to raspberry pi using zig bee protocol	Identification of impurities with use of low bandwidth and low power consumption	No proper representation of data which is being measured
4	Spandana, Seshagiri Rao	2018	WI-FI module, ESP8266 is being used which [4]connects micro controller to internet and all the Sensed data is being delivered to a web server	Along with temperature of water , there also assessed the dissolved carbon dioxide in water	High power consumption material is being used
5	Poonam J. Chavan, Manoj A. Mechkul	2016	[5]The Arm7 is connected to the data concentrator which is present in India's TWARD department and data is sent to TWARD dept. via ZigBee module and there water parameters are monitored	Ending the need of manual testing of water quality	Complicated design in aspects of maintenance
6	Pranit Dakhinkar, Pratik Ghadage2, Ashish Gole , Dinesh Gole	2019	[6]PH sensor, conductivity sensor and turbidity sensor all connected to an Arduino kit which is connected to a Wi-Fi module and sends the sensed data to a cloud environment	Finding the unwanted TSS (total suspended solids) in water resource	There should have been used ZigBee module as well so that the delivered data could be considered more reliable
7	Alfiya Abubar tilju Thomas, Nikhil Joseph	2018	The gathered [7] sensed data from sensors is sent to the servers by MQTT algorithm. This algorithm makes communication much reliable	Monitoring the water quality is yet a complex area, so using nave Bayes theorem to do analysis	There are some security concerns regarding accessibility and device authentication

4. Related Work Discussion

The critical analysis approach is presented in the tabular form format in table 1 further. Every article with reference to its author is presented and evaluated on the basis of the different IOT activities. Above all the IOT approaches were greatly admired but had some minor limitations. On some work there is lesser parameters being measured and on some work there was a very complex design, the last two have some reliability and security issues i.e. the authentication and accessibility issue of the last one

5. Proposed Idea

One of the proposed ideas by the authors is that to develop a system that should be installed and it can collect data from various sensors deployed at different vicinity to monitor about water quality. Cloud environment to store that collective data from the region data should be retrieved over an android app. It will thus reduce time and add efficiency indeed rather than to involve any base station (data read by sensors) to monitor those parameters as mentioned in table 1 in this paper. A real time android application should be used to monitor the system.

6. Conclusion

The paper presents an analyzed survey on the various latest research work related to water monitoring techniques developed and are in used currently under smart water quality monitoring structures. Each paper work had its own significance in the aspect of IOT technology. The papers reviewed are all directly enhancing the water quality monitoring system and taking it to a next level in some form or another.

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