A Survey on Water Quality Monitoring System

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Abstract- *Internet of things is a network of device that contain electronic ,software, sensors and connnectivity which allow these things to connect, interact and exchange data. Water is more essential resource in humans life. water monitoring is useful to protect the people from various diseases. This survey gives us a review about the monitoring the quality of water is by measuring physiochemical parameters of water by chlorine sensor, temperature sensor, ph sensors, water pressure sensor . Zigbee based technology together with compatible transceiver is proposed. It is chosen due to its features that fulfill the requirement for a low cost, easy to use, minimal power consumption and reliable data communication between sensor nodes The results demonstrate that the system is capable of reading physiochemical parameters, and can successfully process, transmit and display the readings. This paper reviews about the use of IOT in order to control the monitoring of waters quality in real-time through the wireless sensor network.*

Keywords- water quality monitoring ,chlorine sensor, temperature sensor ,ph sensors, water pressure sensor, zigbee, wireless sensor network.

I. INTRODUCTION

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 must be monitored in real time. Ensuring the safety of water is a challenge due the excessive sources of pollutants, most of which are man-made. The main causes for water quality problems are over exploitation of natural resources. The rapid pace of industrialization and greater emphasis on agricultural growth combined with latest advancements, agricultural fertilizers and non-enforcement of laws have led to water pollution to a large extent.

The problem is sometimes aggravated due to the non-uniform distribution of rainfall. Individual practices also play an important role in determining the quality of water. Water quality is affected by both point and non-point sources of pollution, which include sewage discharge, discharge from industries, run-off from agricultural fields and urban run-off. Other sources of water contamination include floods and droughts and due to lack of awareness and education among users.

The World Health Organization has identified contamination of drinking water as a critical public health issue; affecting more than 98,000 children with diarrhoea and other water borne diseases every year. Even Today, a large section of society drink tap water risking their lives with deadly contaminants present in drinking water. The findings have thrown light on the fact that water contamination especially in ground water and hardness is a major life-threatening issue about which public awareness needs to be raised. Seventeen percent of the world's human population is in India. Yet, the country has to manage with just 4 percent of freshwater available globally. According to the National Commission for Irrigated Water Resource Development of India, the water shortage problem we face arises not due to lack of it, but due to wastage and poor management.

II. LITERATURE SURVEY

ZulhaniRasin et al[1] in their paper the application of wireless sensor network (WSN) for a water quality monitoring is composed of a number of sensor nodes with a networking capability that can be deployed for an ad hoc or continuous monitoring purpose. The parameters involved in the water quality determination such as the pH level, turbidity and temperature is measured in the real time by the sensors that send the data to the base station or control/monitoring room.

F. Regan et al[2] in their paper introduces a water quality monitoring system based on wireless sensor network which helps in continuous and remote monitoring of the water quality data in India. The wireless sensor node in the system is designed for monitoring the pH of water, which is one of the main parameters that affect the quality of water. The proposed sensor node design mainly comprises of a signal conditioning module, processing module, wireless communication module and the power module. The sensed pH value will be wirelessly transmitted to the base station using Zigbee communication after the required signal conditioning and processing techniques.

Vaishnavi V et al[3] in their paper they present a design and development of a low cost system for real time monitoring of the water quality in IoT(internet of things).The system consist of several sensors is used to measuring physical and chemical parameters of the water. The parameters such as temperature, pH, turbidity, flow sensor of the water can be measured. The measured values from the sensors can be processed by the core controller. Finally, the sensor data can be viewed on internet using WI-FI system. The system has good flexibility. Only by replacing the corresponding sensors and changing the relevant software programs, this system can be used to monitor other water quality parameters. The operation is simple. The system can be expanded to monitor hydrologic, air pollution, industrial and agricultural production and so on. It has widespread application and extension value.

AainaVenkateswaran[4]in his paper, he present the design of IOT based water quality monitoring system that monitor the quality of water in real time. This system consists some sensors which measure the water quality parameter such as pH, turbidity, conductivity, dissolved oxygen, temperature. The measured values from the sensors are processed by microcontroller and this processed values are transmitted remotely to the core controller that is raspberry pi using Zigbee protocol. Finally, sensors data can view on internet browser application using cloud computing.

N.SamihaHaron et al[5] in their paper they proposed system is leveraging on wireless sensors in detecting the water quality and Short Message Service (SMS) technology in delivering alert to the farmers upon detection of degradation of the water quality. Three water quality parameters that are critical to the prawn health are monitored, which are pH, temperature and dissolved oxygen. In this paper, the details of system design and implementation are presented. The results obtained in the preliminary survey study served as the basis for the development of the system prototype. Meanwhile, the results acquired through the usability testing imply that the system is able to meet the users' needs.

A.N Prasad et al[6] in their paper they proposed the following work, Nowadays Internet of Things (IoT) and Remote Sensing (RS) techniques are used in different area of research for monitoring, collecting and analysis data from remote locations. Due to the vast increase in global industrial output, rural to urban drift and the over-utilization of land and sea resources, the quality of water available to people has deteriorated greatly. The high use of fertilizers in farms and also other chemicals in sectors such as mining and construction have contributed immensely to the overall reduction of water quality globally. This paper presents a smart water quality monitoring system for Fiji, using IoT and remote sensing technology. Water quality analysis and its monitoring for large scale industries is a challenging task. Hence a system is being designed to tackle industrial polluted water and major effects on atmosphere. It has advanced features when compared to traditional monitoring system such as low-cost implementation, reusability, flexibility, power consumption, real time data acquisition.

Cho Lin Myint et al[7] in their paper presented a reconfigurable smart sensor interface device for water quality monitoring system in an IoT environment. The smart WQM system consists of Field Programmable Gate Array (FPGA) design board, sensors,Zigbee(figure-1) based wireless communication module and personal computer (PC). The FPGA board is the core component of the proposed system and it is programmed in very high speed integrated circuit hardware description language (VHDL) and C programming language using Quartus II software and Qsys tool. The proposed WQM system collects the five parameters of water data such as water pH, water level, turbidity, carbon dioxide (CO2) on the surface of water and water temperature in parallel and in real time basis with high speed from multiple different sensor nodes.

Figure(1)

S.Verma et al[8] in their paper, Considering monitoring essence, we need a continuous, real-time, in-situ monitoring system for water quality management. Wireless Sensor Network (WSN) fascinated us for pro-active water quality management due to their real-time, continuous and dynamic nature, to act as early warning system so that WSN can trigger appropriate alarm in hazardous situations. Despite years of research and their extreme capabilities, application of WSN in environmental monitoring remains limited. In this paper, our aim is to discuss requirement and suitability of WSN for water quality surveillance. Significance of clean and safe water makes water quality surveillance a matter of essence. A new approach of WSN for water quality surveillance is real- time, remote, automatic, effective and efficient with high precision.

Yunze Li et al[9] in their paper proposes a design and development of a water quality monitoring network and system for real-time water parameter acquisition, water quality monitoring and estimation. A low-cost measurement unit of water quality is designed and developed which is considered as a sensor node in a water quality monitoring sensor network. A comprehensive water quality index system is proposed to integrate the real-time water parameters with a knowledge base.

N.Vijaya Kumar et al[10] in their paper proposed a work,In order to ensure the safe supply of the drinking water the quality needs to be monitor in real time. In this paper they present a design and development of a low cost system for real time monitoring of the water quality in IOT(internet of things).the system consist of several sensors is used to measuring physical and chemical parameters of the water. The parameters such as temperature, PH, turbidity, conductivity, dissolved oxygen of the water can be measured. The measured values from the sensors can be processed by the core controller. The raspberry PI B+ model can be used as a core controller. Finally, the sensor data can be viewed on internet using cloud computing.

Mukhdeep Singh Manshahia [11], he describe the rising field of wireless sensor network (WSN) has potential benefits for real-time monitoring of a physical phenomenon. The Wireless sensors continuously monitor the physical process and transmit information to the base station. It is an information technology which integrates latest technological achievements in the network, micro-electronics and communications. Sensor nodes can communicate over the minimum distance through wireless medium and unite to accomplish a single task. Aim of their paper is give an overview of Wireless Sensor Networks. There are still many challenges and constraints in the sensor networks including limited bandwidth and network lifetime of a node. The paper has also highlighted research challenges in WSN and identifies the future research directions.

Mithaila Barabde et al[12]This paper proposes a Sensor-Based Water Quality Monitoring System. The system architecture consists of data monitoring nodes, a base station and a remote station. All these stations are connected using wireless communication link. The data from nodes is send to the base station consisting of ARM controller designed for special compact space application. Data collected by the base station such as pH(figure-2), turbidity, conductivity, etc is sent to the remote monitoring station. developing an efficient wireless sensor network (WSN) based water quality monitoring system, which examines “water quality”, an important factor as far as, irrigation; domestic purposes; industries; etc are concerned. the proposed execution of high power Zigbee based WSN for water quality monitoring system offering low power utilization and low cost is presented.

Figure(2)

Shruti Sridharan [13]In this paper, the fundamental design and implementation of WSN featuring a high power transmission Zigbee based technology together with the IEEE 802.15.4 compatible transceiver is proposed. It is chosen due to its features that fulfill the requirement for a low cost, easy to use, minimal power consumption and reliable data communication between sensor nodes. The proposed implementation of high power Zigbee based WSN for water quality monitoring system offering low power consumption, and long battery life is presented. The use of high power WSN is suitable for activities in industries involving large area monitoring such as manufacturing, constructing, mining etc.

R.Karthik Kumar et al [14] in this paper the Underwater wireless sensor network is the simple and basic way to monitor the quality of water using wireless sensor network (WSN) technology powered by solar panel. To monitor the quality of water over different sites as a real time application, a base station and distributed sensor nodes are suggested. A WSN technology like zigbee is used to connect the nodes and base station. Nodes and base stations are connected as WSN, the different base stations are connected via Ethernet. The Ethernet can also be connected to internet so the user can just login to the system and get a real time water quality data faraway. This system not only provides comprehensive evaluation of water environment but also can quickly discover urgent water pollution accidents or natural disasters, transferring the abnormal water quality information to monitoring center by quicker communication network.

Niel Andre cloete et al [15]This paper describes work that has been done on the design and development of a water quality monitoring system, with the objective of notifying the user of the real-time water quality parameters. The system is able to measure physiochemical parameters of water quality,

such as flow, temperature, pH, conductivity and the oxidation reduction potential. ZigBee receiver and transmitter modules are used for communication between the measuring and notification node. The water parameters were displayed clearly on the LCD and audible warnings were heard from the buzzer when parameter is at an unsafe level. Future work could include the design and implementation of a turbidity sensor (figure-3), as this a also an important quality monitoring parameter.

Figure(3)

III. PROPOSED SYSTEM

All the drawbacks in the existing system are overcome in proposed system. To overcome the drawbacks of zigbee technology in existing system wifi technology is used. Wifi is more secured than zigbee technology. Wifi technology is cost effective compared to zigbee technology. Wifi technology is not prone to attack compared with zigbee technology. It has many end devices available in the market. It can be used anywhere.

In the proposed system water arrival is monitored through flow sensor and other physical and chemical parameters of the water are monitored through various sensors. An android mobile application is developed to notify the people that the water has arrived with its quality specified.

IV. CONCLUSION

The main issue that is being addressed in this project is about developing an efficient wireless sensor network (WSN) based water quality monitoring system, that examines „water quality", an important factor as far as, irrigation, domestic purposes, industries, etc are concerned. Overall, the proposed implementation of high power Zigbee based WSN for water quality monitoring system offering low power consumption, and long battery life is presented. The use of high power WSN is suitable for activities in industries involving large area monitoring such as manufacturing, constructing, mining etc. Another important fact of this system is the easy installation of the system where the base station can be placed at the local residence close to the target area and the monitoring task can be done by any person with minimal training at the beginning of the system installation.

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