Real-Time River Water Quality Monitoring and Control System

ABSTRACT:

With the advent of this new era of water crisis, save water is the cry all over. Water sources are encroached from every existence on Earth. Saving water needs a systematic monitoring approach to determine its quality. Availability of Internet of Things (IoT) and remote sensing techniques mark the ease of congregating, analyzing and handling of real time data to further accelerate measures taken upon. Real-time water quality monitoring and management initiates prompt alarm ensuring timely response to water contamination in protecting and conserving the aquatic habitat, improving crop production by controlling quality of irrigated water, etc. This paper upheavals the water quality parameters required due consideration for monitoring real time water quality along with the available remote sensors. Also it briefs the review of parameters covered so far. Further it proposes the methodology suitable to the needs of detecting real time water contaminations based on the challenges of existing management system and IoT

KEYWORD:

IOT(Internet Of Things), PH sensor, Turbidity sensor, Temperature sensor.

INTRODUCTION:

In the 21st century, there were lots of inventions, but at the same time were pollutions, global warming and so on are being formed, because of this there is no safe drinking water for the world's pollution. Nowadays, water quality monitoring in real time faces challenges because of global warming limited water resources, growing population, etc. Hence there is need of developing better methodologies to monitor the water quality parameter in real time. Systems for water quality monitoring are required for activity analysis and their impact on nature of the power plants, mining sector, oil industry, etc. Basically, determination of water quality relies on estimation of values of some

important and indicative parameters. For example, the water quality depends on the water temperature, activity level, water flow and presence of volatile organic compounds. Although there are well known and widely used methods for measurement of these parameters with appropriate sensors, design of electronic systems for environmental monitoring is not often straightforward. There are more engineering challenges, some of them are that the application require highly reliable and accurate sensors with the reduced level of maintenance, long lifetime, fast response time, high sensitivity and high selectivity. With an introduction of IoT in the modern world, many problems have been solved. With the use of IoT in monitoring water quality various issues such as data collection, communication, data analysis and early warnings are worked on.

The water quality parameters pH measures the concentration of hydrogen ions. It shows the water is acidic or alkaline. Pure water has 7pH value, less than 7pH has acidic, more than 7pH has alkaline. The range of pH is 0-14pH. For drinking purpose it should be 6.5-8.5pH. Turbidity measures the large number of suspended particles in water that is invisible. Higher the turbidity then the higher risk of diarrhoea, cholera and many more diseases. Lower the turbidity then the water is clean. This research and project will monitor the river water quality by web application, also measures the turbidity, pH and temperature level. Simultaneously, alerts the authorities if the water quality is not good.

LITERATURE SURVEY:

The implementation of a robust and cost-effective water monitoring system demands a good level of research and development. Many researchers have proposed different models in order to implement such a system.

Jayti Bhatt,Jignesh Patoliya entitled “Real Time Water Quality Monitoring System”.This paper describes 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. 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.

Shruti Sridharan, et al., addressed 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. The parameters involved in the water quality monitoring such as the pH level, turbidity and temperature are measured in real time by the sensors that send the data to the base station or control/monitoring room. As the monitoring is intended to be carried out in a remote area with limited access, signal or data from the sensor unit will then be transmitted wirelessly to the base monitoring station. The application of wireless sensor network (WSN) for a water quality monitoring is composed of a number of sensor nodes with networking capability. Such monitoring system can be setup emphasizing on the aspects of low cost, easy ad hoc installation, easy handling and maintenance. The use of wireless system for monitoring purpose will not only reduce the overall monitoring system cost in terms of facilities setup and labour cost but will also provide flexibility in terms of distance or location. In this paper, the fundamental design and implementation of WSN featuring a high-power transmission Zigbee based technology together with the 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 development of graphical user interface (GUI) for the monitoring purposes at the base monitoring station is another main component. The GUI should be able to display the parameters being monitored continuously in real time. The developed GUI platform using MATLAB is cost effective and allows easy customization.

Mohammad Salah Uddin Chowdury et al. have proposed a system for monitoring the quality of water in a river with the aid of an embedded system

consisting of wireless sensor network and IoT. Deep learning models have been used to assess the quality of water and SMS alert is sent in case the value of a sensor has crossed the threshold.Soundarya Pappu et al. have used a pH and a TDS sensor to determine the quality of water with the Arduino microcontroller and the Raspberry Pi3. K-means clustering algorithm is used to predict the quality of water based on the sensed values.

Omar Faruq et al. (2017) A water quality monitoring system based on microcontrollers for people living in Bangladesh's outskirts, where safe drinking water is not available, is provided in this paper. The device has been designed with a high degree of accuracy and is sensitive to several water parameters such as temperature, turbidity and hydrogen potential (pH) displayed on the LCD monitor. Finally, in this paper, each of the parameter values is compared with the predefined equipment, and sensor values and error are calculated.

Stephen Brosnan investigated a WSN to collect real time water quality parameters (WQP). Quio Tie-Zhn,developed online water quality monitoring system based on GPRS/GSM. The information was sent by means of GPRS network, which helped to check remotely the WQP. Kamal Alameh presented web based WSN for monitoring water pollution using ZigBee and WiMAX networks. The system collected, processed measured data from sensors, and directed through ZigBee gateway to the web server by means of WiMAX network to monitor quality of water from large distances in real time. Dong He developed WQM system based on WSN . The remote sensor was based on ZigBee network. WSN tested WQP and sent data to Internet using GPRS. With the help of Web, information was gathered at remote server. Vijayakumar et al.,designed a low cost system design for real time water quality monitoring in IoT utilizes sensors to check many important physical and chemical parameters of water. The parameters such as turbidity, temperature, pH, dissolved oxygen conductivity of water can be measured. In our project, we proposed a water quality monitoring and consystem based on IoT.

PROS:

Water Quality Monitoring (WQM) is a cost-effective and efficient system designed to monitor drinking water quality which makes use of Internet of Things (IoT) technology. Data accuracy and reliability is also the major advantage of the system.

CONS:

There is a disadvantage in the existing system that the system has high complexity and low performance. In this proposed system the complexity reduces and the performance increases by collecting the data of the water parameters like temperature, water level, pH.