IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

IOT Based Water Quality Monitoring System

Chayanika, Arundhati Walia
Student, Asst. Professor in Department of Computer Science and Engineering
Computer Science and Engineering
H.R. Institute of Technology, Ghaziabad

Abstract- Water pollution has become a common problem. The conventional methods of monitoring water quality involve the manual collection of water sample from different locations and these water samples were tested in the laboratory. This process is wastage of man power, time consuming and not economical. By focusing on these problems, a low cost monitoring system is using that can monitor water quality in real time using IoT. The measuring system of water quality that we have implemented checks the quality of water in real time through various sensors (one for each parameter: pH, conductivity, temperature, turbidity) to measure the quality of water. A unique identification has been given to each device and must be able to capture real-time data autonomously. The basic building blocks of IoT consist of sensors, processors, gateways, and applications. This system can keep a strict check on the pollution of the water resources and be able to provide safe drinking water.

Keywords: - Water quality, PH, Conductivity, Temperature, Turbidity, and IOT.

I. Introduction-

Water is one of the most essential natural resource that has been gifted to the mankind. But the quick development of the society and countless human activities speeded up the adulterate and worsen the water resources. For these, the monitoring of water quality is necessary to identify any changes in water quality parameters from time-to-time to make sure its safety in real time. The Central Pollution Control Board (CPCB) has established a series of monitoring stations on water resources across the country which monitor the water quality on either monthly or yearly basis. This is done to ensure that the water quality is being maintained or restored at desired level. It is important that it is monitored on regular basis. Water quality monitoring helps in evaluating the nature and extent of pollution control required, and effectiveness of pollution control measures. CPCB has plans to establish water quality monitoring network across Ganga river basin. All the stations will operate in real time and central station can access data from any of the above stations using GPRS/GSM or 3G cellular services. State pollution boards and CPCB zonal offices can also access data from central station.

Since the time IOT has evolved a lot of problems have been solved in this world. By using IOT in this water quality monitoring system various issues such as communication, data collection, data analysis, and early warnings have been worked on. But in order to get this into picture, technologies and protocols are combined to get the desired output.

II. Internet of Things (IoT)-

Internet of Things (IoT) is defined as the network of physical objects/things - devices, vehicles, buildings embedded with sensor, micro-controller, and network connectivity that enables these objects to collect and exchange data. The IoT can be described as a huge web of embedded objects designed with built-in wireless technologies such that they can be monitored, controlled and linked within the existing Internet infrastructure. Each device has a unique identification and must be able to capture real-time data autonomously. Basic building blocks of IoT consist of sensors, processors, gateways and applications. It is estimated that by 2020, 50 billion 'things' will be connected to the Internet. Wireless technologies such as the Wi-Fi, Bluetooth, ZigBee, RFID, 6LoWPAN (IPv6 Low power Wireless Personal Area Network) allow the device to be connected to the Internet and to each other. The cloud services collect, store and analyze the data collected by the sensors and allow people to take decision accordingly.

Mobile data management applications are being increased because of the rapid spread of mobile phones. Smart phones now have become platform both for computing and communication. Mobile phones are becoming cheaper, easier to use, and can be used for multiple types of information transmission. The mobile data applications along with sensor technology can improve the efficiency as well as accuracy of the data reporting for water quality monitoring system. Smart phones/tablets having sensors embedded with display and keypad can be connected to the Internet with an IP address (satisfies every requirement of an IoT device). They will serve as the hub/remote control for IoT. In Ubiquitous Network Architecture smart things are part of the Internet; authorized users have access to information; servers act as a sink to collect data from each object.

HTTP over Internet. One can create applications like sensor logging, location tracking, and social network of things with status updates with the help of ThingSpeak. API of ThingSpeak permits processing of numeric data like averaging, median, summing, rounding and time scaling. ThingSpeak channel supports 8 data fields, elevation, latitude, longitude, and status. ThingSpeak can send sensors data to cloud to store data in a channel using sensors and websites. Cloud provides easy access to the stored data. ThingSpeak channel data now can be analyzed, visualized, can calculate new data, or interact with web sites and social media. With this one can calculate new data, and visualize data in the form of plots, charts, and gauges using analytical tools online. ThingSpeak can access MATLAB to provide sensor data. It uses tools for devices to communicate for actions. One can react both to raw data and new data in a channel and also can help devices to execute by queuing the commands.

III. Literature Survey-

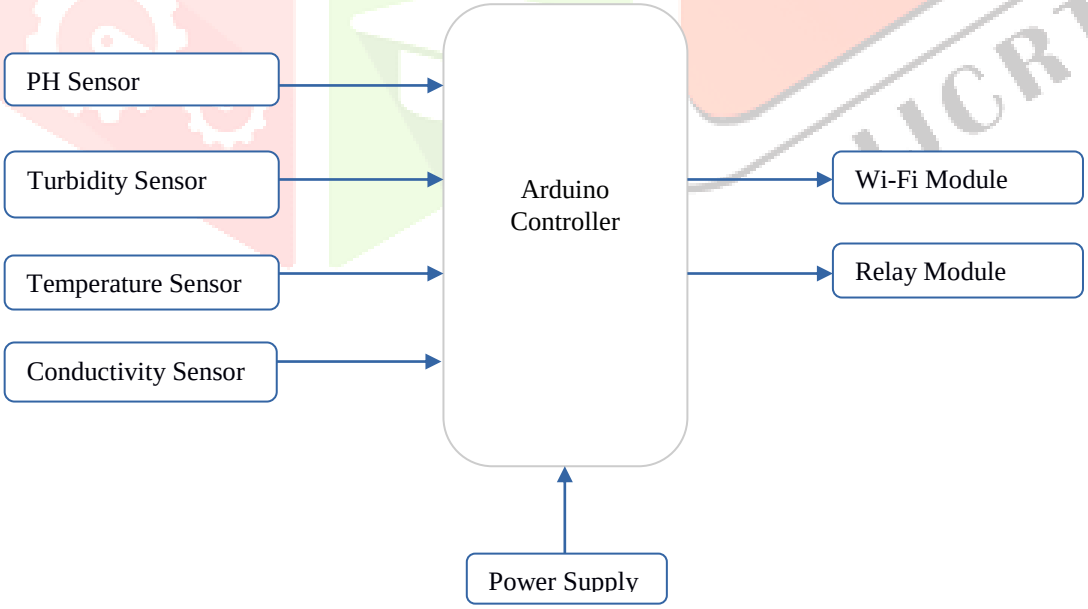
The available water resources are getting depleted and water quality is deteriorated due to the rapid increase in population and need to meet demands of human beings for agriculture, industrial, and personal use. The quality of ground water is also affected by pesticides and insecticides. The rivers in India are getting polluted due to industrial waste and discharge of untreated sewage. In order to eliminate problems associated with manual water quality monitoring, CPCB has planned to go hi-tech and plans to establish 'Real Time Water Quality Monitoring (WQM) Network' across Ganga Basin. Stephen Brosnan, 2007 investigated a wireless sensor network (WSN) to collect real time water quality parameters (WQP). Quio Tie-Zhn, 2010 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, 2011 presented web based WSN for monitoring water pollution using ZigBee and WiMAX networks. The system measured various WQP. It 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. System was capable of monitoring water pollution in real time. Dong He, 2012 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. Kulkarni Amruta, 2013 created solar powered WQM utilizing remote sensor network. The Base station (BS) gathered information from distant remote sensors. The BS associated with ZigBee module was powered by sunlight baseboard (Energy harvesting).

IV. Methodology-

1. The first task is to determine which water parameters would provide a close indication for water pollution. Through extensive research the parameters are chosen to be composed of pH, turbidity, temperature CO.

2. The next step is to transmit the data from the sensors onto the microcontroller kit for further processing.

3. The most of the sensor used will give the analog output the ADC present in the controller will those to digital and transmit the measured data using GPRS module connected to the microcontroller, the information obtained is passed onto the server through GPRS and the end user.



V. Conclusions-

The low cost, efficient, real-time water quality monitoring system has been implemented and tested. Through this system, the officials can keep track of the levels of pollutions occurring in the water bodies and send immediate warnings to the public. This can help in preventing diseases caused due to polluted water and presence of metals. Quick actions can be taken to curb extreme levels of pollution like in the case of the Ganga and Yamuna rivers. The system can be easily installed, with the base station kept close to the target area, and the task of monitoring can be done by less-trained individuals.

Internet of Things (IoT) and its services are becoming part of our everyday life, ways of working, and business. There is a great deal of research on developing crucial building blocks and models for the next generation Internet services supported by a plethora of connected things.

VI. References-

1. R.M. Bhardwaj, "Overview of Ganga River Pollution", Report: Central Pollution Control Board, Delhi, 2011

2. NivitYadav, "CPCB Real time Water Quality Monitoring", Report: Center for Science and Emvironment, 2012

3. Shruti Sridharan, "Water Quality Monitoring System Using Wireless Sensor Network" - International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) Volume 3, Issue 4, April 2014

4. Pavana NR and Dr. M.C. Padma, "Design of Low Cost System for Real Time Monitoring of Water Quality Parameters in IOT Environment", International Journal of Advanced Research in Computer Science and Application Volume 4, Issue 5, May 2016

5. A.C. Khetre, Prof. S.G.Hate , wireless sensor network for water environment monitoring system''.- International Journal of Engineering & Technology IJET Vol.7,No:8

6. Steven Silva, Hoang N Ghia Nguyen, Valentina, Tiporlini, Kamal Alameh, "Web based Water Quality Monitoring with Sensor Network: Employing ZigBee and WiMAX Technology", 36th IEEE Conf. on Local Computer Networks, 2011

7. Himadri Nath Saha, Supratim Auddy, Avimita et al., "Pollution Control using Internet of Things (IoT)". Dept. of Computer Science & Engineering, Dept. of Information Technology Institute of Engineering & Management Maulana Abul Kalam Azad University of Technology, Kolkata.

8. Cho Zin Myint, Lenin Gopal, and Yan Lin Aung "Reconfigurable Smart Water Quality Monitoring System in IoT Environment". Department of Electrical and Computer Engineering Curtin University Sarawak Campus, CDT

9. A.N.Prasad, K. A. Mamun et al. "Smart Water Quality Monitoring System". H. Haqva School of Engineering and Physics University of the South Pacific Laucala, Fiji Islands

10. User Manual Arm7-LPC2148 Development kit- Pantech Solutions

11. ESP8266 serial Wi-Fi wireless Transceiver Module for IoT, ESPRUINO-Wireless