LITERATURE SURVEY ON REAL TIME RIVER WATER QUALITY MONITORING AND CONTROL SYSTEM

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ABSTRACT:

This paper describes work that has been done on 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 the physiochemical parameters of water quality, such as flow, temperature, pH, conductivity, and the oxidation reduction potential. These physiochemical parameters are used to detect water contaminants. Through this project we have schemed to detect the alteration earlier so that crucial steps can be undertaken to prevent impending losses.

PROBLEM STATEMENT

- The traditional water quality monitoring system has certain drawbacks
- It relies on collecting of water samples, testing and analyses in laboratories
- It results in more cost, more man power and time consuming.
- It lacks capability for real-time data collection, hence authorities can't take timely and appropriate decisions and actions.

PROJECT DESCRIPTION:

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 parameters in real time. 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 0-14 pH. 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 higher the risk of diarrhoea, cholera. Lower the turbidity then the water is clean. Temperature sensor measures how the water is, hot or cold. Flow sensor measures the flow of water through flow sensor. The traditional methods of water quality monitor involve the manual collection of water samples from different locations.

This paper introduces a new approach IOT based water quality monitoring system. This system monitors the quality of water in real time. This system includes some sensors which measure the water quality parameter such as pH, conductivity, temperature, dissolved oxygen. The collected values from sensors are processed by micro controller and these processed values are transmitted remotely to the core controller that is raspberry pi using ZigBee protocol. Sensor's data can see on internet browser application using cloud computing. Advantages are more user friendly, efficient. Drawback is high cost for smart sensors. In this system uses wireless sensors for monitoring quality of water parameters monitored are pH, turbidity, conductivity, temperature. A micro controller has the task of signal digitalizing, data transmission, network management. All the devices are worked under a single battery source. Base station is located at the centre of area and sensor node is placed at certain interval of distance at different angle, covering 0 to 360. This system offering low power consumption with high reliability. Another advantage of the system is easy installation. Where the base station can be placed at local residence close to target area and monitoring task can be done by any person with minimum training at the beginning of system installation.

APPLICATIONS:

Smart Water solutions use IoT (Internet of Things) technologies to monitor and measure water quality, conserve water supplies and enable cities to function efficiently. In this article, we outline four examples of how Libelium Plug & Sense can be used for Smart Water applications. The following examples demonstrate several implementations of the technology, and we outline how it can be used to enhance decision making, monitor trends and generate alerts.

Libelium Plug & Sense is a powerful IoT device platform that supports applications in Smart Agriculture, Water, Environment, Cities and Industry. Each device supports a wide range of sensors (150+ supported) and can communicate back to cloud platforms and back-office systems with relative ease.

Smart Water IoT Examples

1.Chemical Detection in Rivers

In February 2018, the Environment Agency in the UK published the State of the Environment Report: Water which reported a gradual decline in the condition of English rivers. Over 86% of Rivers throughout England failed to achieve good ecological status. The reason for this poor quality was primarily phosphorous and to a lesser extent, nitrates. Water quality issues were the cause of 38% of all fish test failures and 61% of invertebrate test failures in 2015.

Smart Water sensors can detect the presence of chemicals in rivers or watercourses. The presence of these chemicals may be due to run-off, agriculture, manufacturing, landfill and other sources of pollution. Libelium Smart Water solutions can detect a wide range of chemicals and contaminants in water. The measurements taken by the sensors can be transmitted back to the cloud using 4G, LoRA or WIFI. The ultra-low power draw of these units also means they can operate in remote locations running on solar power.

2.River Floods and Reservoir Levels

The weather has become more predictable in the past few years, with an increasing number of significant meteorological events reported. The growing volatility of our climate has led to increased regional and localised flooding, rivers bursting their banks and storm surges swamping population centres. Conversely, an increasing trend of unseasonably warm weather has pushed

drinking water suppliers to the limit. With record-breaking UK temperatures in July 2019 already, some are predicting more heatwaves and the potential for a hosepipe ban in August 2019.

The ability to monitor water levels in real-time offers many benefits to local authorities and utilities. The Libelium Smart Water solution can monitor water levels using innovative ultra-sonic sensors that can report water levels to the nearest centimetre (cm). Data and trends can be analysed, while sudden events (floods or leaks) can trigger automated alerts to notify key personnel.

3.Fisheries

Commercial fisheries and ponds require optimal water conditions to ensure the fish and wildlife thrive. As with other Smart Water applications, the ability to monitor key metrics such as diluted oxygen, nitrates, pH levels and phosphates are vital. Fish growth is limited in water levels with a pH of less than 6.5 and the death of the fish is almost inevitable at pH less than 4.

Libelium Smart Water technologies can monitor critical parameters and metrics, reporting the data back for review, monitoring and alerting. With flexible communication options including WIFI and 4G – with solar/battery-powered units – the system is perfect for commercial fisheries, fishing ponds and similar environments.

4.Drinking-Water Quality

Libelium Smart Water systems have been used to great effect throughout the world to monitor the condition of drinking water. IoT technology can be used to monitor rivers, lakes, watercourses, wells and boreholes – ensuring that the water is suitable for human or animal consumption.

The Smart Water system monitors a range of parameters that can be used to assess drinking water quality. Similar to river pollution; drinking water sources can be affected by chemical run-0ff or contamination, waste-water, farming, animal faeces and E-Coli – making it potentially unsafe to drink.

Smart Water IoT solutions can give an indication of drinking water quality and alert authorities in the event the quality drops to an unacceptable level. In

Scotland alone, 7% (150,000) households rely on private water supplies. ~12.5% of the Republic of Ireland's population source their water from 'private supplies'. Despite modern mains water infrastructure, a significant number of households throughout Europe rely on private supplies – that require rigorous monitoring – which is where IoT Smart Water solutions can help.

LITERATURE SURVEY:

- The dynamic characteristic of an autonomous underwater vehicle (AUV) is affected when it is reconfigured with different payloads. It is desirable to have an updated model, such that the control and guidance law can be redesigned to obtain better performance. Hence, we develop a method to enable online identification of AUV dynamics via in-field experiments, where the AUV is commanded to execute a compact set of maneuvers under doublet excitation. The identification process has two stages. In the training stage, state variable filter and recursive least square (SVF-RLS) estimator is used to estimate the unknown parameters. In the validation stage, the prediction capability of the model is checked using a fresh data set. The parameters converged within 12 s in the experiments using five different thrusts. Validation results show that the identified models are able to explain 78% to 92% of the output variation. Next, we compare the SVF-RLS estimator with the conventional offline identification method. The comparison shows that the SVF-RLS estimator is better in terms of prediction accuracy, computational cost and training time. The usefulness of the identified models is highlighted in two applications. We use it to estimate the turning radius of the AUV at different speeds, and to design a gain-scheduled controller
  Index Terms—Autonomous underwater vehicles (AUV), system identification.

- The aim of this project is to analyse and predict the quality of river water for daily usage and agricultural purpose. Water is one of the most essential elements of nature that contributes to perform biological operations of all living bodies on earth. The quality of water impacts directly on living bodies. Change in water quality causes great damage to the living species. Through this project we have schemed to detect the alteration earlier so that crucial steps can be undertaken to prevent

impending losses. Taking advantage to the Gradient Boosting Model (GBM), the water quality was examined and forecasted. With the help of automatic water parameter measuring tools, samples were collected from numerous rivers of Bangladesh. The GBM was instructed utilizing the samples collected from year 2013 to 2019. The model functions using specified arguments. The model evaluates the water quality and anticipates the change that demonstrates the future water quality. The findings suggest that the model's expected values and actual values are in excellent agreement and the future change in water quality has been reported correctly. Keywords—water quality, gradient boosting model, water quality prediction, drinking water quality analysis.

- Due to the rapid population growth and economic development, water environmental protection pressures have been increasing recently. This paper focuses on the pollution of water quality, building a water quality assessment model to analyse the water quality level, and makes an objective further prediction of the trend of its factors. In this paper, the mutation factor of genetic algorithm is introduced into the PSO algorithm. The Least Squares Support Vector Machine (LS-SVM) based on adaptive Particle Swarm Optimization (PSO) algorithm used to optimize the hyper-parameter builds one water quality classification assessment model. The fuzzy information granulation method is combined with the Least Square Support Regression (LS-SVR) to set up a water quality time series model, which can predict the trend of changes in water quality data in three days. With the help of the theoretical analysis and experimental data, this assessment model and the prediction algorithm are faster in training speed and higher in accuracy, compared with the traditional BP neural network

- Water quality monitoring is a necessary requirement for many industries. The purpose of this paper is to generally overview the water quality monitoring industry and describe the performed. The scope of the paper includes factors considered in testing, brief explanations of analytical methods, the evolution of analytical instrumentation, and lists several evolving technologies. The monitoring of water quality is performed for process control, or to maintain discharge limits established by governmental agencies. The Environmental Pro ion

Agency (EPA) has established limits ed on classifications of pollution type and industry type. The EPA regulated over 50 industries through the National Poliutisn Discharge Elimination System (NPDES). The list of components measured in a water sample would vary according to corporate needs, permit requirements and federal and state regulations'.

- This article presents the monitoring of water quality by means of wireless sensor technology that is powered by solar energy. The different constituents of water example pH level, turbidity, water level is measured by means of sensors that are powered by solar energy. The information from the sensors is gathered and afterward sent to the cloud server by means of Wi-Fi module. The collected data is further analysed, shown in visual format in LCD and graphical comprehension is demonstrated via ThingSpeak. In the remote areas, the quality of water is displayed in LCDS. If after analysing the properties the water quality appears to be negative, necessary steps can be taken. Keywords— water quality monitoring system, wireless monitoring, ThingSpeak

- This paper describes work that has been done on 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 the physiochemical parameters of water quality, such as flow, temperature, pH, conductivity, and the oxidation reduction potential. These physiochemical parameters are used to detect water contaminants. The sensors, which are designed from first principles and implemented with signal conditioning circuits, are connected to a microcontroller-based measuring node, which processes and analyses the data.

- In this design, ZigBee receiver and transmitter modules are used for communication between the measuring and notification nodes. The notification node presents the reading of the sensors and outputs an audio alert when water quality parameters reach unsafe levels. Various qualification tests are run to validate each aspect of the monitoring system. The sensors are shown to work within their intended accuracy ranges. The measurement node is able to transmit data by ZigBee to the

notification node for audio and visual display. The results demonstrate that the system is capable of reading physiochemical parameters, and can successfully process, transmit, and display the readings

- Water pollution is one of the problems in the world. Water is used for industrial purpose. So, it is compulsory for each officer to visit the ponds at a designated time and perform manually testing to measure the purity level of the water. The industrial visitors are not come directly to the pond and the information about the water to send the Short Message Service (SMS). A pond is a body of standing water, either natural or artificial. The sensor is fixed to the pond water, it senses the water and the data will be collected through these phase pH meters, humidity and temperature sensor is sending the signal to Arduino microcontroller. pH meter is used to measure the hydrogen ion in the water, temperature sensor will sense the temperature is one of the most frequently calculated variables and sensing can be made either through straight contact with the heating basis without straight contact with the basis using radiated energy in its place. Humidity is used to measure the amount of water present in the air. The GSM module sends the message to industrial visitor. The pH is normal or abnormal and humidity value, temperature value. The motor is fixed in the pond and if industries need water, then they can switch on (or) off the motor. The motor can be switched on (or) off using microcontroller.

- 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 to be monitor in real time. In this paper we 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. The Arduino model can be used as a core controller. Finally, the sensor data can be viewed on internet using WI-FI system.

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- Digital Object Identifier 10.1109/ACCESS.2016.2592958 Design of Smart Sensors for Real-Time Water Quality Monitoring NIEL ANDRE CLOETE, REZA MALEKIAN, (Member, IEEE), AND LAKSHMI NAIR, (Member, IEEE) Department of Electrical, Electronic and Computer Engineering, University of Pretoria, Pretoria 0002, South Africa Corresponding author: R. Malekian (reza.malekian@ieee.org). Received June 3, 2016, accepted July 16, 2016, date of publication July 19, 2016, date of current version August 26, 2016.
- International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887 Volume 6 Issue IV, April 2018- Available at www.ijraset.com ©IJRASET (UGC 74 Approved Journal): All Rights are Reserved IoT based Standard Water Measuring System using GSM S. Suganya1, K. Deepa2, A.Mahalakshmi3 , Dr. P. Gomathi4 , V. Praveen
- Water Quality Monitoring System Based on IOT Vaishnavi V. Daigavane and Dr. M.A Gaikwad Department Electronics & Telecommunication

Engineering, Mtech(VLSI), Bapurao Deshmukh College of Engineering, Sevagram, wardha_442102(M.S.), India

- International Journal of Advanced Research in Computer and Communication Engineering Vol. 9, Issue 1, January 2020 Copyright to IJARCCE DOI 10.17148/IJARCCE.2020.9104 24 Water Quality Monitoring Adithya Jayaraj1 , Esly V Kuriyan2 , Jossila N J3 , Reshma Viswanath C4 , Muneebah Mohyiddeen5