Real – Time River Water Quality Monitoring and Control System

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1.Title: River Water Quality Robot Embedded with Real-Time Monitoring System: Design and Implementation

Author: M. A. A. M. Shahrani, S. N. S. Al-Humairi, N. S. M. Puad and M. A. Zulkipli

Published in: 2021 IEEE 12th Control and System Graduate Research Colloquium (ICSGRC)

Description: Wireless communication is developing new sensing capabilities and implementations. The most current advancements in sensor networking are crucial for environmental applications. The Internet of Things (IoT) enables connections between various devices to share and collect data. IoT enhances its potential by utilising Industry 4.0 to address environmental issues in addition to automation. Since water is essential to both human survival and life underwater, some sort of system is occasionally required to regulate the quality of the water. In order to improve water quality, this research suggested an autonomous robot equipped with real-time multimodal (pH, temperature, voltage, and rubbish level). To track the water quality, the data were collected using sensors, sent over Wi-Fi to a mobile application created by an MIT inventor, and then stored in the cloud.

2.Title: River Water Quality Monitoring and Simulation Based on WebGIS — Anhui Yinghe River as an Example

Author: N. Maojing

Published in: 2016 Sixth International Conference on Instrumentation & Measurement, Computer, Communication and Control (IMCCC)

Description: River pollution is getting progressively worse as business develops. To control the water environment condition in real time and dynamically, WebGIS technology is utilised to simulate and monitor the river's water quality. Additionally, WebGIS has the benefits of map display and network transmission, which may be used to fulfil the task of monitoring and simulating water quality on many sites, greatly increasing labour productivity.

3. Title: Development and Application of Mobile Water Level Monitoring Based on Multi-sensor Integration.

Author: H. Zhang, W. Tao and M. Cao

Published in: 2010 International Conference on Electrical and Control Engineering

Description: This paper presents and develops a multi-sensor integrated dynamic system for mobile water level measurement, based on CORS (continuous operational reference system), GPS (global positioning system), GPRS (general packet radio service), PDA (personal digital assistant) technology, as well as a post-processing platform. Data processing, signal quality control, and system architecture are all thoroughly investigated. An genuine experiment utilising this technique has been conducted. The findings indicate that this system offers a high level of stability, dependability, and flexibility. For the current water level monitoring system based on water-level stations, it is a very effective addition.

4. Title: A demonstration of wireless sensing for long term monitoring of water quality.

Author: F. Regan *et al*.

Published in: 2009 IEEE 34th Conference on Local Computer Networks

Description: We have never before had such opportunities to sense and analyse the environment around us as we do now, thanks to technological advancements that offer new sensor capabilities, novel network capabilities, long-range communications technologies, and data interpretation and delivery formats via the World Wide Web. The difficulties do exist, though. Continuous in-situ monitoring is still one of the most difficult parts of environmental sensing, despite the fact that measurement and detection of environmental contaminants can be successful under laboratory-controlled settings. In this study, the design and testing of a multi-sensor heterogeneous real-time water monitoring system are discussed. In order to track water quality indicators like pH, temperature, conductivity, turbidity, and dissolved oxygen, a multi-sensor system was installed in the River Lee in County Cork, Ireland.

5.Title: Design of IoT-Based River Water Monitoring Robot Data Transmission Model Using Low Power Wide Area Network (LPWAN) Communication Technology

Author: R. D. Lestari, A. Rusdinar, M. A. Murti, G. Tawaqal and D. Lee

Published in: 2019 IEEE International Conference on Internet of Things and Intelligence System (IoTaIS)

Description: According to Presidential Decree Number 15 of 2018, one of the attempts to help limit the pollution and/or damage of the Citarum watershed in Indonesia is the river water monitoring system. It is crucial to monitor the water quality of the Citarum River in order to understand its state. Despite this, routine monitoring necessitates the testing of water samples in a lab. As a result, it is energy inefficient and not real-time. In order to provide for real-time monitoring of monitoring stations in the Citarum watershed and storage of monitoring data on a server for data logging, an IoT-based river water quality monitoring system using LPWAN communication technology will be suggested in this study. A test is run to determine the communication range.

6. Title: Real Time Wireless Monitoring and Control of Water Systems Using Zigbee 802.15.4

Author: S. Maqbool and N. Chandra

Published in: 2013 5th International Conference and Computational Intelligence and Communication Networks

Description: In this essay, we have demonstrated how to remotely check the water level in several water systems, including tanks, rivers, the ground water table, and bore wells. Additionally, we demonstrated how to remotely and automatically control a pump's operation. Additionally, wireless information transmission to mobile devices and remote monitoring of the flood zones are both possible. This project uses Zigbee 802.15.4, a 74HC14 inverter, water level sensors, and GSM technology to monitor the water level. Water quality sensors like turbidity sensors and dissolved oxygen sensors can also be used to monitor the water's quality. This monitoring system uses sensors to keep an eye on the pH level, temperature, dissolved oxygen level, turbidity, and water level.

7.Title: Development of a Real-Time Water Quality Buoy for the Fraser River Estuary

Author: A. Ethier and J. Bedard

Published in: OCEANS 2007

Description: Environment Canada and the Ministry of the Environment of British Columbia have joined forces to launch an innovative project to monitor the water quality of the Fraser River Estuary. The Fraser River Estuary monitoring of water quality and meteorological data needs a special strategy. The construction of this specialised monitoring station was greatly aided by Axys Technologies' competence in the sectors of marine, meteorological, and water quality. A anchored buoy platform was necessary for station placement and in-situ water sampling. The Oceanographic-Data-Acquisition-System (ODAS) buoy with a three-meter diameter was chosen. This platform can accommodate the substantial sampling and monitoring equipment needed for this experiment while enduring freshet conditions in the Fraser Estuary. Standard meteorological data and multi-parameter water data were added to the ODAS buoy.

8.Title: Toward a Smart Real Time Monitoring System for Drinking Water Based on Machine Learning

Author: D. Jalal and T. Ezzedine
Published in: 2019 International Conference on Software, Telecommunications and Computer Networks (SoftCOM)

Description: Drinking-water distribution systems enable the transport of portable water from water sources such reservoirs, rivers, and water tanks to industrial, commercial, and residential customers through intricate pipe networks. Pollution, whether intentional or unintentional, could have an impact on this system. As a result, it's crucial to guard against any entry into water distribution systems and to identify pollution as soon as feasible. A decent water quality for both human and animal life is therefore necessary, and this calls for water monitoring. The goal of this paper is to use wireless sensor networks to regulate drinking water quality. The architecture of our smart system is first developed in great detail. To measure the chemical, physical, and microbiological characteristics of the water, this architecture employs a new generation of wireless sensors.

9.Title: Predictive power management for a solar-powered off-grid surface water quality monitoring system

Author: R. R. Khalid, A. Meyer, J. Meiers, H. P. Beck and G. Frey

Published in: 2016 IEEE 11th Conference on Industrial Electronics and Applications (ICIEA)

Description: In this study, a transportable real-time measurement station that uses renewable energy to track the quality of surface water is investigated. These measurement facilities are intended to support the European Commission's understanding of the Water Framework Directive (WFD). The main aim of the work under discussion is to achieve self-reliance through a mobile monitoring station, by optimising the usage of renewable source energy and limiting the utilisation of energy produced in conventional ways. To do this, the system is further improved by implementing a Power Management System (PMS), which

incorporates predictive controls, to combat the erratic behaviour for automated data collecting for surface water quality and power outages in renewable energy systems. Using Support Vector Machines (SVM) as a tool, the prediction was integrated into the measuring station PMS.

10. Title: Water quality monitoring and waste management using IoT

Author: M. V. Ramesh *et al*

Published in: 2017 IEEE Global Humanitarian Technology Conference (GHTC)

Description: Numerous health problems among colony inhabitants are caused by the poor water quality at Pettipalam Colony in Thalassery, Kannur District, Kerala. Another severe problem that has a negative impact on the local population's health is the contamination of the soil and water as a result of garbage accumulation. The villagers must urgently monitor the nearby waterways and implement effective garbage disposal strategies. Pettipalam Colony in Thalassery has a population of over 2 acres. Up until 2014, their colony ground served as a municipal rubbish dump yard. Currently, colony inhabitants also utilise the area for garbage disposal and open defecation, contaminating the land and environment with plastic.