

Survey Paper on Development of Water Pollution Monitoring System

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Abstract: Water pollution is one of the biggest threats to our surroundings. To supply good quality of water it is important to monitor the quality of water. So, we are designing a cheap and time consuming water pollution monitoring system. The system comprises of different sensors which is used to measure the physical and chemical parameters of the water. The parameters such as temperature, pH, turbidity, TDS sensor of the water can be measured. The measured values from the sensors are provided to Arduino, it reads the data and provide the results. Finally, the sensor data gets appended in the file and can also be viewed on Arduino serial monitor.

Keywords: pH Sensor, Turbidity Sensor, TDS Sensor, Arduino Model

I. INTRODUCTION

Quality of drinking water plays a vital role in the health of animals and human beings. Rivers, lakes, ponds are major sources available for drinking water. Irrigation, fishery and energy production organizations are highly relied on water quality. Therefore, the quality of water of rivers and lakes ought to be kept at a certain level. But still, many of the people don't get plenty and clean drinking water and also the fact that government's responsibility to guarantee that clean water is conveyed to its citizens. Hence it is necessary to monitor the quality of water which will be utilized for consumption. Monitoring is characterized as the collection of data at set locations and at standard interims in order to provide the information which may be used to direct the current conditions, build-up trends, etc.

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 need for user involvement in maintaining water quality and looking at other aspects like hygiene, environment sanitation, storage and disposal are critical elements to maintain the quality of water resources.

Conventional water quality checking methods include sampling and laboratory techniques. These strategies are however not cost effective and time consuming which eventually leads to delayed in detection of impurities and reaction to those contaminants in water. So, there should be more efficient and productive checking strategies to monitor the quality of water.

So, we have designed a solution for easy water quality checking of water bodies with ease. We will design Remote Control (RC) boat which will help to measure the pH level and turbidity level. This will further help us to maintain the water clean. This project is remote-operated and controlled by an RC remote. Thus, this will help to maintain the water quality.

1.1 Goals or Objectives

- To study, water quality and importance of water quality monitoring.
- To develop a system with Ease and convenience of usage.
- To improve data collection system in survey of water quality for large water bodies.

II. LITERATURE SURVEY

2.1 Research Papers

Wong Jung et al., 2021 -Water is a quintessential element for the survival of mankind. Its variety of uses means that it is always in a constant state of demand. The supply of water most primarily comes from large reservoirs of water such as lakes, streams, and the ocean itself. As such, it is good practice to monitor its quality to ensure it is fit for human consumption. Current water quality monitoring is often carried out in traditional labs but is time consuming and prone to inaccuracies. Therefore, this paper aims to investigate the feasibility of implementing an Arduino- based sensor system for water quality monitoring. A simple prototype consisting of a micro-controller and multiple attached sensors was employed to conduct weekly onsite tests at multiple daily intervals. It was found that the system works reliably but is reliant on human assistance and prone to data inaccuracies. The system however, provides a solid foundation for future expansion works of the same category to elevate the system to being Internet of Things (IoT) friendly.[1]

S.Geeta et al., 2017 - Smart solutions for water quality monitoring are gaining importance with advancement in communication technology. This paper presents a detailed overview of recent works carried out in the field of smart water quality monitoring. Also, a power efficient, simpler solution for in-pipe water quality monitoring based on Internet of Things technology is presented. The model developed is used for testing water samples and the data uploaded over the Internet are analyzed. The system also provides an alert to a remote user, when there is a deviation of water quality parameters from the predefined set of standard values.[2]

Nikhil Kedia entitled "Water Quality Monitoring for Rural Areas-A Sensor Cloud Based Economical Project." Published in 2015 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun, India. This paper highlights the entire water quality monitoring methods, sensors, embedded design, and information dissipation procedure, role of government, network operator and villagers in ensuring proper information dissipation. It also explores the Sensor Cloud domain. While automatically improving the water quality is not feasible at this point, efficient use of technology and economic practices can help improve water quality and awareness among people.[3]

Omar Faruq et al., 2017 - A water quality monitoring system based on micro-controllers 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.[4]

NPS pollution encompasses a wide range of sources that are not subject to Federal or often state Regulation. The scope of the problem expands as a result of Population growth and land use changes. Even as waters are restored, others are Identified as impaired as a result of development pressures and other factors such as recent assessment of existing water quality problems. The vast extent and continuous nature of NPS pollution is a daunting challenge. That requires problems be addressed through a variety of approaches using Multiple funding sources. Although not the entire remedy, \$319 funding is an Essential part of the solution to the costly challenges of NPS pollution—it is A critical source of support for NPS management programs and for watershed Projects. State NPS programs typically leverage other programs and funding Sources to achieve water quality improvements. This report highlights some of the many accomplishments of the NPS Program and describes how the program has evolved and is addressing a variety of water quality problems around the country. In the years to come, NPS practitioners at the federal, state, tribal and local levels will continue to work hard together to ensure clean, safe water is available for people, plants and animals—not an easy task by any means. It will take hard work and time to accomplish all that needs to be done.[5]

2.2 Websites

This article talks about water pollution in Brunei. High levels of water pollution in the Brunei River have been traced to wastewater treatment plants, industrial discharge, and polluted streams. Point and non-point pollution sources – including residential, industrial and agricultural outlets – are currently the main sources of pollution in Brunei River. The country is considering taking steps to address the water problem, including introducing legislation to improve watershed protection and manage pollution. The country has built reservoirs and dams to help prevent seawater intrusion and manage its river flow, utilized hydro-logical data network with technological advances, secured

international cooperation from countries like Singapore and improved water quality monitoring. Furthermore, the country has had initial success in adapting to the threats of climate change. [6]

This explains about turbidity and water in detail. Turbidity makes water cloudy or opaque. High concentration of particulate matter affects light penetration and ecological productivity, recreational values, and habitat quality, and cause lakes to fill in faster. In streams, increased sedimentation can occur, which can result in harm to habitat areas for fish and other aquatic life. Particles also provide attachment places for other pollutants, notably metals and bacteria. For this reason, turbidity readings can be used as an indicator of potential pollution in a water body. Excessive turbidity, or cloudiness, in drinking water is aesthetically unappealing, and may also represent health concern. Turbidity can provide food and shelter for pathogens.[7]

This article explains about water pollution in detail. Categorist of water pollution such as groundwater, surface water, ocean water, point water etc. Used water is wastewater. It comes from us sinks, showers, and toilets (think sewage) and from commercial, industrial, and agricultural activities (Think metals, solvents, and toxic sludge). Radioactive waste is any pollution that emits radiation beyond what is naturally released by the environment. It's generated by uranium mining, nuclear power plants, and the production and testing of military weapons, as well as by universities and hospitals that use radioactive materials for research and medicine.[8]

This paper consists of topic like balanced electro absorption modulated RF photonic link. Graphene and MWCNT thick films: preparation and RF electrical properties study. A broadband outlook on flexible and textile RF energy harvesting and wireless power transfer: from near-field to 5G. Designs and Simulations of Millimeter Wave On-chip Single Turn Inductors for 0.13 μm RF CMOS Process Technology. Harmony: Saving Concurrent Transmissions from Harsh RF Interference. DSP-based RF waveform aggregation for next generation mobile front-hauling.[9]

III. PROPOSED WORK

3.1 Flow of the System

The system is designed and implemented with its main goal of monitoring water quality (pH, Turbidity, and TDS) with the consideration that the system:

1. It is suitable in a large aquatic area/ Water Bodies.
2. It can measure and store information in a real-time scenario.
3. It can be remote-operated to move it to a certain place from where it can collect relevant data.

The most important function of the system is to ensure that the data collected from the sensor reflects the actual aquatic/Water Quality scenario and the data are transmitted and delivered as a display of information to the User on Remote Control [Fig. 3]. This is in order to provide a platform that allows fast information dissemination and quick formulation of an appropriate and immediate response. When timely report reaches the key user, for example, that user can immediately identify abrupt changes in the values of monitored water quality parameters, and thus can give them enough lead time for possible implementation of activities to minimize if not eradicate risks and damages. Therefore, the system was designed to provide the following:

1. Data collection and storage.
2. A RC system which will move on the water surface to collect relevant data.
3. Control interface for administrators. The overview of the system is depicted in Fig. 1, Fig. 2 and Fig. 3.

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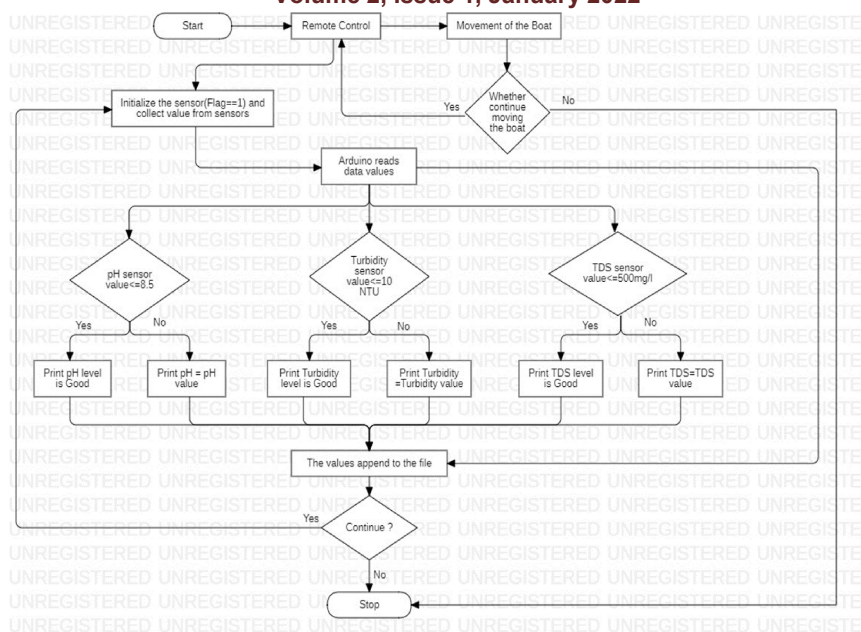
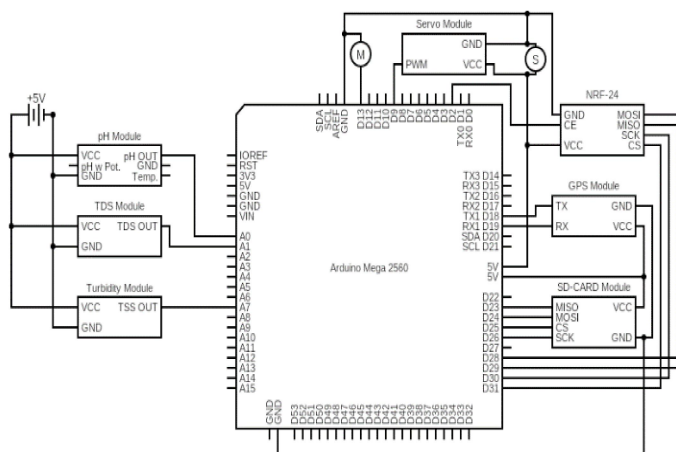


Figure 1: Flowchart for water pollution monitoring system.



IV. CONCLUSION

This survey helps in developing an approach for water pollution monitoring system. It has helped to explore the various approach that has been previously developed like, The current manual method for monitoring of the water quality which is Money & Time consuming and labour intensive. This survey helps in developing an approach for making the devices more relevant and convenient. Monitoring of real time quality of Water from Large water bodies, it makes use of pH, turbidity and TDS sensor with Arduino-based microcontroller. The system can monitor water quality automatically and it is low in cost and require minimum people on duty. So, the system is likely to be more economical, convenient and fast. 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 hydrological, air pollution, industrial and agricultural pollution and so on. It has widespread application and extension value.

REFERENCES

- [1]. Hong, Wong J., Norazanita Shamsuddin, Emeroylariffion Abas, Rosyzie A. Apong, Zarifi Masri, Hazwani Suhaيمي, Stefan H. Gödeke, and Muhammad N.A. Noh 2021. "Water Quality Monitoring with Arduino Based Sensors" Environments 8, no. 1: 6.
- [2]. Geetha, S., Gouthami, S. Internet of things enabled real time water quality monitoring system. Smart Water 2, 1 (2016).
- [3]. Nikhil Kedia, Water Quality Monitoring for Rural Areas- A Sensor Cloud Based Economical Project, in 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun, India, 4-5 September 2015. 978-1-4673-6809-4/15/\$31.00 ©2015 IEEE
- [4]. Md. Omar Faruq, Injamamul Hoque Emu, Md. Nazmul Haque1, Maitry Dey, N.K. Das, Mrinmoy Dey Design and implementation of a cost-effective water quality evaluation system IEEE Region 10 Humanitarian Technology Conference, Dhaka, Bangladesh (2017), pp. 860-863
- [5]. A Catalyst for Water Quality Improvements: (U.S. Environmental Protection Agency [EPA]. National Nonpoint Source Program, 2 Nov, 2020)
- [6]. <https://www.nrdc.org/stories/water-pollution- everything-you-need-know>
- [7]. https://www.epa.gov/sites/production/files/2016-10/docume nts/nps_program_highlights_report-508.pdf
- [8]. <https://borgenproject.org/water-quality-brunei/>
- [9]. <http://water.usgs.gov/edu/turbidity.html>