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Comprehensible River Water Management

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Abstract
River water valuation is extremely significant in green globalization. To verify the safe supply of drinking water, the quality must be monitored in real time. This work will focus on designing a cost-effective system based on IoT for real-time river water assessment at a single location. A variety of sensors are employed to measure the temperature, PH, turbidity, and TDS of the water. The core controller can process the measured values from the sensors.
Keywords: *Water Evaluations, Internet of Things, pH Sensor, Turbidity Sensor, Temperature Sensor.*

1. Introduction
Water is one of the most important elements on the earth. All vegetation and fauna require water to survive. Water is an energetic necessity of living creatures; without it, living things cannot grow. Water is one of the most significant aspects of the landscape. Water is the primary object used in home purposes, agriculture, power generation, and industry. In recent decades, the rapid industrialization and moderate population growth have resulted in a significant increase in freshwater demand. Water, which flows through rivers and streams, is a country's primary wealth. As a result, the significance of rivers is emphasized, and no additional explanation is required. One of the most important causes in the expansion of human settlements. In this paper we have two main concepts,

1. Internet of Things
2. Assessment of Water Quality

The Internet of Things (IoT) is the network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators and connectivity which enable these things to connect and exchange data. [1-3] the number of IoT devices has increased 31% year-over-year to 8.4 billion in 2017 and it is estimated that there will be 50 billion devices by 2025. Water quality monitoring is a method used to check the water parameters to identify the trends of change, pollution levels and thus helps to decide and implement the pollution control systems. Water quality monitoring and control of swimming pools, ponds and other manmade water bodies are important to safeguard public health and is thus in the general interest of the environment and society. [4, 5] (Meghwani, 2017) Orthodox methods need more time and labors for sample collection, testing and data recording. This paper mainly focuses on the development of a system which comprise of IoT sensors for collection of data for monitoring.

2. Aim
To assess the water using sensors and embedded C program

3. Objective
- To assess water quality using sensors
- To improve efficiency and cost-effectiveness

River water computation is critical for a number of reasons. One of the primary reasons is to ensure that the water is safe for human consumption as well as agricultural and industrial use. River water analysis can detect the presence of contaminants that are

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detrimental to human health and the environment, such as bacteria, viruses, heavy metals, and pesticides. Monitoring the health of the river ecology is another key part of river water evaluation. River water calculation is important for a variety of reasons. One of the main reasons is to ensure that the water is nontoxic for human intake and for use in agriculture and industry. [6, 7] River water analysis can detect the presence of contaminants such as bacteria, viruses, heavy metals, and pesticides which can be harmful to human health and the environment. Another important aspect of river water assessment is to monitor the health of the river ecosystem. Water quality parameters such as pH, temperature, dissolved oxygen, turbidity and TDS can provide insights into the health of the river and the organisms that depend on it. [8-10] (Pujar, 2020) [11, 12] the analysis can also help detect changes in the water quality over time, which can be an early warning sign of pollution or other environmental issues. Additionally, river water analysis can also be used to ensure compliance with national and international water quality standards and regulations. This is particularly important for industries that discharge wastewater into rivers and streams. Overall, river water analysis is crucial for ensuring the safety and health of human populations, protecting the environment, and maintaining compliance with regulations. (Mohammad Salah Uddin Chowdhury a †, 2019) The importance of monitoring indoor environments has been shown by several research in recent years. For the first time in its history, the World Health Organization has acknowledged air pollution as a worldwide health issue. The dangers aren't limited to the great outdoors; in fact, studies of interior air quality have revealed pollution levels to be far greater than those outside [13-15].

4. Methodology

Orthodox Method: Physico-chemical parameters analysis for water assessment and for IoT, Water samples to be collected every month from seven different stations of the study area, in clean and dry polythene bottles. The water samples to be collected and preserved for testing of various parameters at 10oC throughout the period of chemical analysis. The water samples to be analyzed by using standard methods (APHA 2005). The pH and Dissolved Oxygen of water samples to be measured immediately after sampling at the field itself. Samples were subjected to filtration before chemical analysis. The determination of TDS was done by gravimetric process while the total hardness was carried out by EDTA complex metric titration method (APHA 2005). The Winkler's alkali iodide-azide method was followed for the estimation of DO and BOD. Nitrate was determined by colorimetric procedure (APHA 2005). Faecal coliform population was analyzed by MPN /100 mL method by growing on M-FC medium at temperature 44.5oC and counted after 48 hours. These are the basic chemical analysis standard methods. IoT will be used to examine the above Physico-chemical Parameters, sensors to measure temperature, PH, turbidity, TDS of the water. 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 monitored and viewed in mobile or pc over the internet. PH is a measure of how acidic/basic water is. The range goes from 0 - 14, with 7 being neutral. PHS of less than 7 indicate acidity, whereas a pH of greater than 7 indicates a base. PH is really a measure of the relative amount of free hydrogen and hydroxyl ions in the water. Water temperature measures how hot or cold water is. It affects most water quality parameters and plays a major role in aquatic life and habitats. PH decreases with increase in temperature. But this does not mean that water becomes more acidic at higher temperatures. Turbidity is the measure of relative clarity of a liquid. It is an optical characteristic of water and is a measurement of the amount of light that is scattered by material in the water when a light is shined through the water sample. The higher the intensity of scattered light, the higher the turbidity. Conductivity - Conductivity provides a rapid means of obtaining approximate knowledge of total dissolved solids concentration of water sample. Total dissolved solids, or TDS for short, are dissolved ions, including salts, minerals

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and metals, that can be found in all non-pure water sources. Figure 1 shows the Block Diagram of Connecting Sensors to Arduino Board.

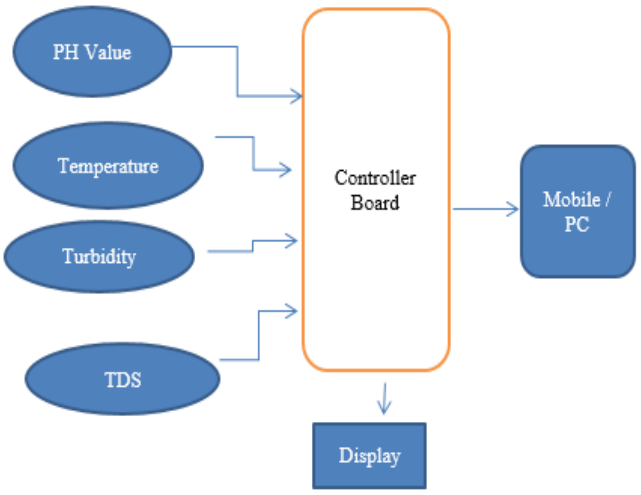

Figure 1 Block Diagram of Connecting Sensors to Arduino Board

Real-time monitoring of water quality by using IoT will immensely help people to become conscious against using contaminated water as well as to stop polluting the water. The research is conducted focusing on monitoring river water quality in real-time. Therefore, IoT based assessment will be a better solution as reliability, scalability, speed, and persistence.

In this paper water level sensor reading with partial coding is presented.

```
#define sensor Power 7
#define sensor Pin A0
Void setup ()
{
PinMode (sensor Power, OUTPUT);

Digital Write (sensor Power, LOW);

Serial. Begin (9600);
}
Int level = read Sensor ();

Serial. Print ("Water level: ");
Serial.println (level);
```

5. Out come

By connecting all sensors, we can get the results, as we can see output of water level sensor. Heavy and poisonous metals can be present in the water that emerges from the factories. To avoid leaching into ground water, this water should not be routed into stagnant areas on the way to the treatment. For managing harmful pests, an advanced pest management (IPM) technique is used, and hazardous substances are rarely used. These chemicals should only be used when needed; their distribution should be targeted, and they should not be applied right before rain is scheduled. Just the minimum level of fertilizers must be used. This will aid in the preservation of soil properties. The industrial solid waste should be disposed of in a suitable location and with proper design in accordance with the regulatory authorities' requirements. To limit pollutant mobility, a suitable binding material should be added. The developed fly ash should be properly stored and used.

6. Future Scope

- Assessment of river water in different sites
- Increase the parameters by addition of multiple sensors
- Upgrade the data to cloud so that we can get real time assessment

Conclusion

As mentioned in this paper our aim is to assess the river water quality through IoT. The arrangement is abundantly able and economical. The system is incredibly versatile and economical. With the help of above model and methods we can assess the water quality easily and continuously which gives good results to maintain river eco system. The system can monitor water quality automatically, and it is low in cost and does not require more people on responsibility. So the water quality assessment is more economical, convenient and fast. The system has good flexibility and acceptable adaptability so it saves time and money

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