IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)
e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 14, Issue 6 Ser. III (June 2020), PP 18-21
www.iosrjournals.org

Online Water Quality Monitoringthrough Sensors

Khushi Jain[1], Mandeep Kaur Sukhija[2], Diya Singhal[3], Arush Gupta[4]
[1](Class 12, Springdales School, New Delhi, India)
[2](Springdales School, New Delhi, India)
[3](Class9, Delhi Public School, R KPuram, New Delhi, India)
[4](Director, Okaya Power Pvt. Ltd., Rohtak Road, New Delhi, India)

Abstract
A water quality sensor device has been developed, which can sense and transmit the water quality online through IOT based controllers, and the resulting real-time data can be accessed on the web.
The water quality sensor device is compact, inexpensive, easy to use, and can be installed at different types of locations. The data can be accessed at multiple locations anywhere, analyzed, and in case of any discrepancy from the permissible limits of pollutants, an alarm is set off so that the necessary action can be taken.
The parameters selected for water quality monitoring are pH, Turbidity, and TDS, and sensors for these parameters have been used. The sensors are integrated through one pipeline and can be installed at the input of the water purifier or main water pipeline to monitor water quality.
The installation of such systems at various effluent sites and live data monitoring at central locations can instantaneously help in decision making and necessary actions, which would prevent pollution of water resources and will benefit all sections of society.

Keywords: Sensor, water quality, pH, Turbidity, TDS, online

Date of Submission: 12-06-2020 Date of Acceptance: 29-06-2020

I. Introduction

Ensuring the safety of water is a challenge due to the excessive sources of pollutants. With the rapid pace of industrialization and greater emphasis on agricultural growth combined with the latest advancements, agricultural fertilizers have led to a large extent of water pollution. 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. These sources result in the pollution of surface water as well as groundwater.

One of the major surface water resources are rivers, and Indian rivers suffer the brunt of pollution, not only due to industrial or agricultural factors but also due to religious reasons. One of the rivers-The Ganga is considered highly sacred, and several religious activities are performed on its banks. As a result, the Ganga river is highly polluted.

Several government initiatives had been launched in the past to reduce pollution load on the river, namely, Ganga Action Plan-I and Ganga Action Plan-II, Namami Ganga Programme. All these plans have failed, and more than 20000 crores (INR) have been spent.

It is understood that the monitoring of pollutant levels in water can give a clear indication of water quality. The quality of water, especially poor water, facilitates the spread of the disease, causes death, and hampers socioeconomic progress. It is thus critical to monitor the quality of water.

Water quality monitoring is defined as the collection of information at set locations and at regular intervals in order to provide data which may be used to define current conditions, establish trends, etc.

Traditional water quality monitoring methods involve sampling and laboratory techniques. However, these methods are time-consuming (leading to delayed detection of and response to contaminants) and not very cost-effective. Online water quality monitoring is essential for quick decisions and alleviating the hazards of contaminated water.

The objectives of the online water quality monitoring system are:

- to measure the critical water quality parameters such as microbial, physical, and chemical properties,
- identify deviations in parameters
- provide early warning identification of hazards.
- real-time analysis of data collected and suggest suitable remedial measures.

Water quality parameters can be checked with the use of various parameters. The sensors are housed in the water body, which could be stored water or even a source of running water. The physical parameter is converted into a measurable electrical quantity using the sensors. This acts as an input to the controllers through an optional wireless communication device. The controller reads the data from the sensor, which is its main function. It then processes it and sends the same using the appropriate communication technology to the designed application.

II. Material and Methods

In this project, three parameters for online monitoring of water quality have been selected, viz. pH, Turbidity, and TDS.

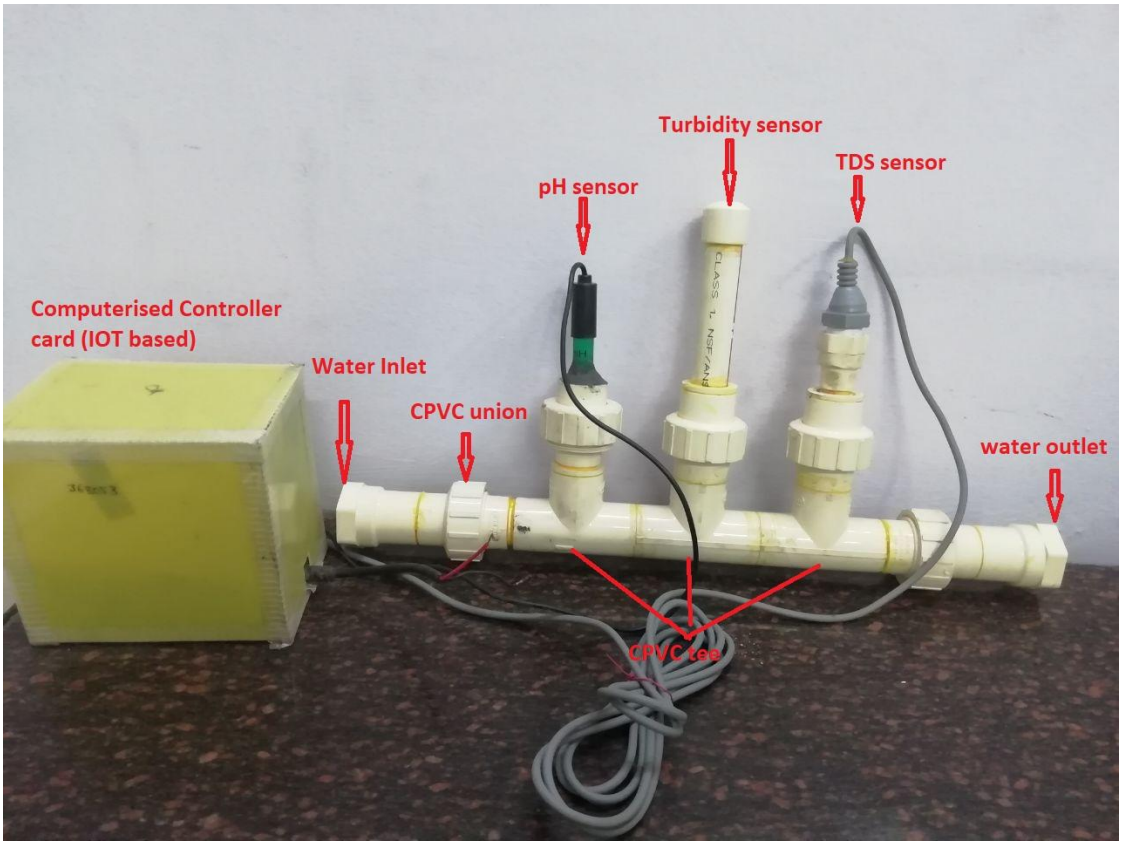
One of the most critical factors is pH, when investigating water quality, as it measures how basic or acidic the water is.

Turbidity refers to the concentration of suspended particles in water.

Total Dissolved Solids (TDS) refers to the inorganic salts like calcium, potassium, magnesium, sodium, carbonates, nitrates, chlorides, etc. as well as some organic matter.

The water quality sensor device has been made of CPVC material; three CPVC Tee connectors have been used and interconnected with each other. At the water source, a CPVC pipe is used as a water inlet, and the other end of the pipe is connected to CPVC Tee. With this, two more Tee connectors are connected, and the final is the water outlet. In the third opening of the Tee connectors, sensors are connected.

The sensors for these parameters were procured from different local sources, and the controller was developed in house. The sensors were integrated through one pipeline and were installed at the input of the water purifier or main water pipeline to monitor water quality. The following picture shows the connection of three different sensors with a common pipeline and the controller.



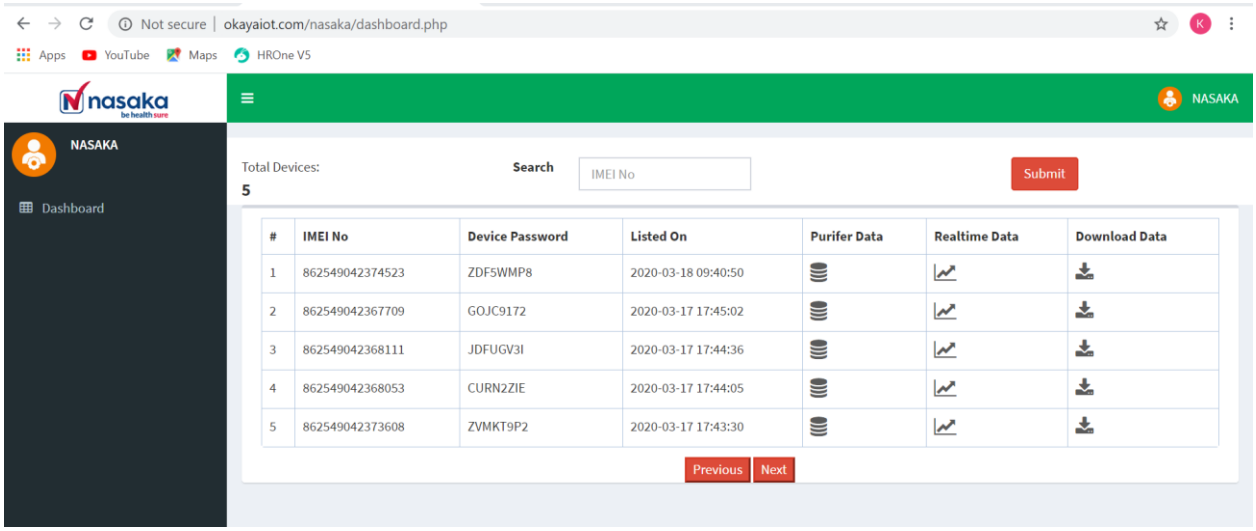
Online data of these three parameters is sent to cloud and can be accessed by logging on to the following webpage with the given Username and passwords:

http://okayaiot.com/nasaka/

The sensor assembly was installed at five different locations and live data collected simultaneously from these locations by logging on the above webpage on PC or mobile phone.

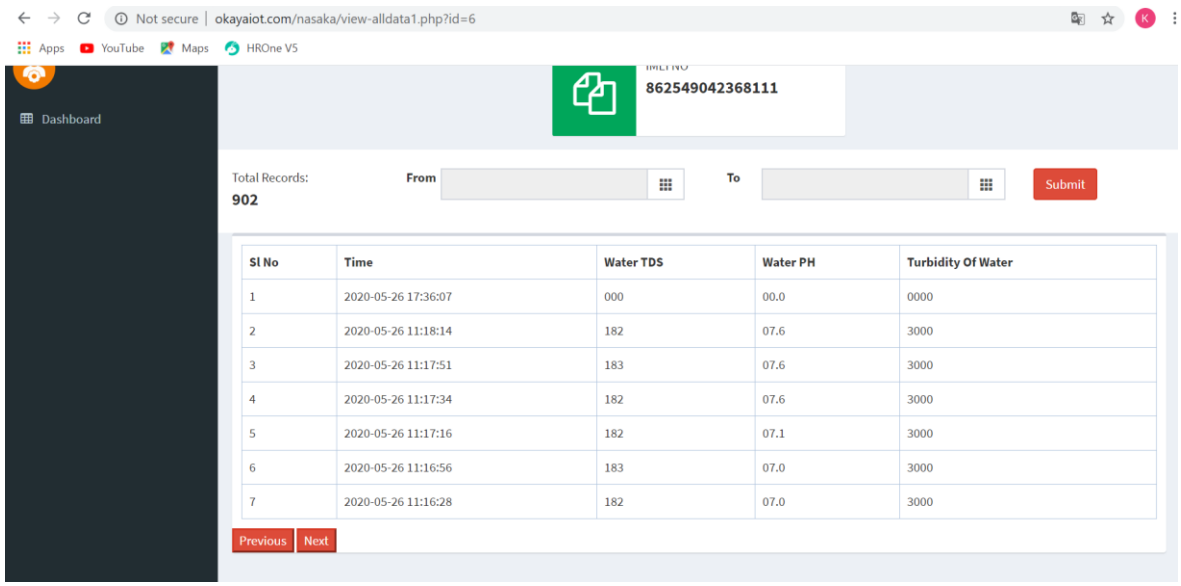
III. Result

The data which can be accessed from the webpage is in the form of a Dashboard, whose screenshot is shown below:



It shows the IMEI number of the device,i.e. the sensor assembly, date of installation, compiled water purifier data since the date it was installed and current or real time data. The data can also be downloaded, if desired.

When Purifier data is clicked on, compiled data up to the date is shown. The screenshot is shown below:



On clicking next, further data can be accessed.

If we click on Real-time data on the Dashboard, the exact real-time data of water quality in terms of pH, TDS, and Turbidity can be seen. The data can also be downloaded.

IV. Conclusion

The developed multiparameter water quality sensors are low-cost tools for water quality measurement in various rural and urban places. The overall system is cost-effective, portable, and easy to use for villagers or any unskilled person. The installation of such systems at various effluent sites and live data monitoring at central locations can instantaneously help in decision making and necessary actions, which would prevent pollution of water resources and will benefit all sections of society.

Acknowledgement: *Author Khushi Jain would like to acknowledge the guidance and motivation of her guide and mentor, Ms.MandeepKaurSukhija.*

Ms.MandeepKaurSukhija pursued Bachelor's of Science and Master's of Science with major in Physics from University of Delhi, India. She specializes in Electronics and Communication. After her post-graduation, she took up Masters in Environment and Ecology. She is currently working as a Post Graduate teacher at Springdales School, DhaulaKuan, New Delhi, India. With an experience of more than 25 years she has taken up research projects with her students in the field of STEM and Environment. In 2017, the Directorate of Education, Govt. of NCT of Delhi, honoured her with the State Teachers'Award. She also received the Pied Piper Award by Springdales Education Society for her contribution for Project based learning and for developing innovative mindsets amongst her students. Her students have won laurels and accolades at various National and International level competitions.

Khushi Jain, et. al. "Online Water Quality Monitoringthrough Sensors." *IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)*, 14(6), (2020): pp 18-21.