Embedded Based Real Time Monitoring and Detection of Bacterial Contamination in Drinking Water

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Abstract **- Water contamination is very important tissue of the country. Many people lose their lives due to water contamination. This paper consists of water quality monitoring system using IOT. Different water samples are tested using the implemented project. The water sample application is analyzed according to the values for the application in which that water can be used. The majority of the individuals on the planet are utilizing the destroyed water with vector infections flighty degree of various poison for cooking and drinking. Over the world, water assumes a significant job since it fulfills all progress requests however holding versatile water is quick one and total measure of water present in the planet stays steady all through the planet.**

Index Terms **- Arduino; Water; Water quality; Ph; TDS; turbidity; temperature**

I.INTRODUCTION

The most significant factor, for human wellbeing and for financial development of nation wants water. Not just for people, every one of the living beings, horticulture and industrialization need water is fundamental one. Water assets is not taken care of appropriately in exceptionally populated districts prompts release of lethal synthetic concoctions, atmosphere changes, developing populace, untreated sewage, and other human exercises. Consequences of shortage issue and accessibility are discriminatory, unfeasible, and non- uniform spread of water all through the planet also. In this paper, we accept India for instance for the most dominant country and creating nation on the planet, just as India faces more difficulties on the monetary side and developing of populace. The various creating nations give water as a fundamental prerequisite for 72% of the populace lives and country territories particularly. Polluted water supply crumbled the wellbeing for human and direct impacted by drinking. Ailment and destruction prompts major brought about by defiled water. Subsequently, Water-Borne sicknesses, for example, dengue, cholera, and jungle fever and so on., are diminished for significant wellbeing concerns. In India, newborn child mortality is major brought about by the runs. No legitimate cleaning of water and sanitation prompts 70% of loose bowels cases.

II.LITERATUREREVIEW

The water quality from the waterways has a significant significance for the explanation that these water assets are commonly utilized for different issues, for example, drinking local and private water supplies, agriculture(irrigation), hydroelectric force plants, transportation and framework, the travel industry, entertainment, and other human or monetary approaches to utilize water [1]. Atmosphere attributes have a significant way on the spatio temporal variety of surface water quality. Disintegrating water quality displays a significant issue to the water security of numerous zones in various climatic classes. The geo-spatial inconstancy of water assets and financial weights present complex difficulties to maintainable administration of water asset to meet residential, agrarian, and modern water requests [2]. At present, the regularly utilized strategies for water quality evaluation incorporate record technique [1], the investigative order process. fuzzy technique, dim assessment strategy and fake neural systems. As the multifaceted nature of water frameworks, water quality affected by numerous variables, there is sure restriction in these techniques [3]. Presently, dim framework hypothesis has been quickly created and is being utilized in numerous zones, for example, in the general public, economy, horticulture, industry, traffic, biology, etc. Various edge teaches, for example, dim hydrology, dim geography, dark

reproducing, local financial investigation of dim, and dim philosophy appeared [4]. In any case, the majority of them depended on scoring framework and later utilization of Artificial Intelligence (AI) in River Quality Assessment was begun. Simulated intelligence has wide extension in stream quality appraisal issue and scarcely any frameworks were created to demonstrate human methods for thinking and finding the waterway water quality from the natural information [5]. Water quality appraisal is an assessment implies that makes a quantitative portrayal to the territorial water ecological factors through a specific level of numerical techniques and means [6]. The contrasts between these methodologies result from the frameworks applied for restricting release and in the charging instruments. In any case, these distinctions are likewise reflected in the systems taken for danger evaluation and the observing of releases to water, for example regardless of whether it is centered around the effluents or on the accepting water; both have their points of interest and detriments. A joined methodology can utilize the focal points [7]. As per positioning guideline and field examination, the entire bowl is isolated as 22 checking areas and 10 contamination markers. By methods for SPSS soft applied in head segment examination technique, paper investigation on the principal contamination pointers and the fundamental contamination commitment areas. The outcome shows four separated head parts reflect 91.81% data of crude factors [8]. Appraisal the progressions of surface water quality in various occasions all through one year is a significant viewpoint for assessing transient variety of waterway contamination because of common or anthropogenic contribution of point and non-direct sources toward water condition that is progressively breaking down [9]. A stream quality checking program (SQMP) could be planned based on the data on the current water quality, principles, anthropological impacts and the 'utilization' criteria. The observed information helps the organizers both at the national and universal levels to create different natural projects [10].

III.IMPLEMENTATION

In this section, the detailed implementation of the water quality monitoring system is explained in form of block diagram as shown in Fig. 1. In Fig. 1, the main blocks are: Solar Panel- this block represents the suitable solar panel. The specifications are 5W and 18V to drive the circuit.

Power Hub- a simple PCB panel module to deviate different wires for ground and main power supply

Battery – this battery is charged using the solar panel. The specification of the battery is 12v and 1.5 Ah. It is a lead acid battery.

WiFi Module- this module is used for IOT connection, the module used here is ESP8266.

20X4 LCD - LCD is used to display the sensor data real time values.

Arduino Atmega - this is the microcontroller board.Atmega328 is the microcontroller and Arduino Nano board isused.

Temperature sensor – to analyze the water temperature LM35 is used.

Turbidity Sensor- to note the values of turbidity sensor

PH sensor- to give values of PH in water

TDS - Total Dissolved Solids are analyzed using this module. These modules are combined together to form the water quality system using IOT.

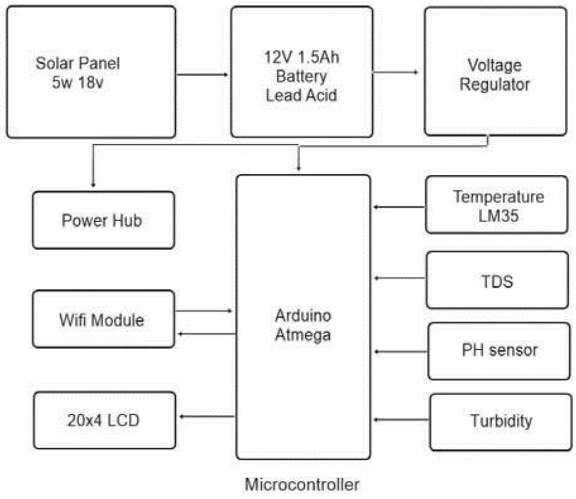

Fig. 1. Block Diagram Representation of Water Quality with implementation of IOT

For IOT implementation thingspeak server is used. Arduino IDE is used for programming the microcontroller. Arduino Software Programming language is used for coding.

IV.RESULTS

In this section, results are shown: in Fig. 2 block of implementation is shown. The samples are taken from different places attaching Yamuna river, which are namely, Baghpat region and Sonipat region,

Waziradbad region, Katha village, Palla village and Baghpat collectorate. These samples are analyzed using the proposed device.

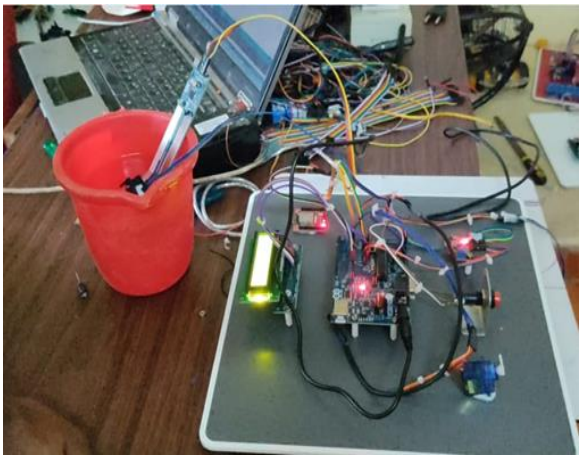

Fig. 2. Experimental Setup

Fig. 3. Values of Turbidity on IOT Server

Fig. 3 shows the values of Turbidity in the IOT server of thingspeak.com. This graph shows the turbidity values taken from IOT server for sample location. These results are then plotted for all samples and figure 8 shows the complete plot.

Fig. 4. Values of Temperature on IOT Server

Fig. 4 shows the temperature on IOT server. The values obtained are in the values of 29 degrees to 50-degree sin Celsius. This figure shows the temperature value on IOT server.

Fig. 5. Values of pH on IOT Server

In Fig. 5, pH values are shown for water quality on IOT server. IOT server-based values for pH are shown on figure 5 and for all samples are shown on fig 6.

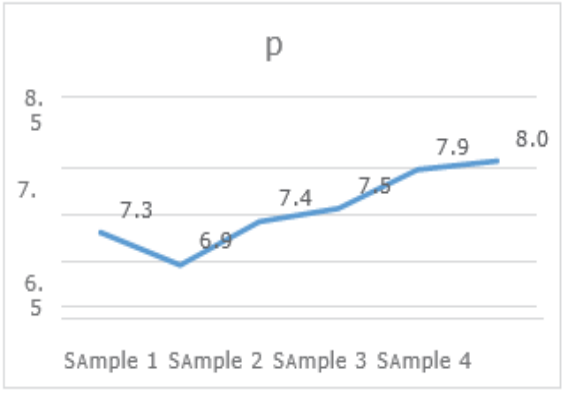

Fig. 6. Results of pH sensor on different samples

In Fig.6, results of pH sensor on different samples. The results shows that sample 1 is best for pH values.

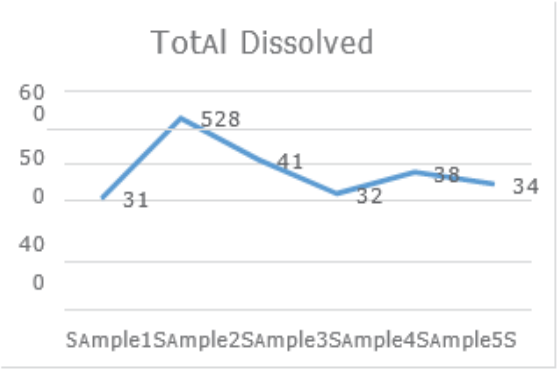

Fig. 7. Results of TDS on different samples

In Fig.7, the results of TDS are shown on different samples. The results are beneficial for sample 1 with lowest TDS values. Similarly, TDS values are also plotted for different samples.

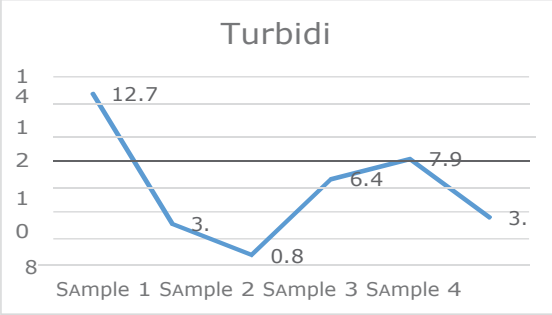

Fig. 8. Results of Turbidity sensor on different samples

In Fig.8, the results of turbidity sensor on different samples are shown. high turbidity are seen for sample 1 and lowest for sample3. In Fig.9, circuit diagram of the proposed water quality testing system is shown:

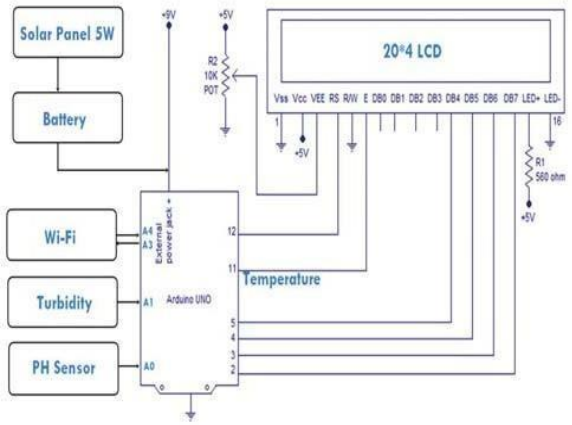

Fig. 9. Circuit Diagram for Water Quality IOT

The circuit diagram as shown in fig. 9, consists of microcontroller atmega328 which connected with Wi-Fi module through A3, A4pins and turbidity and pH Sensor for A0&A1. Temperature sensor on A2, solar panel is connected and 20X4 LCD for its 16 pins. The sensor values are taken from the sensor by coding and then displayed on LCD and through Wi-Fi module it is sent on IOT web server.

V.CONCLUSION

It is seen that these samples can be used for industrial purpose and household purpose. Low TDS and turbidity values are best suitable for drinking, but samples don't show them. All samples are suitable only for industrial purpose. Significance of natural checking in waterway quality appraisal was surely known and different frameworks are created, the proposed Model promises real time readings of the water quality and also advantageous as it shows in internet server and can be accessed from anywhere in the world.

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