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Automatic River Water Quality Monitoring Using IOT

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Abstract: ***One of the major problems in India is surface water pollution that is in Rivers. For the purpose of drinking, agriculture requirements and for industrial usage, an adequate amount of water quality has to be made sure and for maintaining the balance in aquaculture, water quality has to be monitored in real time. Deteriorated quality of water affects all well living beings. Traditional River water quality monitoring involves grab sampling, testing and analysis which is time consuming.***
In this project, determined attempts are made to design an economical system for real time monitoring of river water quality. Different physical and chemical parameters of the water are monitored using various water measuring sensor. The parameters such as temperature, hardness, dissolved oxygen; pH, turbidity and flow can be measured through sensors. The system can be enforced with Arduino model as a core controller. WI-FI module, Internet of things and GSM board can be used effectively to monitor the water quality and thereby relevant impacts for using river water safely.
Keywords: 1. IOT, 2. GSM, 3. Sensors, 4. E.C.

I. INTRODUCTION

In the past ten years, online water quality monitoring has been widely used in many countries which are known to have issues related to river water pollution. Water is a vital resource for agricultural activities, fish farming industries, and all the beings living on the earth. Any Fluctuations in water quality would severely affect the health of the human and animal and will also lead to ecological imbalance among Species. In this era, there has been a major rise in new inventories but simultaneously there are pollutions, global warming, degradation in ecosystem because of which there is an urgent call for on the spot monitoring system for safe drinking water. Nowadays, water quality monitoring in real time faces challenges because of greenhouse effects, depletion of the water resources, dense population, etc. Hence, there is need of establishing a better methodology to monitor the water quality parameters in the real time. World Health Organization in India estimated to have among 77 million people is victims of diseases because of ill-treated water. According to estimation, 21% of diseases are related to unsafe water in India. Nearly 1600 deaths are alone caused due to diarrhea in India each day. The water quality parameter pH shows the acidity or basicity of water. pH of pure water is 7 pH; less than 7 shows acidity and more than 7 shows alkalinity. The pH of drinking water has allowable limits of 6 to 8.5 if it is not paid heed, it results in eye irritation. Also, leads to the skin disorders. Dissolved oxygen (DO) indicates that the oxygen that is dissolved in water, makes the drinking water taste better. The ability of water to pass an electrical current is called conductivity. In water, it is affected by various dissolved solid compounds such as chlorides, sodium, calcium, sulphate, etc. The degree at which the water loses its transparency indicates its turbidity. Water temperature shows how much water is hot or cold. The depletion ofj water resources have become a common problem. The conventional method of monitoring the water quality involves the manual collection of water samples from different areas and locations. Moreover, the current methodology includes analyzing various parameters of water quality such has physical, chemical and biological parameters. Traditional methods of the water quality assessment have the setbacks like complex methodology, long waiting time for the results, inaccuracy due to human error and high cost. Therefore, there is a need to continuously monitor the water quality parameters in real time.

II. REVIEW OF LITERATURE

Bhat (2016) demonstrated the existing water quality system and scenario of water and proposed a system of wireless sensor networks using microcontroller and ZigBee module. Moreover, to make system user friendly web browser application is implemented. Therefore, the system will be faster, more efficient. Djordjevic et al. (2016) studied a final synopsis under the auspices of European Water Association (EWA) was to be held in October in Serbia to present the results. Sneh Gangwar, et al. (2013) has reviewed about the establishment of network of monitoring stations on rivers across the country. Bio-monitoring is done on certain areas. Water quality data are recorded in statistics yearbooks. Mijovic, et al. (2012) analyzed the monitoring of surface water in Serbia with manual sampling at 129 locations and 66 water streams automatic stations.

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Daigavane, et al. (2017) gave a design and development of low-cost system for real time monitoring of water quality in IOT. Anvari, et al. (2009) examined the innovative ways to improve water quality monitoring in west and Rhode Rivers. In (2017), a researcher developed an "Intelligent IOT based water quality monitoring system" pertaining to storage tanks being used by residential areas. This system was implementation as a small prototype using low cost embedded devices like Raspberry Pi3.Verma, et al (2012) was discussed about requirement and suitability of WSN (Wireless Sensors Network) for water quality surveillance. Current water quality monitoring procedures in India are manual, expansive and time consuming. A new approach of WSN for water quality surveillance is real time; remote, automatic, effective and efficient with high precision was proposed by them. Gouthami, et al (2017) detailed overview of recent works carried out in the field of smart quality monitoring. A.N Prasad. et al, (2015) presented an idea about smart monitoring system based on IoT and remote sensing technology for Fiji Islands. Mukesh Katakwar (2014) indicated that the river water quality area through analysis is polluted and can serve as a bad habitat for many aquatic animals. Ashutosh Choubey, et al, (2016) collected and analyzed water samples with respect to physiochemical parameters as per standard methods. Rouen et al. (2005) described an instrumental network of three automatic stations were designed by the engineers at the Centre for ecology & hydrology in Windermere to monitor such responses. In the article, illustration of high-resolution automatic monitoring in both catchment & reservoir applications.

III. OBJECTIVES OF THE STUDY

Water quality indicates physical, chemical characteristics that ensures, support and sustain the biological system in order to gain the wholesomeness of the water body under study. Water quality monitoring therefore consists of periodic and systematic observations to enable its assessment covering physical, chemical and biological parameters.

1) To monitor the water quality on the spot. (*24x7x365)*
2) Integrated system to display of the quality status disturbance on the dashboard and thereby notifying it thorough WIFI module.
3) To facilitate an automated monitoring system for surface water quality based IoT (internet of things) and programming for continuous monitoring of parameters.
4) Ascertaining the appropriateness of water for various purposes.
5) To design evaluated various sensors, transmission technologies.
6) Sensors are in easy access for continuous maintenance and regulating.

IV. METHODOLOGY

1) *Selection of Study Area:* this step involves the initialization by selecting the domain of the project which rivers that is surface water.
2) *Choice of Appropriate Method:* The technical aspects ad methods for determining the parameters of water quality are compared to existing process and thereby pondering to resolve the problem encountered. This is shown in figure 1.
3) *Development of Water Quality Monitoring:* Final selection of parameters, development of sensor system and validating the automatic monitoring system.

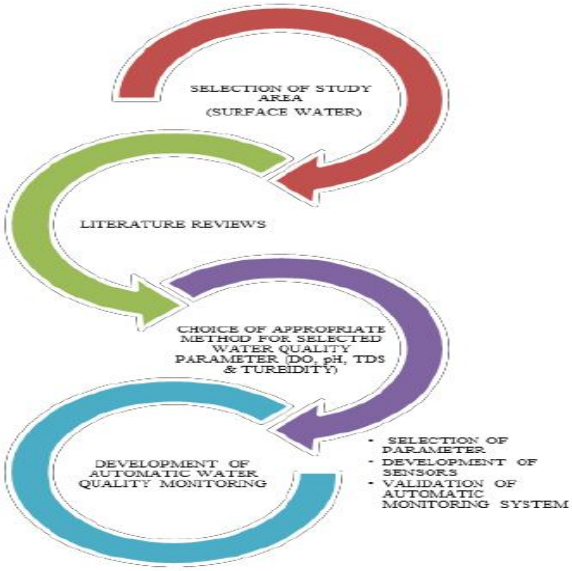


Fig. 1 Flow of methodology.

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The proposed block diagram (figure2) consists of several sensors (temperature, pH, turbidity, flow) which are connected to core controller. The core controller accesses the sensor values and process them to transfer the data through internet. Arduino is used as a core controller here. Now, the data which has been recorded by the system is to be displayed and notified to the end users through Android by WIFI module.

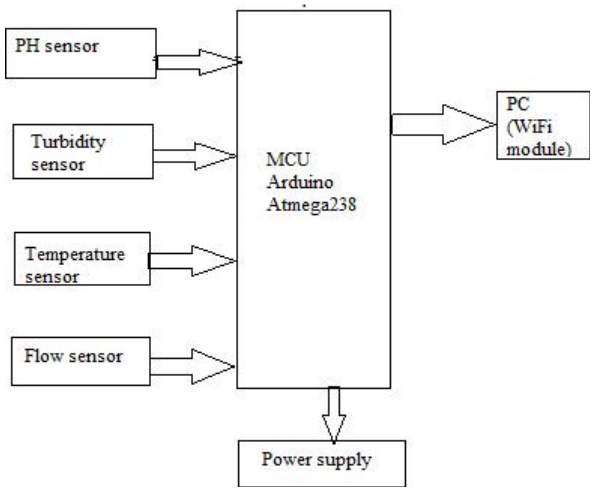


Fig. 2 block diagram.

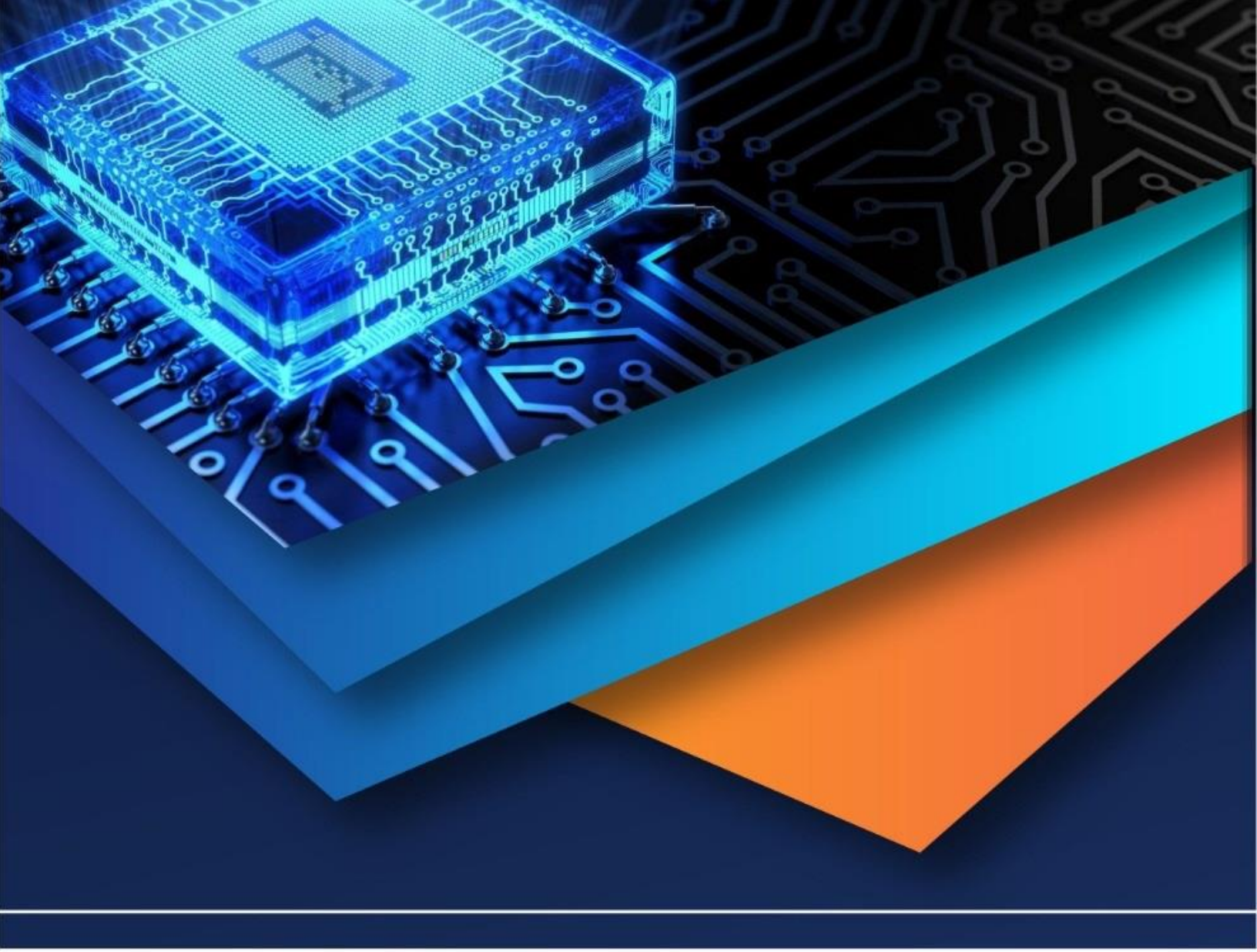
V. CONCLUSION

In conclusion, we can say that on thye basis of prevailing water monitoring system , the given system includes wireless sensor networking using several sensors to measure water quality, microcontroller and GSM module which makes this system simple. Also , microcontroller and GSM module which makes sensor network simple, low cost and more efficiently. Moreover, to make system user-friendly web browser application is also aided in there. Thus, the improvised system will be innovative, high resolute, effective, serves economy, quick, real time and easy to access. Thus, the proposed system fulfills aim and objective of the water quality monitoring.

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