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Design Smart Water Quality Monitoring System Using IOT

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Abstract—*Water is the most precious and valuable because it's a basic need of all the human beings but, now a day'swater supply department are facing problem in real time operation this is because less amount of water in resources dueto less rain fall. With increase in Population, urban residential areas have increased because of this reasons water hasbecome a crucial problem which affects the problem of water distribution, interrupted water supply, waterconservation, water consumption and also the water quality so, to overcome water supply related problems and make system efficient there is need of proper monitoring and controlling system. In this project, we are focusing on continuous and real time monitoring of water supply in IOT platform. Water supply with continuous monitoring makesa proper distribution so that, we can have a record of available amount of water in tanks, flow rate, abnormality indistribution line. Internet of things is nothing but the network of physical objects embedded with electronics, sensors, software, and network connectivity. Monitoring can be done from anywhere as central office. Using Adafruit as free sever data continuously pushed on cloud so we can see data in real time operation. Using different sensors with controller and arduino as Minicomputer can monitor data and also control operation from cloud with efficient client server communication.*
Keywords—*Smart Water Quality Monitoring; Internet of Things; Remote Sensing.*

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I. INTRODUCTION

Water is the primary need of all living beings and living without water is impossible. With the advancement of technology and industrialization, environmental pollutions have become a major concern. Water pollution is one of the most serious types of this environmental pollution. Our lives depend on the quality of water that we consume in different ways, from juices which are produced by the industries. Any imbalance in the quality of water would severely affect the humans' health and at the same time it would affect the ecological balance among all species. Water quality refers to the chemical, biological, radiological and biological parameters of the water .The essential parameters of the water quality vary based on the application of water. For example, for aquariums, it is necessary to maintain the temperature, pH level, Water Level, Total Dissolved Solid, and the level of the water in a certain normal range in order to ensure the safety of the fish inside the aquarium. For the industrial and household applications, however, some parameters of the water are more essential to be monitored frequently than the others, depending on the usage of the water.

Drinking water is becoming more harmful and contaminated due to urbanization, industrialization and increase in population. Hence there is need of better methodologies for monitoring the water quality. For examining the water quality manual efforts were required for testing. Such approaches take longer time and no longer to be considered efficient. By focusing on the above issues our model develop a low cost system for real time monitoring of the water quality in IOT environment.

II. INTERNET OF THINGS

The internet of Things (IoT) is a revolutionary new concept that has the potential to turn virtually anything "smart". A Thing in this context could be defined as an object such as a cardiac monitor to a temperature sensor. This extraordinary event has captured the attention of millions. Why is this so big today? So imagine a world where machines function without any notion of human interaction. A future where machines communicate with other machines and make decisions based on the data collected and all independent of an end user.

To understand how this revolution took shape we have to travel back to the 1900's with a profound prediction from a well renowned inventor Nicolai Tesla in which he stated that the world will be wirelessly connected to a single brain. Every invention starts with a simple thought, that's all it takes to define history. Alan Turing, the inventor of the computer, spoke about machines having sensors and humans teaching the machines, what we know today as Artificial Intelligence (AI). Then came the World Wide Web (www), the flow of information that is available to the public and this was exactly what was missing to realise Teslas prediction. The term itself "internet of things" was coined in 1999 by Kevin Ashton for linking the idea of sensors with the internet .

The IoT journey has taken over a century to see light and it will undoubtedly not stop here.It might be difficult to see the significance of the IoT but every advancement made is to make everyday life simpler and safer.

III. LITRATURE SURVEY

sathish pasika and sai teja gandla [1] proposed a monitoring system which consists of a number of sensors used to measure several quality parameters like turbidity, ph value, water level in the tank, dampness of the adjoining environment and temperature of the water. the sensors are interfaced with the microcontroller unit (mcu) and additional processing is executed by the personal computer (pc). the acquired data will be directed to the cloud by means of internet of things (IoT).

Monira Mukta et al [2] developed an IoT based Smart Water Quality Monitoring (SWQM) system which helps in incessant measurement of quality of water on the basis of four different parameters of water quality i.e., pH, temperature, turbidity and electric conductivity. Four different sensors are coupled to Arduino Uno in order to sense the quality parameters. The data collected from all the four sensors are communicated to a desktop application which is developed in .NET platform and the extracted data are matched with the standard values. On the basis of the collected data from sensors, the developed SWQM model will efficaciously examine the water quality parameters by employing fast forest binary classifier for classification of the sample of water under test is whether potable or not.

Santosh Konde and Shankar Deosarkar [3] proposed a method for developing a Smart Water Quality Monitoring (SWQM) system with reconfigurable sensor interface device using IoT environment. Sensors, Field Programmable Gate Array (FPGA) board, Zigbee based wireless communication module were used in the proposed model. Six different water quality parameters like turbidity, pH, humidity, water level, water temperature and carbon dioxide (CO2) on the surface of water were considered in real-time. The proposed method will provide assistance in guarding the safer and balanced environment of water bodies.

Tha.Sughapriya et al [5] developed a method for determining the quality of water using IoT and different sensor modules. This system uses different sensors for monitoring the water quality by determining pH, turbidity, conductivity and temperature. The Arduino controller used will access the sensor data. With the use of IoT, the collected data is analyzed and the pollution of water can be investigated by a stringent mechanism. Additionally, the developed system sends alerts and notifications to the people and apprehensive authorities about the quality of water. The task of water quality monitoring could be achieved by with people having less training also. Installation of the water quality monitoring system could be achieved effortlessly adjacent to the water resources (target area).

S.A. Hamid et al [6] designed and developed a Smart Water Quality Monitoring System (SWQMS), and the evaluation factors such as temperature and pH value of swimming pool was continuously monitored based on statistical tools such as Design of Experiment (DOE) and Analysis of variance (ANOVA). The findings of the experiment divulge that time, volume of the pool and the interaction aspects will not affect the value of pH, and time of day will have an effect on temperature of the water of swimming pool. It was witnessed that the developed system is proficient to update the water quality status of the pool automatically by means of IoT and adjust the pH level. The proposed system is also proficient to offer monitoring in real-time and needs less maintenance.

Prasad et al [4] developed a method for smart water quality monitoring system in Fiji, by employing remote sensing and IoT technology. The quality parameters used to analyse water are Oxidation and Reduction potential (ORP) and Potential Hydrogen (pH).

With efficacious implementation of this approach of monitoring, an early warning system for water pollution will be developed with a completely implemented system using numerous monitoring stations. The study of water quality in Fiji islands is also presented which necessitates recurrent data collection network for water quality monitoring using IoT and Remote Sensing. The comparative study is presented for various parameters like Turbidity, pH, temperature and Conductivity. The developed system has demonstrated its effectiveness by providing precise and reliable values in real-time water monitoring

IV. PROPOSED SYSTEM

Proposed system uses four sensors which are pH, TDS, Temperature, Water Level, Arduino Uno as the main processing module and one data transmission module ESP8266 Wi-Fi module. The microcontroller unit (Arduino Uno) is a significant part of the system developed for water quality measurement. We collect the information from sensors and display it on LCD and also we can see the same information on thinger.io server.

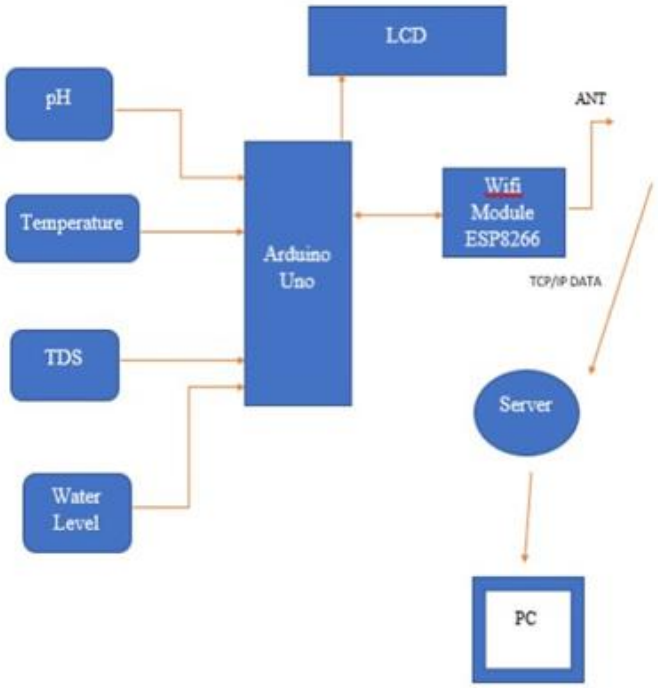

Fig- Working of Design Smart Water Quality Monitoring System.

V. METHODOLOGY

In general water quality monitoring system consists of various sensors such a pH sensor, turbidity sensors, temperature sensors, conductivity sensors, humidity sensors and many other sensors. Fig.1 shows the general block diagram of smart water quality monitoring system. As shown in the figure, core controller forms the heart of the system. All the sensors are connected a core controller and this controller controls theoperation, gets data from sensors, and compares it with that of the standard values and sends the values to the concerned end user or authorities through wireless modules

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VI. DISCUSSION& RESULT

Due to the limited drinking water resources, intensive money requirements, growing population, urban change in rural areas, and the excessive use of sea resources for salt extraction has significantly worsened the water quality available to people. A smart water quality monitoring system is an essential device which monitors the quality of water continuously. Fig. 4 shows the developed model of design smart water quality monitoring system

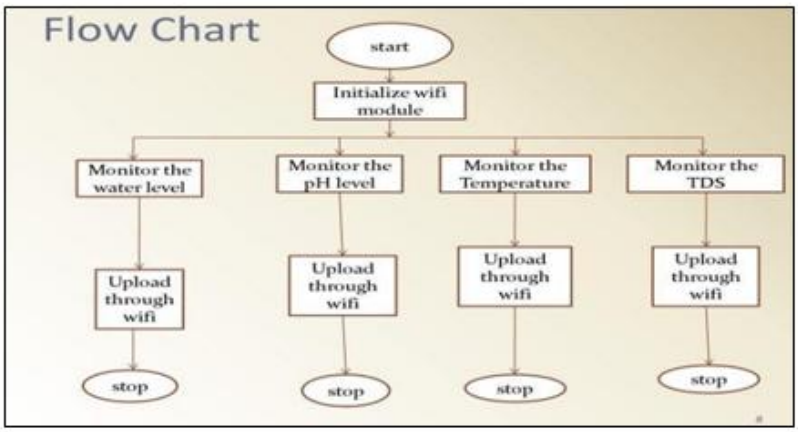

Fig- flow chart

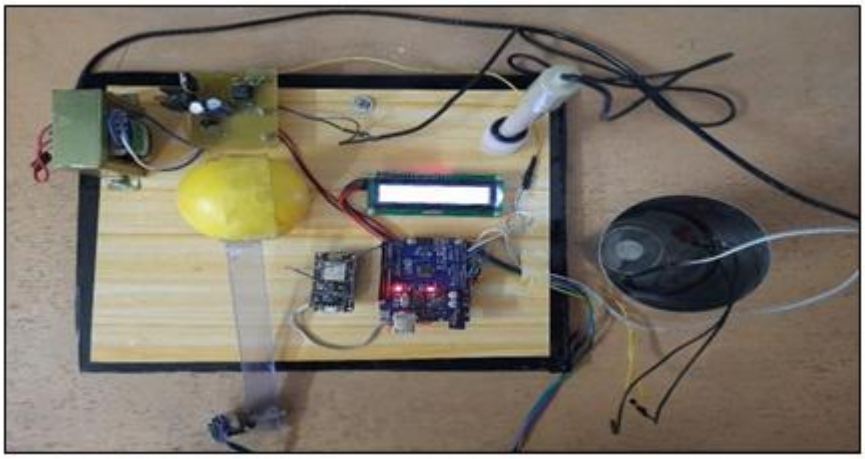

Fig-Developed model of design smart water quality monitoring system.

VII. CONCLUSION

Water Pollution is a major threat to any country, as it affects health, economy and spoils bio- diversity. In this work, causes and effects of water pollution is presented, as well as a comprehensive review of different methods of water quality monitoring and an efficient IoT based method for water quality monitoring has been discussed. Although there have been many excellent smart water quality monitoring systems, still the research area remains challenging. This work presents a review of the recentworks carried out by the researchers in order to make water quality monitoring systems smart, low powered and highly efficient such that monitoring will becontinuous and alerts/notifications will be sent to the concerned authorities for further processing. The developed model is cost effective and simple to use (flexible). Three water samples are tested and based on the results, the water can be classified whether it is drinkable or not.

As a future directive, the suggestion is to use latest sensors for detecting various other parameters of quality, use wireless communication standards for better communication and IoT to make a better system for water quality monitoring and the water resources can be made safe by immediate response.

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