IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 5, June 2022
Impact Factor: 6.252

Real Time Water Pollution Monitoring RC Boat Using IOT

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Abstract: *Nowadays drinking water is the most precious and valuable for all the human beings, drinking water utilities faces new challenges in real-time operation. This challenge occurred because of limited water resources growing population, ageing infrastructure etc. Hence therefore there is a need of better methodologies for monitoring the water quality. Traditional methods of water quality involve the manual collection of water sample at different locations, followed by laboratory analytical techniques in order the character the water quality. Such approaches take longer time and no longer to be considered efficient. Although the current methodologies analysis the physical, chemical and biological agents, it has several drawbacks: a) poor spatiotemporal coverage b) it is labor intensive and high cost(labor, operation; and equipment) c)the lack of real time water quality information to enable critical decisions for public health protection. Therefore, there is a need for continuous online water quality monitoring. The online water monitoring technologies have made a significant progress for source water surveillance and water plant operation. The use of their technologies having high cost associated with installation and calibration of a large distributed array of monitoring sensors. The algorithm proposed on the new technology must be suitable for particular area and for large system is not suitable.*

Keywords: Water Quality; conductivity Sensor; pH sensor; Turbidity Sensor; Raspberry Pi3, model B.

I. INTRODUCTION

In the 21st century, there were lots of inventions, but at the same time were pollutions, global warming and so on are being formed, because of this there is no safe drinking water for the world's pollution. Nowadays, water quality monitoring in real time faces challenges because of global warming limited water resources, growing population, etc. Hence there is need of developing better methodologies to monitor the water quality parameters in real time[1]. The water quality parameters pH measures the concentration of hydrogen ions. It shows the water is acidic or alkaline. Pure water has 7pH value, less than 7pH has acidic, more than 7pH has alkaline. The range of pH is 0-14 pH. For drinking purpose it should be 6.5-8.5pH. Turbidity measures the large number of suspended particles in water that is invisible. Higher the turbidity higher the risk of diarrheoa, collera. Lower the turbidity then the water is clean. Temperature sensor measures how the water is, hot or cold. Flow sensor measures the flow of water through flow sensor. The traditional methods of water quality monitor involves the manual collection of water samples from different locations. With the rapid growth of the thrift/providence, more and more serious troubles of environment arise. Water defilement is one of these problems. Regular monitoring of water quality parameters are Conductivity, pH, turbidity, dissolved oxygen, chemical oxygen demand, biochemical oxygen demand, ammonia nitrogen, nitrate, nitrite, phosphate, various metal ions and soon. The most common method to detect these parameters is to collect samples manually and then send them to laboratory for detecting and analyzing. This method wastes too much man power and material resource, and has the limitations of the samples collecting, long-time analyzing, the aging of demonstration equipment and other issues. Sensor is an ideal solution to solve these problems. It can convert no power information into electrical signals.

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II. LITERATURE REVIEW

[1]Akanksha Purohit, Ulhaskumar Gokhale in their paper titled "Real Time Water Quality Measurement System based on GSM" this technique is time overwhelming and not economical. Since it's not feasible to take the water sample to the laboratory after every hour for measuring it's quality. The water quality measuring system can measure the essential qualities of water in real time. The system consists of multiple sensors to measure the standard of water, microcontroller and GSM to send the information to the watching centre. It's a true time system which is able to endlessly measure the standard of water and can send the measured values to the watching centre when each predefined time. The system relies on microcontroller 8051 and GSM.. Real time system for water quality measuring based on GSM is associate economical system that uses numerous water detection device and GSM network. The system is incredibly versatile and economical. It's real time system that measures numerous parameters present within the water with the assistance of device and send them to the watching centre mechanically. It doesn't need individuals on duty. Its versatile system as a result of simply by replacement the sensors and by creating some changes within the computer code the system will be created to measure completely different parameters of water.

[2] Sachin Patil, Kiran Patil, Sanjay Patil in their paper titled, "Monitoring of Turbidity, PH & Temperature of Water Based on GSM" It bases on SMS (Short Messaging Service) in the GSM (Global System for Mobile Communications) network to instantaneously transfer the collected data. It also can remotely monitor the water quality on line. The system implements automation, intelligence and network of water quality monitoring, and uses man power, material and financial resources. Monitoring of Turbidity, PH & Temperature of Water makes use of water detection sensor with unique advantage and existing GSM network. The system can monitor water quality automatically, and it is low in cost and does not require peopleon duty. Only by replacing the corresponding sensors and changing the relevant software programs, this system canbeused to monitor other water quality parameters.

[3] A. N. Prasad, K. A. Mamun, F. R. Islam, H. Haqva in their paper titled, "Smart Water Quality Monitoring System". The Smart Water Quality Monitoring System will measure the following water parameters for analysis; Potential Hydrogen (pH), Oxidation and Reduction Potential (ORP), Conductivity and Temperature using a RS technology. While monitoring these parameters, it is perceived that one should receive a stable set of results .Therefore a continuous series of anomalous measurements would indicate the potential introduction of a water pollutant and the user will be notified of this activity with the aid of IOT technology. False positives, such as anomalous readings over a short period of time, will be recorded but not treated as an alert. Hence, with the successful implementation of this monitoring approach, a water pollution early warning system can be achieved with a fully realized system utilizing multiple monitoring station This research demonstrates a smart water quality monitoring system. Four different water sources were tested within a period of 12 hours at hourly intervals to validate the system measurement accuracy. The results obtained matched with the expected results obtained through research. The temperature relation with pH and conductivity were also observed for all the water samples

[4] Dr. Nageswara Rao Moparthi in their papeer titled, "water quality monitoring system using IOT" .This suggested square outline comprises for amount for gadgets hosting particular sensors, and the gathered information starting with the greater part units need aid assembled also sent of the arduino. We can measure the ph content and content in the water using the PH sensors. Then messages can be sending to owner whenever the PH content is insufficient. Checking from claiming PH from claiming water utilization relating sensor. Those framework might screen water personal satisfaction automatically. Furthermore it sends notice with commissioned individual and doesn't require kin on obligation alternately physical participation. This framework camwood be used to screen other water caliber parameters such as turbidity, temperature, broken down oxygen levels .this paper will stretch out to figure the temperature of the water and the turbidity of the water and also the PH levels of the water at last it sends those data or information likewise a SMS with inform those sanctioned persons.

[5] M. Joseph Vishal Kumar, Krishna Samall in their paper titled "Design and Development of Water Quality Monitoring System in IOT". The system is able to measure physiochemical parameters of water quality, such as flow, temperature, pH, conduction and also the redox potential. These physiochemical parameters are used to detect water contaminants. The sensors which are designed from first principles and implemented with signal conditioning circuits are connected to a microcontroller-based measuring node, which processes and analyses the data. In this design, ZigBee receiver and transmitter modules are used for communication between the measuring and notification node. Sensing is done by using

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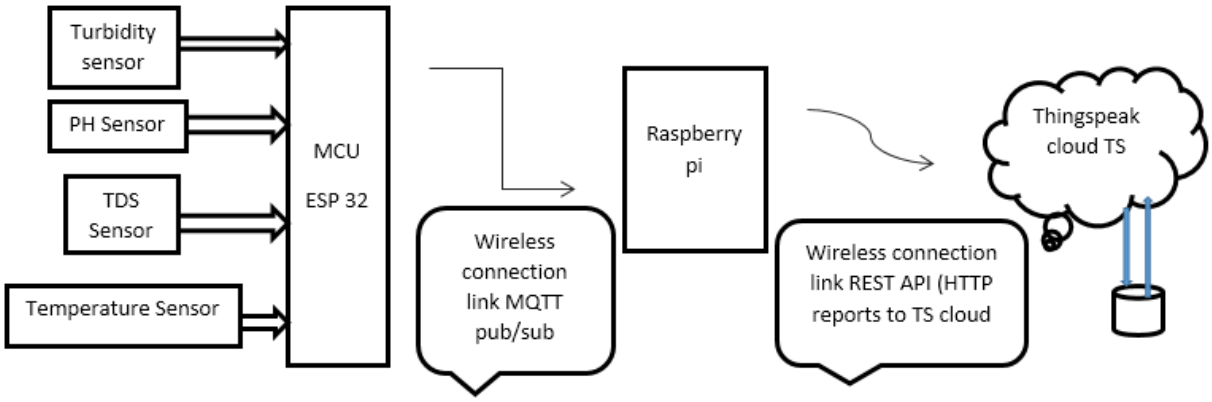
the probes at 3 different levels based on the level of water. Turbidity sensor quantitative measure of suspended particles in the fluid or liquid Water with high turbidity is murky, while water with low turbidity is clear Ph low turbidity is clear pH sensor, commonly used for water measurements, is a measure of acidity and alkalinity, or the caustic and base present in a given solution based on its nature One-wire temperature sensors like the DS18B20 are devices that can measure temperature with a minimal amount of hardware and wiring These sensors use a digital protocol to send accurate temperature readings directly to your development board without the need of an analog to digital converter

[6] Anantha Naik G. D, Dr. Geetha V in their paper titled "IoT based Real-Time Water Quality Monitoring System using smart Sensors". This paper is describes on design and development of water quality monitoring system based on Internet on Things(IOT) using smart sensor networks. With the objective of notifying the user in real time water quality parameters. According to world health organization (WHO) around 76 million people in our country not access to safe drinking water and 21% diseases are water related. To reduce water related diseases we need to measure water parameters such as pH, conductivity, turbidity, temperature etc This paper presents the theory on real time monitoring of water quality in IOT environment. The0water0quality0monitoring is impartment for several applications0such as drinking water distribution and measurement and environment monitoring of pond and ecosystem etc. The proposed real- time water monitoring system having three different sensors which are connected to a core. Which are senses or read the water parameter by using microcontroller and send to the cloud using Wi-Fi module, here we can monitor the 0water quality parameter on the0internet by using 0cloud0computing. We use thing speak as a cloud server to store the water parameters these parameters can be obtained in graphical manners.

[7] Dr. Rajeshwari Devi D V in their paper titled, "Real Time Water Quality Monitoring using IOT Dr. Rajeshwari Devi D V". For checking the water quality consistently and by utilizing sensors water is separated into two chambers: one for drinking and the other for livestock into two chambers: one for drinking other for livestock purposes. Furthermore, it additionally produces the bill utilizing cloud a client can see the water bill in his/her Mobile. utilizing Raspberry pi module and PH, Turbidity, Conductivity and temperature sensors. The yield will be transferred to the cloud and the information from the cloud in inspected and put into public space if not checking does not takes place in proper format .key objective was to decrease the time required for testing of water in research facilities, and we have had the option to accomplish it yet with lesser exactness. It minimizes the laboratory apparatus that would be needed for the conventional method of testing water quality. The significant point is that we recorded all the information obtained in our testing in cloud. The results can be seen and gotten at whatever point required. We can easily track the water quality online

III. PROPOSED SYSTEM

This section explains the complete block diagram of the proposed system. Also, it presents the detail explanation of each and every block. The overall block diagram of the proposed system is as shown in figure 1. This proposed block diagram consists of number of devices having respective sensors, and the collected data from all devices are gathered and sent to the Raspberry pi 3 model B.



. Fig1 Block diagram of Proposed model

The device consist of several sensors for measuring water quality parameters such as pH, turbidity, conductivity. The data from the sensors are sent directly to the Raspberry pi3 model B. So the proposed system gets the data from the

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sensors and processes on them, put the data in a text file which is transmitted to IOT. For transmitting data to the IOT, gateway is created on the Raspberry pi 3 model B using FTP (file transfer protocol) protocol. In the proposed system, for monitoring the processed data on the internet, cloud computing technology is used which provides the personal local server. In cloud computing, separate IP address is provided which make possible to monitor data from anywhere in the world using the internet. To access that monitor data and make system user-friendly browser application is introduced which work on HTTP. So, by using browser application user can access and monitor the data from all over the word

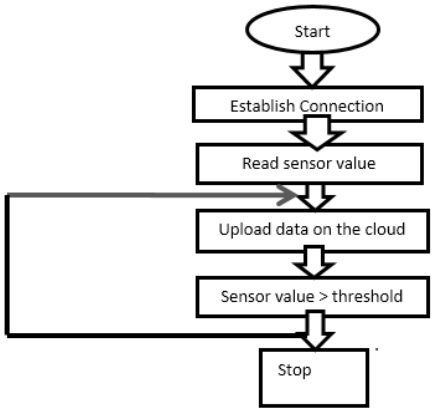


Fig 2 Steps involve in monitoring RC boat

3.1 Advantages of the proposed system:

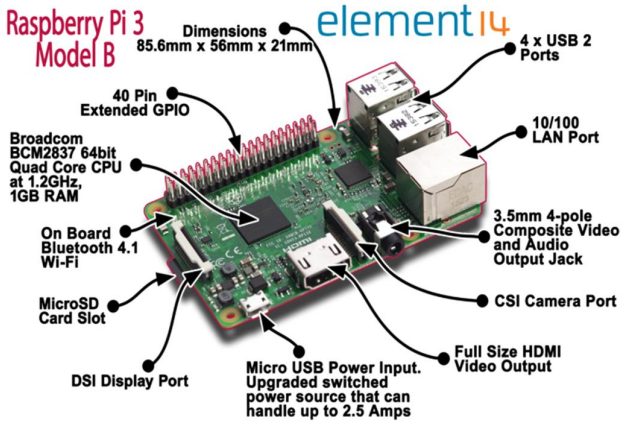
- Improves water quality
- Intelligent management of the services in the city.
- Due to automation it will reduce the time to check the parameters.
- Low maintenance.
- Prevention of water diseases.
- Real time information on the website.

IV. HARDWARE DESCRIPTION

The major components used in the proposed have been discussed briefly:

4.1 Raspberry Pi3 Model B

The Raspberry Pi3 Model B is a wonderful platform that can be used to build automation systems. Clearly, the Raspberry Pi3 model B board is perfect when being used as a “hub” for automation systems, connecting to other open-source hardware parts like sensors.



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Raspberry Pi3 Model B is a small sized single board computer which is capable of doing the entire job that an average desktop computer does Like spread sheets, word processing, Internet, Programming, Games etc. Raspberry Pi3ModelB Built on the latest Broadcom 2837 ARMv8 64bit processor, the new generation Raspberry Pi3 Model B is faster and more powerful than its predecessors. With built-in wireless and Bluetooth connectivity, it becomes the ideal IoT ready solution. It consists of 1.2GHz QUAD Core Broadcom BCM2837 64bit ARMv8 processor,BCM43438 Wi-Fi on board, Bluetooth Low Energy (BLE) on board,1GB RAM,4x USB 2 ports,40pin extended GPIO,HDMI and RCA video output.
Raspberry Pi3Model B runs on Linux kernel based operating systems. It boots and runs from the SD card. It does not have any internal memory other than the ROM. It has an SD card slot which is capable of reading up to 32 GB. The GPIO pins of the raspberry Pi3 Model B are programmed using Python programming language. The I/O devices like sensors are givento GPIO pins whenever needed.

4.2 Water Turbidity Sensor

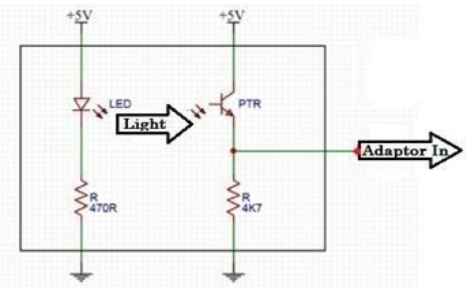
The TSD-10 module measures the turbidity (amount of suspended particles) of the water source. An optical sensor is a measuring product for a turbid water density or an extraneous matter concentration using the refraction of wavelength between photo transistor and diode. By using an optical transistor and optical diodes, an optical sensor measures the amount of light coming from the source of the light to the light receiver, in order to calculate water turbidity.

Turbidity Sensor Theory of Operation

The sensor operates on the principle that when light is passed through a sample of water, the amount of light transmitted through the sample is dependent on the amount of soil in the water. As the soil level increases, the amount of transmitted light decreases. The turbidity sensor measures the amount of transmitted lightto determine the turbidity of the water. These turbidity measurements are supplied to the Raspberry Pi3 Model B, which makes decisions on how long to examine. These decisions are made based on a comparison between clean water measurements (taken at the beginning of the process) and the turbidity water measurement taken at the end of process cycle. This results in water quality check

Specifications

- Rated Voltage: DC 5V (between No #1 & Ground)
- Operating Temperature Range:-10°C ~ 90°C
- Rated Current: 30 mA
- Insulation Résistance: in 100 MΩ by 500V DC



4.3 Water pH Sensor

Do we need to measure aqueous solution pH? Yes, here the Grove - pH sensor can help you do it. This sensor gives the output signal corresponding to the hydrogen ion concentration that is measured by pH electrode. Because it can be directly connected to controller, and then you can observe the pH value at any time. This device can be used for pH measurements, such as waste water, sewage and other occasions.

Features:

- Grove Interface
- Wide measuring range
- Life span is two years
- Isopotential Point: pH 7.00 (0 mV)

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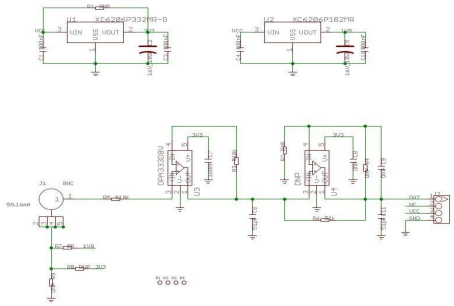

4.4 Water Conductivity Sensor

This sensor allows you to measure water conductivity. It is included in Open Garden Hydroponics. The conductivity of water quality with this sensor can measure water conductivity.

A. Specifications

- Sensor type: Two electrodes sensor
- Electrode material: Platinum
- Conductivity cell constant: 1 ± 0.2 cm-1

V. INTERNET OF THING

In the past decade, all the humans' life changed because of the internet. The internet of things has been heralded as one of the major development to be realized throughout the internet portfolio of technologies. The Internet of Things (IOT) is concerned with interconnecting communicating objects that are installed at different locations that are possibly distant from each other. Internet of Things represents a concept in which, network devices have ability to collect and sense data from the world, and then share that data across the internet where that data can be utilized and processed for various purposes. The internet of things describes a vision where objects become part of internet: where every object is uniquely identified and access to the network. IOT communication is quite different from the traditional human to human communication, bringing a large challenge to existing telecommunication and infrastructure. Furthermore, IOT provides immediate information regarding access to physical objects with high efficiency. The concept of Internet of Things is very much helpful to achieve real time monitoring of sensor data. Internet of Things (IOT) is a kind of network technology, which is based on information sensing equipments such as RFID, infrared sensors, GPS, laser scanners, gas sensors and so on, can make anything join the Internet to exchange information, according to the protocol, which gives intelligent identification, location and tracking, monitoring and management. In proposing system we introduce cloud computing technique for monitoring sensor values on the internet. Cloud computing provides the access of applications as utilities, over the internet. The cloud computing characteristic and development approaches are explained. Cloud computing is a large scale processing unit which processes in run time and it is also a very low cost technology based on the IP. The application area of IOT includes building and home automation, smart city project, smart manufacturing of various products, wearables, health care systems and devices, automotive etc.

VI. THINGSPEAK

HTTP over Internet. Anyone can create applications like sensor logging, location tracking, and social network of things with status updates with the help of Thing Speak. It is an public domain IoT application and API to store and retrieve

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data from things with the help of HTTP and MQTT protocol over the Internet or via a Local Area Network. it enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates API of Thing Speak permits processing of numeric data like averaging, median, summing, rounding and time scaling. it supports 8 data fields, elevation, latitude, longitude, and status. they can send sensors data to cloud to store data in a channel using sensors and websites. Cloud provides easy access to the stored data. Thing Speak channel data can be analyzed, visualized, calculate new data, or interact with web sites and social media. With this one can calculate new data, and visualize data in the form of plots, charts, and gauges using analytical tools online. Thing Speak can access MATLAB to provide sensor data. It uses instruments for devices to communicate for actions. One can react both to raw data and new data in a channel and also can help devices to execute by queuing the commands. V

VII. RESULTS AND DISCUSSION

The following are the results which obtained from this work,

- Waste Level detection inside the water resources.
- Transmit the information to web.
- The data can be accessed anytime and anywhere in the world.
- It is one of the real-time data transmission and access

This Online Monitoring of Water Quality using Raspberry Pi3 Model B is very useful for smart cities in different aspects. We have seen that, in cities there are different water source located in the different areas and water get pollute many times and the people do not get information about this. Our system is designed to solve this issue and will provide pollution details of the water source located in the different areas throughout the city. The concerned authority can access the information from anywhere and anytime to get the details. accordingly they can take the decision on this immediately.

Fig shows that location-1water source sensors information displayed on the Thing speak .This information can be accessed from anytime and anywhere and the concern person take the decision accordingly.

VIII. FUTURE SCOPE

This proposed system gives information to whole users those who depend on that plant. we can use more sensors to detect more parameters for security purpose .By interfacing relay we can controls the supply of water for easy detection.

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IX. APPLICATIONS

- This system can be used for both commercial and domestic purposes.
- Water supply agencies.
- In health department for identifying the cause

X. CONCLUSION

The conclusion of the parameters of water quality monitoring system is verified that the system achieved the reliability and feasibility of using it for the actual monitoring purposes. Monitoring of Turbidity, PH & Temperature of Water makes use of water detection sensor with unique advantage. The sensors are control the project the system can monitor water quality automatically, and it is low in cost and does not required people. Real time system for water quality measuring based on IOT is associate economical system that uses numerous water detection device and IOT network. The system is incredibly versatile and economical. It's real time system that measures numerous parameters present within the water with the assistance of device and send them to the watching centre mechanically. It doesn't need individuals on duty. Its versatile system as a result of simply by replacement the sensors and by creating some changes within the computer code the system will be created to measure completely different parameters of water. The system is reliable and easy and it will be extended to measure water pollution so on.

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