WATER QUALITY MONITORING & ANALYSIS USING IOT

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Abstract : Nowadays, there had been lots of inventions, but at the same time have been pollutions, international warming and so on are being formed, because of the reality of this there is no sheltered drinking water for the world's contamination. Water contamination is one of the greatest fears for the green globalization. In 21st century, environmental monitoring is such an interesting system and plays such an important role in human life. In order to ensure the safe supply of the drinking and other activities of water the quality needs to be screen in real time This paper exhibits a stage advancement and plan of a minimal effort framework for constant checking of condition of environment at the rivers or lakes and Analysis of the water quality using IOT (internet of things). This project using Arduino Mega 2560 R3 microcontroller with several sensors attached to the platform. The device consist of various type of sensors is used to measuring physical and chemical parameters of the different areas water. The parameters such as temperature, PH, turbidity for water quality can be measured and carbon monoxide sensor (MQ-7) for air quality can be measured. Sensors output are saved into a data logger and sent to the Internet clouds. Using the collected data we can say that the water is drinkable or not as an acidic base. By using data that we can say that the particular area is use for fishing or not and also from data we can specify spices of fish. Although we can say that water is useable for agriculture area.

Keywords: **- IoT, Water quality, Air quality, Cloud.**

I. INTRODUCTION

Monitoring the environment in our daily life is important as well as monitoring our health. It is associated to human due to the fact by monitoring the best of water and air surround them will help to enlarge the recognition to maintain the environment considering that the environmental awareness among the public is still not adequate. These days, observing a water quality continuously faces difficulties as a result of a worldwide temperature alteration constrained water assets, developing populace, and so on. Consequently there is need of making better procedures to checking the water and air quality parameters progressively. This paper presents platform to display the surroundings environment at the open water surface area focusing on rivers or lakes. The platform is placed on the water floor area and left for several days to gather the data of temperature, humidity, carbon monoxide and pH of the surrounding environment. The water magnificent parameters pH estimates the familiarity with hydrogen particles. It demonstrates the water is acidic or basic. Unadulterated water has 7pH esteem, substantially less than 7pH has acidic, more than 7pH has soluble. For drinking purpose it be 6.5-8.5pH. Turbidity sensor measures the large number of suspended particles in water that is invisible. Lower the turbidity then the water is spotless. Higher the turbidity higher the risk of the runs, cholera. Temperature sensor senses the surrounding temperature of water in rivers or lakes. Carbon monoxide sensor senses the presence of the carbon monoxide gasoline that used to be released. All the collected data from every sensor are saved into the data logger and cloud. The conventional techniques for water quality screen includes the manual accumulation of water tests from various areas and after 2 days lab process gives final reading. Using the collected data we can say that the water is drinkable or not as an acidic base. By using data that we can say that the particular area is use for fishing or not and also from data we can specify spices of fish. Although we can say that water is useable for agriculture area.

II. LITERATURE SURVEY

The available water resources are getting depleted and water quality is deteriorated due to the rapid increase in population and need to meet demands of human beings for agriculture, industrial, and personal use. The quality of ground water is also affected by pesticides and insecticides. The rivers in India are getting polluted due to industrial waste and discharge of untreated sewage. In order to eliminate problems associated with manual water quality monitoring, CPCB has planned to go hi-tech and plans to establish 'Real Time Water Quality Monitoring (WQM) Network' across Ganga Basin. Stephen Brosnan, 2007 [3] investigated a wireless sensor network (WSN) to collect real time water quality parameters (WQP). Quio Tie-Zhn, 2010 [4] developed online water quality monitoring system based on GPRS/GSM. The information was sent by means of GPRS network, which helped to check remotely the WQP. Kamal Alameh, 2011[5] presented web based WSN for monitoring water pollution using ZigBee and WiMAX networks. The system measured various WQP. It collected, processed measured data from sensors, and directed through ZigBee gateway to the web server by means of WiMAX network to monitor quality of water from large distances. System was capable of monitoring water pollution in real time. Dong He, 2012 [6] developed WQM system based on WSN [7]. The remote sensor was based on ZigBee network. WSN tested WQP and sent data to Internet using GPRS. With the help of Web, information was gathered at remote server. Kulkarni Amruta, 2013 [8] created solar powered WQM utilizing remote sensor network. The Base station (BS) gathered information from distant remote sensors. The BS associated with ZigBee module was powered by sunlight baseboard (Energy harvesting).

III. OBJECTIVE

- Our main objective is Design and development of the real- time monitoring of the water and air quality parameters in IOT environment.
- Our device must be low cost, more efficient reading and capable of processing, analysing, sending data and viewing the data on cloud & website. Implement is suitable for surrounding environment monitoring, ecosystem monitoring, etc. and the data can be viewed anywhere in the world.
- Single tap can detect all the possible water and air parameters such as pH, carbon monoxide sensor (MQ-7), turbidity and Temperature and show to the website and cloud.
- Also using data we can prediction that the water is drinkable or not and also particular area is use for fishing or not.

IV. SCOPE

This system will be helpful to check the quality of water and air in different areas. This system will help to measure the PH level, turbidity level, temperature and carbon monoxide. This system will be used in various areas such as river, lakes and water related places. This will be also useful in healthcare, agriculture, fishing by checking the quality of water.

V. STUDY OF CURRENT SYSTEM

In the current system the report of water check takes more time as the system takes two to three days. It is manual process which takes different phases such as collecting the sample from different places to the laboratory which takes minimum two days after that the report is carried out by the current system.

VI. HARDWARE AND CLOUD

6.1 Processor (Arduino mega 2560)

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega 2560 board is compatible with most shields designed for the Uno and the former boards Duemilanove or Diecimila.

Fig. 1. Arduino Mega 2560

6.2 Network (ESP8266 wifi module)

The ESP8266 WiFi Module is an independent SOC with coordinated TCP/IP convention stack that can give any microcontroller access to your WiFi organize. The ESP8266 is prepared to do either facilitating an application or offloading all Wi-Fi organizing capacities from another application processor. Each ESP8266 module comes pre-customized with an AT direction set firmware, which means, you can basically attach this to your Arduino gadget and get about as much WiFi-capacity as a WiFi Shield offers (and that is simply out of the container)! The ESP8266 module is a very financially savvy board with an enormous, and regularly developing, network.

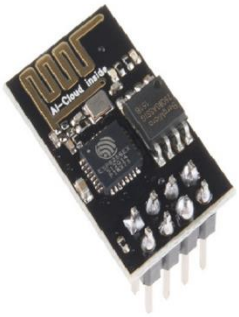

Fig. 2. ESP8266

6.3 Display 20 x 4

A liquid-crystal display (LCD) is a flat panel display, electronic visual display, or video show that utilizes the light adjusting properties of fluid gems. Fluid precious stones don't discharge light straightforwardly. Here, in this i'ble we're going to utilize a monochromatic 20x4 alphanumeric LCD. 20x4 implies that 20 characters can be shown in every one of the 4 columns of the 20x4 LCD, along these lines a sum of 80 characters can be shown at any occasion of time.

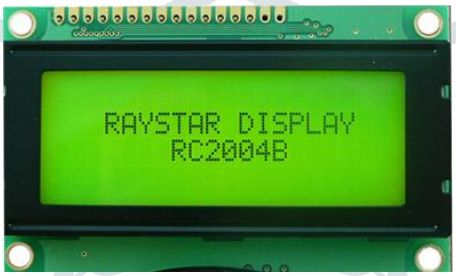

Fig. 3. Display 20 x 4

6.4 Temperature Sensor

This is a pre-wired and waterproofed rendition of the DS18B20 sensor. Convenient for when you have to quantify something far away, or in wet conditions. While the sensor is great up to 125°C the link is jacketed in PVC so we propose holding it under 100°C. Since they are advanced, you don't get any flag debasement even over long separations! These 1-wire computerized temperature sensors are genuinely exact (±0.5°C over a significant part of the range) and can offer up to 12 bits of accuracy from the installed advanced to-simple converter. They work extraordinary with any microcontroller utilizing a solitary advanced stick, and you can even interface numerous ones to a similar stick, every one has an interesting 64-bit ID consumed in at the manufacturing plant to separate them. Usable with 3.0-5.0V frameworks. The main drawback is they utilize the Dallas 1-Wire convention, which is fairly unpredictable, and requires a pack of code to parse out the correspondence. When utilizing with microcontroller put a 4.7k resistor to detecting pin, which is required as a pullup from the DATA to VCC line.

Fig. 4. Temperature Sensor

6.5 PH Sensor

pH stands for power of hydrogen, which is a measurement of the hydrogen ion concentration in the body. The total pH scale ranges from 1 to 14, with 7 considered to be neutral. A pH less than 7 is said to be acidic and solutions with a pH greater than 7 are basic or alkaline.

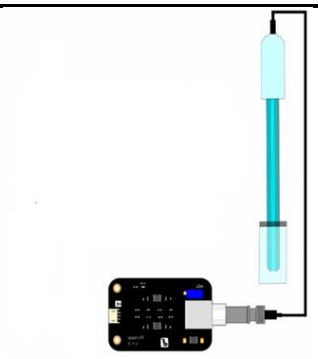

Fig. 5. PH Sensor

6.6 Turbidity Sensor

The Arduino turbidity sensor identifies water quality by estimating dimension of turbidity. It can identify suspended particles in water by estimating the light transmittance and dispersing rate which changes with the measure of all out suspended solids (TSS) in water. As the TTS expands, the fluid turbidity level increments. You may likewise check Liquid Sensor Selection Guide to show signs of improvement acquainted with our fluid sensor arrangement. This Arduino turbidity sensor have both simple and advanced flag yield modes. You can choose the mode as indicated by the MCU as limit is movable in computerized flag mode. Turbidity sensors can be utilized in estimation of water quality in waterways and streams, wastewater and emanating estimations, residue transport research and lab estimations.

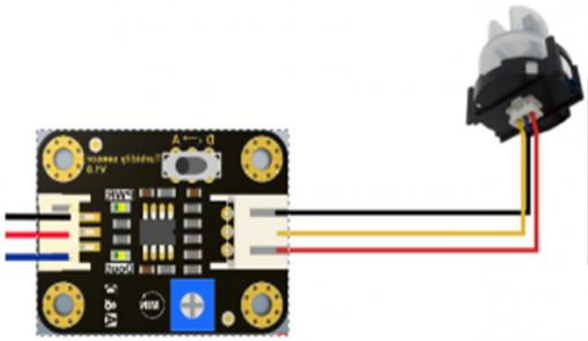

Fig. 6. Turbidity Sensor

6.7 Carbon Monoxide sensor

This is an Arduino Carbon Monoxide Sensor. It utilizes MQ7 test to identify Carbon Monoxide (CO) focuses noticeable all around from 20 to 2000ppm. The affectability can be balanced by the potentiometer. The yield is relative to the thickness of gas. You can utilize simple perusing to peruse the information from this sensor. To facilitate the trouble of utilizing this sensor, a Gravity Interface is adjusted to permit plug and play. The Arduino IO extension shield is the best counterpart for this senor associating with your Arduino microcontroller.

Fig. 7. Carbon Monoxide Sensor

6.8 ThingSpeak

ThingSpeak is a stage giving different administrations solely focused to building IoT applications. It offers the capacities of constant information accumulation, envisioning the gathered information as diagrams, capacity to make modules and applications for working together with web administrations, interpersonal organization and different APIs.

Fig. 8. Logo of ThingSpeak IoT cloud

VII. METHODOLOGY

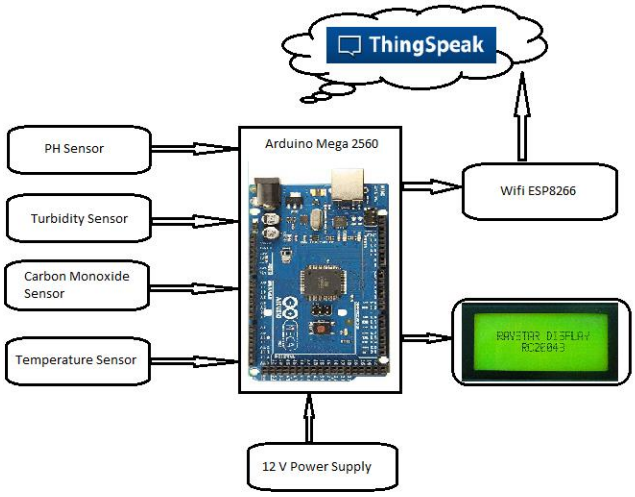

Fig. 9. Block Diagram of whole system

1. The sensors will fetch the data which is PH level, turbidity, temperature and carbon monoxide.
2. The data which is fetched will be sent to the processor.
3. The processor will give the useful information about the environment by the fetched data.
4. The processor will sent the data to cloud which will provide the information related the environment by using ESP8266.
5. The Information related to the environment will also be shown on the display of the device.
6. The data stored on the cloud can be viewed anywhere and anytime.

VIII. RESULT

The test were done for each sensor. And the result were saved in to cloud and showed in to display. Figure shows the reading the PH, turbidity, temperature and carbon monoxide.

In fig. 10 shows the output of temperature sensor on cloud.

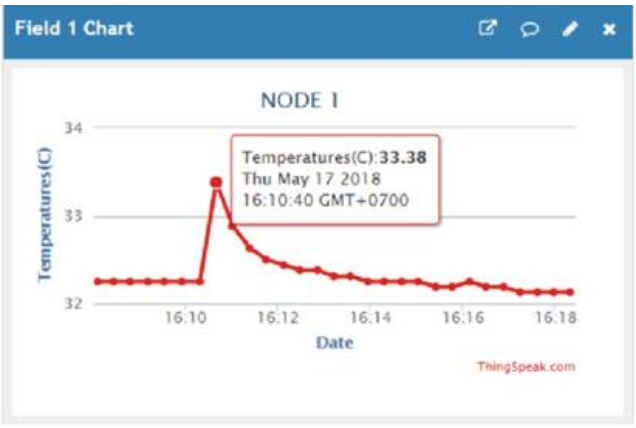

Fig. 10. Output of temperature sensor

In Fig. 11 shows the output of PH sensor on cloud.

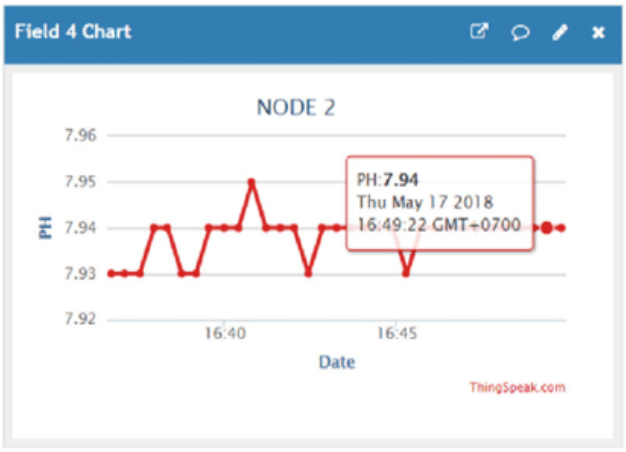

Fig. 11. Output of PH sensor

In fig. 12 shows the output of turbidity sensor on cloud.

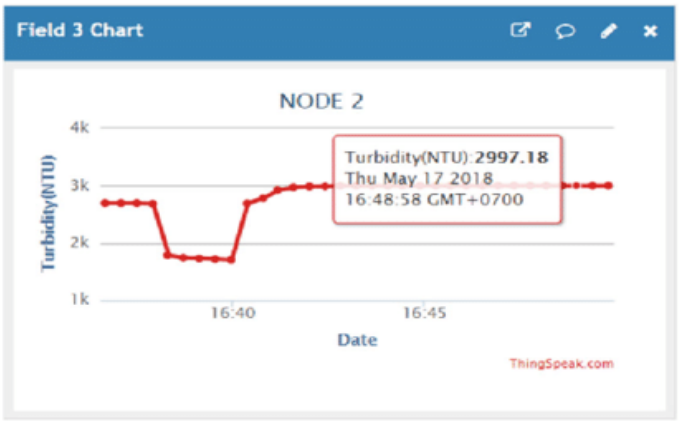

Fig. 12. Output of Turbidity sensor

In fig. 13 shows the output of MQ 7 sensor on cloud.

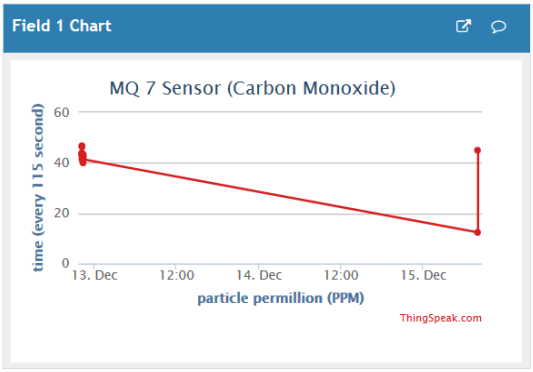

Fig. 13. Output of MQ 7 sensor

In fig. 14 shows Welcome Slide.

Fig. 14. Display welcome slide screen sort

In fig. 15 shows Water Quality Level Slide.

Fig. 15. Display Water Quality level screen sort

In fig. 24 shows Air Quality Level Slide.

Fig. 24. Display Air Quality level screen sort

IX. FUTURE SCOPE

- We can increase the network range of the devices.
- We can develop better architecture model.
- It will also show the environment quality on MAP.
- We can reduce the size of the device and can make the whole device water resistant.

X. CONCLUSION

This system is complete solution of Environmental qualities check which are Water and Air. Thus the System will check the Water and Air by using various sensors. The system will also help human healthcare, Agriculture, Fishing and MWQ (Marin Water quality system).

X. ACKNOWLEDGEMENT

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