International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 05 Issue: 05 | May - 2021 ISSN: 2582-3930

WATER QUALITY MONITORING AND GARBAGE COLLECTOR

Sharon Methri[1], Joesyln Nadar[2], Yash Jain[3], Meena Ugale[4]

[1-4]Department of Information Technology, XIE Mumbai, India

Abstract -The impact of water on any living beings is beyond description. Every year many people are suffering from various fatal diseases caused by water pollution. The objective of the paper is to introduce an intelligent water quality monitoring system in IoT (Internet of Things) platform which would help to monitoring different physical parameters of the drinkable water rather than relying on manual process. The Garbage collector boat is remote controlled and requires less human interference, thereby reducing the errors. The real-time monitoring provides immediate remote access to the water quality as well as quantity data for any household. All these measures aim at bringing down the unnecessary usage of water and prevention of health hazards caused due to consumption of impure water.

***Key Words*:** Internet of Things, Real-Time Water Quality Monitoring, Surface Cleaning

1.INTRODUCTION

India is the geographically rich country. It has many small and large river networks. The impact of water on any living beings is beyond description. The rivers and lakes are the source of fresh water which contains the nutrients, oxygen and food for the ecological system. With the rapid increase of world population, water management becomes an important issue specially in industrial, agricultural and other sectors. Due to lack of circulation, water can become stale and undrinkable. Most of the people around the world lack behind drinkable water.

The Water Quality Monitoring and Garbage Collector (WQMGC) system will measure the following water parameters for analysis: Electrical conductivity, Turbidity and Temperature. A IoT-based solution is developed to help in monitoring data in real time providing a fast and effective reaction in case of rising abnormalities. It is important to record temperature alongside the other parameters as this will be useful in behavioural analysis of the parameters being measured. Relating to temperature-relation theories and conductivity have an undesirable effect with large temperature changes. Turbidity is the measure of relative clarity of a liquid. High concentrations of particulate matter affect light penetration and ecological productivity, recreational values, and habitat quality, and cause lakes to fill in faster. Particles provide attachment places for other pollutants, notably metals and bacteria. For this reason, turbidity readings can be used as an indicator of potential pollution in a water body. Conductivity signifies the ionic strength of a solution. In other words, it is the ability of a solution to conduct electricity with the typical unit for measurement being micro-Siemens per centimeters. Increase in the conductivity value may be indicative of polluted waters, such as sewer leaks or chemical wastes flooding into the water. Moreover, conductivity is directly related to salinity that is conductivity improves with high salinity. The water cleaning boat has been designed to clean floating materials from water which is navigated by the use of Arduino Bluetooth Controller. The ship can prove to be a helping hand in controlling the increasing problem of water pollution. It can greatly reduce the problems caused by floating waste. Also, it can be effectively used for the surveillance purpose and can be used as a good water monitoring system.

Clean water is one of the most important resources required to sustain life and the quality of drinking water plays a very important role in the well-being and health of human beings. About 70% of Earth's surface is covered with water, yet the amount of freshwater fit for human consumption and usage are as less as 2% of the total volume. Water supply to taps at urban homes and water sources available in more rural areas, is however, not necessarily safe for consumption. With population growth increasing at tremendous rate, the human community has begun to face the wrath of water scarcity, only to be elevated by uncontrolled urbanization and industrialization which is further polluting the major amount which is available for consumption. Presently, the quality and availability of freshwater resource are the most pressing of the many environmental challenges on the national horizon. Keeping these factors in mind, water conservation holds the topmost priority in today's world. Also, monitoring the quality of water that is available to us for consumption is equally important as pollution has left no space for pure and potable water. In general, the water quality monitoring process is a specific task carried out by the respective authorities to measure the water parameters whether it can be safely consumed by human, animals and plants or not. The basic observed water parameters for water quality determination are pH level, Turbidity and Temperature. All these water parameters will be measured to determine the water quality before can be safely consumed. Picking up wastes around water can be very tiring if it is done manually and it will take a lot of time. It is hard to see rivers, lakes and ponds that are packed with wastes which leads to water contamination. Water pollution has been a topic of concern in recent years both in India and worldwide. The floating objects on the water surface many times get clogged in the drainage system and cause chocking of the system which results in other harmful effects. Also, such floating objects are consumed by the animals residing in the waters as food items and become the cause of their death. Another concern is the security of the water bodies. The paper focuses on collecting water wastes that can prevent the destruction and waste contamination.

.

2. Related Work

IoT (Internet of things) based smart water quality monitoring (WQMGC) system that aids in continuous measurement of water condition based on four physical parameters i.e., temperature, pH, electric conductivity and turbidity properties. As technology is shifting towards the automation, the advancement in sensors provides the environment to tackle the problem of monitoring and accessibility to any system. The system ensures to prevent any health hazards or potential threats caused due to accidental seepage of sewage or farm release into the portable water. An online monitoring system is to provide these data on the cloud in real-time. Any violations in either the usage limit or water quality is immediately notified to the consumer and authority. The primary objective of this paper is to introduce an intelligent water quality monitoring system in IoT (Internet of Things) platform which would help to monitoring different physical parameters of the drinkable water rather than relying on manual process [1] [2] [3].

The mobile systems range from the size of golf carts to food trucks, depending on their desired output. Solar panels lie on top, generating electricity that charges the GEL-sealed, lead-acidbatteries, which in turn run the motor that pumps water through filters. Clean water pours out a hose, and depending on the filtration process, contaminants flow out in a discharge stream or remain in mechanical membranes. Internet-connected monitors remotely display the systems' water quality, output, and equipment performance. We can deploy it anywhere and literally take contaminated, poisoned water and turn it into drinking water in minutes [7] [8].

3. Proposed System

The proposed block diagram of WQMGC system in Fig-1 consists of two different sensors connected with controller to measure three important physical parameters (Temperature, Electric conductivity and turbidity) of water samples. The temperature sensor provides accurate reading between –55 to 125ºC. Electric conductivity is calculated with the help of turbidity sensor. Turbidity sensor is used in the design to detect the presence of suspended particles by using light. The extracted data from these sensors are accessed by the controller Node MCU and transfer them to the Blynk App through ESP8266 In-built Wifi Module.

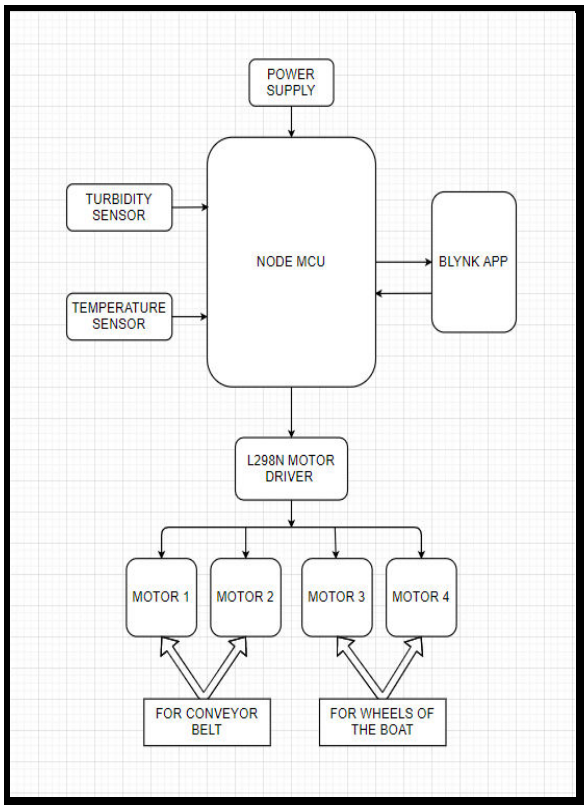

Fig-1: Block Diagram of WQMC

3.1 List of Hardware Components

- ARDUINO MEGA
- NODE MCU
- BLUETOOTH MODULE (HC -05)
- DS18B20 TEMPERATURE SENSOR
- TURBIDITY SENSOR
- L298N MOTOR DRIVER
- DC MOTOR

3.2 List of Software Components

- BLYNK APP
- ARDUINO IDE
- BLUETOOTH RC CONTROL APP

3.3 Water Quality Monitoring Module

The Water Quality Monitoring and Garbage Collector which checks the purity of drinking water that the consumer receives. It measures four qualitative parameters of water to determine its portability. The parameters that are considered by this system are pH, temperature, turbidity and conductivity. It prevents any health hazards or potential threats caused due to accidental seepage of sewage, farm release or any unwanted effluent into the potable water supply lines. All the results are generated and displayed with their readings and their graphical analogue meters through the graphical user interface GUI technique, along with water's impurities limitation points and its hazardous level notification.

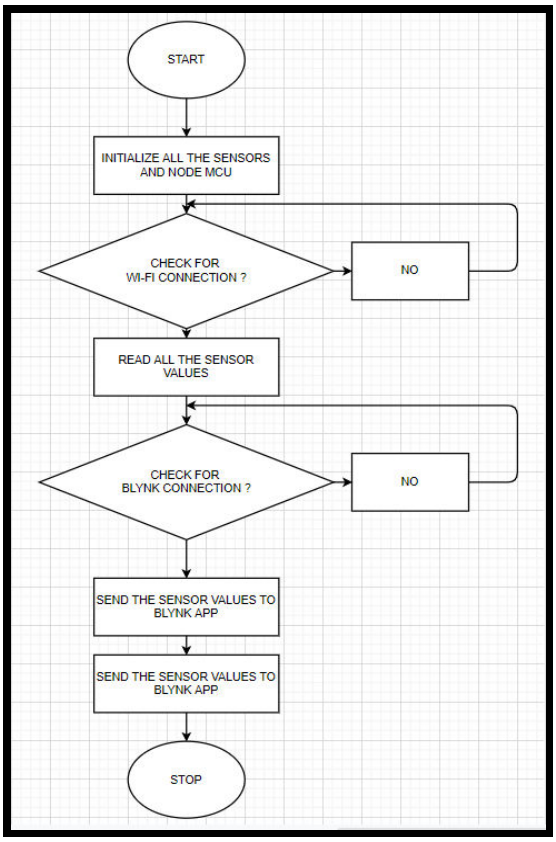

Fig-2: Flowchart for Water Quality Monitoring

3.4 Garbage Collector

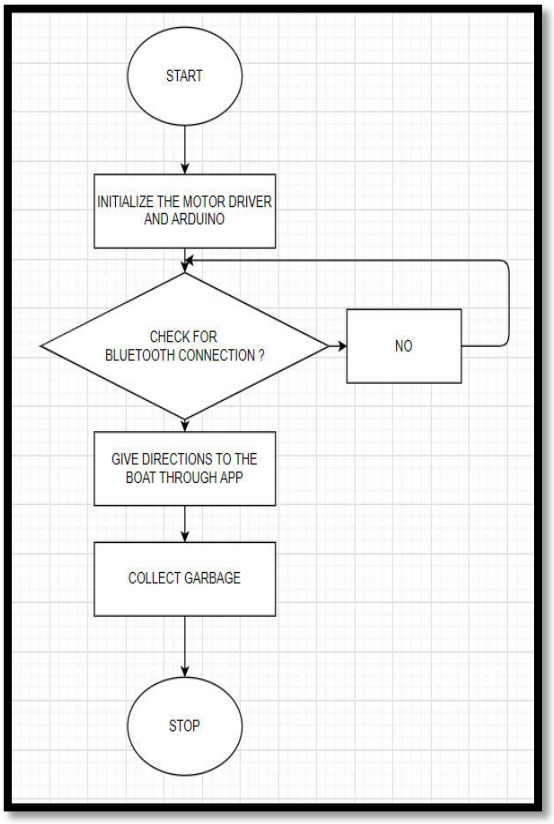

Fig-3: Flowchart for Garbage Collector

Fig-3 shows us the flowchart of garbage collector, the garbage collector starts with the initialization of the motor driver and Arduino then the Bluetooth connection is checked. If the Bluetooth is connected then give directions through Bluetooth RC Control App and collect the garbage using conveyor belt of garbage collector else check for the bluetooth connection.

3.5 Design of WQMGC

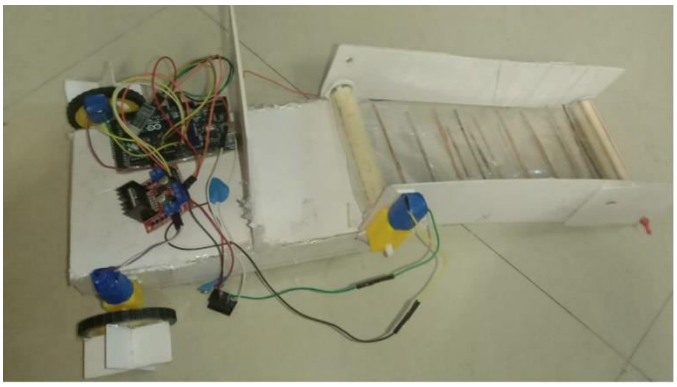

Fig-4: Prototype design of WQMGC system

Fig-4 displays the prototype design of WQMGC system. L293D IC is used which is a typical Motor Driver IC that allows the DC motor to drive on any direction. The IC consists of 16-pins which are used to control a set of two DC motors instantaneously in any direction. It means, by using a L293D IC we can control two DC motors. As well, the IC can drive small and quiet big motors. The L293D is used to provide bidirectional drive current up to 600mA and voltage from 5V to 36V. L293D consists of the output clamping diodes for protection.

There are four DC motors used in the boat. Two motors are used to control the direction of the machine. The Arduino system controls all DC motors using a driver Circuit. Two motors are used to control the conveyor belt. The conveyor belt is controlled by the Arduino system using a motor driver circuit. The conveyor collects all floating garbage from water. The working of the garbage collector is done by using the conveyor belt at the front of the system using two dc motors. These motors rotate the belt in diagonally upward direction picking up the waste from the base and then dumping it in the bin (area just behind the conveyor belt).

4. Result & Discussions

Fig-5 to Fig-7 shows the readings of the different water samples tested on the Blynk App.

Fig-5: Blynk App with readings of a medicine powder
The above picture shows the readings of medicine powder and graph based on the readings obtained.

Fig-6: Blynk App with readings of a talcum powder
The above picture shows the readings of the talcum powder and graph based on the readings previously obtained.

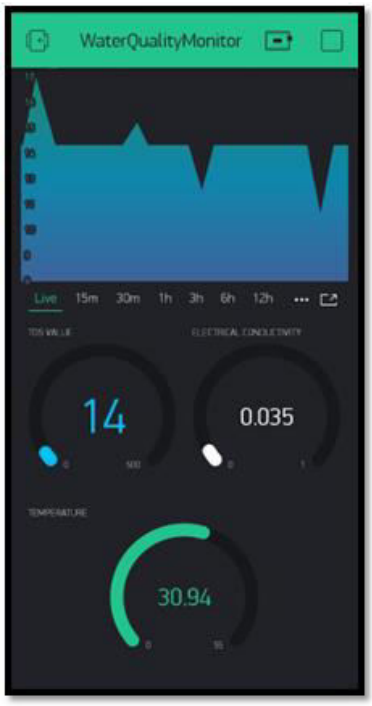

Fig-7: Blynk App with readings of a water with salt
The above picture shows the readings of the water with salt and graph based on the readings previously obtained.

TABLE-1: RESULTS OF DIFFERENT WATER SAMPLES.

SAMPLE	TDS VALUE	ELECTRICALCONDUCTIVITY	TEMPERATURE
WATER	12	0.029	31.06
SALT WATER	14	0.035	30.94
ASH	18	0.04	32.5
WHEAT FLOUR	23	0.057	32.69
POWDER	26	0.063	32.81
CHALK	31	0.08	32.56
MEDICINE POWDER	38	0.09	31.31
SILT AND MUD	48	0.12	31.56

Fig-8 and Fig-9 shows the graph of TDS values and Electrical Conductivity obtained by testing different water samples as shown in the Table-1.

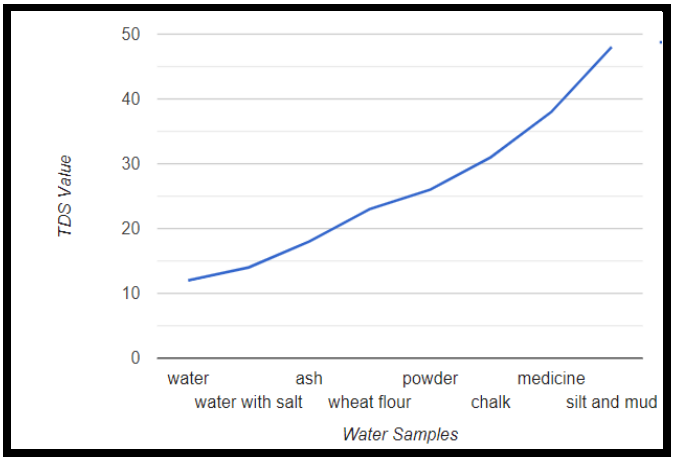

Fig-8: Graph of TDS values of different water samples

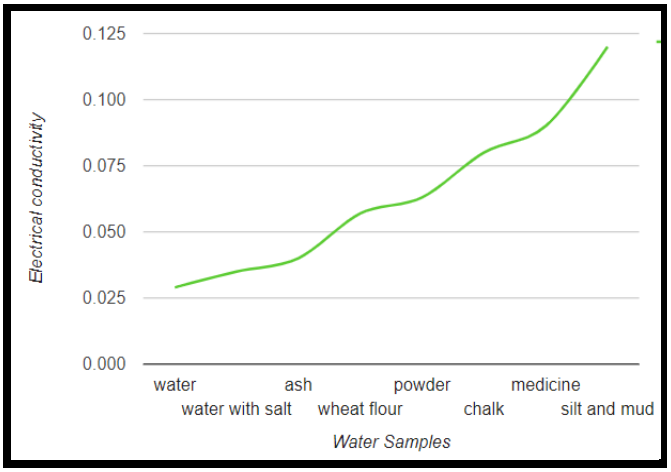

Fig-9: Graph of Electrical Conductivity values of different water samples

5. CONCLUSIONS

Water Quality Monitoring and Garbage Collector is an IOT based paper proposed to work for environment and society problem regarding water quality. Water is the basic need of all living beings. It is important to maintain and monitor the quality, cleanliness and hygiene of water. Water gets polluted due to many reasons such as waste from industries, sewage waste, garbage waste, etc. Sea, river and lake water is valuable for environment as well as for human use example: irrigation and drinking purpose. The WQMGC will be beneficial for humans and aquatic life in freshwater.

REFERENCES

1. Manish Kumar Jha, Rajni Kumari Sah, Rashmitha M. S., Rupam Sinha, Sujatha B., Suma K.V "Smart Water Monitoring System for Real- time water quality and usage monitoring", International Conference on Inventive Research in Computing Applications (ICIRCA 2018).
2. Monira Mukta, Samia Islam, Surajit Das Barman, Ahmed Wasif Reza, M Saddam Hossain Khan "IOT Based Smart Water Quality Monitoring System", IEEE 4th International Conference on Computer and Communication Systems 2019.
3. Neil Andre Cloete, Reza Malekian, Lakshmi Nair "Design of Smart Sensors for Real-Time Water Quality Monitoring", Journal of LATEX class files, VOL. 13, NO. 9, SEPTEMBER 2014.
4. Make Your OWN Creation. "How to make a water cleaning boat,"YouTube,Nov15,2019 Available: https://www.youtube.com/watch?v=SoGnRqtH0ig .
5. A-Arduino Thailand. "Blynk GPS Control Robot real time tracking," YouTube, Mar 3, 2019 Available: https://www.youtube.com/watch?v=Y_NoFSQUpv4&feature=youtu.be .
6. Make Your OWN Creation. "How to make a boat-water cleaning boat," YouTube, Nov 15, 2019 Available: https://www.youtube.com/watch?v=fqd_RcD49ME .
7. DhilanMandaliyaSkyfi Labs. "Water Cleaning Boat", Published: May19,2018 Available: https://www.skyfilabs.com/project -ideas/water-cleaning- boat.
8. IEEE Spectrum. "How solar-powered, mobile water purifiers can help the cities scope with bad water", Published:Oct18,2018 Available:https://spectrum.ieee.org/energywise/green-tech/solar/how-solar-powered- mobile-water-purifiers-can-help-cities-cope-with-bad-water.