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Water Quality Monitoring using TDS, Turbidity, Temperature & pH Sensor

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Abstract – *Water is an essential source for human life. This project is about to monitor pollutant in water and also to find treatment for it. There are many factors related to water pollution, including the number of people living in a watershed, how the land is used (agriculture, forested, urbanized, etc.), and the everyday behavior of the population. We are selecting this project because everyone knows that how much water is pure and good for health. Using different sensor the system can collect various water parameter values such as temperature, hardness of water, turbidity and pH etc. Collected data is first compared with the preset range if data is not within the range that means water is not suitable for drinking and a GSM module sends the data (as a regular message) to the officer and also a buzzer and light indicator will alert the neighborhood people of the reservoir. It helps easily understand supplying water in particular area is clean or unsafe for drinking purpose. These would make simple automation more easy and simple. This system is need of today's situation therefore people will interact with the system easily. The size of the system is small, it also useful for homemade appliances, water tank etc.*

Key Words: TDS sensor, Turbidity, pH sensor, DS18B20 & GSM module.

1. INTRODUCTION

Let us we have discuss the various water polluting factors and what is the impact of these pollutants. Due to these pollutants physical and chemical properties of water changes. This project is about to determine the factor which are responsible for water pollution. Here, we used four sensors which are connected to microcontroller (Arduino Mega2560). Whole project is programmed on Arduino IDE. Each sensor has predetermined range of some values (which are basically termed as normal), or if the value of these sensor do not sets up in given range then an attention command is set to transmitted via GSM module (i.e.SIM900) to supervisor or some senior authorities.

At present there are mainly four methods for monitoring water environment, each of which has its some advantages and disadvantages. Many things we do every day can have an impact on water quality. Human activities, such as urbanization, dam construction, forestry practices, agricultural development, and road building, have a profound effect on the quality of our water. When we fertilize our lawns, use pesticides, drive our cars, or use toxic chemicals we have the potential to add pollution to surface water and groundwater. Hence all these pollutant can me monitor by using this project.

1.1 Design of monitoring System

The proposed water quality monitoring system is illustrated in figure 1. This system has three parts: data monitoring nodes, data comparison with predetermined range of values, transmission of information. Four sensors have their own nodes which are dipped in water and collect the parameters such as pH, total dissolved solid, and total suspended solids and Temperature.

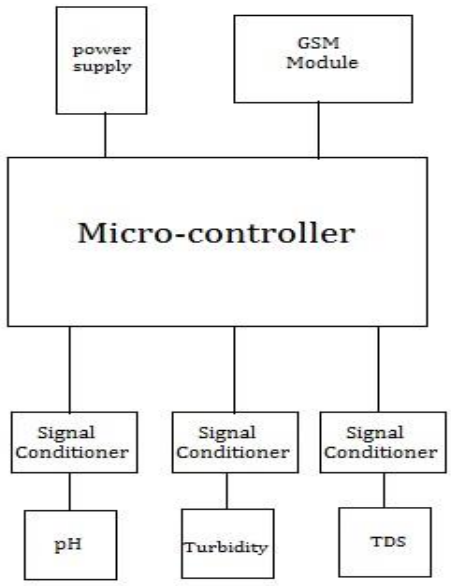

Figure 1. Design of System

Collected parameters are get compared and if values not matched up then information is send a message via GSM module. A 16x2 lcd is mounted on this kit which shows each data continuously. This system is powered by 5 volt and 9 volt supply. Here 5v is required for microcontroller and 9v for signal conditioner sensor.

1.2 Safe/Normal Values of Sensor used

Temperature sensor:

Safe range for drinking water is eight degrees centigrade of the body's temperature. So the water temperature should be between 28 and 44 degrees centigrade. the ideal range and be conscious of it, then wherever possible, staying within that temperature range is a good idea.

pH sensor:

pH defines the acidic and basic nature of water impurity. A pH value is a number from 1 to 14, with 7 as the middle (neutral) point. Values below 7 indicate acidity which increases as the number decreases, 1 being the most acidic. Values above 7 indicate alkalinity which increases as the number increases, 14 being the most alkaline

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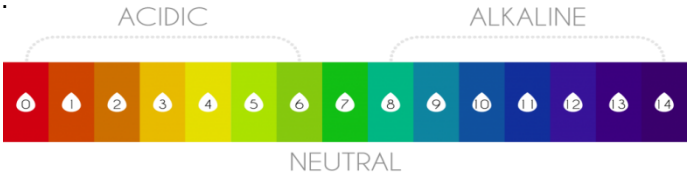

Figure 2. pH indicator

If the water in a stream is too acidic or basic, the H+ or OH- ion activity may disrupt aquatic organism's biochemical reactions by either harming or killing the stream organisms.

TDS Sensor:

TDS (Total Dissolved Solids) are dissolved organic and inorganic substances in water. The lesser level is better for the drinking. But an average TDS level of drinking water can be 300 - 500 mg/liter. If reading is more than that I suggest you don't drink that water.

Table -1: TDS level Chart

TDS level	RATING
Less than 300	Excellent
300-600	Good
600-900	Fair
900-1200	Poor
Above 1200	Unacceptable

Turbidity Sensor:

The mapping from the output voltage to the NTU according to different temperature.

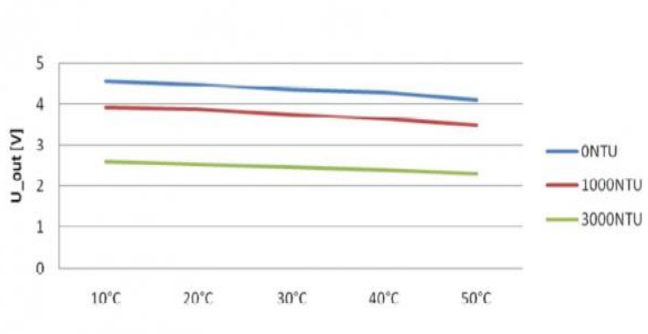

Figure 3. Voltage-Temperature characteristic

E.g. If you leave the sensor in the pure water, that is NTU < 0.5, it should output "4.1±0.3V" when temperature is 10~50℃.

2. ALERT SYETEM & COMMUNICATION

After data is been measured, if any parameter doesn't goes right then microcontroller sends an attention command to supervisor via GSM module. In addition to that particular parameter all other parameter values are also sends so that very little deflection in other sensor can be supervised. Figure 2 show flow chart of the complete process.

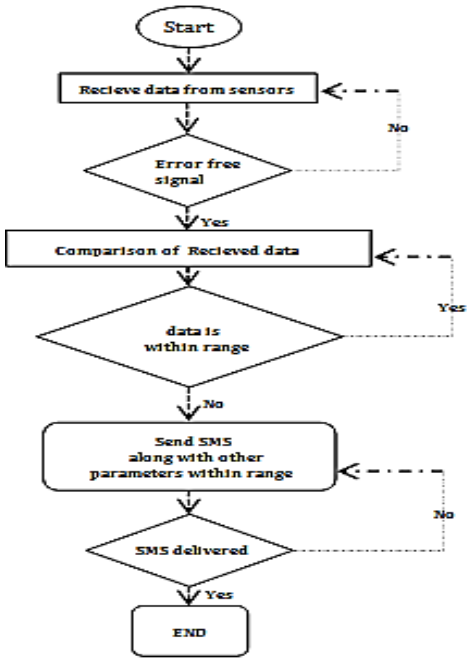

Figure 4. Flow chart of alert system

GSM module (i.e.SIM900) is used due to its easy operation and takes less time to connect itself with network services. The SIM900 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption of 1.0mA (sleep mode & BS-PA-MFRMS=9).With the frame check and re-send mechanism, we could make sure that all the commands and the monitoring data will be sent to the target device successfully.to sum up, our monitoring system has good performance in the wireless communication reliability area.

3. PLATFORM USED FOR DEVELOPMENT OF SYSTEM

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

It uses C language. The support library is a subset of the 'C' standard library. Not all library works but mostly. It has its own arguments and instruction. Having a Serial monitor which act as runtime screen and display all entries or reading on serial monitor.

4. NEED OF THE SYSTEM

In 21st century population growth is very high. Very few people getting pure drinking water but most of people not get pure drinking water ,this is big problem in today's situations. In a system there are different sensor used to detect water quality therefore easily understand which area supplying water is pure and safe . These system require in home ,small area, water purification plant, water tank which can provide pure water to people. So people will aware about the pure water and stay away from disease which is caused by only water.

5. CONCLUSION

Monitoring of Turbidity, PH, Temperature, Total dissolved solid & level 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 people on duty. So the water quality testing is likely to be more economical, convenient and fast. The system has good flexibility. Only by replacing the corresponding sensors and changing the relevant software programs, this system can be used to monitor other water quality parameters. The operation is simple. The system can be expanded to monitor hydrologic, air pollution, industrial and agricultural production and so on. It has widespread application and extension value.

ADVANTAGES

[1] Due to automation it will reduce the time to check the parameters.

[2] This is economically affordable for common people.

[3] Low maintenance.

[4] Prevention of water diseases.

FUTURE SCOPE

[1] To give information to whole users those are depends on that plant.

[2] Detecting the more parameters for most secure purpose

[3] Increase the parameters by addition of multiple sensors

[4] By interfacing relay we controls the supply of water.

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