Arduino Based Water Quality Monitoring And Notification System Using GSM

A.Sowjanya[1] S.Sai Chandu[2] D.Lokesh[3] K.Shiva Shankar reddy[4]
[1]Assistant Professor [2,3,4] Student
[1,2,3,4]Geethanjali College Of Engineering And Technology, Chereyal, Keesara, mandal,Hyderabad

ABSTRACT

This project "ARDUINO BASED WATER QUALITYMONITORING AND NOTIFICATION SYSTEM USING GSM" Water is the primary need of all living being and living without water is impossible. 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 and we consume, to the water supply in our houses. Water quality refers to the chemical, biological, radiological, and biological parameters of the water.

Traditionally, water quality was tested by collecting the samples of water and experimentally analyzing it in the laboratories. However, in today's world, where time is the scarcest resource available and industrialization and economy is growing rapidly, the traditional method of water quality testing is not applicable anymore

To overcome the drawbacks of the conventional water quality monitoring methods, sensors can be used. In order to ensure the safety of the quality of water, it should be monitored in real time.In our proposed method, an own assembled Arduino microcontroller is used as the core controller of the system. In this system, four sensors are used to measure the essential water parameters.

The most essential water parameters needed to be monitored by the average users are water pH level, water turbidity (cloudiness), water temperature, and the water level which is a measurement of the amount of the water in a container. All sensors read the water quality parameters and send the data to the microcontroller in the form of electrical signals. The microcontroller is programmed such that is will analyze the result and compare it with the standard ranges which are predetermined in the code. If any water parameter crossed the standard limit, the alarm system will turn on and the message will be shown on the device's screen and sent to the user's mobile as will.

Keywords: *GSM,LCD,Micro controller,Sensors,pH-level*

.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 and we consume, to the water supply in our houses. 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, dissolved oxygen level, turbidity, and the level of the water in a certain normal range in order to ensure the safety of the fish inside the aquarium. In order to ensure the safety of the quality of water, it should be monitored in real time. To make the process of testing the real-time quality of water simple and easy for everyone, a remote, low cost, and portable water quality monitoring system is designed and developed. It is a user-friendly system which frequently tests the quality of water and sends notification and provides alarm to the user in case of any abnormality in any parameter of the water.

PROPOSED METHOD

In our proposed method, an own assembled Arduino microcontroller is used as the core controller of the system. Once the code is uploaded to the microcontroller, no PC system, keyboard command, monitor is required to operate the system. The system functions automatically and independently according to the code uploaded to the microcontroller. The programming in used in this system is used C language. In this system, four sensors are used to measure the essential water parameters. As it was studied from the previous researches, the most essential water parameters needed to be monitored by the average users are water pH level, water turbidity (cloudiness).

DESCRIPTION ABOUT CIRCUIT

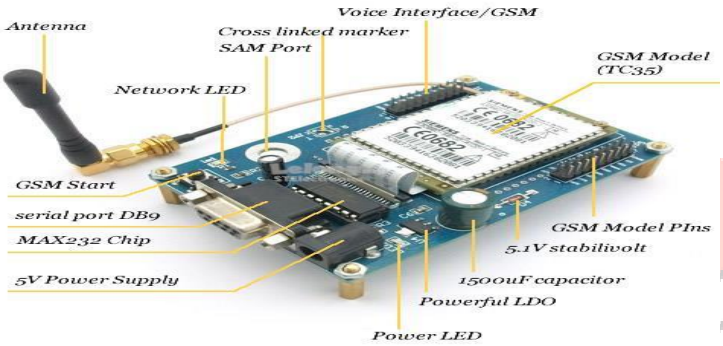
ARDUINO MEGA 2560:

Arduino belongs to a family of single board microcontrollers intended for easy build interactive objects and environments. It consists of 54 input/output pins, 16 analog inputs, 4 UARTs, a 16 MHZ oscillator, a USB connection, a power jack, an ICSP header and a reset button. The data collected by different sensor can be sensed by microcontroller in conjunction with programming code. Multiple languages can be selected to program Arduino mega board. As for our case, we have programmed it using Arduino commands which uses C language. In addition, AT mega 2560 board provides 256 KB of flash memory to store the code. The microcontroller can be powered either via USB connection or external power supply (battery). The recommended power supply range using an external power source is 7V to 12V. However, in the case of exceeding 12V, voltage regulator might overheat and damage the board. A safe power supply of 5V from a regulated source is ensured. Pins used for

power supply are Vin, 5V, GND and IORF. The microcontroller provides communication with computer and other microcontrollers. Its software includes a serial monitor which allows textual data to be sent and received. The RX and TX LEDs will flash when the data is being transmitted or received respectively. To ensure the portability of the expected prototype, a self-made Arduino microcontroller with smaller size was assembled

GSM Module:

GSM module is an information transmission module which is based on dual. The main components of GSM module are GSM baseband processor, Flash, GSM RF, power, antennas, and antenna jack. The module is produced by SIMCOM whose operating voltage ranges from 3.2V to 4.8V with low power consumption. Users control the module through standard AT commands. Moreover, it supports a frequency bandwidth of 900MHZ and 1800MHZ. Data and voice within the frequency bandwidth are transferred safely and fast. The GSM module carries two kind of SMS modes which are text mode and PDU mode. We chose to apply text mode, for the system sends digital messages. What is more, the dual band GSM/GPRS module.



Water Quality Detection Sensors:

Temperature sensor:

The temperature sensor used in the system is DS18B20 from U.S. DALLAS semiconductor company. It can measure temperature from -55° C to +125° C. Its accuracy is ±0.5 °C from 10°C to 85° C and the power supply range is from 3.0V to 5.5V. it has the important properties which a sensor should hold. That is, it is fairly precise, nonreactive to salt water and it is a waterproof sensor. This digital temperature sensor uses one-wire interface and work with any microcontroller .

Turbidity sensor:

Turbidity in water is the result of suspended solids which stop incident and scattered light. Therefore, turbidity is the measure of scattered light caused by suspended particles in water. Turbidity sensor used in our system is produced by DFROBOT operating at 5V DC voltage with less than 500ms response time. Moreover, less than 1NTU (Nephelometric Turbidity Unit) indicates a good water quality, 1-5 NTU indicates a fair water quality, and greater than 5 NTU indicates a poor quality of water .

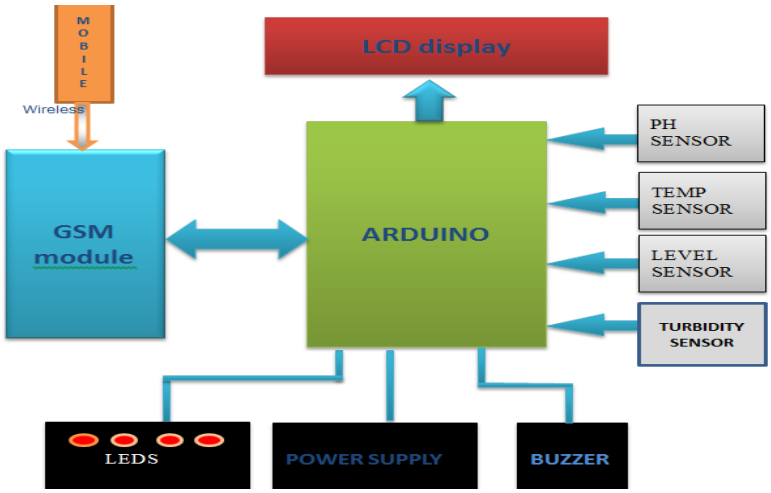
pH sensor:

The pH sensor used in our system is produced by DFROBOT company. It measures full range PH (1-14) with ±0.1Ph accuracy at 25°C. Its operating at 5V within temperature range of 0°-60°. To use the sensor, is first connected with BNC (A miniature quick connect/disconnect radio frequency) connector and PH2.0 interface is plugged into the input of the microcontroller .

Level sensor:

Level of water is one of the four parameters that the proposed system is committed to evaluate. To reach the goal, we have chosen HC-SR04 sensor. It can measure from 2cm to 400cm with an accuracy of up to 3mm. There are 4 pins to be connected in various position. They are, VCC (power supply), trig (trigger), Echo (receive) and GND(ground) pins. Like other sensors in the system, it requires 5V power for operation . The amount of water consumed and the water level in the container are measured from the time, taken to send an electromagnetic signal from the trigger and receiving it back by the receiver, and the velocity of electromagnetic waves (velocity of light). The distance calculated by the microcontroller from these velocity and time indicates the water level in the container.

BLOCK DIAGRAM



WORKING :

First of all the Arduino and all the components initialized by giving 5v input to them.The sensors which we using, begin to take readings from the water and send back to the arduino microcontroller.The microcontroller will analyze the data as per the code, which is programmed into it. If the result of any parameter is varied then respective led will be glows and buzzer makes the sound.The readings from different sensors is shown on a LCD display.And the readings also sent to registered mobile user using GSM module through message.

RESULT :

The system was tested under different conditions and with different qualities of water. The output of the system was successful and in accordance with the research objectives. As mentioned, the sensor readings are shown on an LCD screen on the device prototype itself and it is also sent to the user's mobile through SMS.

FUTURE SCOPE

In this work, the design and demonstration of a prototype remote, automatic, portable, real time, and low cost water quality monitoring system is described. In this system, low cost components i.e. microcontroller, GSM, LCD screen and other nonmain components are used to achieve the objectives of the proposed design with acceptable accuracy.

Compared to the previous related works, the cost of the system prototype is considerably low. To ensure the portability of the device, a self-made, small size Arduino microcontroller is used. The developed system was tested under different conditions, with solution of water with different impurities, and in different periods of time.

REFERENCES

1. M. K. Khurana, R. Singh, A. Prakash, R. Chhabra, "An IoT Based Water Health Monitoring System", International Journal of Computer Technology and Applications (IJCTA), 9(21), pp. 07-13, 2016.
2. M. Deqing, Z. Ying, C. Shangsong, "Automatic Measurement and Reporting System of Water Quality Based on GSM", International Conference on Intelligent System Design and Engineering 2012.
3. N. Vijayakumar, R. Ramya, "The Real Time Monitoring of Water Quality inIoT Environment", International Conference on Circuit, Power and Computing Technologies [ICCPCT], 2015.
4. A.S. Rao, S. Marshall, J. Gubbi, M. Palaniswami, R. Sinnott, V. Pettigrove, "Design of Low-cost Autonomous Water Quality Monitoring System", International Conference on Advances in Computing, Communications and Informatics (ICACCI), 2013.
5. Pradeepkumar M, Monisha J, Pravenisha R, Praiselin V, Suganya Devi K, "The Real Time Monitoring of Water Quality in IoT Environment", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 5, Issue 3, March 2016.
6. [6] L. Hongpin1, L. Guanglin, P. Weifeng, S. Jie, B. Qiuwei, "Real-time remote monitoring system for aquaculture water quality", International Journal of Agricultural and Biological Engineering (Int J Agric & Biol Eng), Vol. 8 No.6, pp. 136-143, December, 2015.
7. "MyDuino",Arduinokits,Available,online: http://www.myduino.com/index.php?route=product/product &product_id=490 Accessed on February 15, 2017.
8. "Arduino", Project hub, Available online: https://create.arduino.cc/projecthub/eani/water-quality- monitoring-and-notification, Accessed on March 4, 2017.