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

# IoT Based Water Quality Monitoring System

**Sanket Chougule[1], Aditya Kamate[2], Sammed Kothale[3],Pranit Nitave[4],A.N.Naik[5]**
Students, Department of Electronic & Tele-Communication Engineering[1,2,3,4]
Faculty, Department of Electronic & Tele-Communication Engineering[5]
Sharad Institute of Technology, Polytechnic Yadrav, Ichalkaranji, Maharashtra, India

**Abstract:** *Water pollution is one of the biggest fears for the green globalization. In order to ensure the safe supply of the drinking water the quality needs to be monitor in real time. In this paper we present a design and development of a low cost system for real time monitoring of the water quality in IOT(internet of things).The system consist of several sensors is used to measuring physical and chemical parameters of the water. The parameters such as temperature, PH, turbidity, flow sensor of the water can be measured. The measured values from the sensors can be processed by the core controller. The Arduino model can be used as a core controller. Finally, the sensor data can be viewed on internet using WI-FI system.*

**Keywords:** Internet of things (IOT), Microcontroller , GSM Module, Sensors, Arduino Nano.

## I. INTRODUCTION

With rapidly rising population, Fresh Water Management is very much essential which demands an increase in agricultural, industrial and other requirements. The quality of fresh water is characterized by "chemical, physical and biological" content. Monitoring the water quality helps in detecting the pollution in water, toxic chemical and contamination. The traditional method still in vogue entails collection of water samples, analyzing it in lab and advice for any water treatment and so forth. Current water pollution monitoring method takes place in 3 main steps: Water sampling, Testing samples, Investigative analysis.

All these 3 steps are very expensive, difficult, time-consuming, need expert advice and less efficient. So, with the advent of technology, automation can be brought in water quality monitoring in taking action appropriately rather than relying on manual process. So, in automating the water quality monitoring some amount of technological innovation has creeped in which would help in monitoring the quality of water rather than relying on manual process.

Hence there is need of developing better methodologies to monitor the water quality parameters in real time. 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. All these parameters are uploaded on webpage through internet and can be accessed anywhere from the world.

## II. LITERATURE REVIEW

Nikhil Kedia entitled "Water Quality Monitoring for Rural Areas-A Sensor Cloud Based Economical Project." Published in 2015 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun, India. This paper highlights theentire water quality monitoring methods, sensors, embedded design, and information dissipation procedure, role of government, network operator and villagers in ensuring proper information dissipation. It also explores the Sensor Cloud domain. While automatically improving the water quality is not feasible at this point, efficient use of technology and economic practices can help improve water quality and awareness among people.

Jayti Bhatt,Jignesh Patoliya entitled "Real Time Water Quality Monitoring System".This paper describes to ensure the safe supply of drinking water the quality should be monitored in real time for that purpose new approach IOT (Internet of Things) based water quality monitoring has been proposed. In this paper, we present the design of IOT based water quality monitoring system that monitor the quality of water in real time. This system consists some sensors which measure the water quality parameter such as pH, turbidity, conductivity, dissolved oxygen, temperature. The measured values from the sensors are processed by microcontroller and this processed values are transmitted remotely to the core controller that is

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

raspberry pi Pribyl, Miroslav Svitek entitled using Zigbee protocol. Finally, sensors data can view on internet browser application using cloud computing.

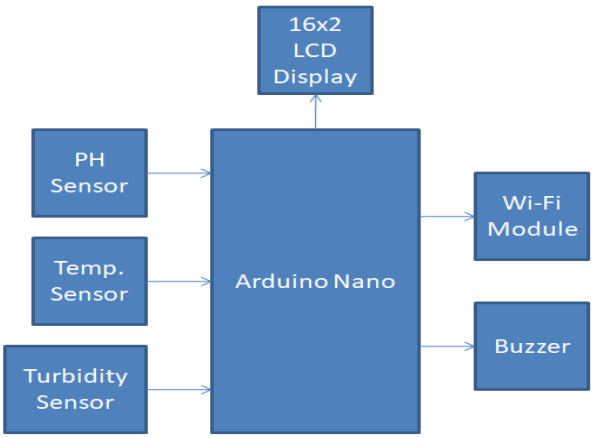
Michal Lom, Ondrej "Industry 4.0 as a Part of Smart Cities". This paper describes the conjunction of the Smart City Initiative and the concept of Industry 4.0. The term smart city has been a phenomenon of the last years, which is very inflected especially since 2008 when the world was hit by the financial crisis. The main reasons for the emergence of the Smart City Initiative are to create a sustainable model for cities and preserve quality of life of their citizens. The topic of the smart city cannot be seen only as a technical discipline, but different economic, humanitarian or legal aspects must be involved as well. In the concept of Industry 4.0, the Internet of Things (IoT) shall be used for the development of so–called smart products. Subcomponents of the product are equipped with their own intelligence. Added intelligence is used both during the manufacturing of a product as well as during subsequent handling, up to continuous monitoring of the product lifecycle (smart processes). Other important aspects of the Industry 4.0 are Internet of Services (IoS), which includes especially intelligent transport and logistics (smart mobility, smart logistics), as well as Internet of Energy (IoE), which determines how the natural resources are used in proper way (electricity, water, oil, etc.). IoT, IoS, IoP and IoE can be considered as an element that can create a connection of the Smart City Initiative and Industry 4.0 – Industry 4.0 can be seen as a part of smart cities.

## III. General Methodology

The system is built around Arduino Nano. Arduino Nano is used as main controller board. In the proposed concept, the system measure the three parameters namely PH, turbidity and temperature of the water and upload its data on the webpage.

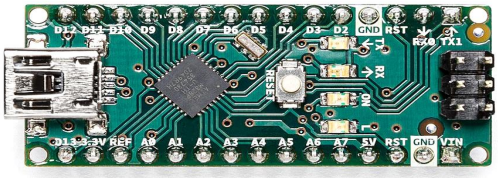
The Arduino Nano read the output of PH sensor which is the analog form and converts it in actual PH value. Then Arduino reads LM 35 output and converts it in actual temperature in degree celsius. The Arduino reads the output value of TSD-10 sensor. Then the Arduino display all the parameter on LCD. It also sends all the parameters to webpage through the internet which is accessible by GSM module. We can also set the range for all parameters. Whenever any parameter crosses its range limit, Arduino send alert SMS to the authority.

### 3.1 Block Diagram




### 3.2 Components Used

**A. Arduino Nano**

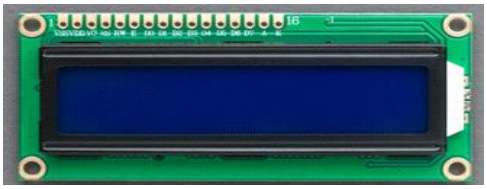


IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 5, May 2022
Impact Factor: 6.252

**Overview**

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one.

**B. 16x2 LCD Display**



**Description**

Wanna add an interface to your project? Use the 16x2 standard alphanumeric LCD display, they are extremely common and is a fast way to have your project show status messages. An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data.

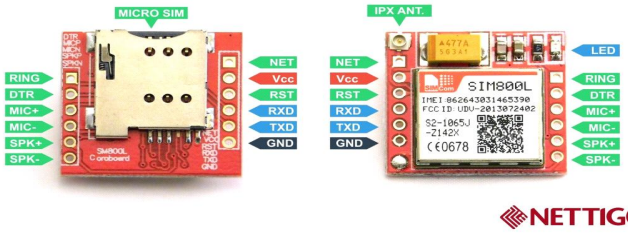
**C. Buzzer**

An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical type. The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren.


**Buzzer Pin Configuration**

The pin configuration of the buzzer is shown below. It includes two pins namely positive and negative. The positive terminal of this is represented with the '+' symbol or a longer terminal. This terminal is powered through 6Volts whereas the negative terminal is represented with the '-'symbol or short terminal and it is connected to the GND terminal.

**D. GSM Module SIM800**

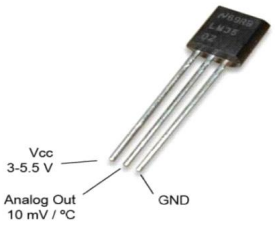



NETTIGO

SIM800L is a miniature cellular module which allows for GPRS transmission, sending and receiving SMS and makingand receiving voice calls. Low cost and small footprint and quad band frequency support make this module perfect solution for any project that require long range connectivity. After connecting power module boots up, searches for cellular network and login automatically. On board LED displays connection state (no network coverage - fast blinking, logged in - slow blinking).

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

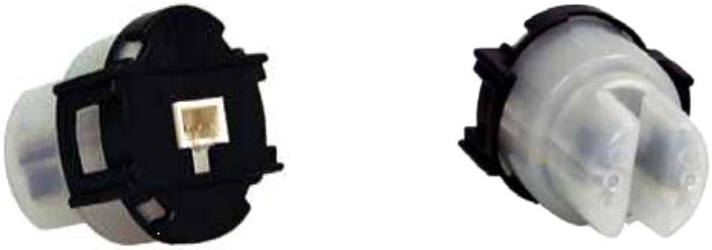
**E. LM35 Temperature Sensor**




**General Description**

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy.

**F. TSD-10 Turbidity Sensor**



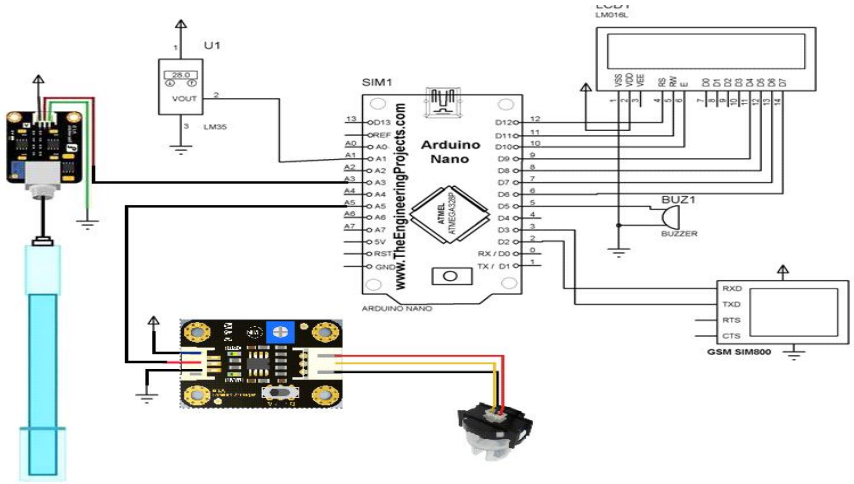
The TSD-10 module measures the turbidity (amount of suspended particles) of the wash water in washing machines and dishwashers. An optical sensor for washing machines is a measuring product for a turbid water density or an extraneous matter concentration using the refraction of wavelength between photo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

**G. PH Sensor**

This is Industrial Grade Analog PH Sensor Kit. Need to measure water quality and other parameters. Here, we have an Industrial Grade Analog PH Sensor Kit. This probe can be used with this pH sensor module. The Analog pH Sensor Kit is specially designed for Arduino controllers and has a built-in simple, convenient, and practical connection and features. It has an LED that works as the Power Indicator, a BNC connector, and a PH2.0 sensor interface. To use it, just connect the pH sensor with the BND connector, and plug the PH2.0 interface into the analog input port of any Arduino controller.

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

### 3.3 Circuit Diagram




## IV. Conclusion

The main goal of the project is to design and construct an Internet of Things Transformer based water quality monitoring which gives real time vales of the three parameters of the water. After the construction of the device, the system was tested successfully. That is the device can monitor the condition of the transformer and send data accumulated from the sensors through the GSM and displayed over the IoT platform. All parameters that are critical and needed and have exceeded their threshold can be sent through SMS for immediate action to be taken. Even though the construction of the system was successful, there were some challenges. The general use of prefabricated microcontrollers for such a project that require specific features increases the complexity and number of hardware modules to be used to execute a simple desire.

## References

**[1].** Nikhil Kedia, Water Quality Monitoring for Rural Areas- A Sensor Cloud Based Economical Project, in 1st International Conference on Next Generation Computing Technologies (NGCT-2015) Dehradun, India, 4-5 September 2015. 978-1-4673-6809-4/15/$31.00 ©2015 IEEE

**[2].** Jayti Bhatt, Jignesh Patoliya, Iot Based Water Quality Monitoring System, IRFIC, 21feb,2016.

**[3].** Michal lom, ondrej priby & miroslav svitek, Internet 4.0 as a part of smart cities, 978-1-5090-1116-2/16/$31.00 ©2016 IEEE