

# IoT BASED STANDARD WATER MEASURING SYSTEM USING GSM

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**Abstract-** Water pollution is one of the problems in the world. Water is used for industrial purpose. So, it is compulsory for an each officer to visit the ponds at a designated time and perform manually testing to measure the purity level of the water. The industrial visitors are not come directly to the pond and the information about the water to send the Short Message Service (SMS). A pond is a body of standing water, either natural or artificial. The sensor is fixed to the pond water, it senses the water and the data will be collected through these phase pH meters, humidity and temperature sensor is sending the signal to Arduino microcontroller. pH meter is used to measure the hydrogen ion in the water, temperature sensor will sense the temperature is one of the most frequently calculated variables and sensing can be made either through straight contact with the heating basis without straight contact with the basis using radiated energy in its place. Humidity is used to measure the amount of water present in the air. The GSM module sends the message to industrial visitor. The pH is normal or abnormal and humidity value, temperature value. The motor is fixed in the pond and if industries need water then they can switch on (or) off the motor. The motor can be switched on (or) off using microcontroller.

**Index Terms:** *Arduino Microcontroller, Humidity Sensor, Temperature Sensor, Relay, Stepper Motor.*

## I.INTRODUCTION

The water is restricted and essential resource for trade, agriculture, and every one the creatures existing on the planet together with the solution. Any imbalance in water quality would severely have an effect on the health of the humans, animals and additionally have an effect on the ecological balance among species. Within the twenty first century there have been many inventions, however, at that time were pollutions, international warming so on also are being shaped, as a result of this there's no safe drinkable for the world's population. The drinkable is a lot of precious and valuable for all the individuals that the quality of water ought to be monitored in real time. These days water quality observations in real time faces challenges as a result of heating, restricted water resources, growing population, etc. Hence, there's a desire of developing higher methodologies to observe the

water quality parameters in real time. Water pollution is one of the problems in the world. The type of water is taken and quality can be measured by pH, humidity and temperature in water level. pH meter is used to measure the hydrogen ion in the water. pH is the numeric representation of gram-equivalent per litre of hydrogen ion concentration in any solution. It varies between 0 to 14. It is the logarithmic measurement of moles of hydrogen ions per litre of solution. The solutions having a pH value between 0 to 7 are acidic solutions with large concentration of hydrogen ions, whereas solutions having a pH value between 8 to 14 are basic solutions with small hydrogen concentration. The solutions having a pH value of 7 are neutral solutions. Measuring the pH gives the measure of normal or abnormal of a water. pH meters live the voltage between 2 electrodes and show the result reborn into the corresponding pH worth. They comprise an easy electronic equipment and a combine of electrodes and a few types of show mark in pH units. It always encompasses a glass conductor and a reference conductor. The glass conductor for mensuration the pH encompasses a glass bulb specifically designed to be selective to hydrogen-ion concentration. Temperature is one of the most frequently calculated variables and sensing can be made either through straight contact with the heating basis or remotely, without straight contact with the basis using radiated energy in its place. The motor can be used pump water used for industrial purpose and former. The pH and temperature is high the motor can be off using the website. Arduino board styles use a range of microprocessors and controllers. The boards, square measure equipped with sets of digital and analog Input/Output (I/O) pins which will be interfaced to varied enlargement boards and alternative circuits. The Arduino UNO is distributed as ASCII text file hardware and code, that square measure commissioned underneath the Lesser General Public License (LGPL).The serial communications interfaces as well as Universal Serial Bus (USB) on some models, that also are used for loading programs for personal computers.GSM may be a mobile communication electronic equipment. GSM may be a digital mobile telecom system that's wide utilized in the globe. GSM uses a variation of your time Division Multiple Access (TDMA) and is that the most generally used of the 3 digital wireless telecom technologies (TDMA, GSM, and CDMA). GSM is wide used mobile communication system within the

world. GSM is wide used mobile communication system within the world. GSM network operators have roaming agreements with foreign operators, users will usually still use their mobile phones once they travel alternative countries. SIM holding home network access configurations could also be switched to those can metered local access, considerably reducing roaming value. Arduino to gather data about the pollution levels of water sources, understanding this data will help us understand how different events in and around the community affect the pollution level of your local water sources. The GSM module can send the value of pH, humidity and temperature to the mobile.

## II. LITERATURE SURVEY

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. IoT is design and development of a low cost system for real time monitoring of the water quality. 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. [1]. In today's world, IoT and Remote Sensing (RS) techniques are being used in different areas of research for monitoring, collecting and analyzing data from remote locations. Drinking water is a very precious commodity for all human beings as drinking water utilities face a lot of new challenges in real-time operation. These challenges originate because of limited water resources, growing population, etc. Therefore, there is a need for better methodologies to monitor the water quality. In order to ensure the safe supply of drinking water the quality needs to be monitored in real-time. In this paper we intend to present the design and development of a low cost system for real monitoring of water quality in an IoT environment. The system consists of several sensors which are used for measuring physical and chemical parameters of water. The parameters such as temperature, pH, conductivity, dissolved oxygen of the water can be measured. Using this system a person can detect pollutants from a water body from anywhere in the world. [2]. Water is a fuel of life and no lives exist without water on this earth planet. The water has to be monitored regularly using smart technologies. There are various purification technologies proposed for monitoring of drinking water, but the hazards of different category are mixed with the drinking water which comes through industrialization, globalization, urbanization, agriculture etc. Hence, the water quality is needed to be monitored at different places in one stretch to avoid pollution in IoT environment. The IoT has the potential to revolutionize the water industry, as more of its technology is connected to the web. Sensor based smart water meters are a form of IoT, a network of technologies which can monitor the position of physical objects, capture meaningful data and communicate that data over a wireless network to a software application for analysis on a computer in the cloud. Technologies are capable of monitoring objects such as smart water meters and other electronic devices, organisms or a

natural part of the environment such as an area of ground to be measured for moisture or chemical content. This paper tells about low cost system that checks the water quality using different sensors, Raspberry pi-module. In the experiment, the output of the sensor will be uploaded to the cloud. Further, from the cloud the data will be examined by Water Monitoring Board (WMB) to know about the contamination and also to send the report. Finally, the uploaded data will be put into public domain; if it is not managed properly by the concerned authorities. In conclusion, the implementation of the proposed sensor based smart meter and other IoT networks can facilitate the data on water quality which can provide actionable information to regulatory authorities for determining compliance by residential, agricultural and other business water users as well as by parties in the water infrastructure. The data can be the basis for enforcement actions so it must be reliable for real time monitoring of water quality parameters in IoT environment through the proposed low cost system. [3]. To ensure the safe supply of drinking water the quality should be monitored in real time for that purpose new approach IoT 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 consist of 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 raspberry pi using zigbee protocol. Finally, sensors data can view on internet browser application using cloud computing. [4]. Drinking water varies from place to place, depending on the condition of the source water from which it is drawn and the treatment it receives, but it must meet Environmental Protection Agency (EPA) regulation. The traditional method of testing Turbidity, pH & Temperature is to collect samples manually and then send them to laboratory for analysis. However, it has been unable to meet the demands of water quality monitoring today. So a set of Monitoring of Turbidity, pH & temperature of Water quality has been developed. The system consists of Turbidity, pH & Temperature sensor of water quality testing, single-chip microcontroller data acquisition module, information transmission module, monitoring center and other accessories. Turbidity, pH & Temperature of water are automatically detected under the control of single chip microcontroller all day. The single chip gets the data, and then processes and analyzes them. If the water quality is abnormal, the data will be sent to monitoring center and alert the public at the same time. It is convenient for management to take corresponding measures timely and be able to detect real-time situation of water quality remotely. The system has realized the automation of water quality monitoring intelligence of data analyzing and networking of information transferring. It is characterized by advantages of shortcut, accuracy and using manpower and material resources sparingly. The technologies are having a high cost associated with installation and calibration of a large distributed array of monitoring sensors. The existing technology will be suitable for particular area but it is not suitable for large system. By focusing on the above issues our paper propose a low cost system for real time monitoring of the water quality in IoT

environment. [5]. Due to the speed of economic development we can see the resulting speeding up the contamination and damage to the water environment, people also responsible who throw the garbage material in water due to which the water get polluted. To overcome all this problem we have developed water quality monitoring system based on wireless sensor network. This system consists of three parts data monitoring node, Wireless sensing node and remote monitoring station. The aim is to design the low-cost system, which is easy to implement and it takes less steps for its operation. The system is designed using ATmega 328, 8 bit micro controller, glass electrode has been used as a pH sensor and wireless communication is achieved by using IEEE 802.15.4 compatible wireless transceiver. This system is used to identify the characteristics of water like pH and temperature. [6].

### III.EXISTING SYSTEM

The existing technology will be suitable for particular area, but it is not suitable for large system. Now a days many people suffering from a number of diseases which is only because of impure or unsafe drinking water. In that system they made water quality smart sensors. So the sensors send data wirelessly to the device which collects data from all the nodes. A Water Quality Monitoring (WQM) system for an eliminating cost consuming jobs of manual monitoring. In this system the measured data of water quality monitoring sensors are collected by the data kit which gives data to the data processing unit through zigbee. In data processing unit the data from different sensors are differentiated and it is continuously compared with the ideal parameters of the sensor value. If the water isn't meeting its quality parameter value, the alert signal is there which is connected to the buzzer. This system is not reliable for long distance also it will apply to only single unit of water source. Water application and municipal water storage are gathered at the substation at which the data are processed. This processed data are sent to the main station through Ethernet networks running on Transmission Control Protocol/Internet Protocol (TCP/IP) and from the main station that data is again differentiated and given to the environment department and public department using the internet. This system has increased data accuracy, reliability and efficiency, also it gives effective data management and fully integrated information systems. But the drawback is that it cannot provide real time monitoring of water. The node collects that receive from the different wireless sensor. The node is connected to the base station through the zigbee technology that powered by the solar panel. This system is low cost but if the solar panel cannot be charged because of the some environment effect then the system will stop working. Every different system consists of some limitation though it cannot meet the aim of real-time, low-cost continuous monitoring of water quality parameters. So, to overcome all this limitation, that leads us to be developed and design the new methodology that will low-cost, real-time and user friendly.

### IV.PROPOSED SYSTEM

Water pollution is one of the biggest fears for the green globalization. WQM System using GSM Service for the Aqua-

Culture based Industries. This design, when implemented, helps in monitoring the water quality, via GSM (by SMS). It is compulsory for an every officer from his industry to visit the ponds at a designated time and perform manual testing to measure the purity level of the water. But it is also known, that these kinds of techniques will consume more time and effort. WQM system is focuses on developing prototypes that can evaluate data collected through these bases: Level of pH in water, Humidity in the water, Temperature level of the water. The sensors send data digitally to the Arduino kit which collects the data transmitted from all sensors. The received digital data is processed by the data Arduino kit and processed data send to the database at which the processed data is compared with the tolerance value of that data. If the water quality parameters cross their threshold value, then the alert message will send using the GSM module, otherwise data keep continuously comparing with its tolerance value. The ponds are far away to villages and power-supply not available to the ponds, data collection nodes are not placed at the place. The system is sets up the receiver node at the data collection center in villages or towns and also send the warnings or a message to the farmers in unhygienic environmental conditions. So, in this prototype used the GSM modems for covers long range communication. GSM modem has a SIM card, operates under a mobile operator, just like a mobile phone. It supports the 2G, 3G technologies, HSUPA, UMTS, WCDMA and HSDPA, as well as the GPRS and EDGE. GSM modems are embedded at both transmitter and receiver station.

#### A.Architecture of water measuring system

The Internet of Things (IoT) is the within network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and network connectivity which enables these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system but it is able to inter-operate the existing internet infrastructure.

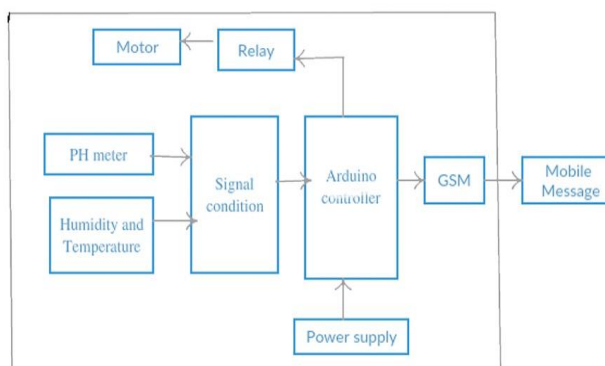


Fig.1 Architecture of standard water measuring system

#### B.Algorithms and Techniques

MQTT may be a shopper Server publish/subscribe electronic messaging transport protocol. It's lightweight weighty, open, simple, and designed

therefore on to be straightforward to implement. These characteristics create it ideal to be used in several things, together with strained environments adore for communication in the Machine to Machine (M2M) and web of Things (IoT) contexts wherever a little code footprint is needed and/or network information measure is at a premium.

#### Features of MQTT

MQTT stands for Message Queuing measure Transport. It is represented as a machine-to-machine (M2M) / IoT property protocol.

This protocol is thus light-weight that it is often supported by a number of the littlest activity and observance devices, and it will transmit information over way reaching, typically intermittent networks.

MQTT could be a publish/subscribe electronic messaging transport protocol that's optimized to attach physical world devices and events with enterprise servers and different customers.

#### Functionality of MQTT

The MQTT algorithmic program consists of Broker, publish and subscribe.

The MQTT messages are delivered asynchronously (“push”) through publishing subscribe design.

The MQTT protocol works by exchanging a series of MQTT management packets during an outlined manner.

Every management packet contains a specific purpose and each bit within the packet is rigorously crafted to cut back the information transmitted over the network.

A MQTT topology contains an MQTT server and an MQTT consumer. MQTT consumer and server communicate through completely different management packets.

#### C. NAIVE BAYE’S THEOREM

Naive Bay’s Theorem is a classification technique supported Bayes’ Theorem with Associate in Nursing assumption of independence among predictors. In easy terms, a Naive Bayes categoryifier assumes that the presence of a selected feature in a very class is unrelated to the presence of the other feature. In order to research the information obtained from the sensors to the MQTT, Naive Baye’s theorem is employed. Here with the assistance of this classifier, a specific or combined parameter of water quality is checked, unrelated to the opposite attributes or it will be aforesaid, that each feature being classified is freelance of the worth of the other feature. In easier words the naive Baye’s theorem will be developed as:

$$P(a/b)=(p(b/a)p(a))/p(b)$$

#### Applications

- Real time prediction
- Multi class prediction
- Text classification
- Recommendation system

#### D. MODULE DESCRIPTION

The proposed system provides the water quality monitoring system used sensors is connected to core controller. The core controller are accessing the sensor values and

processing them to transfer the data through internet. Arduino is used as a core controller. The sensor data can be viewed on the internet. Devices are integrated with the virtual world of internet and interact with it by tracking, sensing and monitoring objects and their environment. The list of modules are as follows:

1) pH Meter: A pH meter is a scientific instrument that measures the hydrogen-ions in the water as well as indicating its acidity or alkalinity expressed as pH. The pH meter measures the difference in electrical potential between a pH electrode and a reference electrode, and so the pH meter is sometimes referred to as a "potentiometric pH meter". pH meter is sense the water and transmit the signal to the Arduino board is microcontroller, the pH value is seven the water is normal and the pH value is above seven the water is abnormal is transmit the value of GSM module. GSM Module sends the message to normal or abnormal in mobile.

2) Humidity Level: Humidity is defined as the amount of water present in the surrounding area. This water content in the air is a key factor in the wellness of mankind. If the temperature is 0<sup>o</sup>C with less humidity. But, if the temperature is 100<sup>o</sup>C and the humidity is high. Humidity sensor is one of the most important devices that has been environmental for measuring and monitoring humidity. Humidity sensors are very important devices that help in measuring the environmental humidity. Technically, the device used to measure the humidity of the atmosphere is called Hygrometer. Humidity is term moisture means the water content of any substance. But practically, the term moisture refers to the water content in solids and liquids. The term humidity refers to the water content in gases.

3)Temperature Level: The most frequently measured environmental quantity is “Temperature”. This might be expected since most of the systems are affected by temperature like physical, chemical, electronic, mechanical, and biological systems. Certain chemical effects, biological processes, and even electronic circuits execute best in limited temperature ranges. Temperature is one of the most frequently calculated variables and sensing can be made either through straight contact with the heating basis or remotely, without straight contact with the basis using radiated energy in its place. The temperature sensor is a thermocouple or a RTD that gathers the temperature from a specific source or water and alters the collected information into understandable and transmit in GSM module.

#### V.CONCLUSION

Monitoring of pH scale, Humidity and Temperature of water makes use of water detection device with distinctive advantage and GSM network. The system will monitor water quality mechanically, and it's low in value and doesn't need folks on duty. Therefore the water quality testing is probably going to be additional economical, convenient and quick. The system has sensible flexibility solely by replacement the corresponding sensors and dynamical the relevant software package programs, this technique will be to monitor alternative water quality parameters. The operation is straightforward. The system may be expanded to watch hydrologic, pollution,

industrial and agricultural production and then on. Its widespread application and extension price. By keeping the embedded devices within the atmosphere for observance permits the self protection of the atmosphere. To implement this got to deploy the sensing element devices within the atmosphere for collection the info and analysis. By deploying sensing element devices within the atmosphere, it will bring the atmosphere into the real world, i.e. it will move with different objects through the network.

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