

# Real time Assessment and Detection of Aqua Distribution System using GSM

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**Abstract-**This paper presents low cost and efficient approach to detect and asses water parameters like temperature , turbidity, conductivity and water temperature. this paper proposes ARM7 based model equipped with sensor array which detects above mentioned water parameters and send it to assessment room using gsm module for assessment where it parameter readings received got displayed using VB based front end. hence ,this model proposes low cost &system which can play vital role in providing clean drinking water by continuous monitoring of water parameters and taking corrective actions.

**Index Terms-**PH sensor;Turbidity sensor; Electronic conductivity sensor; flow sensor; temperature sensor

## 1. INTRODUCTION

Water pollution is a vital problem which requires ongoing evaluation of water resource policy at all levels (international down to local aquifers and wells). It has been suggested that water pollution is the leading global cause of deaths and diseases. this contamination can be of point sources like sewage pipes or non -point sources like nitrogen compounds from fertilized agricultural lands .there are several traditional methods of water contamination detection Which were having several drawbacks-

(1) The unavailability of real-time water quality information to take corrective decisions for public health protection

(2) less number of locations were covered.

(3) it is expensive and requires labors, operation and equipment Therefore, there is a requirement for continuous real time water quality monitoring with efficient spatio-temporal resolution some of the system also implemented using expensive PLC & SCADA based system.

so there is need of paradigm shift in the field of water contamination detection .This paper proposes a model which provides economical and efficient system for detecting and assessment of major water contaminating parameters like water temperature ,conductivity ,PH, turbidityetc. this model also have provision to turn off water flow if any of the parameters are exceeding predefined limit.

## 2. RELATED WORK

Various no. of systems are currently available in the market .It includes a Kohonen self-organizing map(K-SOM) implementation &SCADA based system usedProposed system is efficient but costlier & complex due to use of SCADA & K-SOM [1]. model [2] evaluates the vertical distribution of bulk conductivity, TDS, and specific conductance in groundwater,This model emphasizes on measurementsTDS & conductivity parameters of water. This paper [3] proposes a novel designbased on IEEE 802.15.4 (ZIG-Bee protocol) and solar energy. The prototype is designed to use ECHERP routing protocol and Arduino Mega 2560,This model proposes model which is efficient but costly as it uses solar panels & require sound knowledge of ECHERP protocol .This paper [4] deals with the low cost and holistic approach to the water quality monitoring for drinking water distribution systems,Proposed system detects various parameters & displays readings using python based front end . This paper [5] presents a low cost and holistic approach to the water quality monitoring problem for drinking water using sensor n/w RF module,This module [6] proposes low-cost approach for water parameter monitoring but doesn't covers

parameters like PH,ORP & doesn't take any corrective actions.

This system has two PIC based module for measurement & notifications & one ARM based module for control node measured ,This system is efficient

## 2. METHODS

### 2.1 Parameters Observed

Water contamination is determined by four different parameters namely-

- (1) Turbidity
- (2) PH
- (3) Conductivity
- (4) Water Temperature
- (5) ORP

#### 2.1.1. Turbidity

Turbidity is the amount of cloudiness in the water

Turbidity can be caused by:

- Silt, sand and mud;
- Bacteria and other germs;
- Chemical precipitates.

The most widely used measurement unit for turbidity is the Formazin Turbidity Unit (FTU)

The units of turbidity from a calibrated nephelometer are called Nephelometric Turbidity Units (NTU)

the WHO, establishes that the turbidity of drinking water should not be more than 5 NTU, and should ideally be below 1 NTU.[7]

#### 2.1.2. PH

pH is a measure of how acidic/basic water is.pH is reported in "logarithmic units .The range goes from 0 – 14 ,pH of less than 7 indicate acidity, whereas a pH of greater than 7 indicates a base. pH is really a measure of the relative amount of free hydrogen and hydroxyl ions in the water.

Water that has more free Water that has more free hydrogen ions is acidic, whereas water that has more free hydroxyl ions is basic.Pollution can change a water's pH, which in turn can harm animals and plants living in the water.

#### 2.1.3 Water Temperature

Why the Temperature of Water is Important

Temperature is an important factor to consider when assessing water quality.

In addition to its own effects, temperature influences several other parameters and can alter the physical and chemical properties of water. In this regard, water temperature should be accounted for when determining 7:

#### 2.1.4 Water Conductivity

Why the Temperature of Water is Important

Temperature is an important factor to consider when assessing water quality. [8] In addition to its own effects, temperature influences several other parameters and can alter the physical and chemical properties of water. In this regard, water temperature should be accounted for when determining:

- Metabolic rates and photosynthesis production
- Compound toxicity
- Dissolved oxygen and other dissolved gas concentrations
- Conductivity and salinity
- PH

### 2.2 Parameter's Quality Description

Table 1 gives us brief overview of the water parameters to be observed & also gives us units of these parameters as well as its quality range.

Table 1. Suggested parameters to be observed

Sr No.	Parameters To Be Observed	Range	Unit
1	PH	6 to 8	PH
2	Turbidity	0 to 5	NTU
3	Temperature	-	degree C
4	Electrical Conductivity	500 to 1000	µs/cm

Above table gives us quality range which defines the range of these parameters which is going to be measured by using sensor network & it can also be

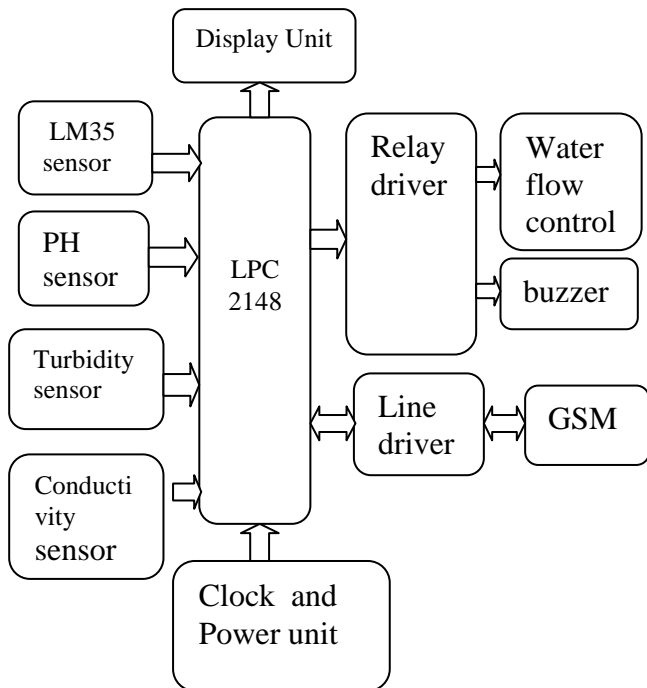
considered as allowable range to maintain the water quality within defined limit by WHO.

If water parameters falls below these range which ,it will change the properties of water in such a way that water is said to be contaminated and this water could be very dangerous for the health of the water.

### 3. PLATFORM DESIGN

The system is categorized in two sections:

**1. Sensor station** It consist of sensor networks like PH, Turbidity, Temperature, and Conductivity etc. Which collect the data and send it to the base station.



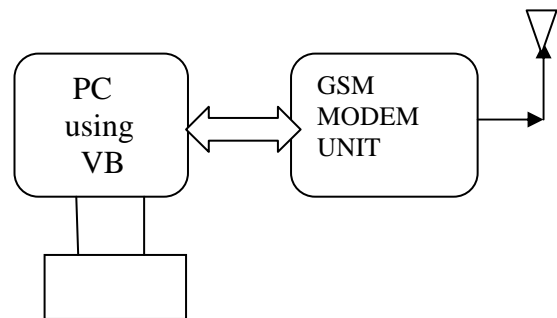
**Fig.1. Sensor Station**

Fig shows the functional diagram of the sensor station .LPC2148 is the heart of the system which is ARM7-TDMI-S based microcontroller having on chip 10-bit ADC, peripheral power control facility. This system can be installed in targeted water distribution system. Then sensor array consisting of water temperature sensor, PH sensor, turbidity sensor& conductivity sensors which measures contamination determining parameters like water temperature, PH,turbidity & Conductivity. f

1. Proposed system will have LM35 sensor for water temperature measurement with some signal conditioning circuitry
2. PH measurement is achieved by PH probe Available in the market.
3. Turbidity measured using IR sensor-detector pair in which current through IR detector changes with the turbidity of the water.
- 4 . Electronic conductivity probes or sensors available in the market can be use for the water conductivity

If water contamination falls below predefined limit It will turn on the buzzer as well as water flow is controlled using relay driver circuitry. water flow is controlled using solenoid valve while audio buzzer is used for the indication.

**2.Base station** receives data from Sensor station and displays it on VB based front end for assessment



**Fig.2. Base Station**

Parameter data sent by sensor station is received by base station using gsm module & it can be observed & assessed by using VB based front end& then we can take corrective actions in order to prevent further water contamination.

### 4.CONCLUSION

This article presents basic design of low cost & extremely efficient system for aqua distribution source detection. Unlike systems which are currently available in the market, it is economical ,light weight, user friendly & requires less power due to use of ARM microcontroller. system also controls the water flow& trigger alarm if the contamination level is exceeding the predefined limit .