



## Real time measurement of impurity level in the water

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**Abstract-**The need of water have risen exponentially to an unprecedented scale in India. The demand for water supply is ever increasing and satisfying this requirement has been a major challenge for many countries around the world. Ensuring access to safe and clean water is another issue that requires attention. In earlier days, the quality of water is high, but over the last two decades it decreases in terms of physical, chemical and biological conditions. This study aims to detect and control the contamination in water. It will monitor the pollution level in water continuously and it will generate the database automatically. This helps us to view the information at any time from the control board. The pH, turbidity and temperature level can be viewed through real time android application, which works under IOT. In the case of pollution accident on a river, it will alert the nearby water control stations by sending them notification through (Internet of Things) IOT to the registered mobile numbers.

**Keywords -** Arduino controller, android application, Internet Of Things, water quality monitoring.

Manually. There are some demerits in those methods. The drawbacks like time management, non-effective results that are due to data loss occur in the collected samples. There is a need in monitoring the water quality continuously. The real time monitoring techniques have paved a way to monitor the water under surveillance.

By focusing the issues in the previous methods, this project could develop a system with high efficiency and low cost. In this project Arduino uno is used as a controller. This system design featured with Internet of Things which helps in collecting data from the sensor. The data can be viewed in mobile phones by accessing the specified Internet protocol. ESP8266, an integrated chip provides Wi-Fi access to the mobile phones.

### II. WATER PARAMETERS

#### A. Temperature

It is important to record temperature along with the other parameters as this will be useful in behavioural analysis of the parameters being measured. Relating to temperature- relation theories, pH and conductivity have an undesirable effect with large temperature change.

#### I. INTRODUCTION

There are some essential needs that human have to depend on it. Water is one among those needs. Water is among the important natural resource. The need for water is getting increased day by day. Surface and ground water is the major water source for all of us. But now the water in both level is being decreased. According to [1], by 2030 is expected that developing countries like India will suffer from water shortage because of increase in need. Many chemicals cause contamination to water. Some of them are chemical outlets from industries, usage of agricultural chemicals in farms.

In order to prevent the water from chemical contamination technology supports to a greater extent. The newer technologies proved to be very efficient for human beings. The method followed in last decades is placing electrodes in particular place like river, lakes, pond and analyzing the chemical change occurring in the electrode manually. It is done by collecting required samples from the spot. According to changes, pH level is calculated

#### B.pH

The pH of a solution is the measure of the acidity or alkalinity of that solution. The pH scale is a logarithmic scale whose range is from 0 – 14 with a neutral point being 7. Values above 7 indicate a basic or alkaline solution and below 7 would indicate an acidic solution. The majority of aquatic life prefers a pH level of 6.5 - 9.0. Anything outside of this optimum range is considered fatal to the marine ecosystem. Extreme pH values also increase solubility of elements and compounds making them toxic and therefore more likely to be absorbed by marine life. Additional information are that when temperature increases the pH level decreases.

### C. Turbidity

Turbidity is the optical determination of water quality. Turbid water will appear cloudy, murky or otherwise coloured, affecting the physical look of the water. Turbidity measurements are often used as an indicator of water quality based on clarity and estimated total suspended solids in water. It is based on the amount of light scattered by particles in the water column. It can come from suspended sediment such as silt or clay, inorganic materials or organic matter such as algae, plankton and decaying material. In addition to these suspended solids, turbidity can also include coloured dissolved organic matter (CDOM), fluorescent dissolved organic matter (FDOM).

## III. SENSOR DESCRIPTION

### A. Temperature sensor

A temperature sensor is a device, typically, a thermocouple or RTD that provides for temperature measurement through an electrical signal. A thermocouple (T/C) is made from two dissimilar metals that generate electrical voltage in direct electrical voltage in direct proportion to changes in temperature.

### B. pH sensor

The most commonly used pH sensors consists of glass electrodes. The glass electrode method has high reproducibility, and it can measure pH of various solutions. The majority of pH electrodes available are combination electrodes that have both the glass electrode and the reference electrode conveniently placed in one housing. While the reference electrode and the pH measuring electrode are physically combined into one electrode, the electrodes still function independently, and

characteristic

problems

remain.

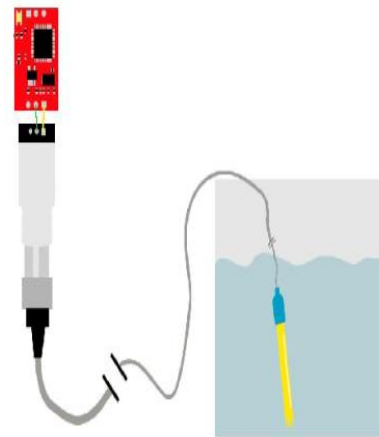


Fig.1 pH sensor connected pH- EZO embedded board.

### C. Turbidity sensor



Fig.2. Turbidity sensor

The turbidity sensor measures the turbidity of fresh-water or seawater samples in NTU (Nephelometric Turbidity Units, the standard unit used by most water collection agencies and organizations). Is small, sleek design and simple setup making it easy to use at the collection site or in classroom? It can also be used to monitor precipitate formation or algae and yeast populations in chemistry and biology classes. The Turbidity Sensor includes high-quality Hach Stabcal 100 NTU standard for quick calibration and a high-grade glass cuvette for your water sample.

IV. INTERNET OF THINGS

The Internet Of Things is a newer technique that has power to do something with a smartness software, sensor

Typically, IOT is expected to offer advanced connectivity of devices, systems and services that goes beyond Machine-to-Machine (M2M) Communications and covers a variety of protocols, domains and

applications. The interconnection of these embedded devices is expected to usher in automation in nearly all fields, while also enabling advanced applications like a smart grid.

The term itself ‘Internet of Things’ was coined in 1999 by Kevin Ashton for linking the idea of sensors with the internet. The IoT journey has taken over a century to see light and it will undoubtedly not stop here. Every advancement made is to make the life simpler and easier.

V. BLOCK DIAGRAM

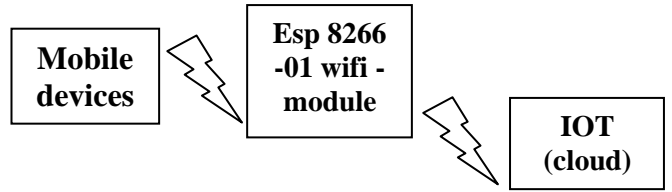
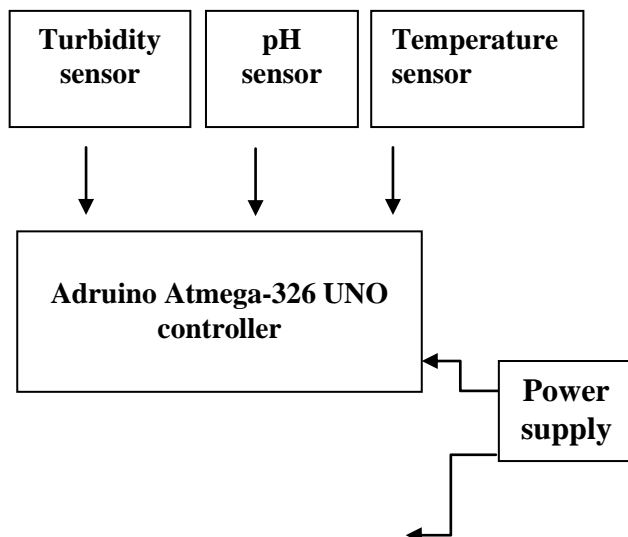


Fig.3 Block diagram

The block consists of various sensors like turbidity, pH and temperature sensors .These sensors are connected to the analog input of Arduino controller. As the controller and ESP 8266 module are provided with power supplies.

A. Arduino UNO controller



Fig.4 Arduino controller board.

Arduino Uno is a microcontroller board based on the ATmega328p. It has 14 digital input/output pins (of which 6 can used as a PWM outputs), 6 analog inputs, a16MHz quartz crystal, a USB connection, a power jack,an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for few dollars and start over again.

“Uno” means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board And version 1.0 of Arduino Software (IDE) were the reference versions of Arduinio, now evolved to newer releases. The uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current,

past or outdated boards see the Arduino index of boards.

B. ESP 8266-01 chip



Fig.5 ESP 8266 chip

The ESP8266 Wi-Fi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much Wi-Fi-ability as a Wi-Fi Shield offers. The ESP8266 module is an extremely cost effective board with huge and ever growing, community.

This module has a powerful enough on board processing and storage capability that allows it to be integrated with sensors and other application specific devices through its GPIO's with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal existence PCB area. The ESP8266 supports APSD for VoIP application and Bluetooth Co-existence interfaces, it contains a self-calibrated RF allowing it to wrk under all operating conditions and requires no external RF parts.

There is an almost limitless fountain of information available for the ESP8266, all of which has been provided by amazing community support. In the documents section below you will find resources to aid you in using the The ESP8266, even instuctions on how to transforming this module into an IoT (Internet of Things) solution.

## VI. OPERATING PRINCIPLE

The block consists of sensors interfaced with Arduino controller board. The circuit comprises of pH, turbidity and temperature sensing sensors, an Arduino uno microcontroller board along with an IOT module. Each and every second the quality of water is being monitored by the system. The initial working of the system starts with the sensors. When there is change in any one of the parameters like pH, turbidity, the signal sensors enables the arduino controller to send enable signal to ESP8266. The chip is specified with wifi module whip helps to transmit the collected signals to cloud. The data that is stored I the cloud can accessed by using an Android application. The application is featured with pH, temperature and turbidity graph which helps

## VII. CONCLUSION

In this project, the design and measurement of real time monitoring the water quality parameters in IoT environment is presented. The proposed system consists of two water quality parameter sensors, Arduino uno and an IoT module. These devices are low cost, more efficient and capable of processing, analyzing, sending and the data can be viewed anywhere in the world. In the future, we plan to implement several sensors for monitoring toxic gas and other chemicals present in water.

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