# Water Quality Monitoring System Using Sensors and IoT Technology

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***Abstract-*** *Air pollution is a mixture of solid particles and gases in the air. Car emissions, chemicals from factories, dust, pollen and mold spores may be suspended as particles. Effect of air pollution has many bad things and the others may cause problems to our health, for instance, asthma, cough, and lung disorders. In addition, the pollutant can cause global warning, acid rain, and disturbing plant growth. Basically, a human cannot determine whether the air is good or not. Hence, it is necessary to have a tool that can measure the air quality. This project is purposed to design an air quality monitoring system by utilizing esp-01 module. As the result, users can monitor the air quality using smartphone connected through ESP-8266 Wi-Fi. Therefore, the air condition can be monitored every time. Currently, there is so much air pollution cases that actually can be changed if we are aware. In other words, we can contribute as part of the solution instead part of the pollution*

***Keywords***- Wireless Sensor Network (WSN), water parameters, Internet of things(IoT), WI-FI.

## I. INTRODUCTION

The wireless communication technologies are increased for aiding person's individual and regular responsibilities. There are many applications developed for building control, automation, data acquisition in recent years. There are many benefits like low cost, easy installation, and maintenance. The remote device network is applicable in several functions like farming, traffic management, remote health care, forest management, security andsurveillance[1].The"wirelesssensornetwork"containsconnectivity,computing and signal processing, and spread device nodes for sensing[2].This framework permits the user to display the devices which are connected from the bottom station through completely dissimilar communication principles such as "Bluetooth, Zigbee, WIFI, RFID and GPRS" [3]. IoT was established in parallel to WSN's during which several things are associated with networks from one to different. Jing[4] created are mote wireless watching system for water supply using "PIC microcontroller" that relieson GPRS. The complexity of the microcontroller architecture is more, and the cost is high. The air quality index (AQI) in India launched in 2014 under Swachh Bharat Abhiyan monitors air pollution on 10 scales ranging from low (green) to moderate (yellow) to serious (red) through data analysis of various air contaminating matters like pm 2.5, O3, NO2, SO2, CO. The present paper develops an Internet of Things (IoT) that enabled air quality monitoring system mobile in nature analyzing real-time surrounding data measuring Carbon Monoxide, Smoke and PM level. Therefore, to solve these disadvantages, a low cost, low power and system on chip primarily based wireless device node is needed. Purohit and Gokhale [5] created a true time watching system using GSM, Intel, sensors, ADC and LCD. These devices are limited because they are supported advanced dedicated electronic boards [6],[7],[8].There are different WEB applications like RFID tags, smart technique, sensor technique and mobie techniques [9].

## II. EXISTINGSYSTEM

Now a day's water is polluted due to many reasons. In this current system, the equipment cost is high, and it takes a lot of time to process. Traditional methods have the drawbacks such as long waiting time for results high cost, low measurement precision, and complicated methodology[12].

So with the implementation in the technology, we use different methods and techniques to check the quality of water. There is ad is advantage in the existing system that the system has high complexity and low performance. This water quality monitoring using sensors and Iot helps many of us to manage water quality. The Mobile-DAQ unit combines a single-chip microcontroller, air pollution sensors array, a General Packet Radio Service Modem (GPRS-Modem), and a Global Positioning System Module (GPS-Module).

## III. PROPOSED SYSTEM

In this proposed system the complexity reduces and the performance increases by collecting the data of the water parameters like temperature, water level, co2, pH. The information collected is updated on the web server that can be retrieved from any where in the world.

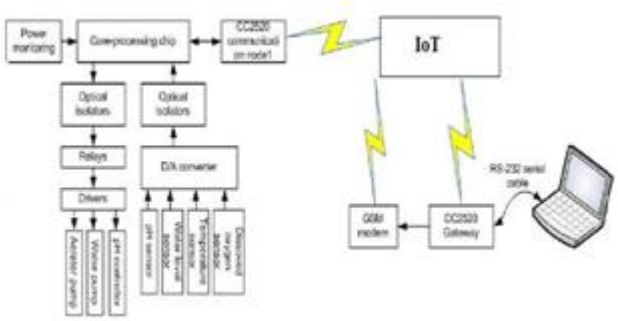


**Figure 1: S**ystem block diagram

## IV. WORKING OF PROPOSED SYSTEM

Connect the ESP8266 with the Arduino. ESP8266 runs on 3.3V and it may get damaged when it is provided with5V. Connect the VCC and the CH_PD to the 3.3V pin of Arduino. The RX pin of ESP8266 works on 3.3V and it will not communicate with the Arduino when we will connect it directly to the Arduino. So, we will have to make a voltage divider for it which will convert the 5V into 3.3V. This can be done by connecting three resistors in series like we did in the circuit. Connect the TX pin of the ESP8266 to the pin 10 of the Arduino and the RX pin of the esp8266 to the pin 9 of Arduino through the resistors

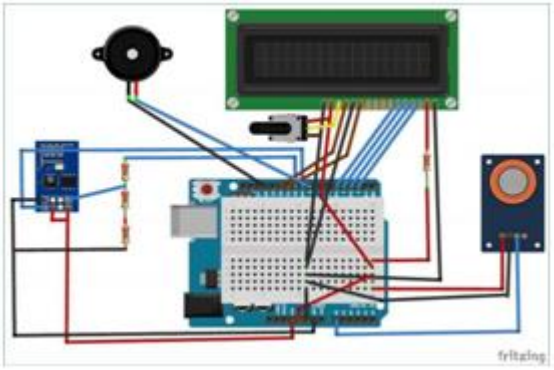


**Figure2: Schematic Diagram**

**co2 sensor:** The co2 sensor is a device which is used to measure the carbon dioxide in the water. This system uses SKU:SEN 0219 to measure the concentration which is an analog infrared co2 sensor. Parts per million (ppm) is the unit which is used for measuring the concentration of co2. One "ppm (parts per million)" is equal to 1milligram of something per liter of water. The characteristics of this type of co2 sensors are low power consumption, high senstivity, water proof and anti-corrosion, temperature compensation and stability.


**Figure3:**$CO_2$ Sensor

ESP8266 Wi-Fi module gives your projects access to Wi-Fi or internet. It is a very cheap device and make your projects very powerful. It can communicate with any microcontroller and it is the most leading devices in the IOT platform. Learn more about using ESP8266 with Arduino here. Then we will connect the MQ 2 sensor with the Arduino. Connect the VCC and the ground pin of the sensor to the 5V and ground of the Arduino and the Analog pin of sensor to the A0 of the Arduino. Connect a buzzer to the pin 8 of the Arduino which will start to beep when the condition becomes true.

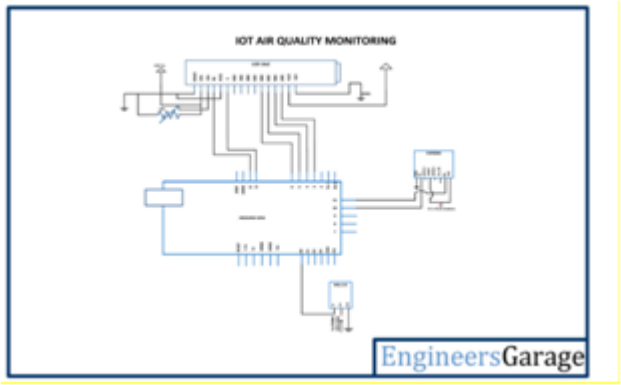


**Figure4:** Interfacing of Arduino

**WI-FI:**

The WI-FI module used in this project is ESP8266. It follows TCP/IP stack and is a microchip which is less in cost. This microchip allows the microcontroller to connect to a WI-FI network, by using Hayes style command connections are done or made through TCP/IP connection. ESP8266 has 1MB of built-in flash, single chip devices able to connect WI-FI. Es press if systems are the manufacturers of this module , and it is a 32-bit microcontroller. There are 16GPIO pins in this module. This module follows the RISC processor. It has 10 bit DAC. Later Es press if systems released a software development kit (SDK) which is used to programme on the chip so that another microcontroller is not used. Some of the SDK's are Node MCU, Arduino, Micro Python, Zerynth and Mongoose OS. SPI, I2C,I2S, UART are used for communicating between two sensors or modules. IOT gateway is discussed briefly in[7].

**Figure5.1:**Wi-FiModule

## V. RESULTS AND DISCUSSIONS

**Figure7:**Prototype of project

The online application used to analyze air quality data got from sensors in this proposed system was "Thing-speak". Thing-speak is an open source internet of things application programming interface used to store and retrieve data from interconnected things using the hypertext protocol over the internet or via a local area network. It also provides access to a broad range of embedded devices and web services. This enables the creation of sensor logging applications that can be updated regularly. The data collected from the sensor is passed through arduino to wifi module and then further the data is uploaded to the server. Here we're using thing speak server. Thing Speak is a cloud platform for Internet of Things. It allows the users to store the data collected from sensors in different channels. It is also used for real-time data processing, visualizations, and plugins.


**Figure8:** Sensor data showing air pollution


**Figure 9:** Sensor data accessing in the web through IoT

## VI. CONCLUSION

By using a WIFI module, the interfacing is done between transducers and the sensor network on a single chip solution wirelessly. For the monitoring process, the system is achieved with reliability and feasibility by verifying the four parameters of water. The time interval of monitoring might be changed depending upon the necessity. Ecological environment of water resources is protected in this research. The time is reduced, and the cost is low in this environmental management.

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