Real Time Low Cost IoT Based Water Quality Monitoring System

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Abstract

Water is essential for living organisms and water can get polluted anytime and it is biggest fear for green globalization, So water pollution cause various types of water borne diseases like dengue, malaria etc, 40 percent of the death in the world caused by water pollution, So the quality of water has to measured on real time for that we proposed a water quality monitoring system ny using IoT technology, It consist of various types of sensors like pH, turbidity, conductivity these sensors periodically sends analog signal to the Arduino uno. Where the Arduino is programmed such a way that a threshold value is given if the value from the sensor does not meet the condition it will rise the alaram by sending signal to the Thing Speak web server using nodeMCU Wi-Fi module, the users get the information to their mobile from the server. This system is cost effective that is one time investment, if we test manually it consume more time and money.

Keywords: Ph, Turbidity, Conductivity, Node MCU, Thing Speak

I. INTRODUCTION

Nowadays, monitoring quality of water faces many challenges because of global warming, limited water resources, growing population etc. In India among 77 million people suffering due to not having safe water and also 21 percent of disease related to unsafe water, more than 1600 deaths are occured due to diarrhea. Hence there is need of developing methodologies to monitor water quality parameters on real time water quality parameters. pH measures the concentration of hydrogen ions, from that we know water is acidic or alkaline. Normal water has pH value ranges from 6.5 to 8.5pH, if it is more than that then we know then alkaline or if it is less pH value then water is more acidic. Turbidity sensor measure the suspended particle in the water, if any imbalance in the quality pf drinking water affect the human health. Water plays important role in human life. Conductivity sensor conduct electricity more if more metal ions present in the water that is harmfull for humans.

II. INTERNET OF THINGS

It is defined as network of physical things-devices embedded with sensors,m1cro•controller and network connectivity that enables these objects to collect and exchange the data. we can able to place any device on a location and control from another location, the backbone of this technology is internet ,each device has unique identification so that we able to connect many sensor and capture the signal on real time the accuracy of time being taken to send the data is too good.

A. ThingSpeak

ThingSpeak is open source OS which can store and retrieve the data of sensor through Internet. Only authorised person can access the data from the server using loginID and password, processed data from arduino uno send to this server through nodeMCU that is ESP8266 is low cost wifi module with full TCP / IP stack, it uses serial receiver and transmitter while working with ThingSpeak first we have to create an account then create new channel after moving to status update field give field name like pH, temp etc. If you check public then other people can see the status after that click on save channel, an API is created program calling to API to identify the calling program

B. Arduino Uno

Fig. 1: Arduino Uno

It is open source microcontroller board developed by Arduino.cc it has 14 digital 1/0 pins,6 ana log 1/0 pins is programmed using Arduino IDE via USB cable it can powered by using 9-volt battery it has a clock speed 16MHz and 32KB of flash memory, SRAM has 2KB whereas EEPROM 1KB each of digital and analog pins used has as a input or output under the software control usong pinMode(),digitalRead() functions,each pin can provide 20mA as recommended operating condition and it hasinternal pull resistor 20 to 50k ohm,40mA is the maximum current limit for the pins.

C. Problem Statement

Monitor the quality of drinking water in residential home on real time and give the information regarding whether Water is safe for use or not

D. Objective

1) Place the sensor in specified location
2) To collect the information on real time and analyse 3)Get the information about the water is polluted or not

E. Proposed Methodology

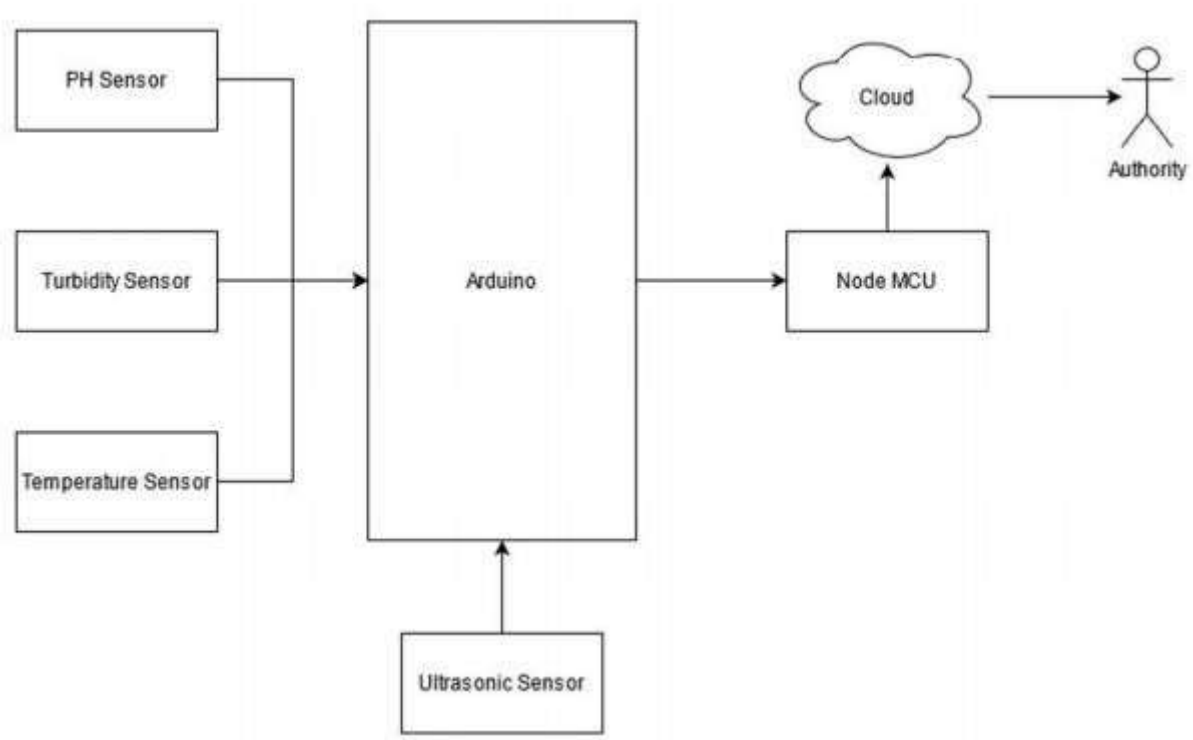


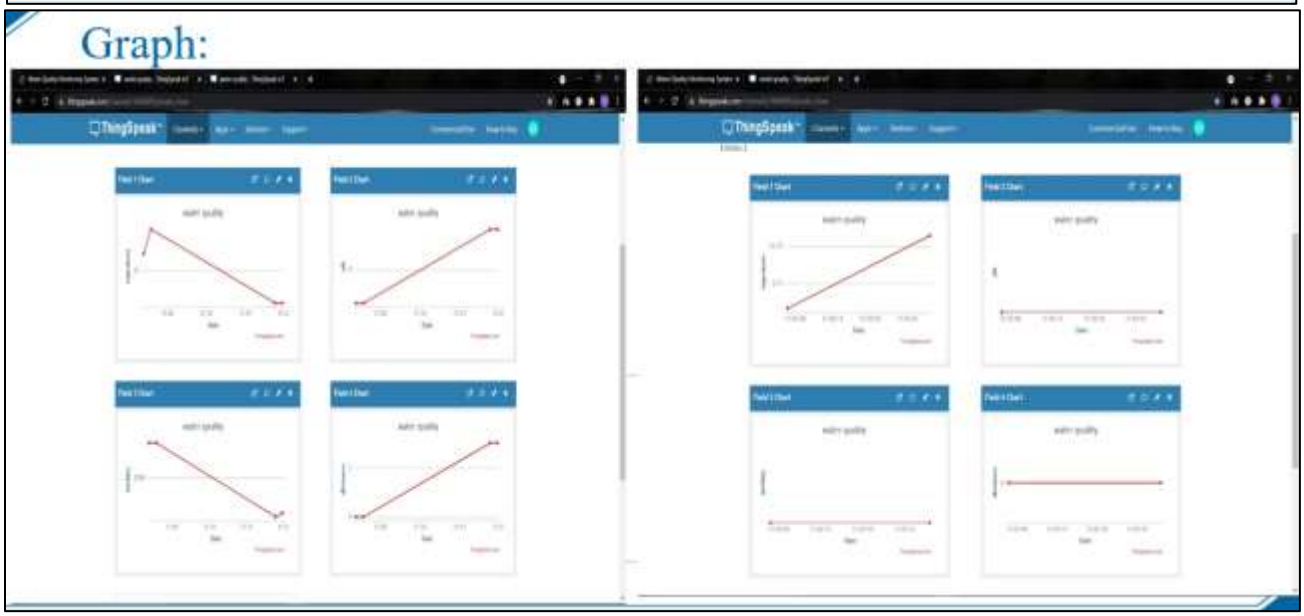
Fig 5.1: Architecture

Here first we collect various types of sensors PH, turbidity, conductivity, Ultrasonic, temperature these sensors are connected to arduino uno where each sensor have threepin vcc, gnd, and one analog pin the sensor observe any physical or chemical change that will convert into analog signal and passed to the mirocrocontrolller where we maintain the operating voltage is 5v throughout

this system ,we can connect many sensor and pass the signal to microcontroller at a time this is because microcontroller has many pins and has the capability to control more electronic devices ,the arduino simply cannot take values from sensor unless it is programmed through Arduino IDE, once program dumped to arduino through USB cable the arduino collects the data these data does not have meaning untill it convert it into information by applying some formulas after converting it into information we set a condition that if the values range from the sensor meet the condition then the water is safe to drink otherwise not ,the information periodically send to the Thing Speak web server by usnig WiFi module ESP8266 this module acts as a transmitter and receiver for both arduino and web server from the web server we can use matlab or any other tools in order to analyse the data and represent in visualize form. The users get these data to their mobile only if they are authorized for that they have to provide login id and password here multiple users can get same data if both use same channel and the information regarding water quality gets on real time because arduino programmed in a such a way that it can fetch the signal from the sensors periodically.

III. RESULTS

- We have identified a suitable implementation model that consists of different sensor devices and other modules, their functionalities which are connected to Arduino UNO board for monitoring.
- A pH sensor is one of the most essential tools that's typically used for water measurements. This type of sensor is able to measure the amount of alkalinity and acidity in water and other solutions.
- Turbidity sensors measure the amount of light that is scattered by the suspended solids in water. As the amount of total suspended solids (TSS) in water increases, the water's turbidity level (and cloudiness or haziness) increases.



- After sensing the data from different sensor devices, which are placed in a particular area of interest. The sensed data will be automatically sent to the web server through the Wifi module.
- In this project, a real time water quality monitoring system prototype developed for water quality monitoring in Residential homes is presented.

IV. CONCLUSION

The traditional way of monitoring water quality takes more time and resources, where the water sample has to be collected and tested in water laboratories which are not only costly but also lack capability for real-time data capture, analyses and fast dis• semination of information relevant for making timely and inform ed decisions. The proposed project is an efficient, inexpensive. IOT solution for real-time water quality monitoring. The proposed system uses Arduino and NodeMCU microcontrollers for interfacing several sensors. An efficient coding will be developed to track water quality. A web-based API i.e., ThingSpeak is used to monitor the parameters suchas pH value, the turbidity of the water, level of water in the tank, temperature. Further, these measured parameters are also monitored in ThingSpeak webserver. Proposed system will definitely help in monitoring the quality of the drinking water from anywhere.

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