iJRASET
International Journal For Research in
Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** III **Month of publication:** March 2018

DOI: http://doi.org/10.22214/ijraset.2018.3646

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue III, March 2018- Available at www.ijraset.com

Water Quality Care System

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Abstract: This project presents on an android application which enables the good and best monitoring system of water pollution. In this project the pollution monitoring device is used to monitor the pollution in the environment. Water pollution monitoring describes the process and activities that need to take place to characteristics and monitor the quality of the environment. water pollution monitoring is used in the preparation of environment impact assessments, as well as in many circumstances in which human activity carry a risk of harmful effects on the natural environment. The device is connected to a cloud computing system, and the cloud system compute the signal to the to the mobile application, this show the quality of water in the water tanks
Keywords: pH sensor, Turbidity sensor, Temperature sensor, Flow sensor, Ardurino model, WI-FI module

I. INTRODUCTION

In the 21st century, there were lots of inventions, but at the same time were pollutions, global warming and so on are being formed, because of this there is no safe drinking water for the world's pollution. Now a days, air and water quality monitoring in real time faces challenges because of global warming limited water resources, growing population, etc. Hence there is need of developing better methodologies to monitor the air and water quality parameters in real time. The water quality parameters pH measures the concentration of hydrogen ions. It shows the water is acidic or alkaline. Pure water has 7pH value, less than 7pH has acidic, more than 7pH has alkaline. The range of pH is 0-14 pH. For drinking purpose it should be 6.5-8.5pH. Turbidity measures the large number of suspended particles in water that is invisible. Higher the turbidity higher the risk of diarrheoa, collera. Lower the turbidity then the water is clean. Temperature sensor measures how the water is, hot or cold. Flow sensor measures the flow of water through flow sensor. The traditional methods of water quality monitor involves the manual collection of water samples from different locations.

II. LITERATURE SURVEY

A. Environmental Electrochemistry as a Tool for Water and Air Quality Monitoring

Voltammetric and polarographic methods at the Hg electrode were used to study presence of sulfur species in different contrasting natural samples: stratified anoxic lakes, seawater lake Rogoznica Lake (Croatia) and crater lake Pavin Lake (France); rain precipitation and sea-aerosols. In all of these investigated samples typical HgS reduction voltammetric peak, characteristic for many different reduced sulfur species (RSS, sulfide, elemental sulfur, polysulfides, labile metal sulfide species, orgnosulfur compounds) was recorded at about -0.6 V vs. Ag/AgCl reference electrode. In addition to, in Pavin Lake anoxic samples voltammetric peaks characteristic for the presence of free Fe(II) and FeS nanoparticles were recorded at -1.4 V and around -0.45 V, respectively. Depending on experimental conditions (oxidative and/or reductive accumulation, different accumulation times and potentials or different stripping technique, acidification and purging) it is possible to make distinguish between different sulfur species. This work clearly shows a large potential of electrochemistry to be used as powerful analytical technique for determination and speciation of different reduced sulfur species in dissolved and colloidal phases in natural waters.

Published in: Bioinformatics and Biomedical Engineering, (iCBBE) 2011 5th International Conference on
Date of Conference: 10-12 May 2011
Date Added to IEEE *Xplore*: 31 May 2011
INSPEC Accession Number: 12106610
DOI: 10.1109/icbbe.2011.5780760
Publisher: IEEE
Conference Location:

B. Multi-Sensor System For Remote Environmental (Air And Water) Quality Monitoring

1) *Abstract:* In this paper realization of the low-power, portable, low-cost multi-sensor system for air and water quality monitoring is described. Developed system is battery-powered with solar panel-based charger unit, and it is intended for use in remote environmental monitoring by collecting information about air temperature (T) and relative humidity (RH), presence of volatile organic compounds (VOC) as well as water temperature and pH level. The hardware of the system is based on the ATmega128

microcontroller which acquires the sensors data and coordinates the work of all peripherals. To establish full standalone operation, peripherals such a TFT color LCD display, embedded keypad and SD card for data storage are included. Air quality parameters are collected with SHT11 (T and RH) and MQ-135 (VOC) sensors, while water temperature is monitored with encapsulated LM35 sensor. For pH level monitoring, TiO_2-based thick film pH resistive sensor was fabricated and characterized. The pH sensor readout electronics, based on the integrated circuit AD5933, is designed in such way to ensure reliable in-situ measurements. Discussion of the applications of the proposed system in the more complex, a cloud-based, system for air and water quality monitoring in real-time, with the IBM Watson IoT platform is given as well.

Published in: Telecommunications Forum (TELFOR), 2016 24th
Date of Conference: 22-23 Nov. 2016
Date Added to IEEE *Xplore*: 19 January 2017
INSPEC Accession Number: 16616242
DOI: 10.1109/TELFOR.2016.7818711
Publisher: IEEE

C. An Industrial Viewpoint On The Training Of Societal Systems Engineers

The company with which I am associated, Systems Control, Inc., currently employs 150 people. Most of the company's technical staff has received formal systems engineering, and approximately half hold the Ph.D. degree. The company does a significant fraction of its business in areas where social and economic factors are significant considerations; these include urban planning, water and air quality monitoring, control or sewage treatment plants, urban transportation, air traffic control, human operator modelling, corporate modelling, and industrial and public utility demand forecasting. While relatively few of our staff members obtained degrees in fields with titles that can be construed as equivalent to "societal systems engineering," nevertheless, many of the recent graduates have received some formal training in this direction as part of their systems engineering curriculum. I would like to comment on the present and projected value of this training to an organization such as ours.

Published in: Decision and Control, 1972 and 11th Symposium on Adaptive Processes. Proceedings of the 1972 IEEE Conference on
Date of Conference: 13-15 Dec. 1972
Date Added to IEEE *Xplore*: 01 April 2010
DOI: 10.1109/CDC.1972.269043
Publisher: IEEE

D. Remote Environmental Monitoring Using Internet Of Things (Iot)

Environmental monitoring encompasses systematic methods that observe and study conditions of natural resources such as air, land, and water. Challenges associated with traditional environmental monitoring methods include accessibility constraints imposed by harsh terrains and vast geographical areas, lack of real-time data collection and processing, and the inability to facilitate continuous monitoring. This calls for a need to develop remote environmental monitoring techniques that are based on intelligent data acquisition, communication and processing. This paper focuses on using Internet of Things (IoT) technology to build and deploy smart, connected sensors that provide continuous monitoring of air and soil quality. Acquired data will be displayed on a graphical user interface (GUI) that provides real-time information, which may be used to define current conditions of the area being monitored, and also to establish trends or detect any abnormalities. Parameter thresholds will be established in order to trigger email/text alerts to users, stakeholders, or monitoring personnel, when there is a deviation from normal.

Published in: Global Humanitarian Technology Conference (GHTC), 2017 IEEE
Date of Conference: 19-22 Oct. 2017
Date Added to IEEE *Xplore*: 25 December 2017
DOI: 10.1109/GHTC.2017.8239335
Publisher: IEEE

E. Design Of A Smart Gas Detection System In Areas Of Natural Gas Storage

This paper focus on the development of a new device suitable to detect and measure methane gas in areas of natural gas storage site. This device, the Smart Gas Detection system, can measure the air and water quality, including all the parameters that can have outliers by an eventual gas leak in the aquifer or atmosphere. The air quality parameters measured by low cost sensors, include CH4

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and CO2 gas, while for water quality parameters measured include temperature, pH and electrical conductivity. The sensor node is based on Arduino UNO microcontroller, receiving the data from the sensors and transmitting to the database on Raspberry pi 3, remotely accessing all the data. It is extremely important to develop devices with the new commercial low-cost sensors to detect and measure gases in atmosphere to monitoring the carbon dioxide and methane due to their role as greenhouse gases and also gas leaks from wellbores can severely affect the health of people and animal.
Published in: Geoscience and Remote Sensing Symposium (IGARSS), 2017 IEEE International
Date of Conference: 23-28 July 2017
Date Added to IEEE *Xplore*: 04 December 2017
DOI: 10.1109/IGARSS.2017.8128365
Publisher: IEEE

III. SCOPE

This publication discusses the monitoring of the quality of waters, including rivers and streams of all sizes, from their source to tidal limit (i.e. the influence of salt water intrusion), canals and interconnecting river systems, lakes of all types and sizes, including marshes and swamps, reservoirs and river impoundments and groundwater.

IV. PROPOSED SYSTEM

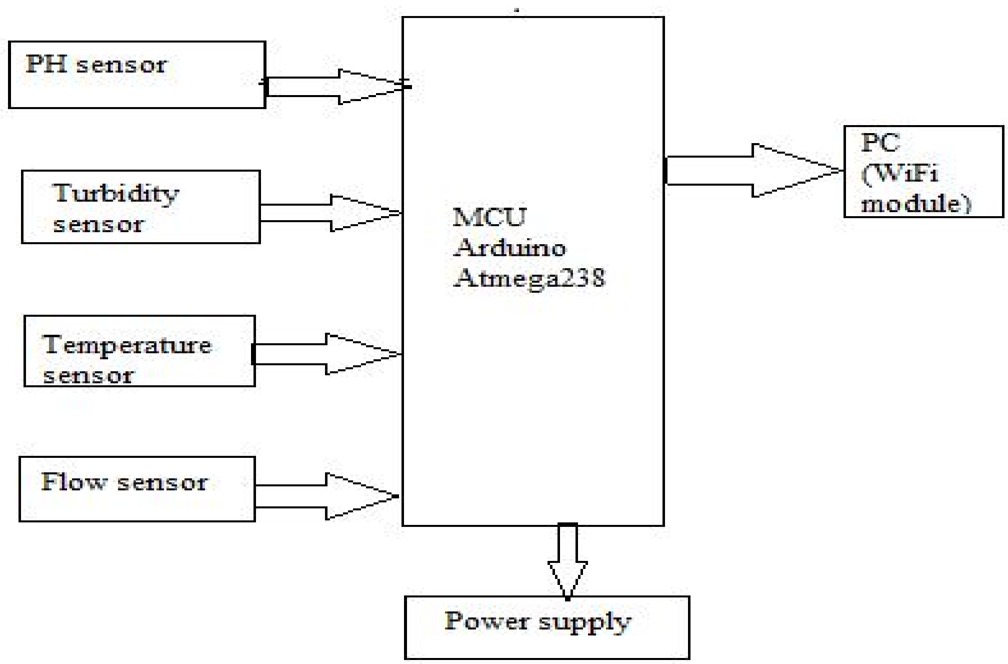

Fig: Block diagram of our project

In this, we present the theory on real time monitoring of water quality in IoT environment. The overall block diagram of the proposed method is explained. Each and every block of the system is explained in detail.
In this proposed block diagram consist of several sensors (temperature, pH, turbidity, flow) is connected to core controller. The core controller are accessing the sensor values and processing them to transfer the data through internet. Ardunio is used as a core controller. The sensor data can be viewed on the internet wi-fi system.

A. pH sensor

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 values below 7 would indicate an acidic solution. It operates on 5V power supply and it is easy to interface with arduino.The normal range of pH is 6 to 8.5.

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Fig: pH sensor

B. Turbidity Sensor

Turbidity is a measure of the cloudiness of water. Turbidity has indicated the degree at which the water loses its transparency. It is considered as a good measure of the quality of water. Turbidity blocks out the light needed by submerged aquatic vegetation. It also can raise surface water temperatures above normal because suspended particles near the surface facilitate the absorption of heat from sunlight.

Fig: Turbidity sensor

C. Temperature Sensor

Water Temperature indicates how water is hot or cold. The range of DS18B20 temperature sensor is -55 to +125 °C. This temperature sensor is digital type which gives accurate reading.

Fig: Temperature sensor

D. Flow Sensor

Flow sensor is used to measure the flow of water through the flow sensor. This sensor basically consists of a plastic valve body, a rotor and a Hall Effect sensor. The pinwheel rotor rotates when water / liquid flows through the valve and its speed will be directly proportional to the flow rate. The Hall Effect
sensor will provide an electrical pulse with every revolution of the pinwheel rotor.

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Fig: Flow sensor

E. Arduino Uno

Arduino is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller. Arduino Software (IDE) were the reference versions of Arduino, 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.

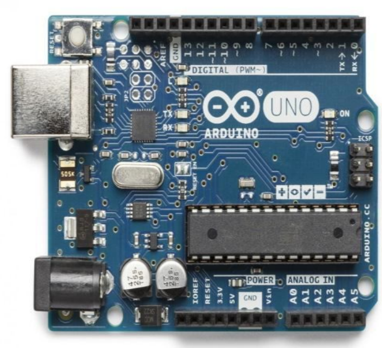

Fig:Arduino uno

F. Wifi Module

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi 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. The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

Fig: WiFi module

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V. SCHEMATIC CIRCUIT WITH ITS WORKING

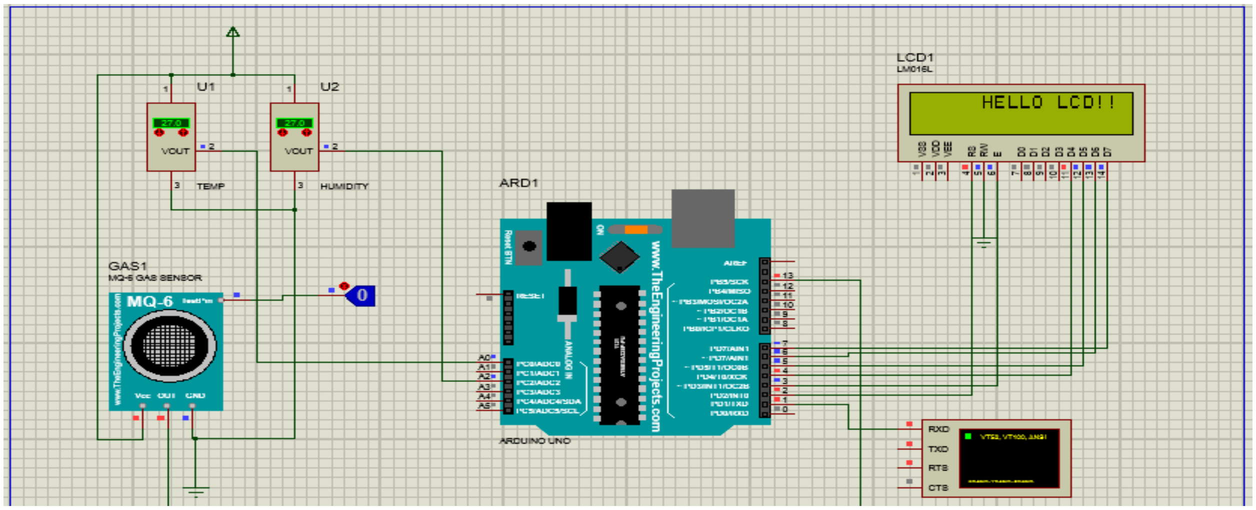

Fig. schematic circuit

The whole design of the system is based mainly on IOT which is newly introduced concept in the world of development. There is basically two parts included, the first one is hardware & second one is software. The hardware part has sensors which help to measure the real time values, another one is arduino atmega328 converts the analog values to digital one, & LCD shows the displays output from sensors, Wi-Fi module gives the connection between hardware and software. In software we developed a program based on embedded c language.

The PCB is design at first level of construction and component and sensors mounted on it. BLYNK app is installed in the android version to see the output. When the system get started dc current given to the kit and arduino and WIFI gets on. The parameters of water is tested one but one and their result is given to the LCD display. The app went provided with hotspot gives the exact value as on LCD display shows on kit. Thus like this when the kit is located on any specific water body and WIFI is provided we can observe its real time value on our android phone anywhere at any time.

VI. CODING

```
#define SW_VERSION " ThinkSpeak.com" // SW version will appears at innitial LCD Display
#include "MCP3008.h"
#include <ESP8266WiFi.h>
WiFiClient client;
//const char* MY_SSID = "OneVirusFound";
//const char* MY_PWD = "123456789";
const char* MY_SSID   = "vivo v5";
const char* MY_PWD    = "haikishore";
const char* TS_SERVER = "api.thingspeak.com";
String TS_API_KEY ="UN47YDTFZTM3HAPL";
#define CS_PIN    2
#define CLOCK_PIN 14
#define MOSI_PIN  13
#define MISO_PIN  12
MCP3008 adc(CLOCK_PIN, MOSI_PIN, MISO_PIN, CS_PIN);
const int MOTOR = D1;
const int buttonPin = D2; // variable for D2 pin
byte sensorInterrupt = 0; // 0 = digital pin 2
float calibrationFactor = 4.5;
volatile byte pulseCount;
```


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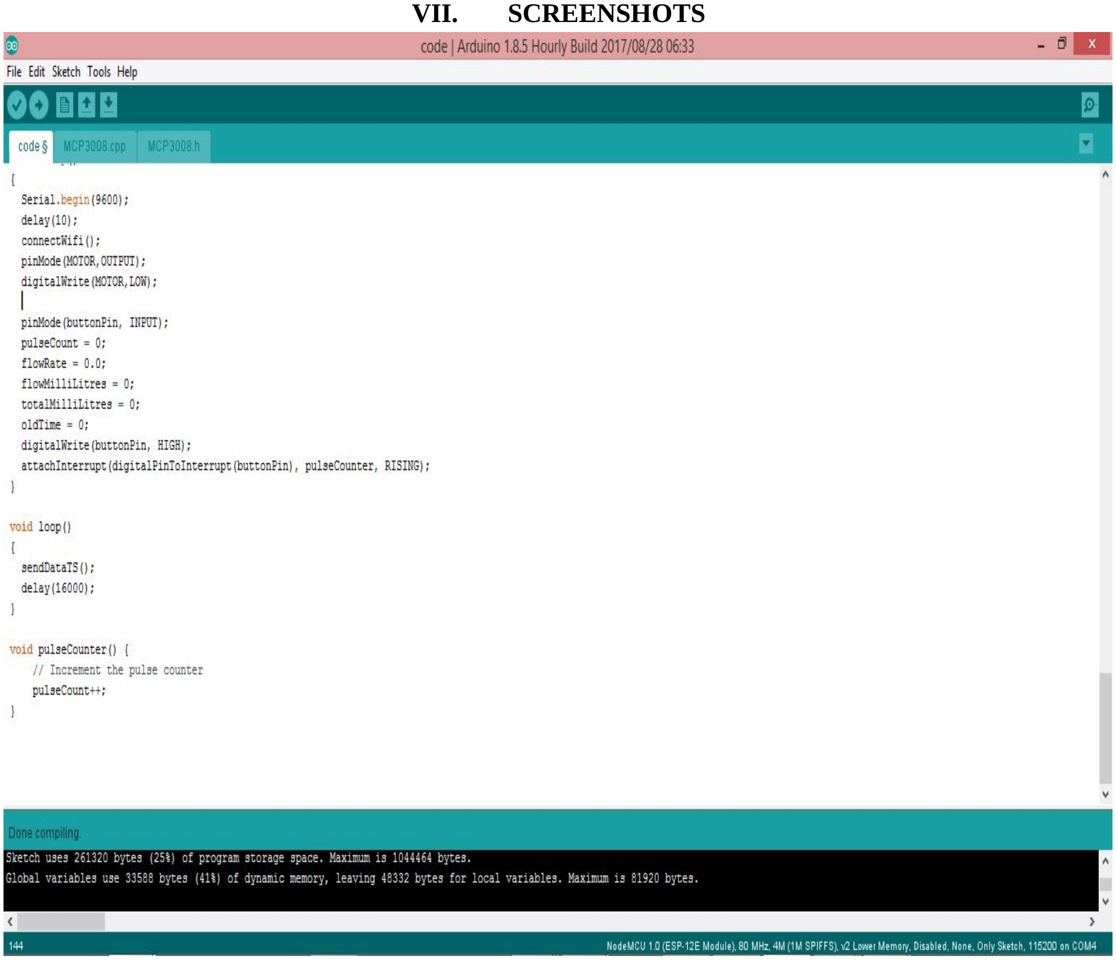
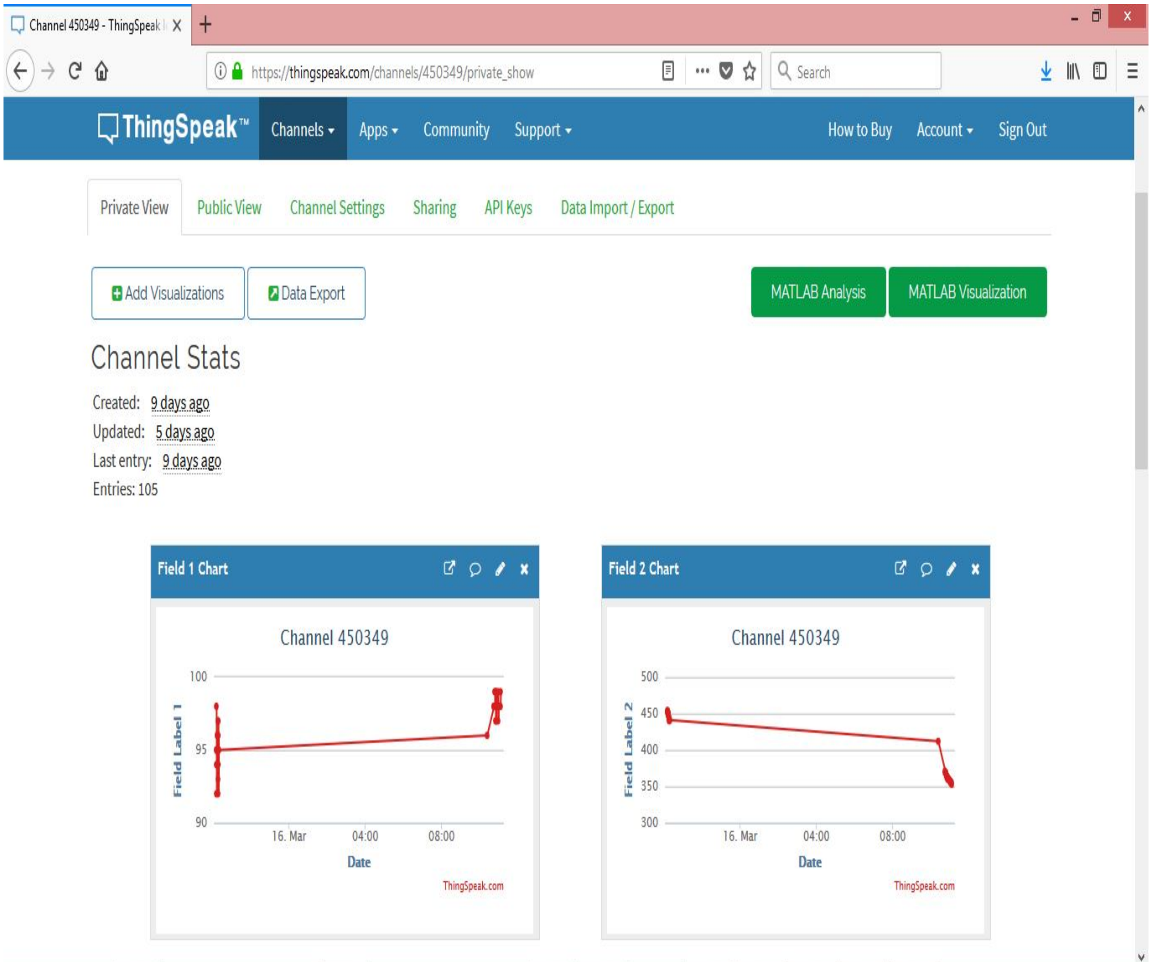
```
float flowRate;
unsigned int flowMilliLitres;
unsigned long totalMilliLitres;
unsigned long oldTime;
String a="";
int b = 0;
/**************************************************
 * Connecting WiFi
 **************************************************/
void connectWifi()
{
  Serial.print("Connecting to "+ *MY_SSID);
  WiFi.begin(MY_SSID, MY_PWD);
  while (WiFi.status() != WL_CONNECTED)
  {
    delay(1000);
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi Connected");
  Serial.println("");
}
/**************************************************
 * Sending Data to Thinkspeak Channel
 **************************************************/
void sendDataTS(void)
{
  int val1 = adc.readADC(0); // read Chanel 0 from MCP3008 ADC
  Serial.println(val1);
//  delay(300);
  int val2 = adc.readADC(1); // read Chanel 0 from MCP3008 ADC
  Serial.println(val2);
//  delay(300);
  int val3 = adc.readADC(2); // read Chanel 0 from MCP3008 ADC
  Serial.println(val3);
//  delay(300);
  int val4 = adc.readADC(3); // read Chanel 0 from MCP3008 ADC
  Serial.println(val4);
//  delay(300);
  detachInterrupt(sensorInterrupt);
  flowRate = ((1000.0 / (millis() - oldTime)) * pulseCount) / calibrationFactor;
  oldTime = millis();
  flowMilliLitres = (flowRate / 60) * 1000;
  totalMilliLitres += flowMilliLitres;
  unsigned int frac;
  Serial.print("Flow rate: ");
  Serial.print(int(flowRate)); // Print the integer part of the variable
  Serial.print("."); // Print the decimal point
  frac = (flowRate - int(flowRate)) * 10;
  Serial.print(frac, DEC); // Print the fractional part of the variable
```

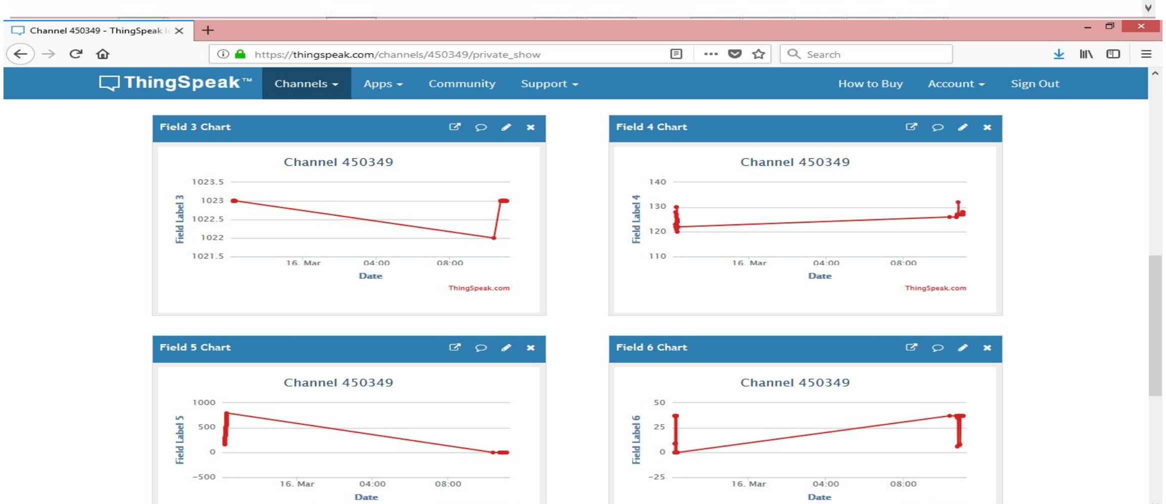
```
  Serial.print("L/min");
  Serial.print("  Current Liquid Flowing: "); // Output separator
  Serial.print(flowMilliLitres);
  Serial.print("mL/Sec");
  Serial.print(totalMilliLitres);
  Serial.println("mL");
  if(Serial.available())
  {
    String inchar = Serial.readString();
    a = inchar.substring(5,10);
    Serial.println(a);
     b = (a.toInt());
    Serial.println(b);
  }
      if (client.connect(TS_SERVER, 80))
   {
     String postStr = TS_API_KEY;
     postStr += "&field1=";
     postStr += String(val1);
     postStr += "&field2=";
     postStr += String(val2);
     postStr += "&field3=";
     postStr += String(val3);
     postStr += "&field4=";
     postStr += String(val4);
     postStr += "\r\n\r\n";
     postStr += "&field5=";
     postStr += String(totalMilliLitres);
     postStr += "\r\n\r\n";
     postStr += "&field6=";
     postStr += String(b);
     postStr += "\r\n\r\n";
     client.print("POST /update HTTP/1.1\n");
     client.print("Host: api.thingspeak.com\n");
     client.print("Connection: close\n");
     client.print("X-THINGSPEAKAPIKEY: " + TS_API_KEY + "\n");
     client.print("Content-Type: application/x-www-form-urlencoded\n");
     client.print("Content-Length: ");
     client.print(postStr.length());
     client.print("\n\n");
     client.print(postStr);
//     delay(1000);
   }
   client.stop();
 //  pulseCount = 0;
   attachInterrupt(sensorInterrupt, pulseCounter, FALLING);
}
void setup()
{
  Serial.begin(9600);
```

```
  delay(10);
  connectWifi();
  pinMode(MOTOR,OUTPUT);
  digitalWrite(MOTOR,LOW);
  pinMode(buttonPin, INPUT);
  pulseCount = 0;
  flowRate = 0.0;
  flowMilliLitres = 0;
  totalMilliLitres = 0;
  oldTime = 0;
  digitalWrite(buttonPin, HIGH);
  attachInterrupt(digitalPinToInterrupt(buttonPin), pulseCounter, RISING);
}
void loop() {
  sendDataTS();
  delay(16000);
}
void pulseCounter() {
    // Increment the pulse counter
    pulseCount++;
}
```

VII. SCREENSHOTS







VIII. RESULT & DISCUSSION

We have identified a suitable implementation model that consists of different sensor devices and other modules, their functionalities are shown in figure. In this implementation model we used ATMEGA 328 with Wi-Fi module. Inbuilt ADC and Wi-Fi module connects the embedded device to internet. Sensors are connected to Arduino UNO board for monitoring, ADC will convert the corresponding sensor reading to its digital value and from that value the corresponding environmental parameter will be evaluated. After sensing the data from different sensor devices, which are placed in particular area of interest. The sensed data will be automatically sent to the web server, when a proper connection is established with sever device.

IX. CONCLUSION

Monitoring of Turbidity, PH & Temperature of Water makes use of water detection sensor with unique advantage and existing GSM network. The system can monitor water quality automatically, and it is low in cost and does not require people on duty. So the water quality testing is likely to be more economical, convenient and fast. The system has good flexibility. Only by replacing the corresponding sensors and changing the relevant software programs, this system can be used to monitor other water quality parameters. The operation is simple. The system can be expanded to monitor hydrologic, air pollution, industrial and agricultural production and so on. It has widespread application and extension value.

By keeping the embedded devices in the environment for monitoring enables self protection (i.e., smart environment) to the environment. To implement this need to deploy the sensor devices in the environment for collecting the data and analysis. By deploying sensor devices in the environment, we can bring the environment into real life i.e. it can interact with other objects through the network. Then the collected data and analysis results will be available to the end user through the Wi-Fi.

X. FUTURE ENHANCEMENT

A. In future we use IOT concept in this project
B. Detecting the more parameters for most secure purpose
C. Increase the parameters by addition of multiple sensors
D. By interfacing relay we controls the supply of water

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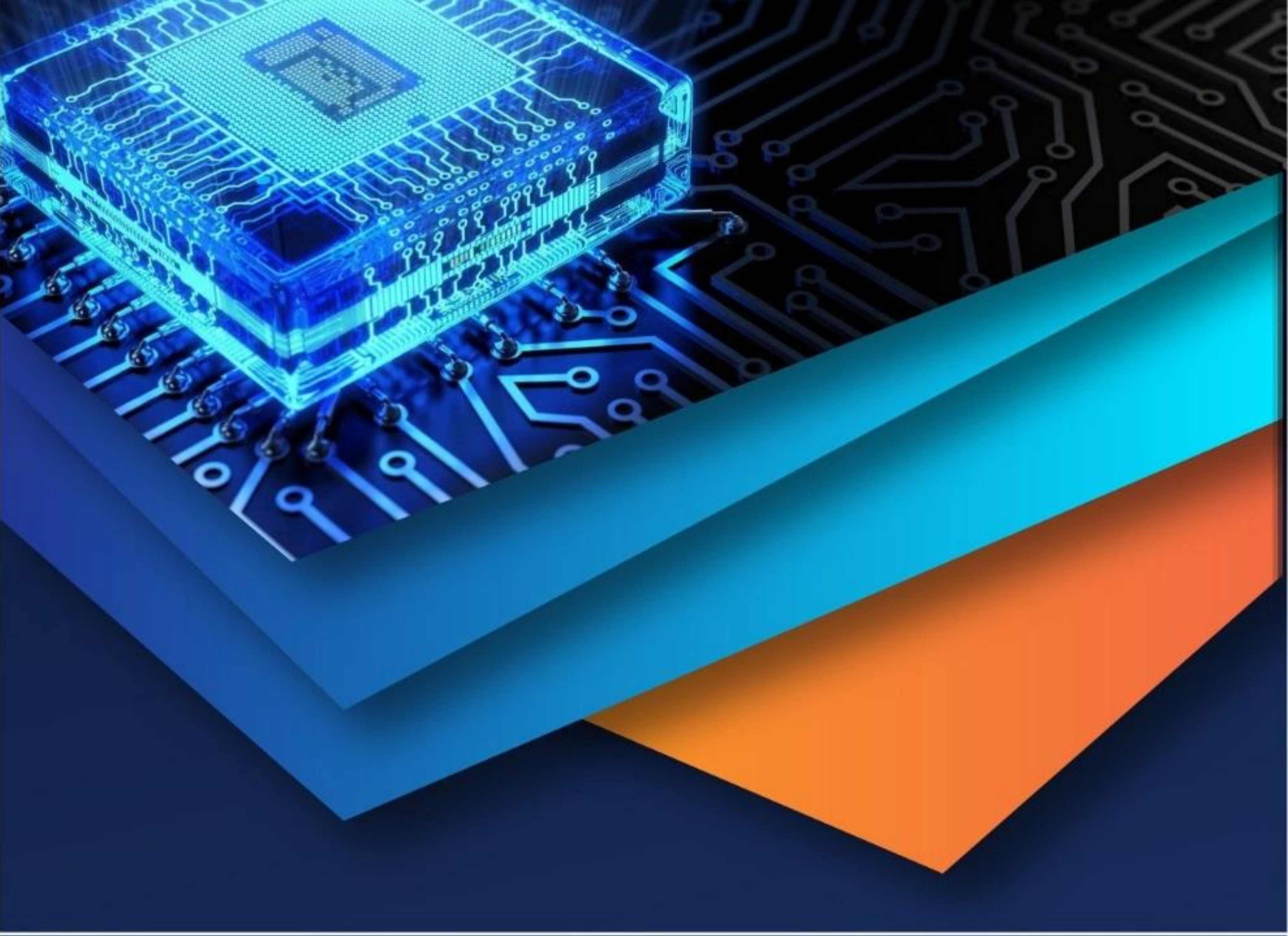

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