International Journal of Grid and Distributed Computing
Vol. 13, No. 2, (2020), pp. 1800-1806

IOT based Real Time Environmental Monitoring system using Blynk Application

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Abstract:

Internet of Things (IoT) plays a major role in our lives. Many real time environmental changes can be measured using IoT. It uses sensor networks to monitor vital changes in the environment. Here, a real time environmental android application to monitor Humidity, Temperature and Gas is developed. These parameters are sensed and sent to the web server through Wi-Fi. The information can be accessed from anywhere. The android application developed can access the real time data and displays the results. If the value sensed crosses the limit or any critical value, a buzzer is used to send an alert signal to the users. The end user can monitor the sensed data and its graphical analysis using a smart phone where it is deployed with hardware. The project uses the Arduino UNO board, lm35 sensor, ESP8266 Wi-Fi module. The application accesses the data and the results are observed by the end users.

Keywords: IOT, Real Time Environment, Sensor, Arduino UNO, Wi-Fi

1. Introduction

In day to day life, rapid changes in the environment occur. Due to this, health problems arise. So, it is very essential to monitor the environment where people spend more time. Internet of Things is a wide application area [1]. Using this, we can monitor, control and access the information. Gas, Temperature and Humidity are the basic parameters for environment monitoring. Here a cost effective application is developed to monitor the parameters. To sense the information, temperature, humidity and ultrasonic sensors are used respectively to sense the information. The open source microcontroller board Arduino Uno is used in this project. The results from the application show the real – time monitoring of these parameters and its analysis. In future, the system can be extended for remote monitoring.

Objectives:

The objectives of the system are:

1. To monitor the pollution in the industry.

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2. To sense the current temperature, humidity and the LPG gas whether present in air or not.
3. To check the pollution ranges and provide an alert signal.
4. To detect the hazarders gases present in the air.

2. Relative Works

Nowadays IoT applications are used in our daily routine life. Researchers are using IoT extensively for their work [1-6]. Deekshath et al., [1] developed an IoT Based Environmental Monitoring System using Arduino UNO and Thingspeak. Environmental parameters such as temperature, humidity and moisture were monitored and their changes were noted. The data were sensed and sent to cloud platform for analysis. Zafar et. al., [2] designed an IoT based Real time environmental monitoring system using cloud. They sensed temperature and humidity of the surrounding area. The data which is sensed using the developed system is uploaded to the cloud storage. The data are accessed and the results are displayed to the end users. A simple and low cost system was developed by authors in [7]. They monitored and controlled temperature, humidity and CO2 level using sensors. LPC2148 microcontroller was used and the data sensed was sent to ThingSpeak cloud. A weather monitoring system using Raspberry Pi was developed by **S.**D. Shewale, S.N.Gaikwad [8]. The system was complex due to Raspbian operating system when compared to Arduino.

3. Model Design

The requirements needed for the work are mainly the sensors.

Project Requirements:
The requirements of the project are:

- ArduinoIDE
- Temperature sensor(lm35)
- Humidity sensor (dht11)
- Gas sensor (mq8)
- Bread board
- Jumpwires (male to male, female to male, female to female)
- USB cable
- BLYNK application
- Node MCUameica esp8266 board
- Wi-fi connection
- Buzzer, LED

Arduino Uno:
Arduino is an open source prototyping platform, relatively easy to utilize hardware and software. The Arduino board reads input from both digital and analog ports. And also output signals from analog and digital ports. It is a micro controller which can connect the hardware with the help of USB cable with the Arduino software IDE.

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ESP8266

Fig 1 ESP8266

Wifi Module

The esp8266 (Fig 1) is easy to use and ease gadget for web availability. The module can function as an access point (can make hotspot) and as a station (can associate with wi-fi). Hence it could easily bring information and transfer it in the Internet making IoT as simple as possible. Likewise it can also retrieve information from Web using API. So the system, could get any data that is accessible on the web, making it smarter. To make it user friendly, this module can be programmed using the Arduino IDE. But this version of the module has only 2 gpio pins (can hack it to use upto 4). So it must be utilized alongside another microcontroller like Arduino, else independent esp-12 or esp-32 renditions can be utilized.

Features of 8266 wifi module:

- low cost, compact and powerful Wi-Fi module
- Power supply: +3.3v only
- Current consumption: 100ma
- I/O voltage: 3.6v (max)
- I/O source current: 12ma (max)
- Built-in low power 32-bit mcu @ 80mhz
- 512KB flash memory
- can be used as station or access point or both combined
- Supports deep sleep (<10ua)
- Supports serial communication hence compatible with many development platform like arduino
- can be programmed using Arduino IDE or at-commands or lua script

4. **Software Implementation**

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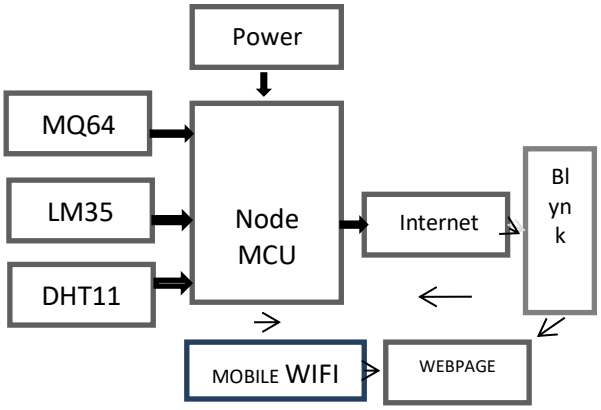

Fig 2 Proposed system

Proposed Methodology:
The proposed system is shown in Fig. 2.
The programs are coded and uploaded in the Arduino software. It is connected with the sensor to sense the different sensor in humidity and the pollution. The Block of the system is shown above:

Modules:
The modules used in this system are:

- Evaluation of sensor value
- Data upload
- Wifi Connection
- Blynk Application
- Alarm sensing system

Evaluation of sensor value:

Node MCU assists in identifying the gas level, temperature and humidity which is screened on the monitor. The entire system is associated through IoT, which sends the information and compares with the reference values. When the level goes beyond a limit, the system sends an alarm message.

Data upload:

In the proposed system (Fig 2), the parameters sensed by the sensors are organized by the sensor node and they are transmitted to Node MCU. The sensed analog values are transmitted to the live monitoring system.

Wifi Connection:-

After uploading the data it can run on a Serial Monitor of an Arduino IDE and it may give a local host IP address it could become connected on a Wifi of a Mobile or any device. The given IP address can be put on a browser that would also connected on same wifi .It will display an Static web page That Contains a Result.

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Blynk application:

Blynk is a mobile application it can be available on PlayStore which can be downloaded. Login your email to that application. Create a new Project in a blynk application. An Authentication code will be generated and an email is sent. After that import a header
#include<BlynkSimpleEsp8266.h>”
to the source code and run it.

Alarm sending system:

The microcontroller measures all the input information from the sensor. At the point, when gas level becomes critical, a buzzer is activated to send a signal to the user about the danger of the environment. When there is high rise in temperature and gas level, the controller sends the emergency alert message and blink the LED it remarks that the environment has such sudden change. The sample source code the application is shown below.

```
Serial.println("");
Serial.println("WiFi connected");
  // Starting the web server
server.begin();
Serial.println("Web server running. Waiting for the ESP IP...");
delay(100);
  // Printing the ESP IP address
Blynk.run();floatval;
changeMux(LOW,HIGH,LOW);
val=analogRead(analog);
int val1=val;delay(100);
changeMux(HIGH,LOW,LOW);
val=analogRead(analog);
int val2=val;
delay(100);
changeMux(LOW,LOW,LOW);
val=analogRead(analog);
int val3=val;delay(100);
Serial.print("   ");
//prints the hydrogen value
Serial.println("   ");
if (val1>=1000 or val2<=100 or val3>400){
//if limit has been reached, LED turns on as status indicator
```

5. Experimental Results

The complete framework of the proposed system was shown in Fig 2. Fig 3 shows the Blynk application. At the start, the user enters the login and password. After correct authentication, the user can view the sensed data

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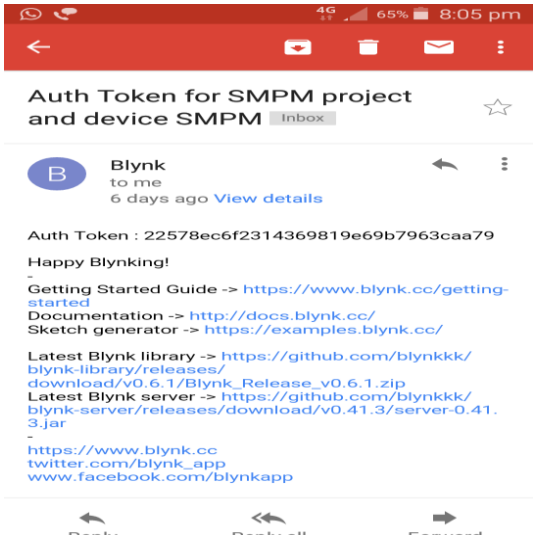

Fig 3 Blynk Application

The Initiation of the application is shown. Fig 4 shows the monitoring of Temperature, Humidity and LPG gas. The live record of temperature, humidity and gas level are monitored in the application (Fig 4).

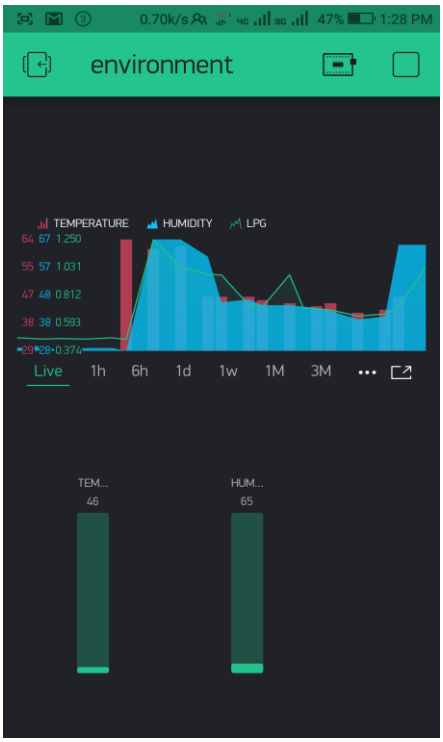

Fig 4 Evaluation of environmental parameters

A graphical recording of these parameters are displayed (Fig 4). The temperature and other parameters are recorded six hours once. This will enable the precaution measures to be taken.

6. Conclusion

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Here a real time environmental monitoring system is developed to monitor temperature, LPG gas and humidity of surrounding environment. The data are recorded and sensed from the system. This data is sent to the Blynk application via Wi-Fi where both real-time data and its graphical analysis are viewed. The end user can monitor the environment changes using a smart phone. This work can be reached out to implement a home mechanization system where the sensed values can be utilized to trigger some action and control the gadgets for heating or cooling via the mobile application. This system is a crucial step in understanding the IoT applications development and implementation and serves as a building block for a number of useful innovations in this direction.

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