IOT based Gas Leakage detector

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Index Terms

Blynk ,cloud ,Iot , Nodemcu(Esp8266) , MQ6 gas sensor, Blynk Widget, Eventor, Gauge

I. Main Objective

This document refers to a model of gas detector developed using MQ6 sensor, used for detecting LPG and smoke gas and nodemcu(ESP8266), which is a wifi connected device used to send data from the sensor to your mobile app using authentication token provided by the app. It alerts the nearby people by displaying alert message on LCD and turning RED led ON. This model also alerts the distant concerning people about the gas leakage using a smart IOT app called BLYNK through notification on app itself and sending the alert message on provided email id.So now this paper refers to a technique where we can detect gas leakage and use smart alerting techniques like notification and email through which we can alert people in advance and avert any hazardous situations.

II. Implemented Attributes

1) MQ6 sensor is used to get data from surrounding environments.
2) Nodemcu(Esp8266) get data from MQ6 sensor and send it to the mobile app BLYNK . Nodemcu is connected to BLYNK through Auth Token provided by the app. It's connected to mobile through wifi.
3) Nodemcu will also send commands to two LEDs and one 2*16 LCD according to data received from MQ6 sensor.
4) When gas level is below 300 kohm then turn on GREEN led with a greeting message on LCD.
5) When gas level goes beyond 300 kohm then print alert message on LCD and turn on RED led to alert surrounding people.
6) When eventor widget of BLYNK got triggered(gas level above 300 kohm) blynk will send notification on BLYNK app and also send alert message on provided email id.

III. Hardware used

1) MQ6 Sensor
2) Breadboard
3) Nodemcu(Esp8266)
4) GREEN led and RED led
5) Jumper wires
6) USB Cable
7) 2*16 LCD Display with I2C module for simpler connection.

IV. Software Requirements and App dependencies

1) Arduino IDE
2) BLYNK mobile app

V. Circuit and Description

A. Description

Working of this model starts with the reading of surrounding environment's data with the help of MQ6 sensor which measures in ppm(parts per million) and outputs in the form of analog resistance. MQ6 gas sensor is mostly used for sensing LPG gas leakage detection and also for smoke(caused due to fire) detection.Working principle of MQ6 gas sensor is that it works by changing the resistance of circuit across it.The sensor consist of a sensing material which ionize the gases which

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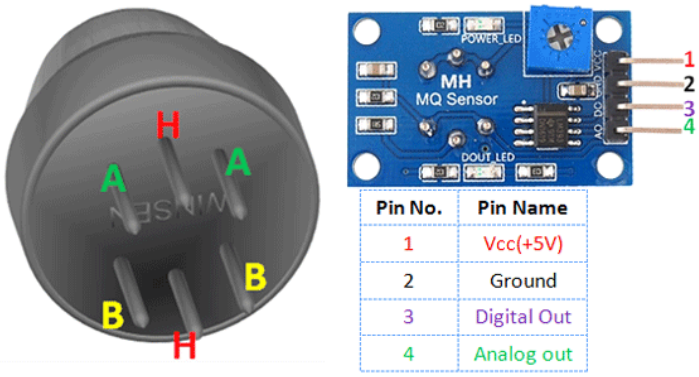
comes in contact.As a result, the ionization process of gases changes the resistance across the circuit. Now the working of nodemcu(Esp8266) starts as soon as output of MQ6 sensor goes as input into analog pin(A0) of nodemcu.When the value of analog resistance is below 300 kohm the it's considered as no leakage of gas and as result GREEN LED turns on while turning off the RED LED.When value is below 300 kohm then nodemcu also prints the a message - "Have nice day" in first line and "Level:" with value of resistance(in kohm) in second line. When any gas leakage is detected then accordingly resistance of circuit inside of MQ6 sensor changes. Afterward according to reading change if the reading of resistance goes beyond 300 kohm then RED led will turn ON and Alert message will be displayed on the LCD display.Through wifi, all these readings will be going from nodemcu to BLYNK app and as reading goes beyond 300 kohm then Eventor widget of BLYNK app will be triggered and then there is alert notification on BLYNK app and also on email id that we have provided on BLYNK app.

B. Some facts about MQ-6 sensor



Pin No.	Pin Name
1	Vcc(+5V)
2	Ground
3	Digital Out
4	Analog out

Fig. 1. MQ sensor Pinout

1) Vcc -This pin powers the module, typically the operating voltage is +5V
2) Ground -Used to connect the module to system ground.
3) Digital Out-You can also use this sensor to get digital output from this pin, by setting a threshold value using the potentiometer.
4) Analog Out-This pin outputs 0-5V analog voltage based on the intensity of the gas.

C. Circuit

Fig. 2. circuit(without leakage)

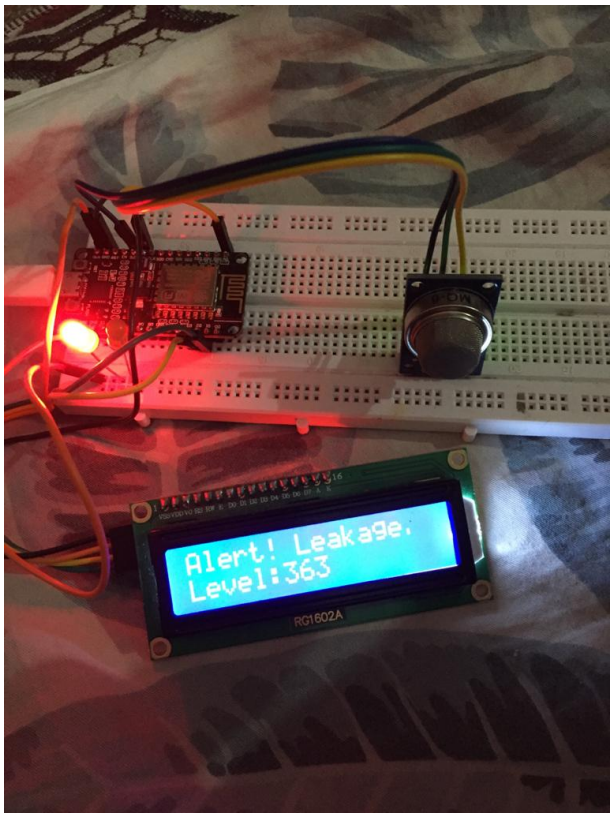


Fig. 3. circuit(with leakage)

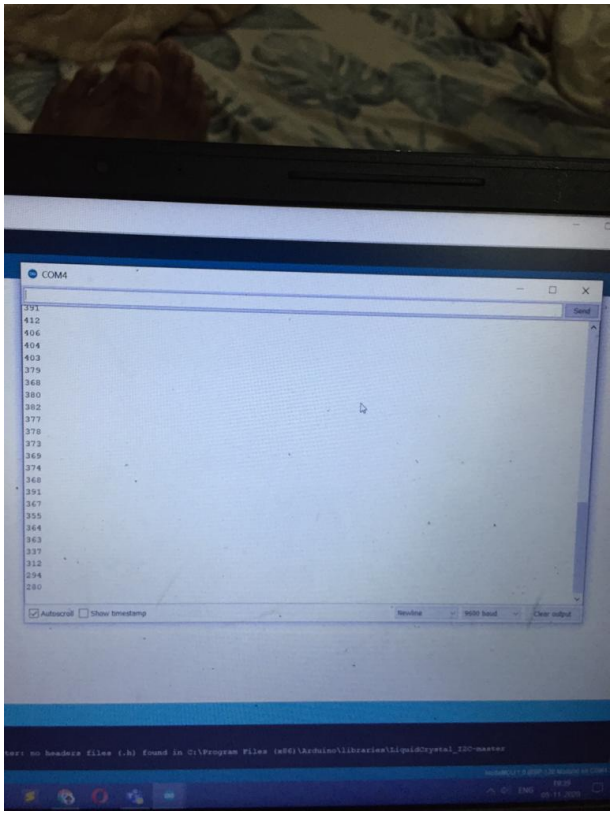


Fig. 4. serial monotor with leakage

VI. Sample Output(above two figures)

VII. Nodemcu code

```
#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
BlynkTimer timer;
char auth[] = "3gKp9IBHHUdMamZaq1SjT5T-wGI-sF8G";
char ssid[] = "saurav's machine";
char pass[] = "123456789";
LiquidCrystal_I2C lcd(0x27, 16, 2);
int m;

void setup()
{

  Serial.begin(9600);
  Blynk.begin(auth, ssid, pass);
   Wire.begin(D2, D1);//connect D2,D1 of nodemcu to SDA and SCL of lcd display;
   lcd.init();


  lcd.backlight();// Turn on the blacklight.
  pinMode(13,OUTPUT);//GPIO 13
  pinMode(15,OUTPUT);//GPIO 15
  timer.setInterval(1000L, sendUptime);
}


void sendUptime()
{
  Blynk.virtualWrite(V1, m);
}

void loop()
{
  Blynk.run();
  timer.run();

  m=analogRead(A0);
  Serial.println(m);


  if(m>300)
  {
    lcd.clear();
    lcd.print("Alert! Leakage.");//print a message for gas leakage.
    lcd.setCursor(0, 1);//change the line.
    lcd.print("Level:");//print sensor resistance on second line.
    lcd.print(m);

    delay(2000);
    digitalWrite(13,LOW);//GREEN LED off when there is gas leakage(gas level above 300).
    digitalWrite(15,HIGH);//RED LED on when there is gas leakage(gas level above 300).
```

```
  }
  else if(m<=300)
  {
      lcd.clear();
      lcd.print("Have nice day");//print a greeting message in case of no leakage.
      lcd.setCursor(0, 1);//change the line.
      lcd.print("Level:");//print sensor resistance on second line.
      lcd.print(m);
      delay(2000);
      digitalWrite(13,HIGH);//GREEN LED on when there is no gas leakage(gas level below 300).
      digitalWrite(15,LOW);//RED LED off when there is no gas leakage(gas level below 300).3
  }
}
```

VIII. Flow charts

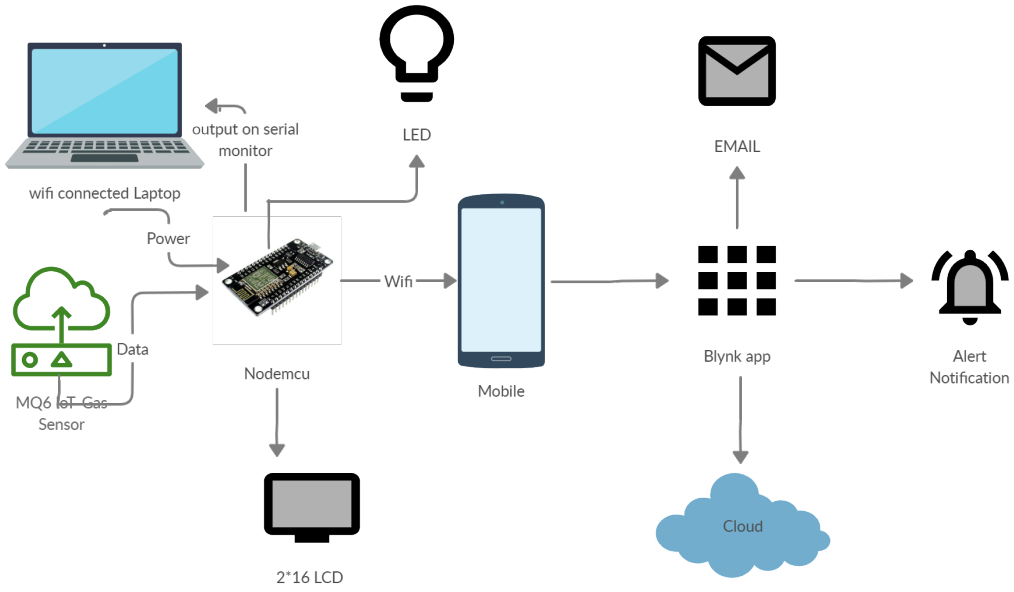


Fig. 5. Complete flowchart

IX. User Manual

1) Header file ESP8266WiFi.h is included due to esp8266(nodemcu) application.
2) Header file Wire.h is included for the application of I2C module(used with Lcd display).
3) BlynkSimpleEsp8266.h header file includes all the required files needed for the use of BLYNK iot app with nodemcu.
4) 2*16 LCD Display requires LiquidCrystal_I2C.h header file for it's use.
5) Blynk.run() in void loop() function is used to check for sending notification using EVENTOR widget defined in BLYNK app.
6) Connections of MQ6 sensor:-
   - Vcc of sensor - 3v3 of nodemcu.
   - GND of sensor - GND of nodemcu.
   - A0 of sensor - A0 of nodemcu.
7) Connections of 2*16 display:-
   - Vcc of display - vin of nodemcu.
   - GND of display - GND of nodemcu.
   - SDA of display - D2 of nodemcu.
   - SCL of display - D1 of nodemcu.

8) Connections of RED and GREEN LEDs:-
   - RED LED to gnd and D8(GPIO15) of nodemcu.
   - GREEN LED to gnd and D7(GPIO13) of nodemcu.