



DESIGN OF FIELD TAINING MONITORING AND CONTROLLING SYSTEM USING LABVIEW

S Vimala Devi¹, Vinothini L², Viveka PA³

¹Assistant Professor, Electrical & Electronics Engineering, Kamaraj College of Engineering and Technology, Madurai

^{2,3}UG Students, Electrical & Electronics Engineering, Kamaraj College of Engineering and Technology, Madurai

Abstract

Industrial disaster is the major accident affect the environment. Every serious incident is happened from minor faults. Industrial parameter like temperature, Carbon monoxide, pH level etc., plays a vital role and it has standard limits in the field. The main objective of our project is to control these parameters causing pollution and to reduce the effects without affecting natural environment. The system is implemented using LabVIEW software, which is used to monitor the pollution and also send the controlling signal to arduino, when there is a disturbance affecting the standard of the system. The system probes the level of these parameters during industrial process.

Keywords: Pollution parameters monitor and control, LabVIEW, Temperature, pH,CO

important component of the system. All monitoring strategies have reasons and justifications which are often designed to establish the trends in environmental parameters.

Nowadays, Due to improper monitoring many problems are creating. If the system is monitored regularly, the parameter will be controlled in any cases.

Arduino microcontroller acts as an I/O engine that interfaces with LabVIEWVIs through a serial connection. This helps to move information from Arduino pins to LabVIEW without adjusting the communication, synchronization.

The major objectives are, to monitor and control the tainting parameters, to alert the surrounding while parameters exists standard level in industries using LabVIEW.

I. INTRODUCTION

Industrial pollution is generally referred to undesirable outcomes when factories emits harmful by-products and waste into the environment such as emission to air or water bodies (water pollution), deposition on landfills (land pollution) or emission of toxic chemicals into atmosphere(air pollution).

Environment law now requires industry to take responsibility for any pollution that could harm the environment. Ongoing independent monitoring of the air and water supply are necessary to check for any breaches of legislation.

LabVIEW (Laboratory Virtual Instrument Engineering Workbench) is a system design platform and development environment for a visual programming language from national instruments. The software is perhaps the most

The quality of the effluent management and working environment can determine [1]. The operator window is opened then operator will be able to monitor all the required parameters [2]. The execution and remotely the contamination observing and control framework can further be enhanced [3]. The data based server is attached to the pollution server for storing the pollutants level [4]. The wireless system is used which is more adaptable and cost effective it provides the password security against operator misuse [5]. The observation and assessment both are used synonymously. The industrial natural condition evaluation is given by contamination administration board once it can pose as a viable rival modern quality in importance ordinary quality [6]. Operating strictly according to environmental regulations significantly

increases drilling, waste disposal and site restoration costs, thereby cutting down profits [7-9]. Using sensors and enables to have a keen control on the environmental pollution caused by the industries. This paper introduces a LabVIEW based online pollution monitoring of industries for the control over pollution caused by untreated disposal of waste [10-14].

II. RELATED WORK

A. Monitoring system

In this project, system allows user to monitor the parameters. By using sensor, the data acquire through an arduino using the graphical programming environment LabVIEW.

In the industrialization, it becomes necessity to monitor the industry environment remotely. With the help of sensor the data will updated based on the condition and arduino receives the information.

Overall process get monitor through LabVIEW. In this project monitoring is the initial step to analyze the parameters efficiently.

B. Controlling system

Control of parameters can be computed and data can be transferred through online. Pollution controlling system comes under arduino using LabVIEW. The major aim is to control the temperature in the industry and for other parameter alert process will takes place.

III. SYSTEM DEVELOPMENT

HARDWARE REQUIREMENTS

1. Arduino:

Arduino is a single board microcontroller intend to make application of ineractive object or environments more accessible. It is an open source physical computing platform and development environment for writing software for the board. Arduino can be used to develop interactive objects taking inputs from variety of switches or sensors, and controlling a variety of lights, motors and other physical outputs. Arduino has some advantages for educational and interested recreational over other system like inexpensive, open extensible software,extensible hardware.

2. Temperature Sensor(LM-35):

The temperture is the one of the most important parameter in industrial parameters in indutrial process. Precision measurement of

temperature is essential for variety of industries such as agro industry, food industry, food storage house, sugar-cane factories,etc. The temperature of the process and environmental temperature are two different measured. Present system is designed for measurement of environmental temperature. The LM-35 series is of precision integrated circuit temperature sensors, whose output voltage is linearly proportional to the temperature in degree Celsius. The LM-35 sensor is most suitable

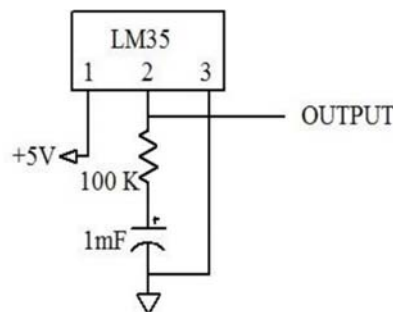


fig.1.LM-35

The circuit consists of an LM35 whose terminals are connected to an input voltage of 5V and a series connection of 100k Ω resistance and 100MF capacitance is connected in order to avoid any voltage drop across the circuit. The series connection is grounded and output is taken from terminal 2. The scale factor is .01V/ $^{\circ}$ C. The LM35 does not require any external calibration or trimming and maintains an accuracy of +/-0.4 $^{\circ}$ C at room temperature and +/- 0.8 $^{\circ}$ C over a range of 0 $^{\circ}$ C to +100 $^{\circ}$ C. The LM35 has an advantage over linear temperature sensors calibrated in $^{\circ}$ Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling.

3. Carbon Monoxide:

A carbon monoxide analyzer or CO analyzer is a gadget that recognizes the vicinity of the carbon monoxide gas in request to avert carbon monoxide harming. The circuit setup comprises of analyzer head associated with an increasing unit. A number of supporting resistances are utilized to stay away from voltage drop over the circuit. It is suggested that aligning the locator for 200ppm CO in air and utilizing Load resistance of around 10K Ω (5K Ω to 47K ω) builds circuit proficiency.

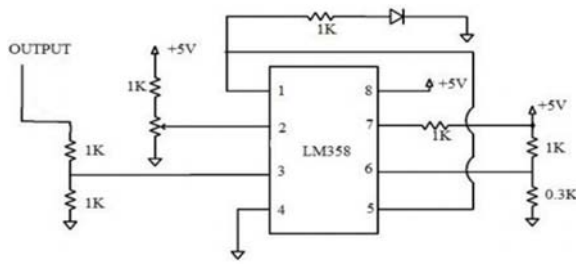


fig.2.CO analyzer

4. pH Sensor:

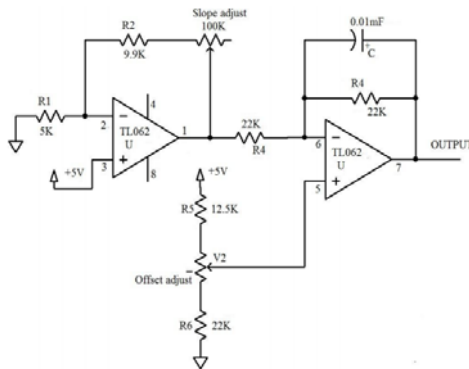


fig.3.pH sensor

fig.3 circuit is used to measure the pH of the sample water used and to convert it into voltage signals. The signals from the pH electrode has a typical value of resistance varying from 10 MΩ to 100 MΩ and the voltage signals are in range of 0.56 mV. So we have to use IC's which performs under a low current. Here resistors are used for various current limiting and amplification purposes. Capacitors are also used. In pH mode the reference can be adjusted from pH 0 to pH 12. With the reference properly adjusted, the output in volts will be the actual pH of the indicator solution. Our pH sensor is digitized and is able to communicate with computer and can automatically record data for extended period of time and so on.

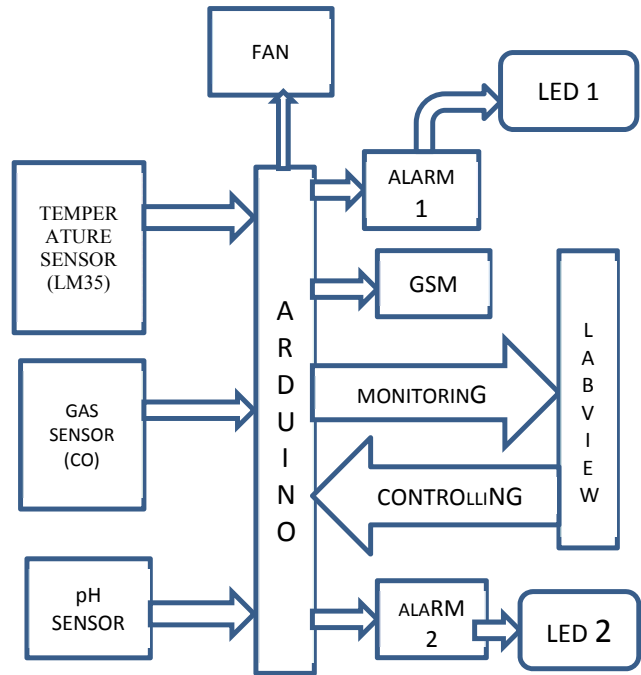


fig.4.

IV. BLOCK DIAGRAM

A. Methodology:

fig.4 shows the process of the system. In this diagram, sensed data from parameters sensor which are used above considered as an input. Those inputs are given to arduino and by passing information from arduino to LabVIEW, the monitoring process takes place. After monitoring, the information returns to arduino for control those parameters.

Initially temperature can be control using fan and alternate sources when the level exceeds the limits. Fan which is a control unit connected to arduino. For CO and pH level alert unit is connected. If the levels cross the limit respective alarm will operate with separate indication. GSM is used to receive the message when user is far away from the field.

V. BLOCK OF ENTIRE DESIGN

Fig.11 represents the entire process of the project. The above diagram shows the circuit design of each parameter components. It is the pictorial representation of the method which undergoes in our project and as well as important of LabVIEW interface.

TABLE.1.Limits of parameters

S.N O	PARAMETERS	MINIMUM VALUE	MAXIMUM VALUE
1	Temperature	20°C	40°C
2	Carbon Mono-oxide	30ppm	200ppm (150mV)
3	pH Level	(6.5)80mV	(7.5)105mV

A. Table Description:

Table.1. represents the limit of the parameters in the industry. The need of these limits to obtain the standard values of the industrial pollution parameters. It mentions specific range for each parameters.

Temperature Monitoring:

- Temperature has range if the range exceeds the corresponding control action takes place to limit the level of the temperature. fig.6 & fig.7 shows implementation by LabVIEW as given below,

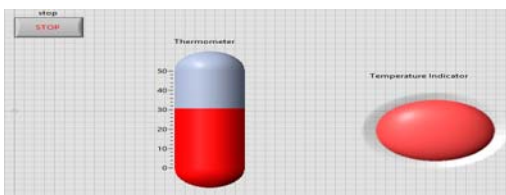


fig.5. Execution of temperature level

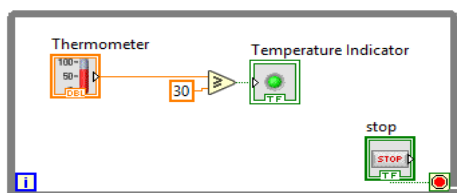


fig.6. LabVIEW block of temperature

CO Monitoring:

- The alarm 1 activates for alerting with required led indication when CO level cross the given limits shows in fig.8.table

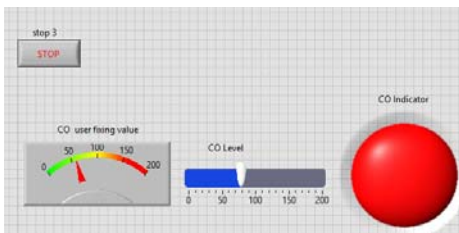


fig.7. Execution of CO level

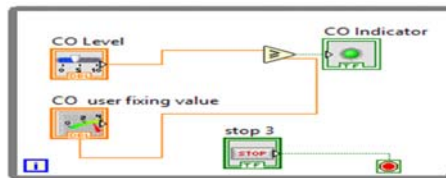


fig.8. LabVIEW block of CO

pH Monitoring:

- If pH level exceeds the range mentioned in the above table, the alarm 2 will activates with specific led indication then the system receives the alert signal.

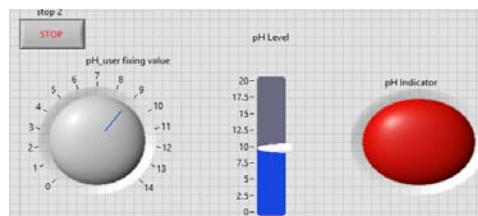


fig.9. Execution of pH level

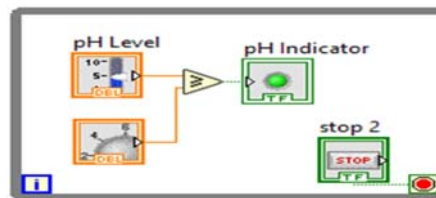


fig.10. labVIEW block of pH level

TEMPERATURE SENSING:

In arduino, temperature should sense and detect the level of the parameter. For this case program is necessary to sense through labVIEW. The program reads the value as input and it detect by comparing with standard values and produce an output.

Algorithm:

- Read the given data as input
- Temperature sensor terminals are read as integers in the program.
- The pin modes of vcc and ground (gnd) are used to take the output from sensor.
- The pin mode of sensor terminal is used for read the data as input.
- The digital write are vcc - HIGH and ground – LOW for LM35.
- Then initializes 16x2 LCD and sets cursor at column 2 row 0.

- Read the sensor output and convert reading into temperature.
- After the previous step, adds the decimal points and convert it into Fahrenheit.
- Sets the cursor at column 0 row 1 and the temperature will prints in degree Celsius.
- First print the degree sign and then letter "C".
- The next step is to set the cursor at column 8 row 1.
- Then print temperature in degree Fahrenheit and the same step repeat as in Celsius.
- At last 1 second delay is given for proper time interval process.
- Run and execute the program.

PROGRAM FOR TEMPERATURE SENSING:

```
#include<Field.h>
```

```
intvcc=A0;
```

```
int sensor=A1;
```

```
intgnd=A2;
```

```
float temp;
```

```
float tempf;
```

```
intpo=0;
```

```
Fieldlcd(12,11,5,4,3,2);
```

```
void setup()
```

```
{
```

```
pinMode(vcc,OUTPUT);
```

```
pinMode(sensor,INPUT);
```

```
pinMode(gnd,OUTPUT);
```

```
// Vcc for LM35
```

```
digitalWrite(vcc,HIGH);
```

```
// Ground for LM35
```

```
digitalWrite(gnd,LOW);
```

```
// initializes the 16x2 LCD
```

```
lcd.begin(16,2);
```

```
//sets the cursor at column 2 row 0
```

```
lcd.setCursor(2,0);
```

```
//prints temperature
```

```
lcd.print("TEMPERATURE");
```

```
}
```

```
void loop()
```

```
{
```

```
//reads the sensor output
```

```
temp=analogRead(sensor);
```

```
//convert the sensor reading to temperature
```

```
temp=teamp*5;
```

```
//adds the decimal point
```

```
temp=temp/10;
```

```
//converts to Fahrenheit
```

```
tempf=(temp*1.8)+32;
```

```
//sets cursor at column 0 row 1
```

```
lcd.setCursor(0,1);
```

```
//prints temperature in degree Celsius
```

```
lcd.print(temp);
```

```
//prints degree sign
```

```
lcd.print((char)223);
```

```
//prints letter C
```

```
lcd.print("C");
```

```
//sets cursor at column 8 row 1
```

```
lcd.setCursor(8,1);
```

```
//print temperature in degree Fahrenheit
```

```
lcd.print(tempf);
```

```
//prints degree sign
```

```
lcd.print((char)223);
```

```
//prints letter F
```

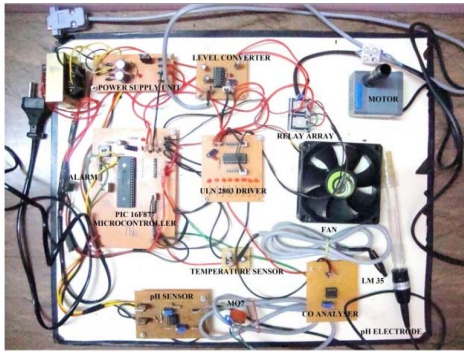
```
lcd.print("F");
```

```
//1 second delay
```

```
delay(100);
```

```
}
```

Hardware Result:



VI. CONCLUSION

The field of pollution monitoring and control is very wide and this project is an attempt to minimize the problem of cost and regular inspections in the field. This is an endeavor to

monitor and control by utility of LabVIEW software. The performance of the tainting monitor and control system can further be improved by implementing sensors for controlling dust, noise, smoke, moisture and other parameters, thereby improving the industrial and natural environment.

There may be other softwares used for designing control system but LabVIEW is the simplest and user-friendly than others. Here ranges are mentioned based on our wish .In case of some field; they have standard levels on their work basis. It doesn't need any code to run the software and the constants can be changed easily as a user's desire. The user can monitor the parameters readings taken from the workplace and control them.

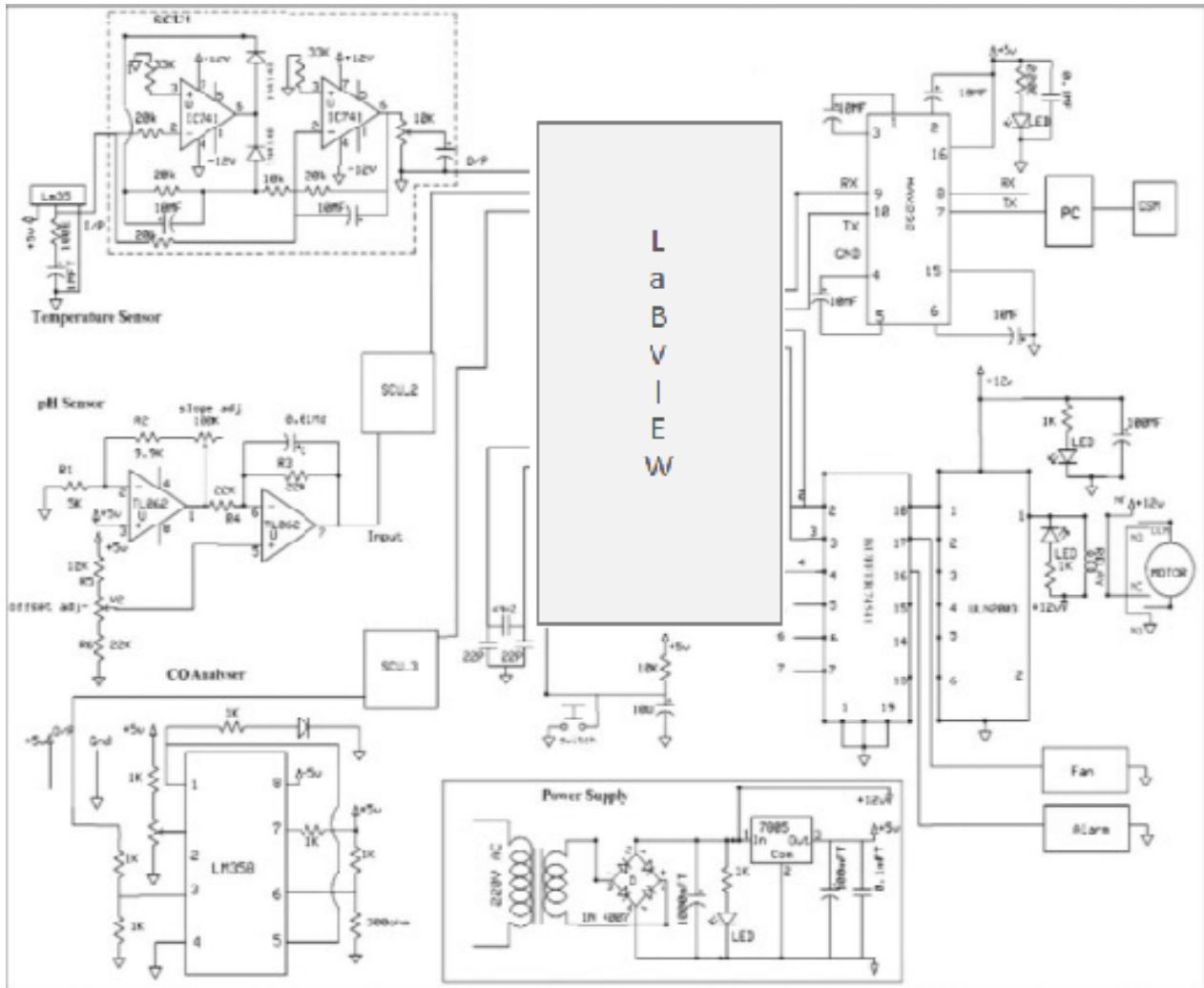


Fig.11.Implementation using LabVIEW

VII. REFERENCE

- [1] Pravin J, Deepak Sankar A, Angeline Vijula D, "POLLUTION MONITORING SYSTEM USING LabVIEW AND GSM" International Journal of Advanced Research in Electrical Electronics and Instrumentation Engineering Vol. 2, Issue 6, June 2013.
- [2] A.H.Utgikar , Ajay Gardi , Pratik Khule , Kiran Dayma , "LabVIEW BASED INDUSTRIAL PARAMETER SUPERVISION AND ALERT SYSTEM" International Journal of Innovative Research in Computer and Communication Engineering , October 2016 .
- [3] Mythly J, Balaji P, "IMPLEMENTATION OF MONITORING INDUSTRIAL POLLUTION SYSTEM USING LabVIEW AND GSM" International Research Journal of Engineering and Technology (IRJET) ,March 2016.
- [4] Sarathkumar M, Barathiselvaraj M, Vikram S, Chikkandhar G, "ADVANCED POLLUTION MONITORING AND CONTROLLING SYSTEM USING CLOUD INTERFACE" IJSRD - International Journal for Scientific Research & Development ,2016.
- [5] Isha Gupta, Rashpinder Kaur, "DESIGN AND DEVELOPMENT OF INDUSTRIAL POLLUTION CONTROL SYSTEM USING LabVIEW".
- [6] Karan Siyal, Ratnaprabha Kasde, "LabVIEW AND WIRELESS BASED REAL TIME SENSOR MONITORING".
- [7] Francis D. Udoh and Offiong I. Akpanika, "AN APPROACH TOWARDS EFFECTIVE MONITORING OF ENVIRONMENTAL POLLUTION RESULTING FROM PETROLEUM".
- [8] Kunja Bihari Swain, Santamanyu G, Amiya Ranjan Senapati, "SMART INDUSTRY POLLUTION MONITORING AND CONTROLLING USING LABVIEW BASED IOT".
- [9] Kavi Khedo, Rajiv Perseedoss, Avinash Mungur, University of Mauritius, Mauritius "A WIRELESS SENSOR NETWORK AIR POLLUTION MONITORING SYSTEM".
- [10] W Slooff, D de Zwart, JM Marquenie "DETECTION LIMITS OF A BIOLOGICAL MONITORING SYSTEM FOR CHEMICAL WATER POLLUTION BASED ON MUSSEL ACTIVITY".
- [11] O Pummakarnchana, N Tripathi, J Dutta, "AIR POLLUTION MONITORING AND GIS MODELING: A NEW USE OF NANOTECHNOLOGY BASED SOLID STATE GAS SENSORS".
- [12] JW Kwon, YM Park, SJ Koo, "DESIGN OF AIR POLLUTION MONITORING SYSTEM USING ZIGBEE NETWORKS FOR UBIQUITOUS-CITY".
- [13] H Edner, P Ragnarson, S Spannare, S Svanberg, "DIFFERENTIAL OPTICAL ABSORPTION SPECTROSCOPY (DOAS) SYSTEM FOR URBAN ATMOSPHERIC POLLUTION MONITORING".
- [14] "AN ENVIRONMENTAL AIR POLLUTION MONITORING SYSTEM BASED ON THE IEEE 1451 STANDARD FOR LOW COST REQUIREMENTS" Nihal Kularatna Univ. of Waikato, Hamilton.
- [15] YJ Jung, YK Lee, DG Lee, KH Ryu, "AIR POLLUTION MONITORING SYSTEM BASED ON GEOSENSOR NETWORK".