# GSM based Remote Industrial Pollution Monitoring and Control System

**Snehal V. Laddha, Archana R. Tiwari**

## ABSTRACT

*Air pollution refers to the release of pollutants into the air that are detrimental to human health and the planet as a whole [1]. Air pollution is a major concern in modern cities and in developing countries nowadays. Atmospheric pollutants such as CO2, NO2, CO, O3, SO2, Suspended Particulate Matter (SPM), Respirable Suspended Particulate Matter (RSPM) and Volatile Organic Compounds (VOCs) have a direct impact on the human health; they are responsible for a variety of respiratory illnesses (such as asthma) and can cause cancer in humans if they are exposed to these pollutants for extended periods of time[2]. Hence, air pollution monitoring is vital nowadays especially in the urban and industrial areas. We provide a portable monitoring system which will continuously monitor and provide the sensory information directly on the cell phones. Therefore reducing the need to visit power plants to read the information and hence human errors.*

***Keywords: Remote environmental monitoring, GSM, Air pollution monitoring, etc.***

## 1. INTRODUCTION

The concentration of air pollutants such as CO2, CO, NO2, etc. is highly location-dependent. The urban areas with heavy traffic concentration and industrial areas have a considerable impact on the local air pollution[1][2].
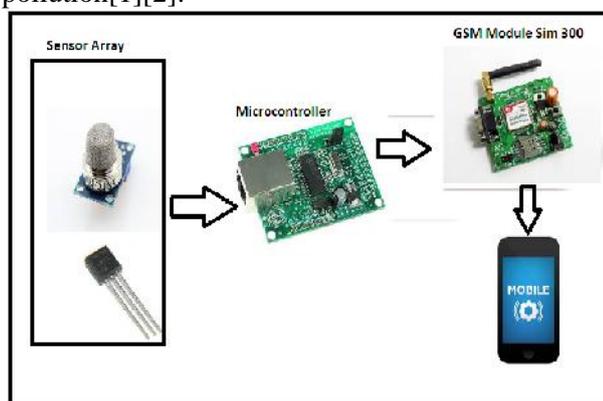


*Fig. 1. Remote Environmental monitoring system*

Air pollution and quality monitoring is extremely important in today's world as it has a direct impact on human health. Air pollution is on the rise due to a number of anthropogenic activities and its monitoring is of vital importance to mitigate certain measures to control it [3]. This work deals with the measurement of air pollutant level in the vicinity of power plant and transmitting the measured data to the concerned authority for monitoring[8][9].This reduces the efficiency of the industry also the power plants are situated in rural areas which are difficult to reach instantly in case of emergencies.

## 2. METHODOLOGY

Remote Environmental monitoring system is designed with two sensors (LM35 and MQ135), interfaced at port A on PIC also there is a LCD panel connected on port B and GSM module on port C. Fig 2 shows the block diagram.
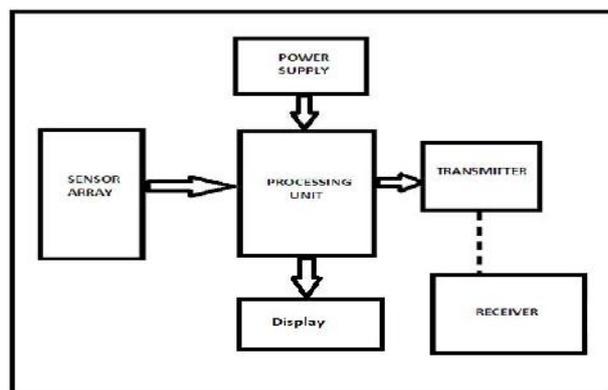


*Fig. 2. Block Diagram of the system*

The GSM module starts searching for signal. The time out period for signal detection is 20 sec. The GSM connected on 6th and 7th pin of the PIC signals the PIC that network is found and After getting the signal the LCD starts displaying the current value of temperature and nitrogen. The ideal

International Journal of Engineering Technology Science and Research
IJETSR
www.ijetsr.com
ISSN 2394 – 3386
Volume 4, Issue 7
July 2017

values of temperature and nitrogen is 40ºC and 400 PPM , sensors interfaced at port. A keep providing information about current values of these parameters and according to that PIC decides if threshold limit is crossed . If such event happens then the PIC triggers the message through GSM and the industry is notified. In another case there's no crossing of limit in then PIC executes the read_sms function and if the industry asked for current values of environmental parameters through text command "GETPARAM1" then PIC executes the send_sms function, the values are sent through the message. Fig. 3. Shows the circuit diagram
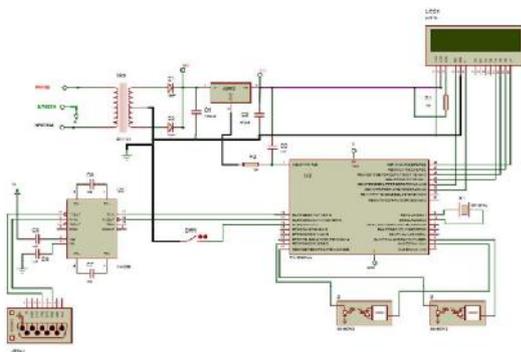


*Fig. 3. Circuit diagram*

## 3. SOFTWARE SIMULATION

3.1 XC8 Compiler

The MPLAB XC8 is a full-featured, highly-optimized ANSI C compiler for the PIC10/12/16/18 microcontroller families. This compiler integrates into Microchips MPLAB(R) X IDE, is compatible with all Microchip debuggers and emulators, and runs on Windows, Linux and Mac OS X.
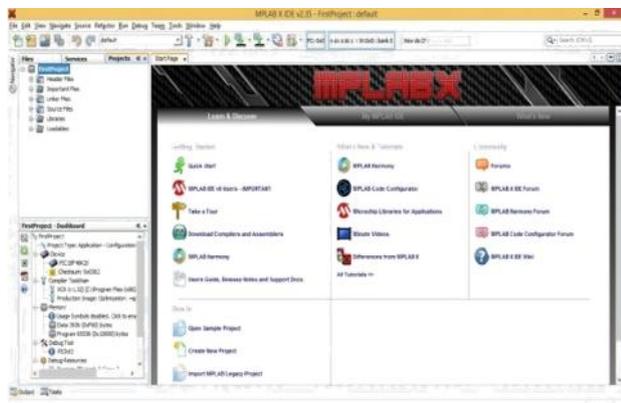


*Fig. 4. MPLAB XC8 window*

The MPLAB XC8 Compiler also comes with 12 months of High Priority Access, a maintenance

subscription providing web access to new version releases and priority technical support for the compiler.[5]

This compiler supports 8-bit Microchip PIC devices with baseline, Mid-Range, Enhanced Mid-Range, and PIC18 cores. The following descriptions indicate the distinctions within those device cores:

3.2 PROTEUS SOFTWARE

Proteus is a simulation and design software tool developed by Lab centre Electronics for Electrical design**.** It also possess 2D CAD drawing feature. It deserves to bear the tagline "From concept to completion". It is a software suite containing schematic, simulation as well as PCB designing is the software used to draw schematics and simulate the circuits in real time. The simulation allows human access during run time, thus providing real time simulation.[4][7]

## 4. RESULT AND CONCLUSION

The figure shown below depicts the three ways of how the result is displayed to the user. In the first process, the message is displayed on the LCD. The LCD shows the values of Temperature and Nitrogen percentage in the environment in real time in ºC and PPM (Parts per million).



*Fig. 5. Results obtained on phone via message*

In the second method, when the user requests for current status of parameters by sending a message to

the registered number, "GETPARAM1", the LCD displays "SENDING MESSAGE" and simultaneously message arrives at the mobile phone showing the values of sensors.

In the third method, when the parameters cross their respected danger levels that is , when temperature is above 40 ºC or Nitrogen level is above 400 ppm ,then message is triggered and user is notified.



*Fig. 6. Results as displayed on LCD panel*

This product is developed to measure the level of contents of air pollutants in remote power plants.

1

## 5. REFERENCES

[1] Jen-Hao Liu, Yu-Fan Chen, Tzu-Shang Lin and Chiai-Pang Chen*," Air quality monitoring system for urban areas based on the technology of wireless sensor network"*, International journal on smart sensing and intelligent systems,vol.5,no.1,Mar-2012

[2] Raja Vara Prasad, Mira Baig, R.K.Mishra, P.Rajalakshmi, U.B.Desai and S.N.Merchant, *"Real time wireless air pollution monitoring system"*, International journal on communication technology, vol-2, Jun 2011.

[3] A.R.Al-Ali, Imran Zualkernan and Fadi Aloul, *"A Mobile GPRS Sensor Array for air pollution monitoring"* IEEE Sensor Journal, vol.no.10, Oct 2010

[4] Nihal Kularatna and B.H.Sudantha *"An Environmental Air Pollution Monitoring System Based on the IEEE 1451 Standard for Low Cost Requirements"* IEEE Sensors Journal, Volume: 8, Issue: 4, April 2008

[5] Y.J.Jung and Y.K.Lee *"Air Pollution Monitoring System based on Geosensor Network",* Geoscience and Remote Sensing Symposium, 2008. IGARSS 2008, IEEE International.

[6] A. Kumar, H. Kim, and G. P. Hancke, *"Environmental monitoring system: a review,"* IEEE Sensors J., vol. 13, no. 4, pp. 1329–1339, April 2013

[7] Abdullah Kadri, Elias Yaacoub, Mohammed Mushtaha, Adnan Abu-Dayya "Wireless sensor network for real-time air pollution monitoring"

[8] Young Jin Jung, Yang Koo Lee, Dong Guy Lee, Keun Ho Ryu, Silvia Nittel  Air pollution monitoring system based on geosensor network , IEEE International Geoscience and Remote Sensing Symposium, pp.III-1370–III-1373, 2008.

[9] O. A. Postolache, J. M. D. Pereira, and P. M. B. S. Girao, "Smart sensors network for air quality monitoring applications," IEEE Trans Instrum.Meas., vol. 58, no. 9, pp. 3253-3262, Sep. 2009.