

# "Automated System for Monitoring and Controlling Industrial Air Pollution"

Prof. Mr. V.P. Patil<sup>1</sup> Miss. Sapana Patil<sup>2</sup> Miss. Prajakta Borse<sup>3</sup> Miss. Chaitali Chaudhari<sup>4</sup>  
Miss. Poonam Nagare<sup>5</sup>

<sup>1,2,3,4,5</sup>Department of Electronics and Telecommunication Engineering

<sup>1,2,3,4,5</sup>Sandip Foundation Mahiravani, Nashik, Maharashtra(India)

**Abstract**— Every chemical based industry has its own emission of gases, but the main problem occurs when the emission is beyond the standardized limit. The reason for crossing the standardized limit is uncontrollable chain reaction of chemicals. The emission of gases through industries cannot be completely avoided, but can be controlled. In our system, we consider designing the protocol using sensors connected to microcontroller based system. The main objective is to study the available feasibility in the air pollution control and provide in the format suitable for microcontroller. The first step in a analysis is to identify all available options to control the pollution(air). Available options are those air pollution control techniques with a potential for application to the emission unit and the pollutant under evaluation. Our system is based on monitoring and controlling air pollution using Atmega328p IC. MQ7 sensor is used for sensing the emitted gas, and after crossing the standardized limit the solenoid valve opening and closing is controlled by relay card.

**Key words:** MQ-7 sensor, Atmega328p IC, 5V 5pin Relay, Solenoid valve

## I. INTRODUCTION

Pollution is certainly not the new thing in today's world .The increase in the development of technology and the human race, we fail to take care about the surrounding in which we live in. Thus environment is polluted and the quality of environment is decreased. There are several types of pollution such as water pollution, noise pollution, soil pollution, air pollution etc. Out of these air pollution act as serious aspect. Due to the uncontrolled chain reaction of chemicals taking place in furnace, the emission of gases cross the standard value. Thus toxic gases mixed with the environment and causing health issues. These gases have to be monitored controlled and proper precautions shall be taken. The paper highlights the method for measuring the co2 gas. So a methodology is designed using IC Atmega328 to measure the level of air pollution and also measure the concentration.

## II. EASE OF USE

The purpose of this system is automatically control and monitor (air pollution system) air pollutant concentration are influenced by spatial or time variance of emission of hazardous substances & dynamic of their dispersion in the air and also the measure of this is to achieve air quality standard. To overcome these problems we apply monitoring of air pollution has been implemented using gas sensor and microcontroller where system shows the level of pollutants thus by knowing level we found possibility of reducing the air pollution. It is proposed that in addition to control this level solenoid valve is placed at source level.

## A. Analysis:

The analysis is divided into three main parts. The first section of this project introduces that we prevent the formation of pollutant and emissions by minimizing it at the source itself. As chemical reaction is takes place in way that excess of gases goes out of control which can be sensed by controller IC whether that data will get monitored. The second section is a compilation of air pollutant level which is passed to relay card. The third section is to control gas which depends on opening and closing of solenoid valve.

## III. BLOCK DIAGRAM

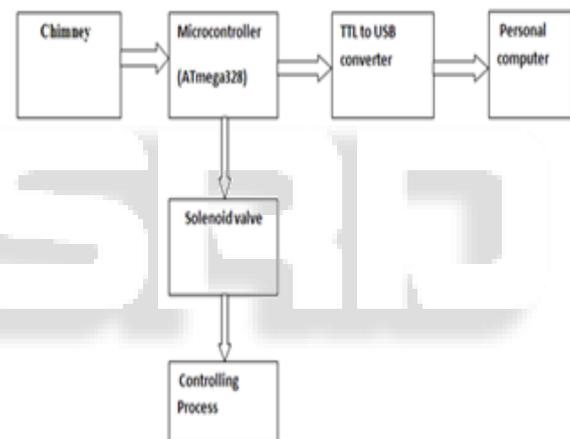


Fig. 1: Block Diagram of proposed system

## A. Sensor:

The sensor is placed in chimney for the detection of gas. In our system we use the MQ-7 sensor. This is a sensor which is sensitive to effects of CO. Carbon monoxide (co) is very dangerous gas which is odourless ,colourless and tasteless, it cannot be smelt, seen ,or tasted. CO is measured in parts per million(ppm).The detecting range of sensor is 20ppm-2000ppm.

## B. Microcontroller:

In this system we are using the Atmega328p controller which has inbuilt ADC. Microcontroller detects the sensor output. The input and output voltages are measured and converted to digital values by ADC. If sensor output exceed the threshold level the microcontroller provides the pulse to relay card. The more CO it detects, the greater the analog voltage it will output. If the analog voltage reaches a certain threshold, it will trigger the LED to turn on, signaling that the CO threshold has been reached and now over the limit. Also store the data backup of CO over limit which helps to monitoring the system.

### C. Solenoid Valve at Output Side:

Solenoid valve is use in our system for the controlling purpose. We use solenoid valve in our system is operate on 230v AC supply. When the gas level exceed the threshold level, then output from Atmega328p is given to 5pin, 5v relay card. When it is normally closed then solenoid valve start to partially turn off the solenoid valve at the source of chemical process. When process in control then solenoid valve start partially opening. They help to control the excess emission of pollutant and hence reducing the air pollution.

### IV. ALGORITHM

- Start
- Sensing gas by sensor
- If standard limit not exceed then continue regular process
- If yes then signal is forwarded to controller system
- Solenoid valve connected at source level that is at place where chemical process carried out
- When process get out of control due to which excess emission of pollutants start increasing, then the solenoid valve start closing partially
- when process in controll then Solenoid valve start partially Opening
- End process

### A. Flowchart:

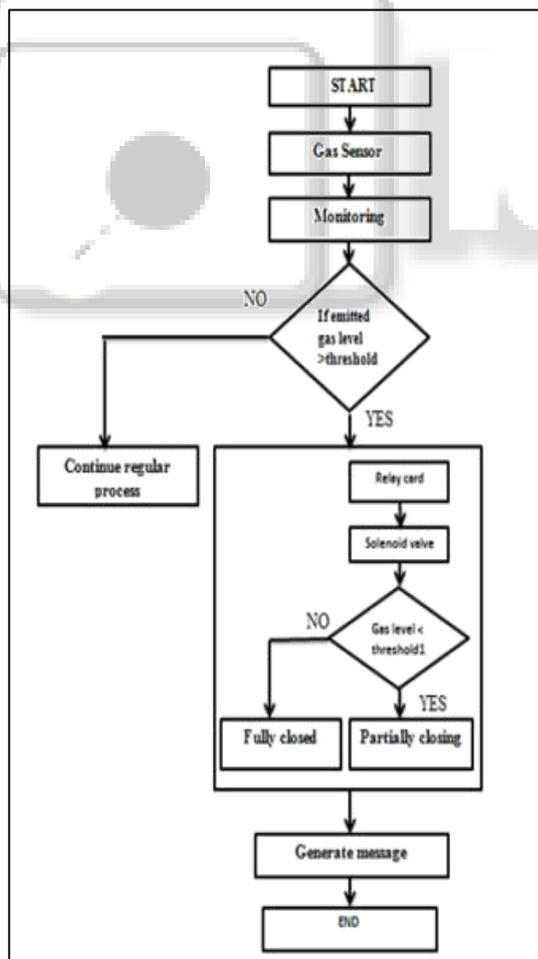


Fig. 2: Flowchart of proposed system

### V. RESULT

The sensor placed in a chimney detects the concentration of gas coming out from the chimney. If the acquired signal crosses the user defined value of gas, the signal is passed on to the 5V 5pin relay card. And based o this signal acquired by the relay card the solenoid's opening and closing is controlled which is placed as a source of chemicals at the furnace.

### VI. ADVANTAGES

- Monitoring as well as controlling process are simultaneously carried out automatically.
- The pollution data from sensor transmitted to a database of laptop that makes this data helpful to pollution board creating awareness among people.
- Also through the laptop user can sign in his account to check the pollution level for controlling purpose.
- Controlling is the solution which can help the industries to reduce the pollution as well as it will help the industries in carrying out their corporate social responsibilities.

### VII. DISADVANTAGES

- This system only applicable for chemical based industries.
- Periodic maintenance of sensor is necessary.

### VIII. APPLICATIONS

- In chemical industries.
- In sugar factories for measuring the level of polltion & to control it.

### A. Social Impact:

This system is useful for saving environment from air pollution. The system which we have designed is mostly focused on controlling the air pollution automatically. This leads to save the environment from harmful gases.

### IX. CONCLUSION

The system of monitoring and controller found to be more compact, user friendly and more efficient. The inbuilt ADC in the Atmega328p micro controller make the control module very compact and useful. An efficient interface for monitoring air pollution has been implemented using gas sensor and microcontroller. The system will show the level of air pollutants and by knowing these levels we study the possibility of reducing the pollution.

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REFERENCES

- [1] Snehal Sirsikar, Priya Karemore.Review Paper on Air Pollution Monitoring system.Vol. 4, Issue 1, January 2015.
- [2] Amarakanth1, N. V. Uma Reddy.Engine Self-Test With Air Pollution Detection And Remote information System.Volume: 03 Special Issue: 03,May-2014
- [3] Raja Vara Prasad Y, Mirza Sami Baig, Rahul K. Mishra, P. Rajalakshmi, U. B. Desai and S.N. Merchant.Real Time Wireless Air Pollution Monitoring System.Volume 2, Issue 2,June 2011.
- [4] R.A.Roseline, Dr.P.Sumathi.Pollution Monitoring For Healthy Environment Using Integrate Wireless Sensor Networks And Grid Computing.Volume 3, No. 1, January 2012.
- [5] Gaikwad Varsha Bhagwan, Puranik V.G.Real Time Air Pollution Monitoring Using Mobile Phone.Volume 3, Special Issue 4, April 2014.
- [6] Darshana N. Tambe and Ms. Nikita Chavan.Detection Of Air Pollutant Using ZIGBEE.International Journal of Ad hoc, Sensor & Ubiquitous Computing (IJASUC)Vol.4, No.4, August 2013.
- [7] Nitin Raut, Jabar Yousif, Sanad Maskari. Cloud for Pollution Control and Global Warming.Vol. 1 WCE 2011, July 6 - 8, 2011, London, U.K

