

# Idea Lab Project ID-07

## Toxic Gas Monitoring

Submitted By

Chitra Yesodharan (13BIC009)

Vaishnavi Shah (13BIC061)

Chiranjay J Bhalani (12BIC011)

Falguni Saluja (12BIC014)



IC DEPARTMENT  
INSTITUTE OF TECHNOLOGY  
NIRMA UNIVERSITY  
AHMEDABAD-382481

DECEMBER - 2016

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# Toxic Gas Monitoring System

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Idea Lab Project

Submitted By  
Chitra Yesodharan (13BIC009)  
Vaishnavi Shah (13BIC061)

Under the mentorship of  
Prof. Jalpa Shah



INSTRUMENTATION & CONTROL ENGINEERING  
INSTITUTE OF TECHNOLOGY  
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## Declaration

We do hereby declare that the technical project report submitted is original, and is the outcome of the independent investigations/research carried out by us and contains no plagiarism. The research is leading to the discovery of new facts/techniques/correlation of scientific facts already known. This work has not been submitted to or supported by any other University or funding agency.

We do hereby further declare that the text, diagrams or any other material taken from other sources (including but not limited to books, journals and web) have been acknowledged, referred and cited to the best of our knowledge and understanding.

Date:

Place: Ahmedabad

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Chitra Yesodharan  
13BIC009

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Vaishnavi Shah  
13BIC061

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Prof. Jalpa Shah  
Asst. Prof IC

**NIRMA UNIVERSITY  
INSTITUTE OF TECHNOLOGY  
IDEA LAB  
INSTRUMENTATION AND CONTROL ENGINEERING  
DEPARTMENT**

Final Report of the work done on the Idea Lab Project.

1. Project Title: Toxic Gas Monitoring System
2. Period of Project: 1 year
3. (a) Name of Students – Chitra Yesodharan (13BIC009)  
Department – Instrumentation and Control Engineering  
(b) Name of Students – Vaishnavi Shah (13BIC061)  
Department – Instrumentation and Control Engineering  
(c) Name of Mentor – Prof. Jalpa Shah  
Department – Instrumentation and Control Engineering
4. Project Start Date: 4<sup>th</sup> December, 2015
5. (a) Total Amount Approved – Rs. 22000  
(b) Total Expenditure – Rs. 14259  
(c) Report of work done –
  - i. Brief objective of the project: This project aims at designing a toxic gas monitoring system, which uploads the dynamic data of sensor on website.
  - ii. Work Done: An online database was made, wherein the sensor data was dynamically uploaded. Then this online database was linked with website made using 000webhost.
  - iii. Technical Difficulties Faced: Being an Instrumentation engineer, making the website and linking it with online database was our greatest difficulty.

Signature

Chitra Yesodharan  
(13BIC009)

Signature

Vaishnavi Shah  
(13BIC061)

Signature of Mentor

Prof. Jalpa Shah  
Assistant Prof,  
IC Department,  
Institute of Technology,  
Nirma University, Ahmedabad.

Signature of Idea Lab Co-ordinator

Prof. Sandip Mehta  
Idea Lab Co-ordinator,  
IC Department,  
Institute of Technology,  
Nirma University, Ahmedabad.

Signature of HOD

Dr. Dipak Adhyaru  
HOD  
IC Department  
Institute of Technology,  
Nirma University, Ahmedabad.

Signature of Director

Dr. Alka Mahajan  
Director  
Institute of Technology,  
Nirma University, Ahmedabad.

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**Final Report**

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## 1.1 Introduction

Safety assumes a noteworthy part in this day and age and it is vital that good safety systems are to be actualized in places of training and work. The fundamental goal of this work is outlining miniaturized scale controller based lethal gas checking framework. The dangerous gasses like Carbon mono - oxide and other combustible gasses are detected and showed every last second in the created online element site. The advantage of this automated detection and alerting system over the manual method is that it offers quick response time and accurate detection of an emergency and in turn leading faster diffusion of the critical situation.

In the advancement of innovation and mankind, we neglected to take care about the surroundings in which we live in. In this way we contaminated the earth and accordingly diminishing the nature of the place we live. Despite the fact that there are a few parts of contamination, for example, soil, air and water contamination, out of these air contamination goes about as the genuine perspective as the other can be identified outwardly and by taste, yet the dirtied air can't be recognized as it can be scentless, tasteless and colourless.

Toxic gasses are one that causes serious health impacts, but at the same time are utilized as a part of ventures in expansive amounts. These gasses can have harmful consequences to life and property if not distinguished and controlled at the correct time. There are challenges that oil and gas organizations face with regards to working with dangerous chemicals. Gasses like hydrogen sulfide actually happen amid extraction operations, which make it a typical hazard for specialists in the field. Working in an enclosed environment that contains a hazardous gas combines two occupational safety hazards: being in a confined spaces and hazardous gas exposure. With the risk of exposure to highly toxic gases, employers need to safeguard workers by using the right gas detection equipment.

Toxic Gas: Any such gaseous matter that has an adverse effect on any form of life, may it be plants and trees, animals or human beings can be categorized under the umbrella of a toxic gas for a predefined concentration range set by international standards. Long periods of exposure to these gases can cause permanent damage or death to living things.

## 1.2 Literature Study:

Toxic gases are one that causes serious health impacts, but are also used in industries in large quantities. These gases have to be monitored; such that increase in the normal level of them could be known and proper precaution measures can be taken. But the current systems available are not so portable and are costly and



difficult to end. So an embedded system is designed using PIC 16F877 Microcontroller, for the purpose of detection of hazardous gas leakage, which in turn avoids the endangering of human lives. The hazardous gases like LPG and propane were considered here. If these hazardous gases level exceeds normal level that is  $LPG > 1000\text{ppm}$  or  $Propane > 10000\text{ppm}$  then an alarm is generated immediately, and a SMS is sent to the authorized user as an alert message, which leads to faster diffusion of emergency situation. The system is affordable and can be easily implement in the chemical industries and in residential area which is surrounded by the chemical industries or plants, to avoid endangering of human lives. The system also supports to provide real-time monitoring of concentration of the gases which presents in the air. As this method is automatic the information can be given in time such that the endangering of human lives can be avoided.

“Intelligent Residential Security Alarm and Remote Control System Based On Single Chip Computer”, the paper focuses on, Intelligent residential burglar alarm, emergency alarm, fire alarm, toxic gas leakage remote automatic sound alarm and remote control system, which is based on 89c51 single chip computer. The system can perform an automatic alarm, which calls the police hotline number automatically. It can also be a voice alarm and shows alarm occurred address.

### 1.3 Major Objectives Proposed

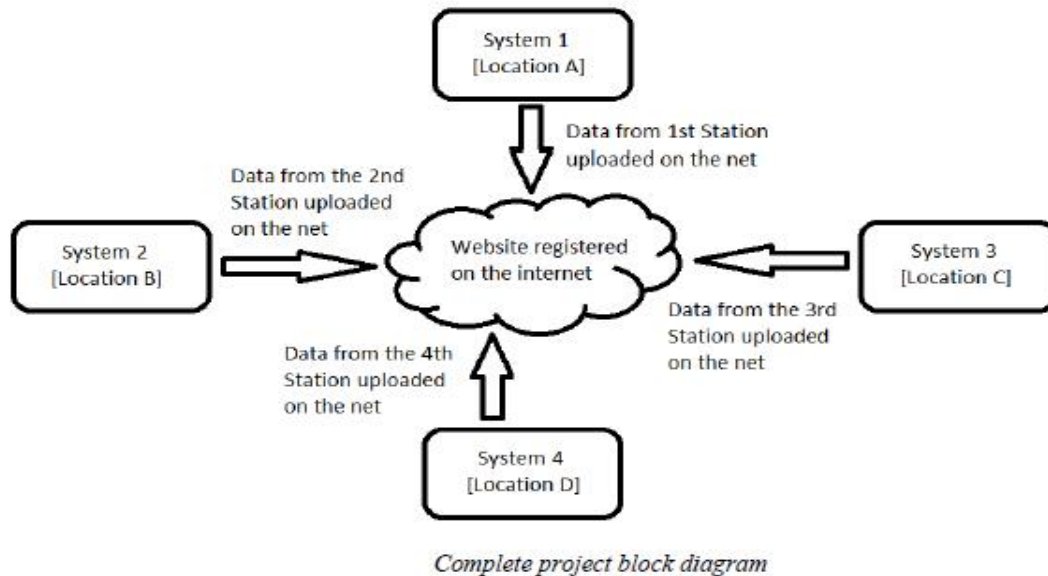
The objectives of this project are as follows

1. To design a system that enables the user to continuously monitor the presence of hazardous target gases remotely.
2. To collect the monitored data from multiple such systems and share it on a self-constructed website so as to increase the accessibility of the monitored data.
3. To generate and send an alert message to a remote location in case the concentration of the hazardous target gases increase beyond a safe limit

The main idea of the gas monitoring system that we have built was to share the outcome of the system on a platform that can be accessed from any location and by any person to whom the system is known.

The only necessary condition is availability of internet in any form.

Consider more than one such gas monitoring systems functioning independently and at distant locations from the others. By using a self-constructed website for data sharing, it is possible to upload the data of all the systems functioning at that time, on a common platform. This gives access to the status of all the gas monitoring systems without actually being present at any of the sites.



## 1.4 Objectives Achieved

After conducting study for various feasible sensors, sensor were interfaced with the Arduino Mega 2560 microcontroller board. The graphical interface for monitoring is developed in LabVIEW. The VISA API is used in LabVIEW to interface controller board with GUI. Through GUI data is logged in the excel sheet. Sample webpage using HTML codes were developed which are interlinked so as to obtain a complete website: Data logged into the excel sheet were monitored through webpage. Presently, we have implemented a single sensor node on website with dynamic data. If the value of monitored gas exceeds the limit alert email will be sent to the user.

## 1.5 Technical Difficulties Faced

Installing LabVIEW Database Connectivity Toolkit with its updated library tools as we had device drivers' error.

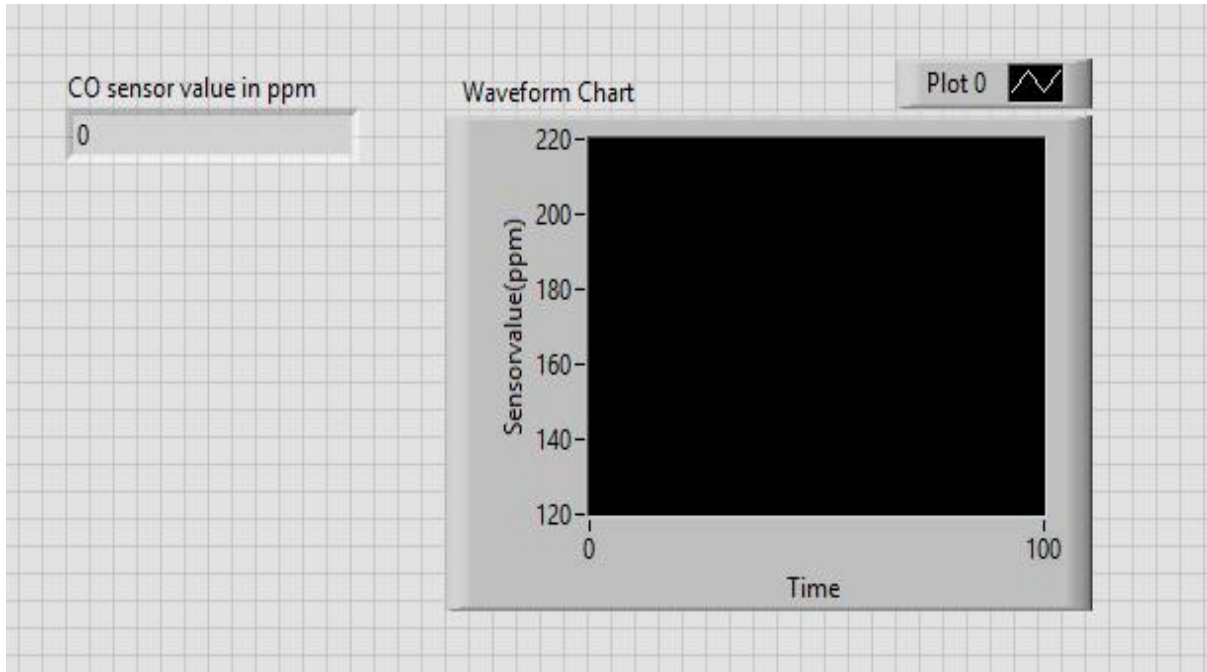
Connecting the Database provided by freemysqlhosting.com with 000webhost domain.

Being in Instrumentation and Control field, in order to build a Dynamic website was the major complexity we faced in our project.

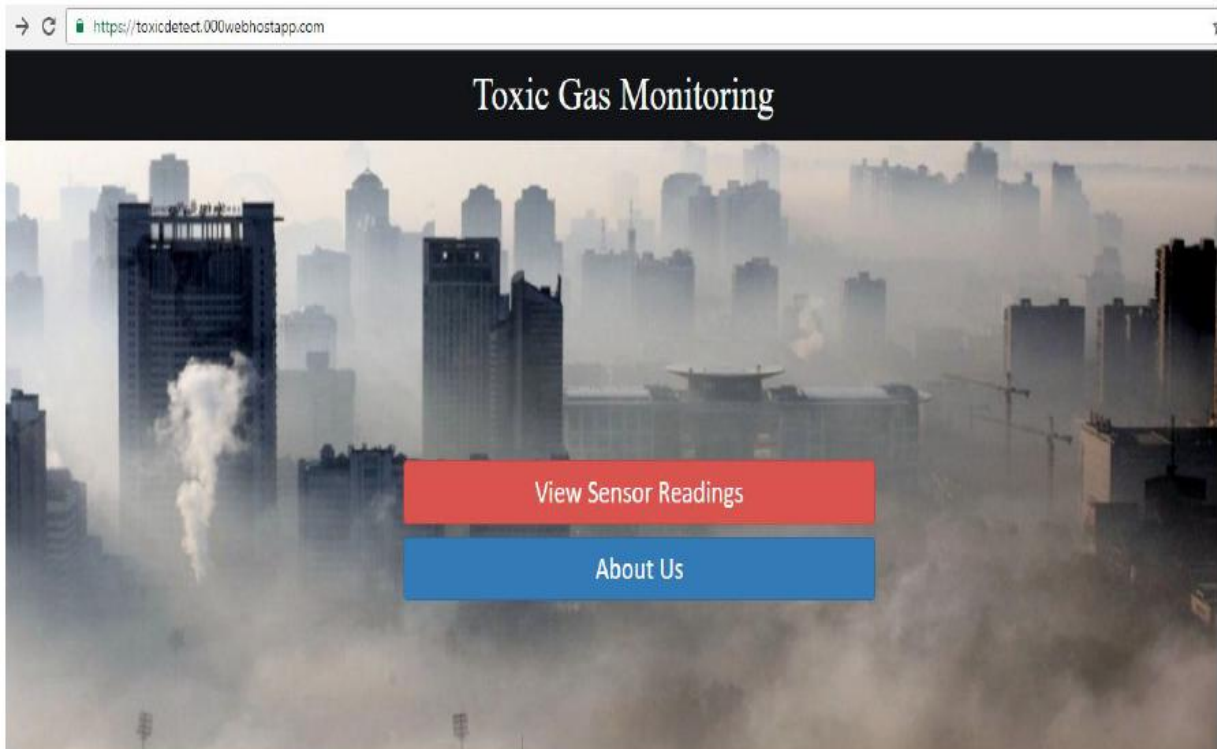
## 1.6 Experimental Setup and Data

The system consists of software and hardware. After conducting study of various feasible sensors, sensors were interfaced with Arduino Mega 2560 Microcontroller

board. MQ series sensors are used for air quality measurement. The graphical user interface for monitoring of these sensor values is developed in LabVIEW. The VISA API package is used to interface Arduino controller board with LabVIEW. Through LabVIEW data is logged in an online database. In order to bring the data to an online platform, we developed a website using HTML and PHP codes. The main aim is to display dynamic data of sensors on the website.



*Fig: Front view of LabVIEW file*



*Fig: Screenshot of main page of website*

Date	Time	Timing	Carbon Monoxide	Ozone	Sulphurdioxide
15-12-2016	10:21:38	2147483647	112	35	42
15-12-2016	10:21:38	2147483647	112	51	40
15-12-2016	10:21:37	2147483647	112	55	30
15-12-2016	10:21:35	2147483647	111	47	40
15-12-2016	10:21:34	2147483647	110	42	30
15-12-2016	10:21:32	2147483647	110	45	50
15-12-2016	10:21:30	2147483647	108	43	49
15-12-2016	10:21:28	2147483647	108	43	49
15-12-2016	10:21:26	2147483647	108	43	49
15-12-2016	10:21:24	2147483647	108	43	35
15-12-2016	10:21:22	2147483647	108	49	42
15-12-2016	10:21:20	2147483647	103	47	53
15-12-2016	10:21:18	2147483647	103	46	52
15-12-2016	10:21:16	2147483647	103	36	42
15-12-2016	10:21:14	2147483647	103	46	52

*Fig: Screenshot of data logged on website*

## 1.7 Budget Analysis

Approved Amount: Rs 22000

Utilized Amount: Rs 14259

Available Amount: Rs 7741

## 1.8 Conclusion and Future Work

Toxic gas detection and monitoring is very important for the safety of the life around. These gases have direct adverse effect on life with increase in concentration. The data on website can be accessed by user at any point of time hence like traditional method transportation of air samples is not required from one place to another.

To develop the interface for monitoring dynamic data for toxic gases from different sensor nodes on single website. To develop the new toxic gas interface with controller board by studying its effect on human health. Also a safety control mechanism and an alarm mechanism should be provided which get activated when the sensors sense the presence of the target gas.

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