

# Design of an Internet of Things Approach for Industrial Pollution Monitoring

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**Abstract:-** Industrialization increases the degree of automation and so it increases pollution by releasing pollutants into the atmosphere. There should be a system to monitor and assess the industrial pollution. Specific attention is given to the factors which affect the health of living organisms and Ecosystem. Industrial pollution monitoring is the collection of information at different locations of industries and at regular intervals of time in order to provide the data which may be used to define current conditions. Due to the complexity of parameters large variations are found between different industries. The proposed system aims in building a robust system that can measure the industrial pollution and help to reduce it and to decrease human interference in monitoring the industrial pollution and provide a healthy environment for the workers to work in. The system evaluates the industrial pollution continuously and indicates when there is an increase in the emissions and takes action to control it using wireless technology (i.e) Internet of Things.

**Keywords:** Air pollution, continuous monitoring, industrial waste, wireless technology, IOT.

## 1. INTRODUCTION

In our nature, Pollution is one of the biggest problems. It occurs because of impurities mix with the air, water, soil [1]. To keep safe our nature, we need to keep track the pollution level of air, water Etc. When the pollution levels cross the safe limits, we need to purify air, water, soil etc. As we, all know "Prevention is better than cure", so we need to be alert before the pollution level cross safe limits.

In this paper, we will show how to monitor the pollution level. In our paper, we will discuss about how to keep track of air pollution, water pollution and noise pollution. We will use Microcontroller and some sensors for this paper. For air pollution control, we need to measure the pollutant present in the air. For we use MQ7 and MQ6, The MQ7 is a Carbon Monoxide (CO) sensor suitable for sensing CO concentrations in the air [2]. It can detect CO-gas concentrations anywhere from 20 to 2000ppm. The MQ-6 module is used in gas leakage detecting which can detect LPG, butane, propane, LNG, presence of alcohol, cooking fumes, and cigarette smoke.

These sensors continuously monitor the presence of pollutant in air and send the information through the IOT. It also senses the temperature of the surrounding in the industries to eliminate the discomfort of the worker while working [3]. For temperature sensing, we use LM35 is a temperature sensor that outputs an analog signal which is proportional to the instantaneous temperature.

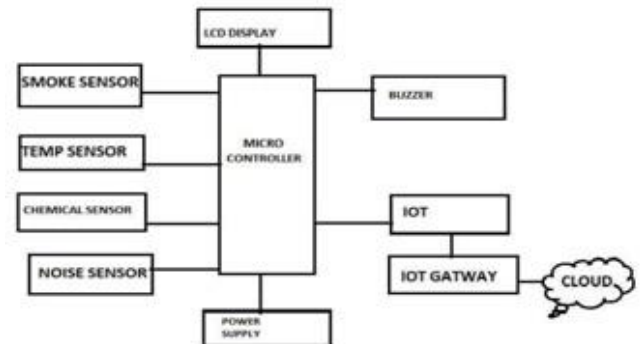


Fig.1 Proposed System Block Diagram

The output voltage can easily be interpreted to obtain a temperature reading in Celsius for noise pollution control, we need to measure the decibel. The normal human ear can detect sounds that range between 0 db and about 140 db. We will use Microphone amplifier breakout to measure the sound levels [4]. The microcontroller will be connected to a display. The display will show the instant results. If any results cross the safe levels, an alarm will alert the pollution control room. At the interval of 5 min, all the data will be uploaded to the cloud. The pollution control rooms will analysis the data to transform and remodel with a view to reach to a certain [8].

## 2. PAST SYSTEM ANALYSIS

As we know the industrial growth drastically increasing, environmental pollution related issues rapidly comes into existence. To fulfill the need of flourishing monitoring system, in our paper we are establishing a network called Internet of Things, in which sensing devices are connected with wireless embedded computing system [9]. Previously it is done with GSM, by using GSM we can give alert to the company but it will stores the history. So we are moving to IoT. The disadvantage of previous system is that monitoring the past value is not possible. It can be overcome by the proposed system.

## 3. PROPOSED SYSTEM SUMMARY

The proposed system is to control the air pollution by using modern technology. Gas sensor to detect the amount of Smoke released in the industries. If gas level exceeds the threshold value warning is given to particular company. Chemical sensor sense the ph value of the water which is sending before as waste from the company. It also monitors the temperature and sound of the working environment

using sensor for the labour comfort. It First time and second time it will intimate via buzzer, message to the user and updated in the server via cloud using IoT technology [14]. After the third time the company license will be terminated and message will be sent to the user about the termination of the license.

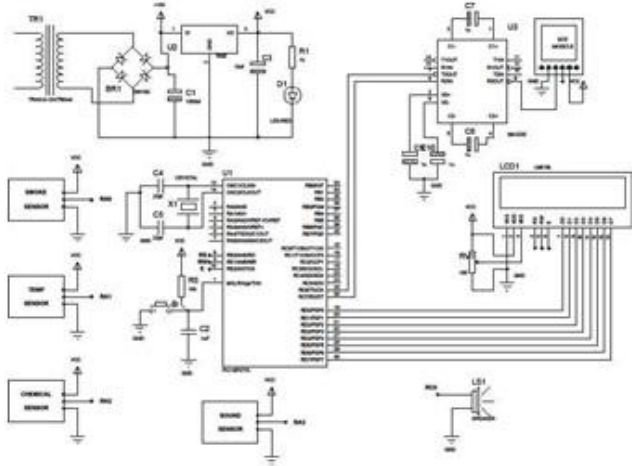


Fig.2 Circuit Diagram of the Proposed System

4. LITERATURE SURVEY

➤ Title

Managing Heterogeneous Sensor Data on a Big Data Platform, IoT Services for Data-Intensive Science. Authors & Year: Sulayman K. Sowe , Takashi Kimata , Mianxiong Dong, Koji Zettsu & 2014 Publication:2014 IEEE 38th International Computer Software Application, conference and Workshops

➤ Description

Big data has emerged as a key connecting point between things and objects on the internet. In this cyber-physical space, different types of sensors interact over wireless networks, collecting data and delivering services ranging from environmental pollution monitoring, disaster management and recovery, improving the quality of life in homes, to enabling smart cities to function. However, despite the perceived benefits we are realizing from these sensors, the dawn of the Internet of Things (IoT) brings fresh challenges. Some of these have to do with designing the appropriate infrastructure to capture and store the huge amount of heterogeneous sensor data, finding practical use of the collected sensor data, and managing IoT communities in such a way that users can seamlessly search, find, and utilize their sensor data [16]. In order to address these challenges, this paper describes an integrated IoT architecture that combines the functionalities of Service-Controlled Networking (SCN) with cloud computing. The resulting community-driven big data platform helps environmental scientists easily discover and manage data from various sensors, and share their knowledge and experience relating to air pollution impacts. Our experience in managing the platform and communities provides a proof of concept and best practice guidelines on how to manage IoT services in a data-intensive research environment.

➤ Title

IOT-based air pollution monitoring and forecasting system, Authors & Year: Chen Xiaojun, Liu Xianpeng, Xu Peng & 2015. Publication:2015 International Conference on Computer and Computational Sciences (ICCCS).

➤ Description

Using empirical analysis, conventional air automatic monitoring system has high precision, but large bulk, high cost, and single datum class make it impossible for large-scale installation. Based on introducing Internet of Things (IOT) into the field of environmental protection, this paper puts forward a kind of real-time air pollution monitoring and forecasting system [10]. By using IOT, this system can reduce the hardware cost into 1/10 as before.

The system can be laid out in a large number in monitoring area to form monitoring sensor network. Besides the functions of conventional air automatic monitoring system, it also exhibits the function of forecasting development trend of air pollution within a certain time range by analyzing the data obtained by front-end perception system according to neural network technology. Targeted emergency disposal measures can be taken to minimize losses in practical application.

➤ Title

Indoor Air Quality Monitoring Systems in the IoT Environment, Authors & Year: Oh, Chang-Se; Seo, Min-Seok; Lee, Jung-Hyuck; Kim, Sang-Hyun; Kim, Young-Don; Park, Hyun-Ju & 2015. Publication: May 2015 with 396 Reads DOI: 10.7840/kics.2015.40.5.886.

➤ Description

Recently, The World Health Organization announced that harms human health because of air pollution that is emerging as threats to human health worldwide. According to the, Seoul, 2011 According to a July 2014 Public Facilities indoor air quality measurements, were examined to be in violation of indoor air pollution standards in most multi- use facility [17].

Indoor air pollution resulting from this is present in the paper, and cause disease, such as pulmonary disease, asthma, bronchitis and to In this connection, the measurement of indoor air quality by using the environment sensor, analyzing the measured data to generate an actuator signal required for ventilation and improve indoor air quality by implementing a monitoring system with real-time measurement, autonomously managing the air quality [18].

➤ Title

Vehicular pollution monitoring using IOT Authors & Publication: Souvik Manna; Suman Sankar Bhunia; Nandini Mukherjee & 2014 Publication: International Conference on Recent Advances and Innovations in Engineering (ICRAIE-2014).

➤ Description

Degradation of air quality in cities is the result of a complex interaction between natural and anthropogenic environmental conditions. With the increase in urbanization and industrialization and due to poor control on emissions and little use of catalytic converters, a great amount of particulate and toxic gases are produced [11]. The objective of this paper is to monitor air pollution on

roads and track vehicles which cause pollution over a specified limit. Increasing number of automobiles is a serious problem that has been around for a very long time. This paper proposes use of Internet of Things (IoT) [12] to address this problem. Here, combination of Wireless Sensor Network and Electrochemical Toxic Gas Sensors and the use of a Radio Frequency Identification (RFID) tagging system to monitor car pollution records anytime anywhere.

### 5. CONCLUSION

Pollution is one the greatest headache of mankind. Due to pollution, the society is getting infected by diseases, viruses, bacteria etc... To keep safe ourselves, we need to take some actions. In this paper, we are dealing with how to prevent air, water and noise pollution. We are using some sensors, which can detect LPG, butane, propane, LNG, presence of alcohol, cooking fumes, and cigarette smoke in air and Carbon Monoxide in air, noise level etc... The sensors will send the collected data to the cloud. Analyzing the data, a report will be generated. Based on that report, the action will be taken against pollution.

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