

# Detection and Analysis of Air Pollution using Smart Sensors

Gurjot Singh Gaba

Lovely Professional University, Jalandhar, Punjab, India (144411)

**Abstract.** This paper proposes a system for a cost-effective detection cum analysis of Air Pollution and issuance of precautionary measures to pollution control board and people. The proposed system monitors the different components of air pollutants such as carbon dioxide, carbon monoxide or dust particle intensity present in the air in various parts of the city and the observations is further shared through Wi-Fi connectivity; which is presented on android/iOS application to various entities.

**Keywords.** Air pollution, smart sensors, detection, embedded systems

## 1. Introduction

The current air pollution monitoring device mostly fixed device, usually by Government agencies or private groups for site-specific (in particular the vicinity of traffic routes or factory) is provided with an air pollution detecting device, through the air pollution detecting device for judging the information on the local air pollution, and implementation of the improvement programme. However, the above known art has the following problems: Detection Cum Analysis of Air Pollution and Issuance of Precautionary Measures to Pollution Control Board and People

**Wide enough not a coverage area:** Because of the limited to the problem of technical or financial, air pollution detecting device is usually arranged in a fixed position, it is not possible to detect air pollution in the other regions. Even though using the movable type of air pollution detecting the vehicle comes to carry out detection.

**Insufficient prescription and interactive:** Since air pollution situation is closely related to the health of the people. The general air pollution detection system detecting information must be sent back to the control center, and then through the control centre it is important to inform the people, but they are not capable enough to intimate and warn the people.

## 2. Literature Review

**System and method of detecting air pollution, route-planning method applied to said detection system, and warning method of air pollution**

This system was proposed by 6 Taiwanese scholars in the year 2008. The name of the inventors is (i) Fu Huailei, (ii) Hu Kaixiang, (iii) Wang Tingyu, (iv) Lin Ziqi, (v) Lin Feng, (vi) Fang Yuguang. They claimed that their “invention provides a system and methods for detecting conditions of air pollution,

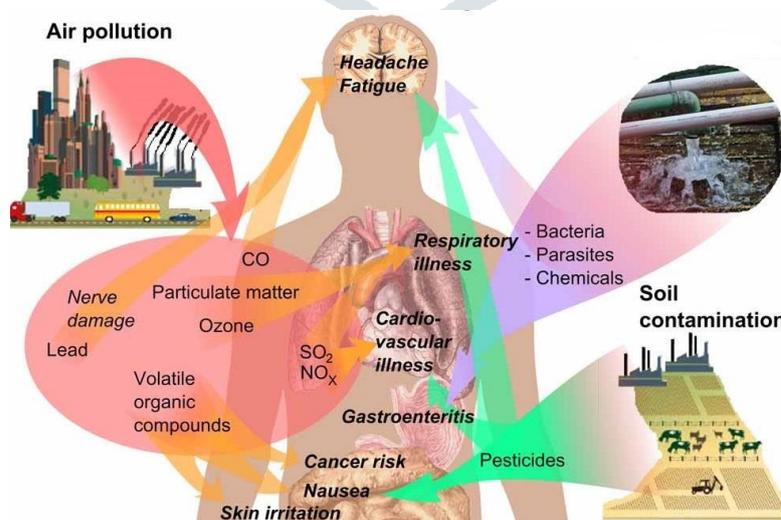
characterized by the use of a detecting device to detect polluting particles in the air, as well as an orientating device to confirm the location of the detecting device, such that information on air pollution conditions and location orientation can be transmitted from a data transmission device via a network system to an analyzing device for conducting data analysis and management, thereby obtaining real-time information on air pollution conditions across all regions and increasing efficiency in the improvement of air pollution”[8]. Although this system is good enough to detect the levels of air pollution and also gives the location of the place where air pollution is more. But, it is very necessary to inform the people about the increase in level of air pollution as people can only control the level of pollution in the environment. For this it is important to acknowledge people about the real-time levels of air pollution and the constituents of air pollutants in the environment.

### Air pollution sensor system

This system was proposed by Johan Marra of Netherlands in 2008 but was published in 2010. He claimed that “the invention relates to an air pollution sensor system comprising an air inlet, an air outlet, a sensor unit, and an air displacement device. The air displacement device is arranged to establish an air flow from the air inlet through the sensor unit to the air outlet. The sensor unit comprises a filter for removing airborne pollutants from the air flow. The sensor unit is arranged to generate an output signal based on the amount of airborne pollutants removed from the air flow by the filter. The air displacement device is arranged to be controlled by the output signal, thereby improving the lifetime of the air pollution sensor system by minimizing the amount of pollutants that will be deposited inside the sensor unit when the air pollution sensor system is operated under predetermined conditions”. [9]

### 3. Proposed Methodology

There is lot of adverse effects of air pollution on human body. Various consequences of pollution on human body is depicted in fig.1.



**Fig.1** Health Effects of Air Pollution

To overcome the adverse effects of pollution on human body, a scheme has been proposed. The method constitutes of sensing unit which detects the presence of pollution from the surroundings. Further it has analyzing unit which measures the amount of pollution so that necessary actions can be taken by the concerned authorities. Last section is receiving unit, which transmits the information collected from the environment to the pollution control bodies.

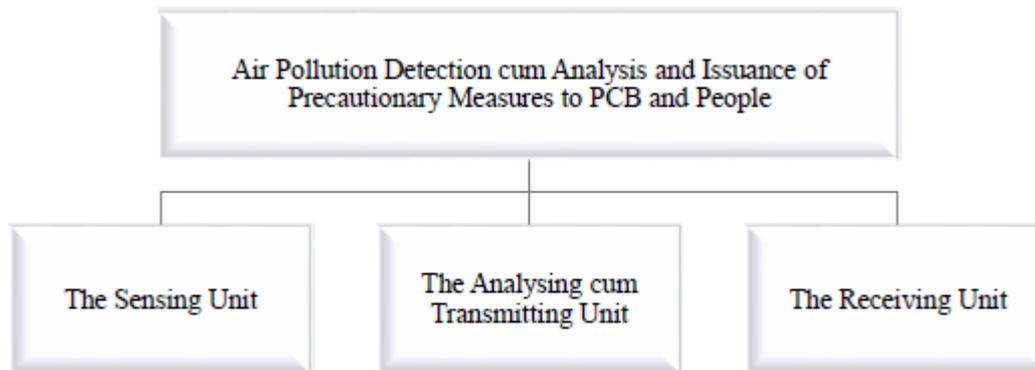


Fig.2 Block Diagram of Complete System

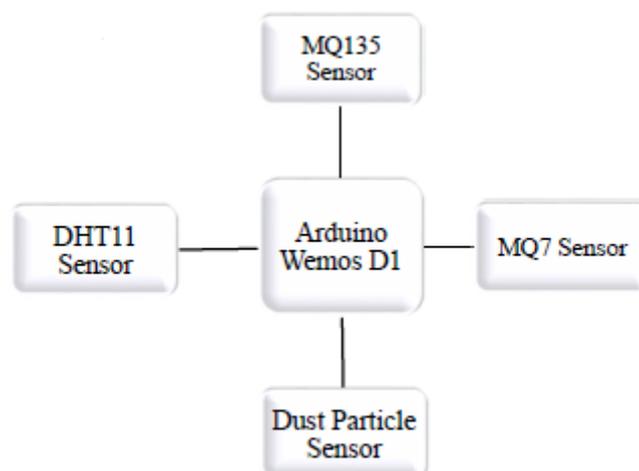


Fig.3 Interconnection of various sensors

Various sensors are interconnected as shown in figure 3 for the purpose of detection of pollution. Then the complete scenario has been presented in figure 4.

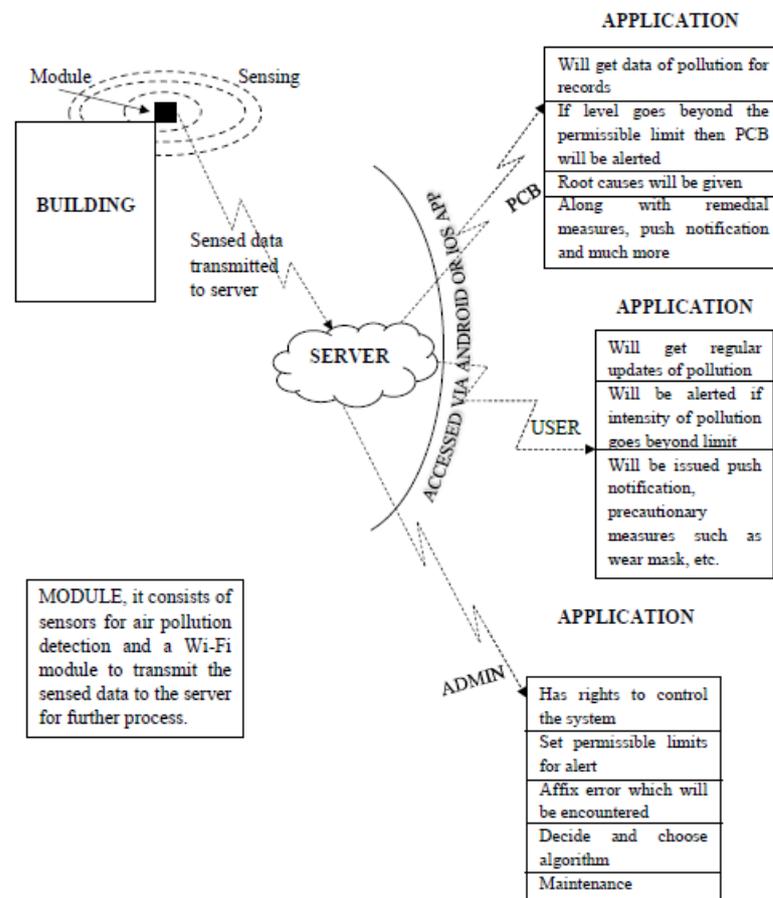


Fig.4 The complete working scenario

## Conclusions

The air pollution contains hazardous components which must be controlled otherwise will affect the humans body. The control is only possible if it is detected correctly. The authors proposed and tested a pollution detection and communication mechanism using smart sensors and mobile application. The system is tested successfully.

## REFERENCES

- [1] <https://www.universetoday.com/81977/causes-of-air-pollution/>
- [2] <http://eschooltoday.com/pollution/air-pollution/effects-of-air-pollution.html>
- [3] <http://www.mass.gov/eea/docs/dep/air/aq/health-and-env-effects-air-pollutions.pdf>
- [4] [http://www.business-standard.com/article/government-press-release/government-has-taken-series-of-steps-to-address-pollution-related-issues-116071901137\\_1.html](http://www.business-standard.com/article/government-press-release/government-has-taken-series-of-steps-to-address-pollution-related-issues-116071901137_1.html)
- [5] <http://cen.acs.org/articles/95/i4/Peering-Chinas-thick-haze-air.html>
- [6] [https://en.wikipedia.org/wiki/Pollution\\_in\\_China](https://en.wikipedia.org/wiki/Pollution_in_China)
- [7] <http://economictimes.indiatimes.com/news/environment/pollution/air-pollution-5th-largest-killer-in-india-study/articleshow/18486354.cms>
- [8] National Taiwan University, inventor; 20 Mar, 2009. System and method of detecting air pollution, route-planning method applied to said detection system, and warning method of air pollution, United States patent US 20090309744 A1
- [9] Koninklijke Philips Electronics; 06 May, 2010. AIR POLLUTION SENSOR SYSTEM, United States patent US20100107739A1
- [10] <http://www.yourarticlelibrary.com/air-pollution/effects-of-air-pollutants-on-human-health/19785/>
- [11] <http://www.air-quality.org.uk/15.php>
- [12] <https://qz.com/386759/its-not-just-the-taj-mahal-pollution-is-ruining-many-other-iconic-monuments-in-india/>