Air Quality Monitoring System Based on IoT

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Abstract. The system presented in this paper is an advanced real-time air quality reporting system
supported by the Internet of Things (IoT) architecture. Air quality in an environment heavily
affected by the community's state in a region may affect human, animal, and plant safety.
Therefore, air quality levels in a region should be tracked regularly. This study aimed to build an
IoT-based air quality system to evaluate air quality conditions in a given region. The device can
track the air rates of different substances including O3, SO2, CO and particulate matter using
sensors. Read the Arduino microcontroller sensor detail. The data sent to the cloud system then
accessed the cloud system through a WIFI module on Arduino. The effects of the tracking are
available through a cloud Site page. The current model is implemented successfully and can be
deployed for real system implementations.

Keywords: Pollution monitoring, IoT, Sensor network, Environment, Arduino.

1. Introduction
Over the last quarter of a century, companies developed rapidly. Such activities have created severe and
complicated environmental issues [1]. Considering the importance of environmental quality in people's
lives, the World Health Organisation (WHO), by establishing limits to the amounts of different air
contaminants, Ozone, nitrous oxides & sulphur oxide which include ground level, has established
recommendations on minimizing public and health consequences of air pollution [2][3]. The extreme
climate is first & foremost contamination that has triggered climate erosion, climatic transition,
stratosphere ozone depletion, habitat destruction, shifts in ecological and hydrological processes, soil
degradation and pressures on Buildings for food processing, acid rain & global warming [4]. Occurrences
of cancer, measles, asthma, respiratory problems, cardiovascular heart & chronic cardiovascular problems
have been recorded for raising such pollutants. Therefore, the market for environmental emissions
monitoring systems is growing [5] through sources of emissions utilizing harmful chemicals, these devices
will be able to identify and measure their origins easily. The modern air automated surveillance program uses laboratory analyzes with fairly complicated facilities, large quantities, unreliable activities and high costs [6][7]. For large-scale construction, this renders high cost and wide volume difficult. This machine will only be built at essential control sites of some main firms, so device data cannot forecast the ultimate emissions situation. This thesis suggests integrating IoT technologies with environmental protection to resolve deficiencies in conventional control and detection approaches and to-research costs [8][9]. This work has been carried out based on many previous studies. In the past, studies performed air quality management and surveillance in the house [10]. This work is also focused on our study into remote contact for air quality monitoring. We also established an outdoor quality control program, in comparison to previous studies. A variety of substances like O$_3$, SO$_2$, CO and particulate matter can be calculated in the soil. Web sites track air quality remotely [11][12].

2. Related Work

Environmental monitoring practices were checked at home. The author suggests a paradigm for temperature, moisture and light intensity control focused on the combination of ubiquitous, dispersed sensor systems, data collection knowledge system and background understanding and reasoning[13]. It is rewarding to have accurate sensory knowledge. Several camera devices for environmental control have been introduced recently. Many of the detection devices for tracking CO$_2$ (carbon dioxide) are different. A monitoring system is developed for carbon dioxide levels in remote areas. The machine also monitors the outdoor tracking zone's temperature humidity and light strength. Similarly, the author presents an urban CO$_2$ monitoring system[14]. It runs outside on 100 square kilometers in a metropolitan environment.

A low power ZigBee sensor network is suggested to track VOC emissions rates in indoor environments. An indoor and outdoor air quality monitoring system based on WSN is presented. A range of sensors in each node is either hardwired or wirelessly connected to the central control device [15]. A control program for air quality is introduced in real-time. The machine consists of seven sensors that control seven gasses.

3. Proposed System

The device can track the air rates of different substances including O$_3$, SO$_2$, CO and particulate matter through sensors. Read the Arduino microcontroller sensor detail. The data sent to the cloud system then access the cloud system through a WIFI module on Arduino. The effects of the tracking are available through a cloud Site page. The current model is implemented successfully and can be deployed for real system implementations. Figure 1 shows the design of the system. The sensor MQ-7 is used for reading CO concentrations in the soil. An analog sensor is MQ-7. The characteristics of the MQ7 gas sensor include a strong CO, reliable and long service life. This system uses 5V AC / DC heating power supply which uses 5VDC, distance calculation (20-2000 ppm) to test carbon monoxide gas. The analog pin on Arduino is connected in Figure 2 MQ-7. We use a gas sensor as an analog sensor for calculating ozone concentrations in the soil, to calibrate the Ozone levels. MQ-131 operates on a 5V (VCC) power supply attached to a microcontroller-connection VCC board.

The output voltage on a sensor would rise as the detector detects the gas in the environment, reducing the gas concentration and deoxidating. The importance of the O$_3$ gas concentrations is determined by the ratio of the sensor's resistance importance to the sensor's resistance when the air is clean.
4. Results
A system test was carried out from the results of the design that was carried out. The test has been conducted on campus to monitor conditions of air quality on campus. Figure 2 shows the system results of the simulated prototype module.

A system test was carried out from the results of the design that was carried out. The test has been conducted on campus to monitor conditions of air quality on campus. Data on ozone rates and CO particles were derived from the test results for compounds in the air that were analyzed. Each one minute, the data is obtained in the cloud. One may access the webpages from the internet through the web pages of the channel monitoring.
5. Conclusion

We also created a low-cost surveillance program. The semiconductor gas sensors may be used to track the gas concentrations of the target gas. A device has numerous advantages such as low-cost, rapid response, low maintenance, continuous measurement capacity, etc., using semiconductor sensors. One of the system's key benefits is a compact scale. The WLAN, the network server and the site server Gateway Node are all bundled into one lightweight edition. That is really compact for the device. This device also helps one to incorporate certain hardware components into the controller as a microcomputer of credit scale. Through incorporating further sensing nodes, the network can be updated. This device is valuable due to its comprehensive nature and calculation tests. The system can be rendered as a smart portable tool to track emissions

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