



AIR POLLUTION DETECTION AND MONITORING SYSTEM BASED ON IOT

¹Ms. Pritam Ramesh Kamble, ²Prof. S. S. Patil, ³Prof. A. S. Mali

¹M.Tech. Student, Dept. of E&TC Engg, Tatyasaheb Kore Insti. Of Engg. & Tech Warananagar,

²Assistant. Professor, Dept. of E&TC Engg, Tatyasaheb Kore Insti. Of Engg. & Tech. Warananagar,
Kolhapur, India

pritamkamble287@gmail.com, asmali@tkietwarana.ac.in

Abstract: In a country like India, air pollution is increasing alarmingly by the day. The main reasons for increasing the pollution level are the burning of crops, the emissions of motor vehicles, the overt release of smoke into the atmosphere of the industries and the overt incineration of waste. Current level of hazardous gases in the atmosphere is detected by Internet of Things (IOT) based pollution system. In our daily life, the quality of the air determines the most because everyone needs fresh air to live. The IOT based pollution system helps us to retrieve the data from any location where the device is installed. All data is visible in the smartphone app. By using the concept of IOT, we can use multiple pollution devices in different locations and get the data to the smartphone app.

Keywords — Internet of Things, Gas sensor, Humidity sensor, Arduino, Air, Pollution.

I. INTRODUCTION:

Air pollution is the biggest problem of any country, whether developed or developing. Health problems have grown at a faster rate, especially in urban areas of developing countries, where industrialization and a growing number of vehicles lead to the release of many gaseous pollutants. Harmful effects of pollution include mild allergic reactions such as irritation of the throat, eyes and nose as well as some serious problems such as bronchitis, heart disease, pneumonia, lungs and aggravated asthma. IOT-based air pollution monitoring system monitors air quality through a web server using the internet and triggers an alarm when the air quality drops below a certain threshold level, which means that there are enough harmful gases in the air, such as CO₂, smoke, alcohol, benzene, NH₃, LPG and NO_x. It shows the air quality in PPM on the LCD screen and also on the web page so that it can monitor it very easily. An LPG sensor has been added to this system, which is mainly used in homes. The system displays temperature and humidity. The system can be installed anywhere, but most commonly in industries and homes where gases are most commonly encountered and issues a warning message when the system exceeds the threshold.

Previously there was LPG detector with MQ6 sensor and smoke detector with MQ2 sensor, but this time it adopts MQ135 sensor which is the best choice for air quality monitoring as it can detect the most harmful gases and their quantity can measure accurately. In this IOT project you can monitor the pollution level anywhere using your computer or mobile. We can install this system anywhere and can also activate a device when the pollution exceeds a certain level, such as we can turn on the exhaust fan or send alert SMS or email to the user.

II. LITRATURE SURVEY:

The difficulty of the conventional monitoring instruments is their large size, heavy weight and extremely expensive. This leads to inadequate deployment of the measuring stations. To be effective, the locations of the monitoring stations must be carefully placed because the air pollution situation in urban areas is strongly

related to human activities and location dependent.

IOT based air pollution monitoring system is used to monitor air quality through web server using internet. It will sound an alarm when the air quality drops above a certain level, i.e when there are enough harmful gases in the air such as CO₂, smoke, alcohol, benzene, NH₃, LPG and NO_x. This system shows the air quality in PPM on the LCD screen and also on the web page so that it can be monitored very easily. Temperature and humidity are detected and controlled in the system. An air pollution monitoring system for monitoring the combination of the main air pollutant gases is designed, developed and observed with the wireless standard. This system measures the combination of gas such as CO,NO₂ and SO₂,and using semiconductor sensor. The hardware unit integrates a single-chip microcontroller, air pollution sensor array. Environmental monitoring is a systematic approach to observing and studying the state of the environment and studying the state of the environment. For healthy people, the width must be clean air, but fresh air is polluted due to the increase in the transport system. The transport system has an impact on the environment in which we live. An increase in the number of vehicles leads to an increase in the emission of pollutants from traffic. To monitor the effect of this pollution on the environment and the health of the individual, it is therefore necessary to monitor the level of pollution in urban and suburban areas.

IOT is a breakthrough innovation in technology, policy, industry and engineering circles that can enable air quality monitoring. IOT enables the connection of a network of objects by incorporating intelligent detection systems such as sensors. IOT connects the array of devices over the internet to communicate and exchange data and uses such connections to perform very useful functions. We use the Thingspeak IoT platform and have clearly defined the derivations stating the correct ppm on the screen with the correct calibration.

III. EXISTING SYSTEM:

Existing devices used for pollution monitoring required continuous manual knowledge acquisition and processing from time to time, sequentially requiring group personnel to continuously monitor and log information. A model created and it screens the variability of boundaries such as air, noise, temperature, humidity and light weight. Existing devices used for pollution monitoring required manual monitoring of the device from time to time, sequentially requiring a group of employees to continuously monitor the data and log in to the information.

Manual systems pressure people to have all the details of their work correct at all times, with the understanding that people are not perfect. With manual systems, the extent of service provision depends on individuals and this requires management to provide continuous training to employees to keep them motivated and to ensure they follow proper procedures. The person responsible for knowledge registration can also change the information on behalf of higher officials, making it unreliable.

IV. BLOCK DIAGRAM:

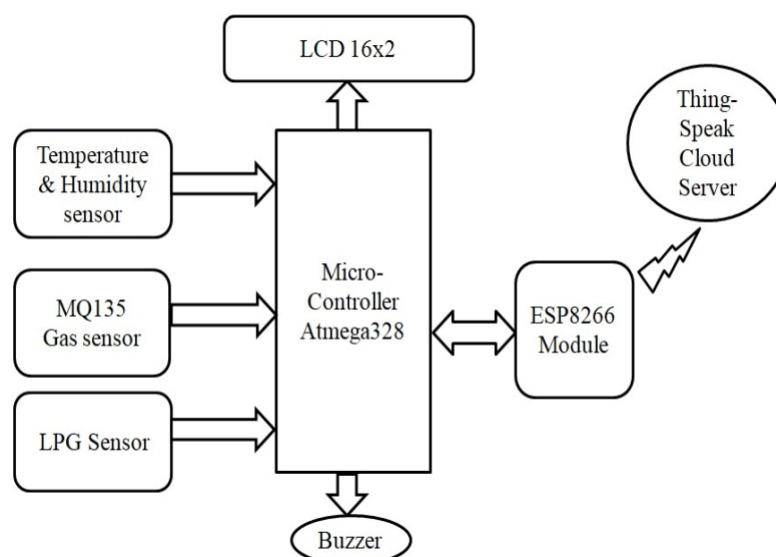


Fig: 4.1 Block diagram of Air pollution detection and monitoring system

A. Temperature and Humidity sensor:

DHT-11 is a humidity and temperature sensor, which generates calibrated digital output. It can interface with any microcontroller such as arduino. The DHT11 humidity and temperature sensor consists of 3 main components such as a resistive humidity sensor, an NTC thermistor and an 8-bit microcontroller which converts the analog signals from both sensors and transmits the single digital signal.

B. Gas sensor:

We will use two sensors as MQ135 gas sensor and MQ6 LPG sensor. The MQ135 sensor can detect NH₃, NO_x, alcohol, benzene, smoke, CO₂. So it is a dynamic gas sensor for air pollution monitoring system. We will connect these sensors to Arduino, then it will detect all the gases and it will give the pollution level in PPM (parts per million). MQ135 gas sensor gives the output in the form of voltage levels and we need to convert it to PPM. Sensor gives us value 90 when there is no gas around and the safe level of air quality is 350 PPM and it should not exceed 1000 PPM. When the value is less than 1000 PPM, the LCD screen and the web page will show "Fresh Air". When the value increases from 1000 PPM, it indicates "Poor Air, Open Windows". When it goes beyond 2000, the "Danger!" indicate Go to fresh air".

C. WIFI Module:

The ESP8266 Wifi module is used to access wifi or internet. It is a cheap chip with full TCP/IP stack and MCU (microcontroller unit). It runs on 3.3v and gives our system access to wifi.

D. Microcontroller ATMEGA328:

ATMEGA328P is one of the high-end microcontrollers with AVR technology with a large number of pins and functions, a low-power controller from Microchip. ATMEGA328P is an AVR RISC architecture based 8-bit microcontroller. It is the most popular of all AVR controllers because it is used in ARDUINO cards. ATMEGA328P is a 28-pin chip, many pins of the chip have more than one function here.

E. Thingspeak Cloud server:

The server has the all data related to air pollution with time and date information. The server can be used to store all the information as well as monitor the changes in the data.

V. CONCLUSION:

The air pollution monitoring system that constantly tracks the air quality in an area and displays the measured air quality on an LCD screen. It also sends measured data to the "Thing speak" platform. The system helps create awareness of the quality of the air one breathes on a daily basis. This monitoring device can provide real-time air quality measurements.

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