Environmental Air Pollution Monitoring System in Vijayawada

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Abstract: Over the couple of Decades there is a fast development in the transportation offices. These offices are intended to serve the people and make their life simpler. Aside from the favourable circumstances these offices additionally make difficult issues to nature. The first and the principal is the extreme natural contamination which has caused crumbling of air, environmental change, stratospheric ozone consumption, loss of biodiversity, changes in hydrological frameworks. This paper presents a way to monitor the air pollution due to the concentration of hazardous gases. In real time concentration in order to control the traffic density manually based on the data collected from different geographical locations. This is achieved by sensing the concentrations of gases by sensors and transmitting using GSM to a centralized data base.

Keywords: Vijayawada,gsm, Arduino Board, CO, NO2.

I.   INTRODUCTION

Control of air contamination and air quality checking are entirely important to execute reduction techniques and animate ecological mindfulness in the nationals' locale. A few procedures and advances can be utilized to screen air contamination information[1]. Presently, conventional natural checking strategies, for example, air quality observing stations, are commonly exact however costly and massive. These surprising expense and high exactness air quality checking stations dependent on concoction analyzers are utilized to address the natural directions and norms. For the most part, they are less thickly utilized and give detecting information at low spatial goals in the urban communities. Along these lines, air quality observing frameworks dependent on minimal effort and exact sensors to be coordinated in remote sensor systems conveyed at high spatial goals in the shrewd urban communities can be a substantial and viable instrument for continuous universal checking, bolster choices, illuminate overall population.

1.1. AIR POLLUTION STANDARDS:

Air contamination is a noteworthy ecological wellbeing danger to people particularly youngsters. For kids under five, it can cause ceaseless obstructive aspiratory sickness and lung malignancy in grown-ups. Intense lower respiratory tract contaminations, particularly pneumonia, are the greatest enemies of youthful kids and cause in excess of 2 million yearly passing's. In excess of 384 dangerous gases have been distinguished in the earth. In any case, of these gases six poisons: CO, NO2, ground level O3, SO2, particulate issue and lead are the most hazardous and are known as "the basic air contaminations" or "criteria air toxins.". The important transmission models were introduced in India in 1991 for oil and 1992 for diesel vehicles. These were trailed by making the Catalytic converter necessary for oil vehicles and the introduction of unleaded oil in the market. On April 29, 1999 the Supreme Court of India chose that all vehicles in India need to meet Euro I or India 2000 principles by June 1, 1999 and Euro II will be mandatory in the National Capital Region(NCR) by April 2000. Vehicle makers were not set up for this advancement and in a resulting judgment, the use date for Euro II was not executed. The benchmarks, in light of European controls, were first exhibited in 2000 [2]. Ecological checking is a systematic methodology for watching and concentrate the state of condition. For the solid person require to breath in a perfect air yet because of expanding the transportation framework natural air get contaminated. Transport framework have the effect on condition in which we live. Increment in the vehicle offers ascend to expanding traffic-related contamination outflow. Along these lines, to follow the impact of this contamination on nature and soundness of individual it is important to follow the dimension of contamination in urban and rural zones. Numerous wellbeing related issues are emerging from air contamination. Significant wellspring of air contamination is street traffic emanation which radiates the 97% of CO and 75% of NO. Hence, air quality observing is required so as to give valuable data about the contamination and can take suitable measures to alleviate the negative effect at whatever point it is essential. The motivation behind checking the air quality isn't just to gather the information yet in addition give the data which is required by the researcher, organizers, policymakers to settle on a choice on enhancing and dealing with the earth [3]. The principle mission of air quality checking system is to record the grouping of contamination and other parameter identified with the contamination and convey these data or iinformation to the populace to caution against any peril[4]. Dynamically stringent standards have been taken off from that point forward. Every single new vehicle produced after the usage of the standards must be agreeable with the directions. Since October 2010, Bharat arrange III standards have been upheld the nation over.

In 13 noteworthy urban areas, Bharat arrange IV outflow standards are set up since April 2010. Visakhapatnam as it was called and known as the coastline slope resort with lovely green -shrouded slopes all around, oh, has been mad e to secure the questionable qualification of being the 'most dirtied mechanical bunch' presented by the Central Pollution Control Board with the most astounding Comprehensive Environment Pollution Index of 70.82 outperforming even the Patancheru - Bolaram compound enterprises belt which at one time the High Court requested to be shut [5]. There are numerous approaches to gauge air contamination, with both basic, synthetic and physical strategies and with progressively complex electronic procedures. There are four primary strategies for estimating air contamination.

A. PASSIVE SAMPLING METHOD

In this strategy, we gather the examples and send the examples to the lab consistently. In the lab, the examples are tried utilizing a few instruments. The weakness of utilizing this strategy is the outcomes acquired are not precise and the procedure included isn't programmed that is it devours time and furthermore requires experts during the time spent delivering the outcomes[6].

B.AUTOMATIC SAMPLING METHOD

Automatic strategies deliver high-goals estimations of hourly toxin fixations or better, at a solitary point. The examples are investigated utilizing an assortment of strategies including spectroscopy and gas. The example once investigated is downloaded progressively, giving extremely exact data. The detriment of utilizing this strategy is it isn't practical[7].

B. ACTIVE SAMPLING METHOD

Active examining techniques utilize physical or concoction strategies to gather dirtied air, and examination is done later in the research facility. Ordinarily, a known volume of air is siphoned through a gatherer, (for example, a channel, or a compound arrangement) for a known timeframe. The authority is later expelled for examination. Tests can be gathered day by day, giving estimations to brief timeframes, however at a lower cost than programmed checking techniques. The inconvenience of utilizing this strategy is it is tedious[8].

I. PROPOSED METHOD BLOCK DIAGRAM

The block diagram for he environmental air pollution monitoring system is shown in Fig. 1.1. It consists of Arduino Uno board, Power supply, Sensors for different gas pollutants, GSM module, LCD display and Buzzer. The sensors can be powered using a regulated power supply of 5V. Sensor MQ-135 detects NOx and CH4, MQ-7 detects CO. Arduino Uno Board acts as a processor and controller. It calculates the raw data from the sensor and displays it on the LCD panel.

A. ALGORITHM AND FLOWCHART

In order to perform entire process, one need to adopt a step by step process and is presented in the form of an algorithm.

Step 1: START.
Step 2: Declaration of sensor data using characteristic curves from respective datasheets.
Step 3: By using this sensor data, calibration of sensors is performed.
Step 4: Calculate R_S and R_O values.
Step 5: If Gas id=0, then calculate the concentration of Gas id=0 and display on LCD else next Gas id is considered.

Step 6: If Gas id=1, then calculate the concentration of Gas id=1 and display on LCD else next Gas id is considered.

Step 7: If Gas id=2, then calculate the concentration of Gas id=2 and display on LCD else Step 5 is repeated.
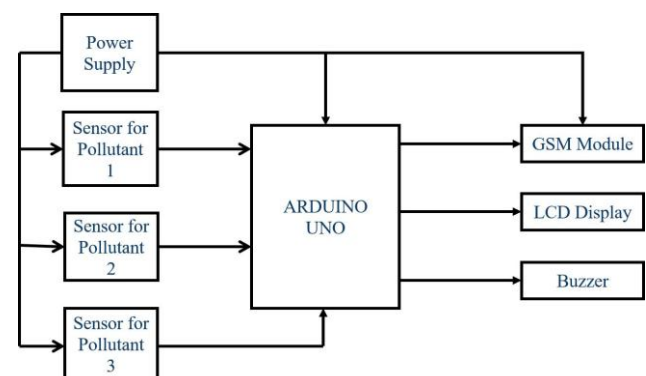
Step 8: If concentration of any gas exceeds the prescribed limit, the buzzer is activated and a warning messag e is sent through GSM else the process repeats.

Step 9: REPEAT.
B.Experimental set up for air Pollution

1 2 3 4 5 6
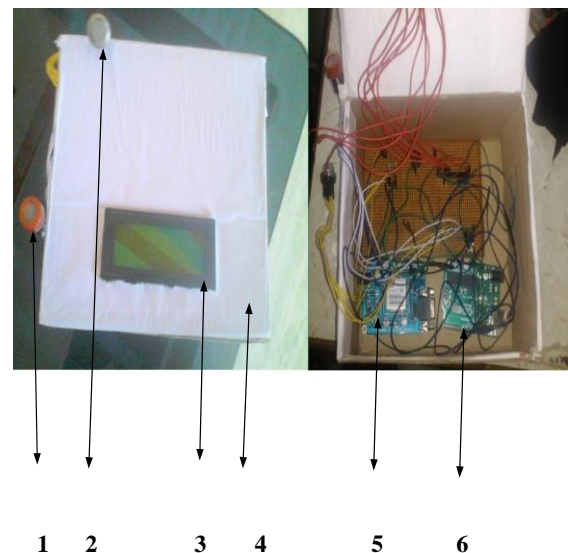
1.MQ-7 Sensor 2.MQ.- 135 Sensor 3.LCD Display 4.Cabinet for mechanical strength 5.GSM module 6.ARDUINO UNO

Fig. 1.1: Block Diagram for Environmental Air Pollution monitoring System

III RESULTS

The concentration of the three major gas pollutants namely, Carbon Monoxide (CO), Methane (CH4) and Nitrogen Dioxide (NO2) are measured at some polluted areas of Vijayawada and whenever the concentration of a particular gas pollutant exceeds its prescribed limit a warning message is sent through the GSM. Fig. 1.2 shows the concentrations of three pollutant gases observed at Municipal Corporation Guest House, Vijayawada on 12th February. The concentrations of NO2 and CH4 are zero ppm since under normal environmental conditions these two gases are present at very low levels (usually in ppm and even lesser). Concentration of CO=0.49 ppm at that instant


Fig. 1.2: Observation on 12th February at Municipal Guest house Vijayawada.

Fig. 1.3 shows the concentrations of three pollutant gases observed at Municipal Corporation Guest House, Vijayawada on 5th April. The concentrations of NO2 and CH4 are zero ppm and concentration of CO=0.74 ppm at that instant.

Fig. 1.3: Observation on 5th April at Municipal Guest House, Vijayawada.

Fig. 1.4 shows the concentrations of three pollutant gases observed at Benz circle, Vijayawada on 5th April. The concentrations of NO2 and CH4 are zero ppm and concentration of CO=0.94 ppm at that instant. Fig. 1.5 and Fig. 1.4 shows the concentrations of three pollutant gases observed near Bike exhaust system. At one instant of time the concentration of NO2= 0.69ppm and the concentration of CO exceeded the prescribed limit as shown in Fig. 1.5. Hence a warning message "CO Limit Exceeded" is sent through the GSM at that instant as shown in Fig. 1.5.
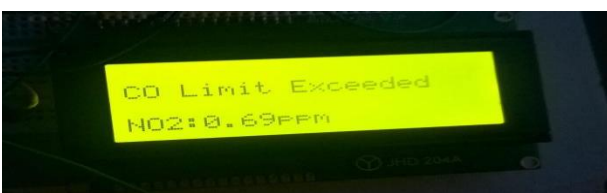
Fig. 1.4: Observation on 5th April at Benz Circle, Vijayawada.

Fig. 1.5: Observation near Bike Exhaust System.

At some other instant of time the concentration of CH4 exceeded the prescribed limit as shown in Fig. 1.6. Hence a warning message "CH4 Limit Exceeded" is sent through the GSM at that instant as shown in Fig. 1.6

Fig. 1.6: Observation near Bike Exhaust System

At some other instant of time the concentration of CH4 exceeded the prescribed limit as shown in Fig. 1.7. Hence a warning message "CH4 Limit Exceeded" is sent through the GSM at that instant as shown in Fig. 1.7. Fig. 189 shows the screenshot when the message is sent through the GSM module stating that CO and CH4 limits are exceeded at that particular instant when tested near bike exhaust system.

Fig.1.7: Screenshot when the Message is sent through the GSM Module.

IV. CONCLUSION

Based on the observations made by air pollution monitoring system experimentally as shown in results, these autonomous system provide an advancement in the filed of pollution control.. The framework is utilized to

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quantify centralization of toxin gases, for example, CO2, NO2 and other poison gases from condition. The contamination information from different sensors clusters is transmitted to a focal server that makes this information accessible to government specialist. The information demonstrates the poison levels and their conformance to neighborhood air quality norms. The framework additionally utilizes as far as possible to assess the dimension of wellbeing worry for a particular territory. It likewise relates significant and instinctive hues to the diverse classifications, in this way the condition of air contamination can be imparted to the client very effectively.

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