Embedded Control for Pollution Free Zone

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Abstract : In the growing population, the problem faced by the people is pollution. Today's children are tomorrow citizens. It's our responsibility to take care of children health. Other victims of this air pollution are the old people whose respiratory system is not strong to withstand the pollution of the world's top 20 polluted cities, 13 are in India compared to just three in China. A systematic review of the literature on the effects of air pollution on low birth weight (LBW) and its determinants, preterm delivery (PTD) and intrauterine growth restriction (IUGR), was conducted. Children's exposure to air pollution is a special concern because their immune system and lungs are not fully developed when exposure begins, raising the possibility of different responses than seen in adults. In addition, children spend more time outside, where the concentrations of pollution from traffic, power plants, and other combustion sources are generally higher. Although air pollution has long been thought to exacerbate minor acute illnesses, recent studies have suggested that air pollution, particularly traffic-related pollution, is associated with infant mortality and the development of asthma and atopy. Other studies have associated particulate air pollution with acute bronchitis in children and demonstrated that rates of bronchitis and chronic cough declined in areas where particle concentrations have fallen.

Keywords: AVPD (Automatic Traffic Pollution Detector), GSM (Global System Module)

I. Introduction:

The most important thing is that the children are mainly affected by the air pollution. Children breathe more air per pound of body weight, so their exposure to air pollution is much greater than adults. Children's organs, including their lungs, develop until they reach their late teens, usually around the age of 18. In India one survey estimated that about 35% of children are suffering from respiratory problem due to air pollution. Along with harming human health, air pollution can cause a variety of environmental effects: Acid rain is precipitation containing harmful amounts of nitric and sulphuric acids. These acids are formed primarily by nitrogen oxides and Sulphur oxides released into the atmosphere when fossil fuels are burned. And also we have to keep the hospital surroundings to be pollution free zone. For this intension we have taken a project called 'EMBEDDED CONTROL SYSTEM FOR POLLUTIN FREE ZONE'. Actually air pollution control using microcontroller and when pollution reaches threshold level the motor stops the injection of fuel. But in our project we are using air pollution control using Adriano. Instead of stop the injection of fuel using GSM (Geo satellite module) sends the information to traffic level to provide alternate route. And here silica gel is used as absorber which absorbs the CO2, NO2 particles in the air and its gases are not hazards to the environment, and leaving beings. It has social benefits.

II. Problem Identification:

Air pollution is caused mainly by Transportation, fuel combustion in stationary sources, burning of fossil fuels like coal, wood, dry grass, and construction activity. Motor vehicles produce high levels of carbon Monoxide (CO) and Hydrocarbons (HC) and Nitrogen Oxides (NO). Construction activities, bad roads and burning of fossil fuels are responsible for Dust (particular matter) Pollution. Residential and Commercial activities also contribute to Air Pollution.

The human health affects due to poor air quality. Principally, air pollution affects the Body's respiratory system and the cardiovascular system. Though the individual reactions to air pollutants depends on the type of pollutant a person is exposed to, the degree of exposure. Air pollution may cause long term health problems. The health effects caused by air pollutants may range from biochemical and physiological changes like difficulty in breathing, wheezing, coughing, and aggravation of existing respiratory and cardiac Conditions.

III. Components Used:

3.1 Sensing Unit:

The function of the sensing unit is to sense the pollution in the given surrounding and the condition of the atmospheric air.

3.2 GSM

Fig:1 GSM Module

GSM is a mobile communication modem; the idea of GSM was developed at Bell laboratories in 1970. It is used for mobile communication system in the world. It operates at frequency bands at 850Hz, 900Hz, 1800MHz, and 1900MHz frequency bands. Here the GSM sends the information regarding the pollution to the owner of the vehicle which would be supervised by the traffic police.

3.3 ARDUINO

It easily programmed, erased and reprogrammed at any instant of time. It is capable of receiving and sending information over the internet with the help of various Arduino shields. It is functions as a mini computer just like other microcontrollers through various input and output.

3.4 LCD Display

The function of liquid crystal display is to display the level of pollution. There are three levels i.e. normal level, threshold level and the above the threshold level.

Fig: 2 LCD Display

3.5 Absorbent

The absorbent used here is silica gel, which absorbs the pollutants from the Mass air.

3.6 AVPD

The function of the AVPD is to detect the pollution caused by the specific vehicle, capturing the name plate of the vehicle and sending the alert message to their phones.

IV. Block Diagram & Working

In this paper we are implementing pollution monitoring system based on the amount of pollution released from the vehicles. If the pollution level detected is less than predefined value (500ppm). Then the vehicle is considered in a perfect condition. If the pollution level detected exceeds the predefined value (500ppm) then there is a need to control. First stage is to detect the pollution level and that would be done by MQ135 SENSOR. Air pollution sensors are the device that detect and monitor the presence of air pollutant in the surrounding area. They can be used for both indoor and outdoor environments. Every vehicle has its own emission of gases, but the problem occurs when the emission is beyond the standardized values.

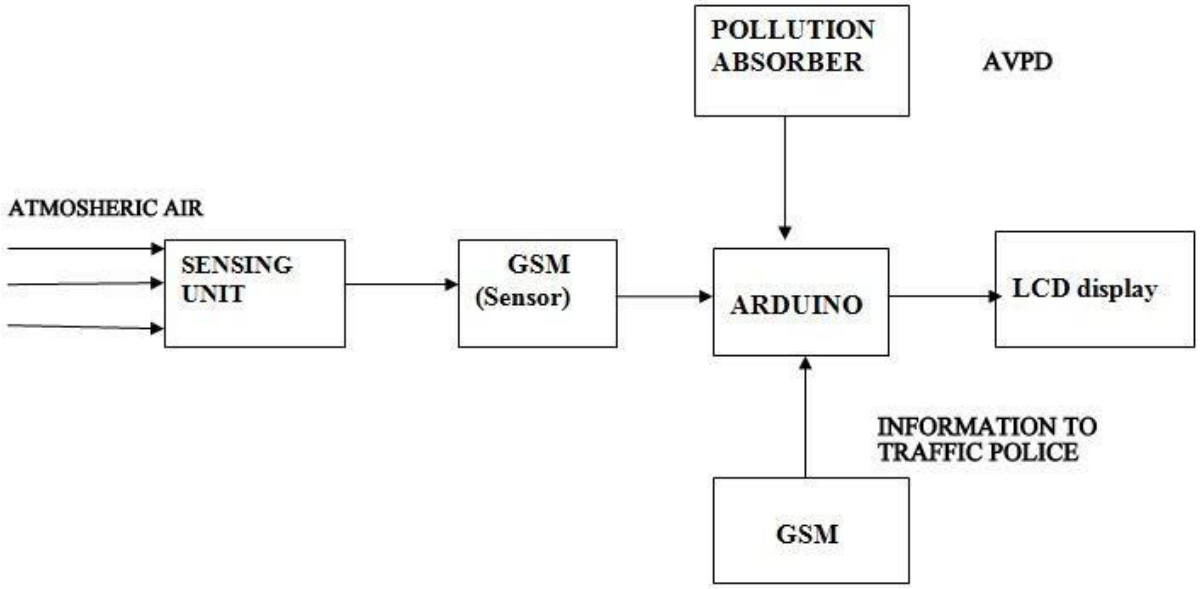

Fig: 3 Block Diagram of proposed model

The primary reason for this beach of emission level being the incomplete combustion of the fuel supplied to the engine which is due to the improper maintenance of vehicles. Using GSM (Global system for mobile) is a second generation cellular standard developed to cater voice services & data delivery using data digital modulation, it sends the information to the receiver, which is in the other side. The receiver receives the input and this input is given to the Adriano in which it the senses the data if the pollution level detected strikes beyond the predefined value, then it automatically sends a message to traffic control system using GSM and is to block that route and provide alternative route. This information details are displayed on the output screen using LCD. If the pollutants are beyond the threshold level the absorber is activated using silica gel. It can absorb the pollutants like CO, NO2 etc.

Here two sensors are placed, one at the lower level and another at the higher level, if the sensors at the lower level senses it refers to the threshold condition. At this condition air sucker is activated, the function of the air sucker is that it absorbs the air and separates the CO2 from the air. So absorbed CO2 is converted into fuel and the fuel is reused. If both the sensors detect the pollution, then Automatic Vehicle Pollution Detector is activated. The function of the AVPD is detecting the pollutants in case of more than threshold level, it captures the photo of the name plate and message would be sent to the owner of the vehicle. The respective person will be fined for the extra pollution caused by their vehicle.

4.1 **Process Involved**:

Wind Motion: There are many layers of the atmosphere, the layer near to the sun gets heated up, the density of the heated air is more than that of the non- heated air the denser air moves down and cooler high pressure area and the low pressure area could be obtained from the sensors moves up, this process is called as wind motion.

In this paper the process is involved. It is impossible to control the air pollution in the open field and the same could be achieved by above process. It could be implemented in two zones; high pollution and low pollution zone. Pollution in the atmosphere is similar to that of the wind motion. The information about the level of pollution is obtained by means of sensors.

4.2 **Pollution Level Indication:**

When the sensors start sensing, there are two stages first, in the case of the threshold level, here the Automatic Vehicle Pollution Detector is activated; the function of the AVPD is to check whether the given region is high pollution region or the low pollution area. After examining the state of the environment in the area, AVPD is activated, upon the activation; it automatically detects the pollutants from the vehicle. The alert message will be sent to the owner of the vehicle regarding the pollution caused by the vehicle and the respective person will be fined if his vehicle exceeds than the predetermined value of the pollutant.

Second, if the pollution in the give region is in critical level, the air sucker is activated, the function of the air sucker is to suck pollutant air from the atmosphere, absorb the CO2 gas from the air converting the CO2 gas into methane and the methane will be converted back to the useful fuel. Thus the fuel is recycled and reused by this carbon to fuel cycle.

V. **Working Cycle:**

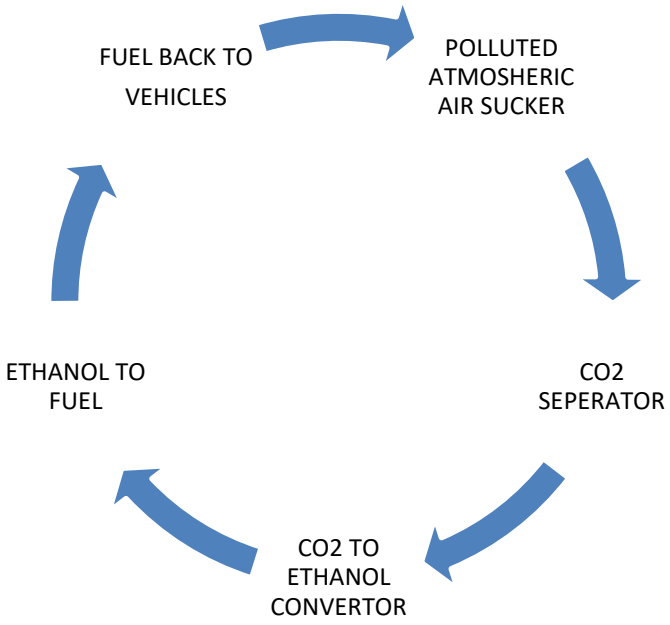

Fig: 4 working cycle of the Model

5.1 Model Implementing Constrains:

It should be implemented where the need for the control of air pollution is necessary. The Model is suitable for both indoors and out door pollution control. The project implementation place should be open area. So the control could be still easier.

- This can be implemented in vehicles as pollutant emission controller.
- This can be used in hospital for highly important place which should be in pollution free zone.
- This can be used as pollutants charging unit in industrial sector.
- This can be used as air pollution measuring unit and for controlling and monitoring of air pollution in industries.

VI.Conclusion:

By implementing the above project, the pollution could be control to required level, keeping the given environment clean. The health of the children and the aged people could be protected. This project could be implemented both indoors and out door. Presence of dangerous unnatural ingredients causing imbalance in the ecosystems and health hazards to human beings and animals are called pollution. Pollution is mainly found in air, water, soil, food and sound.

Major human activities like industries, agriculture, health care, transport, dwelling and energy generation are the causes of pollution. Soil pollution by various solids and liquids has created imbalances in soil ecosystems besides creating number of ecological hazards in cities and villages. Control of pollution has been a formidable challenge to human civilization. As the pollution grows with the civilization and growing population, the control of pollution is more challenging. Several measures have been adopted, suggested

imposed in industries, in agriculture and urban dwellings to control the pollution. However fast growing population and high capital requirement are the major problems being faced to implement the scientific methods of pollution control.

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