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# Detection of Air Pollution in Vehicles Using Embedded and IoT

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**ABSTRACT:** Many medical complications occur  due to person taking care of the patient or the elder people's medication need to sort huge amount of medicines everyday. This system is creation of pillbox prototype to sort out the medicines by itself. And also with it's other advanced features, this device can be intended to be used by hospitals or retirement homes. This medical pill box is mainly focused on patients taking medications frequently or for the attendants taking care of the patients who deal with more patients. The smart pillbox enables caretakers or clients to determine the medicine amount and the time to take the pills for everyday. The smart pill box also contain sub-boxes to set data data for distinct pills. At the point when the time to take pill has been set, The pill box will reminds patients to take medicines using sound and light. Conventional pillbox usually requires attendants to take care of the patients everyday consistently. The Intelligent pillbox would discharge the attendants' weight on much of time preloading pills for patients and overlook measurements must be taken. Intelligent pill box also avoids untimed medicine administration which can show adverse effect on patient's health. The developed system is designed mainly to help patients to take required medicines at right time in appropriate proportion.

## I. INTRODUCTION

Air pollution monitoring is very essential in this modern world. Increase in the industries, automation, change in life styles all these things increases the pollutant level of air such as $CO_2$ , $NO_2$, $CO$,$SO_2$ have adverse impact on human health. Also it causes global warming, acid rain, depletion of ozone layer. Therefore we necessarily require an Air pollution monitoring system to control the pollution level by regular monitoring of atmosphere especially in urban and industrial areas .In this paper we proposed a low cost, efficient wireless system that can help in air pollution monitoring. This device is basically based on an Arduino controller that controls all the operation of pollution monitoring system. We can mount this DAQ unit on any vehicle or we can fix it at different places from where we can get readings at different instances. Here we use a CO sensor to detect CO level in air and this sensed pollutant level and also physical location of the place using GPS are transfer to MSP controller in form of packet frames and by using GSM and public mobile network services all the details can be transferred to pollution server. From this server any client can get pollution level information of any place in the city. Here we set a threshold level for CO, if any time CO gas crosses that level LED attached to MSP will blink and also an alarm sends alert message to server. By collecting details from server we can also show it on google map to show the CO level at exact locations.

## II. LITERATURE SURVEY

**1.      A Mobile GPRS Sensors Array for Air Pollution Monitoring - J Charles,A.R. Al-Ali,Imran Zualkernan,Fadi Aloul**

An online GPRS Sensors Array for air pollution monitoring has been designed, implemented, and tested. The proposed system consists of a Mobile Data-Acquisition Unit (Mobile DAQ) and a fixed Internet-Enabled Pollution Monitoring Server (Pollution-Server). The Mobile DAQ unit integrates a single-chip micro controller, air pollution sensors array, a General Packet Radio Service Modem (GPRS Modem), and a Global Positioning System Module (GPS-Module). The Pollution-Server is a high- end personal computer application server with Internet connectivity. The Mobile DAQ unit gathers air pollutants levels ($CO$, $NO_2$, and $SO_2$), and packs them in a frame with the GPS physical location, time, and date. The frame is subsequently uploaded to the GPRS Modem and transmitted to the Pollution-Server via the public mobile network. A database server is attached to the Pollution-Server for storing the pollutants level for further usage by various clients such as environment protection agencies, vehicles registration authorities, and tourist and insurance

companies. The Pollution-Server is interfaced to Google Maps to display real-time pollutants levels and locations in large metropolitan areas. The system was successfully tested in the city of sharjah, UAE. The system reports real-time pollutants level and their location on a 24-h/7-day basis.

2.       An Environmental Air Pollution Monitoring System Based on the IEEE 1451 Standard for Low Cost Requirement - Nihal Kularatna,Bh Sudantha

An Environmental Air Pollution Monitoring System(EAPMS) for monitoring the concentrations of major air pollutant gases has been developed, complying with the IEEE 1451.2 standard. This system measures concentrations of gases such as CO, NO, S O , and O using semiconductor sensors. The smart transducer interface module (STIM) was implemented using the analog devices' ADuC812 micro converter.Network Capable Application Processor (NCAP) was developed using a personal computer and connected to the STIM via the transducer independent interface. Three gas sensors were calibrated using the standard calibration methods. Gas concentration levels and information regarding the STIM can be seen on the graphical user interface of the NCAP. Further, the EAPMS is capable of warning when the pollutant levels exceed predetermined maxima and the system can be developed into a low cost version for developing countries.

3.       Development of IoT based vehicular pollution monitoring system -Ramagiri Rushikesh

The high traffic area is selected to monitor the pollution level with the help of RFID placed at a short fixed distance along with the sensor nodes at the roadside. The tag number of the vehicle is identified by an RFID reader and is transmitted to the server. When the sensor level is high than the threshold, a message is sent to the owner.

Air Pollution and Insurance Based Vehicle Locking System - Abu Jayyab

They have proposed Air Pollution and Insurance Based Vehicle Locking System which is designed with Atmega processor that controls the engine of vehicle based on the values of the sensors and preset date on the controller. Every vehicle which crosses the pollution threshold level in an area, the vehicle's engine will be automatically turned off by the engineered circuit.

Vehicular Emission Monitoring System Using Internet of Things A.C.Kaladevi1 , K.S.Jeyareka2 C. Beulah Ratchanya , S. Aishwarya , K. Akshaya**.**

Vehicles have become an indispensable part of today's life. But the usage of vehicles contributes to air pollution by releasing a variety of toxic gases into the atmosphere by burning gasoline. The emission from vehicles contains nitrogen                                                                          oxides                                                                          (NOx),                                                                          carbon

monoxide (CO), and hydrocarbon (HC). Due to this, the quality of air is degrading and it also causes diseases like asthma attacks, cancer etc. Poor maintenance and ignition defect of the vehicle increases the emission by causing more fuel consumption. India is the fifth most polluted country in the world and a number of measures are being taken by the government authorities to control the air pollution. But it is a difficult task for the officials to constantly check all the vehicles on a regular basis and to keep a track of the emissions released. This work aims to use Wireless communication and IoT to control the pollution. The gas sensor is used to sense the emission from the vehicles and send it to the transport office database using Wi-Fi. A threshold value for the emission is initialized based on the BS-6 criteria. If the vehicle exceeds the threshold limit then an alert SMS is sent to the owner to Service the vehicle within 10 days. If the service is not done, then the report is sent to the police department to take necessary actions. Analysis is done to find out which engine emits more emission and it is displayed. A secured cloud database is used to prevent any eaves dropping or tampering. SMS gateway is used to send the alert messages.

## III. METHODOLGY

These environmental pollutants are mainly released by industries working with chemicals. Industries management only have a eye on profits and consider environmental safety as least priority which in turn affects the atmosphere and industrial workers health who are living in and around industries as the level of harmful gases are high around industrial areas compared to normal living places. Sensors (CO, Methane, Temperature and Humidity, Air quality, Flammable gases) are connected with Msp to get the environmental values. The automation is done using hardware components, which enables wireless communication and can control the behavior of sensors. Arduino is

responsible for controlling sensors such as Temperature and Humidity sensor, Air quality Sensors and Gas Sensors. Msp sends signals to each sensor to perform specific action or retrieve data from a specific sensor. The data sent from the micro controller is sent to the mobile application, which send data to web server.

**BLOCK DIAGRAM:**
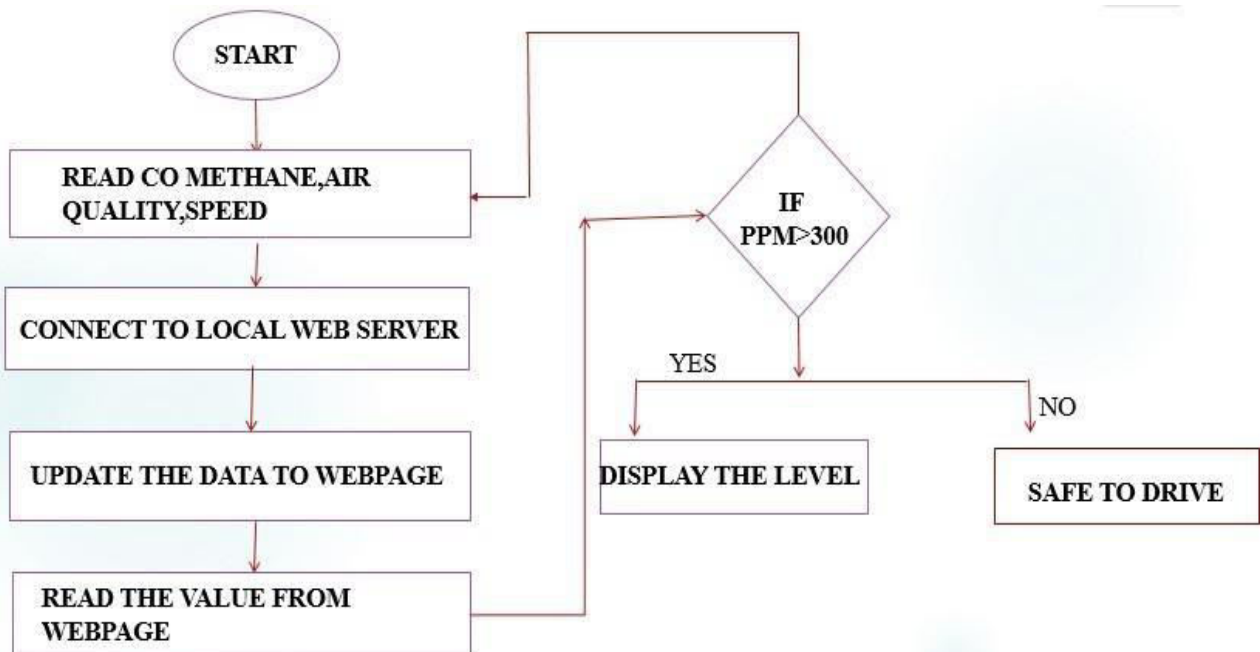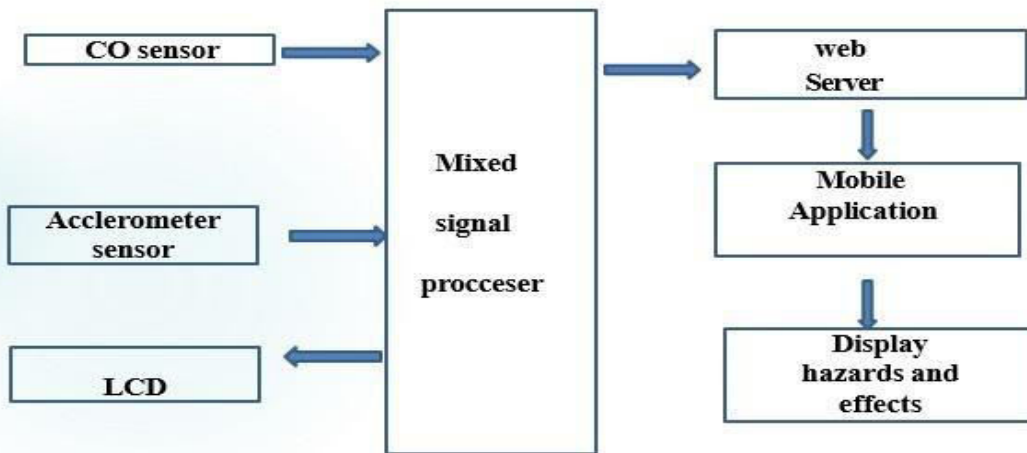




Proposed system Flowchart

The flowchart as shown in describes the software implementation of the    proposed system. In order to reduce the responsibility of family members of dividing the medications in the pill box, we assume that the medicine the patients need to take at particular times has been packed into the pill box. In this system we register 2 members finger in sensor. Based upon the patients we have to set the pill time for required medicine by using input system. We can set the different time for different pills. If the more than one pill is required at a time, give the box nos. to the system to get required pills. We also set the no. of pills we are inserting in the system.The real-time clock gives continuous time as an output. Monitor the time continuously using a Real-time clock to identify the pill time. If the system time matches with pill time, the system shows that that it is time to take a pill.

## IV. WORKING PRINCIPLE

The sensors are used to read the environmental toxic gases and the MSP controller is used to compare and analyze the data with threshold data and environmental data. Sensors (CO, Methane, Air quality, speed) are connected with MSP to get the environmental values. the proposed system aims to get values from the sensor and send to the web server though the mobile application, which is connected with MSP. and display the data .

## V. RESULT

The application "Blynk" is available in Play store in order to receive the data from Mixed Signal Processor. The received data is transmitted to the webserver, so that the user can access the data from any place. The received data will be stored in a text file. Whenever new data received by the server, the older data from the text file is replaced with the new data.The Blynk mobile application is used to get the data from the text file created.The application can be updated every 2 second. Based on the data received from the application, the alert messages will be displayed.
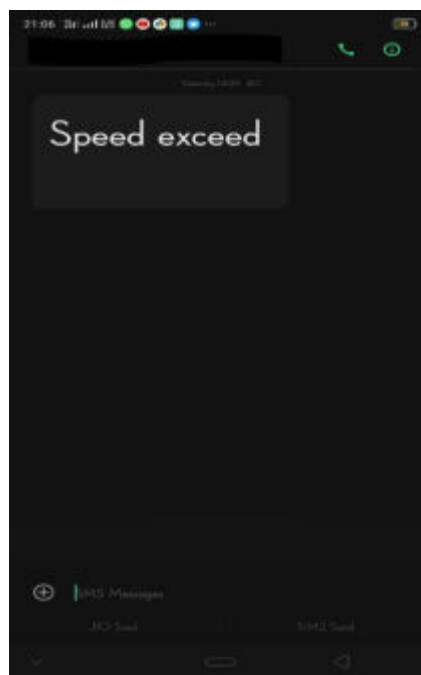
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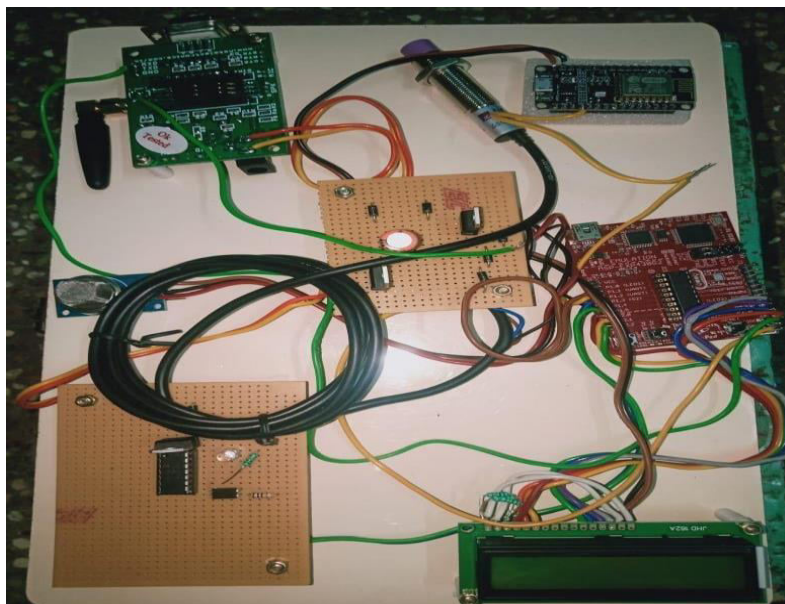


`Experimental setup
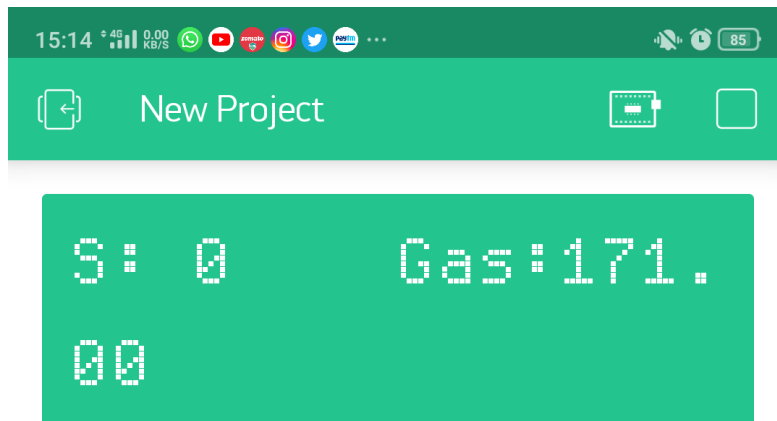
Application output



GSM Output

## VI. CONCLUSION

This paper aimed to monitoring toxic gases in vehicles for safety applications. The proposed system is to monitor harmful gases like Carbon Monoxide, Flammable gas, speed of the vehicles using sensors which are connected with Mixed Signal Processor. The data are send to an mobile application which are displayed on the screen. The values are displayed on the mobile app. It is portable, so we can used in large vehicles as well as domestic purposes.

## VII. FUTURE WORK

This system is monitoring only two parameters and hence can be expanded by considering more parameters that cause the pollution especially by the industries.Many pollutants do not have sensors that sense them if available they are very expensive and hence building sensors for different parameters might be a future and very challenging task. The

developed system consumes too much power, so we can use solar power as an external source of energy in future and it will definitely improve the reliability of the system.

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