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ANALYSIS OF GAS IN AIR IN A VEHICLE CABIN BASED ON IOT

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ABSTRACT- Motor vehicles are the basic source of transportation where vehicles with A/C play a major part. This paper designs an embedded system for a vehicle cabin, which senses the gases like carbon-monoxide if the level goes above the normal value and oxygen level if it goes below the normal value and displays each and every second. If the level of the CO increases than the normal level or the level of the oxygen decreases than the normal level then ventilation is provided immediately by window sliding. A warning message is sent to the authorized user via IoT Module. The advantage of this device is for proper detection and faster response time which leads to faster solving of the situation, compared to manual method.

Keywords - Internet of things (IoT), Gas sensor, NodeMcu, CD loader, Relay.

I. INTRODUCTION

This framework is utilizing the gas sensor which gathers information from the vehicle cabin about the concentration levels of the gas and conveys the content to IoT component and also displays in the LCD. The primary goal of the complete context is to recognize the poisonous gases. In case of any poisonous gases that are present in vehicle cabin during the usage of AC, it is indicated in LCD which is attached within the device. Continuous intake of harmful gases in the human body might produce several diseases, sometimes it even leads to death. If the few gases are scentless, they will be unprotected for a long time that causes significant health problems [1-2]. This device detects gases such as CO (carbon monoxide), oxygen. CO is scentless which with concentration over 150ppm cause confusion, nervous damage, unconsciousness, and fainting, above it will kill the human being. Every gas has its own physical and chemical properties that make them difficult to investigate without any instrument [5]. Dangerous gases exhibit at different levels depending upon the density and concentration of it [6]. The gas sensor is performing like a gas molecule that absorbs the gases that creates high temperature, that temperature change over into electrical signal. Initially, the sensor identifies the small amount of gas content of high concentration produces an electrical signal to the device. The NodeMcu is an open-source device that helps to upload the obtained data's as the IOT product within a few seconds in internet [3]. The device has an LCD display, it shows the concentration level of surrounding gases in the LCD [7] .This device consists of a 8829 CD loader, which is assumed as a window and when the gas sensor detects the high concentration of gas contents then the loader opens with the help of relay and closes after the concentration level reaches the normal level. This device consists of a relay, it is an electrically operated switch. Many relays are used as an electromagnet content that is used for the operation of a switch, but

other operating principles such as solid state relays are also used based on their applications. Relays are used, when it is necessary to control a circuit a low-power signal or where several circuits must be controlled by only one signal. A two way relay is used, in which one is used to rotate the motor of the CD loader in clockwise direction to open the loader and the other is used to rotate the motor of the CD loader in anticlockwise direction for closing of the loader. Node MCU V2 board is receiving information and transfers to the Wi-Fi module which is connected to the internet [4]. If the module IP-address is known anyone can see the information data.

II. LITERATURE SURVEY

"Alerting and Detection of Toxic Gases in Industries using Internet of Things", by Bichinapally Sruthi, E.Sreenivasulu: This paper concentrates on industrial disasters by detecting the gas leakage, radiation leakage, change in temperature and also detects the fire produced in industries, using a gas sensor (it contains carbon monoxide sensor, methane sensor, propane sensor, hydrogen sensor), temperature sensor, fire sensor all connected to the single microcontroller. If the concentration level reaches above the normal level or if the radiation leakage occurs then an alarm will be produced using buzzer for alerting the workers and these change in values of gas content along with the change in temperature will be uploaded on the particular website for future and further references or analysis. The website can be visited by different users if the IP address of that particular website is known.

"Investigation of an Indoor Air Quality Sensor for Asthma Management in Children",by Utkarshani Jaimini,Tanvi Banerjee,William Romine,Krishnaprsad Thirunarayan,Amit Sheth and Maninder Kalra: They proposed a data driven approach to develop a continuous monitoring activity detection system aimed at understanding and improving indoor air quality in asthma management. This paper mainly concentrates on the gas contents that affect the asthma patients such as high concentration levels of Particulate Matter, Volatile Organic Compounds, Carbon dioxide that evolves during smoking and cooking. They detected the gas content values using a foobot sensor and attained smoking at an error rate of 1%, cooking with an error rate of 11%, and with an overall efficiency of 95.7%.

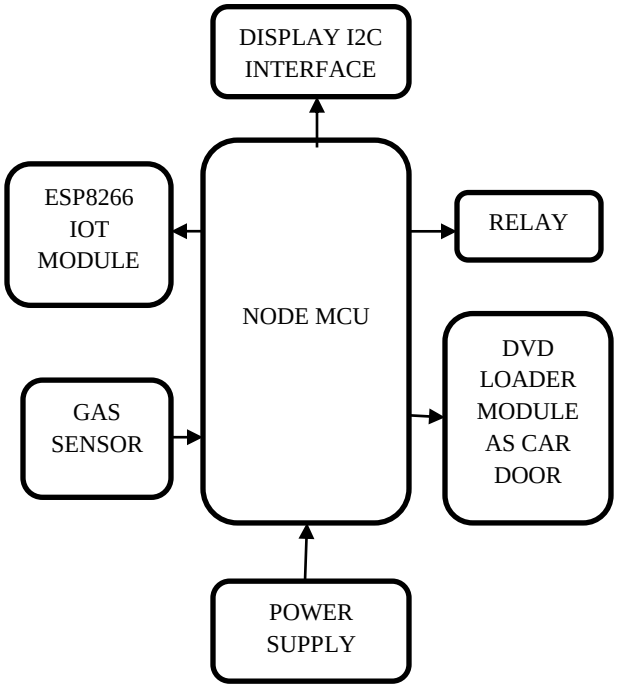
"ISSAQ: An Integrated Sensing Systems for real-time Air Quality monitoring", by Jung-Yoon Kim, Chao-Hsien Chu, and Sang-Moon Shin: This paper discusses about the issues, infrastructure, information processing, and challenges of designing and implementing an integrated sensing system for real time indoor quality monitoring. The system detects the level for ozone, Particulate Matter, carbon monoxide, nitrogen oxides, sulphur dioxide which mainly evolves during transportation, increase in population density and due to sudden climatic change. The sensor node or array with multiple sensors is used to collect air pollution readings, from which the overall air quality level can be detected.

"Recurrent Air Quality Predictor Based on Meteorology-and pollution-Related Factors", by Ke Gu,Junfei Qiao and Weisi Lin: In this paper they measured the air quality using recurrent air quality predictor(RAQP). The RAQP exploits some key meteorology– and pollution- related variables to infer air pollutant concentrations such as the fine particulate matter(PM2.5).The RAQP method recurrently applies the one-hour prediction model, which learns the current record of pollution- related factors to predict the air quality one hour later, to then estimate the air quality after several hours. This paper concentrates on both pollution- related gas contents and meteorological based changes that occur at certain times.

III. PROPOSED MODEL

This paper utilizes the gas sensor for the detection of increase in concentration level of any gases from the AC inside the vehicle cabin. The device will be fixed inside the vehicle cabin and starts working when the AC is in on state and displays the values of gas concentration levels in the LCD display. When the gas

contents from the AC in the vehicle, that is if the carbon monoxide goes above the normal level or if the oxygen level goes below the normal breathing level those values will be indicated in the LCD and these values will also be uploaded in the website through a single NodeMcu microcontroller, which is provided with Wi-Fi module for uploading data's.



The increase in gas content leads to the operation of a two relay model in which one of the relay works for the clockwise rotation of motor of the CD loader (which is assumed as a window of the vehicle), for opening and when the gas content reaches the normal level after certain period of time the other relay works which rotates the motor of the CD loader in anticlockwise direction for closing. It works based on the program given to the microcontroller. The concentration values can be seen by different users by connecting to the NodeMcu. The typical composition is:

- 74.4% of nitrogen
- 13.6- 16.0% of oxygen
- 4.0- 5.3% of carbon dioxide
- 1% of argon and several ppm (parts per million) of hydrogen, carbon monoxide, 1 ppm of ammonia and less than 1 ppm of acetone, methanol, ethanol and other Volatile Organic Compounds(VOC).

1. ESP8266 IoT MODULE

ESP8266 is used for its efficient power usage, compact design, and reliable performance due to its highly integrated Wi-Fi module. This inbuilt module is used for the upload of data's in internet and being used for future reference or for comparison.

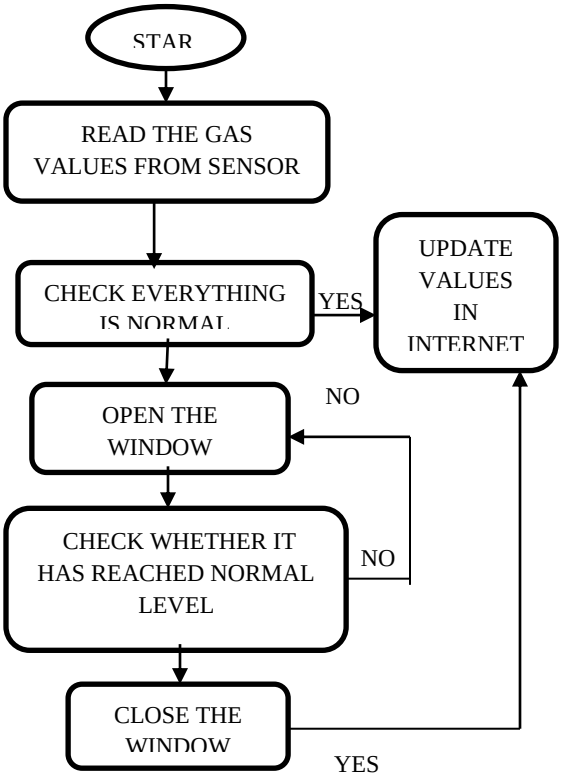
2. GAS SENSOR

Separate sensor is used to detect the presence of poisonous gases that are produced in car when the AC is on for a long period of time. The sensor has a high sensitivity combined with a quick response time. The sensor can also sense various gases like propane, methane, Iso- butane.

3. RELAY

Relay is a special electronic device that can be used as a switch to control the low power operating devices. A two way relay is used in this process for the rotation of both clockwise and anticlockwise directions.

IV. FLOW CHART



V. APPLICATION

1. This framework can be developed and used in industries for the detection in gas leakage or radiation leakage.
2. This can be developed and used in house, or any living areas like party halls and be caution before any incident happens.

VI. CONCLUSION

In this work, a system for the detection of gas contents when it reaches the abnormal level, such as when the carbon monoxide goes above the normal breathing level or when the oxygen level when goes below the normal breathing level was created. Also these concentration values are uploaded in internet using a

NodeMcu microcontroller which is provided with a Wi-Fi module within a certain time period which can be used for further or for future references.

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