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RFID Based Air Pollution Monitoring and Control Using IoT

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ABSTRACT: In this project we have designed new thing of the monitoring the pollution level in vehicles to be monitored continuously and updated the every value in IOT (internet of things) based cloud server monitor page. In recent years most of the incident happening in traffic. Because of the most of the vehicles are queue in traffic area and traffic signal. So that we have designed this project to help and monitor the air pollution and automatically data's are updated in cloud based system. The co_2sensor measures the co_2 level of the vehicle. If the value higher than the stipulated level, it will automatically intimate to the owner of the vehicle. In case the owner do not response for intimation after two or three times about the co_2 level and the message automatically will send to RTO office and displayed the producing the co_2 level. So that RTO office will file the case against the vehicle to produce the over pollution. These are everything updated through the RFID based embedded module to scan the current value of the pollution level and co_2 sensor measure the current value of the emitting the co_2 from each vehicles and send the value using WIFI modules, which is connected to the arduino pro mini and will send the message to the PHP (Hypertext Pre-processor), which will use to see in worldwide.

KEYWORDS: Arduino, RFID, LCD, Sensor, IoT.

I. INTRODUCTION

Air pollution is the introduction of particulates, biological molecules, and many harmful substances into Earth's atmosphere, causing diseases, allergies, death to humans, damage to other living organisms such as animals and food crops, or the natural or built environment. Air pollution may come from anthropogenic or natural sources. The atmosphere is a complex natural gaseous system that is essential to support life on planet Earth. Indoor air pollution and urban air quality are listed as two of the world's worst toxic pollution problems in the 2008 Blacksmith Institute World's Worst Polluted Places report.[1] According to the WHO report, air pollution in the year 2019. An air pollutant is a substance in the air that can have adverse effects on humans and the ecosystem. The substance can be solid particles, liquid droplets, or gases. A pollutant can be of natural origin or man-made. Pollutants are classified as primary or secondary. Primary pollutants are usually produced from a process, such as ash from a volcanic eruption.

Other examples include carbon monoxide gas from motor vehicle exhaust, or the sulfur dioxide released from factories. Secondary pollutants are not emitted directly. Rather, they form in the air when primary pollutants react or interact. Ground level ozone is a prominent example of a secondary pollutant. Some pollutants may be both primary and secondary. They are both emitted directly and formed from other primary pollutants before flue-gas desulfurization was installed. The emissions from this power plant in New Mexico contained excessive amounts of dioxide. Nitrogen diffusion tube for air quality monitoring. Positioned in London City. Schematic drawing, causes and effects of air pollution: (1) greenhouse effect, (2) particulate contamination, (3) increased UV radiation, (4) acid rain, (5) increased ground level ozone concentration, (6) increased levels of nitrogen oxides. Thermal are air pollution abatement options for hazardous air pollutants (HAPs), volatile organic compounds (VOCs), and odorous emissions. Major primary pollutants produced by human activity include.

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II. SYSTEM MODEL

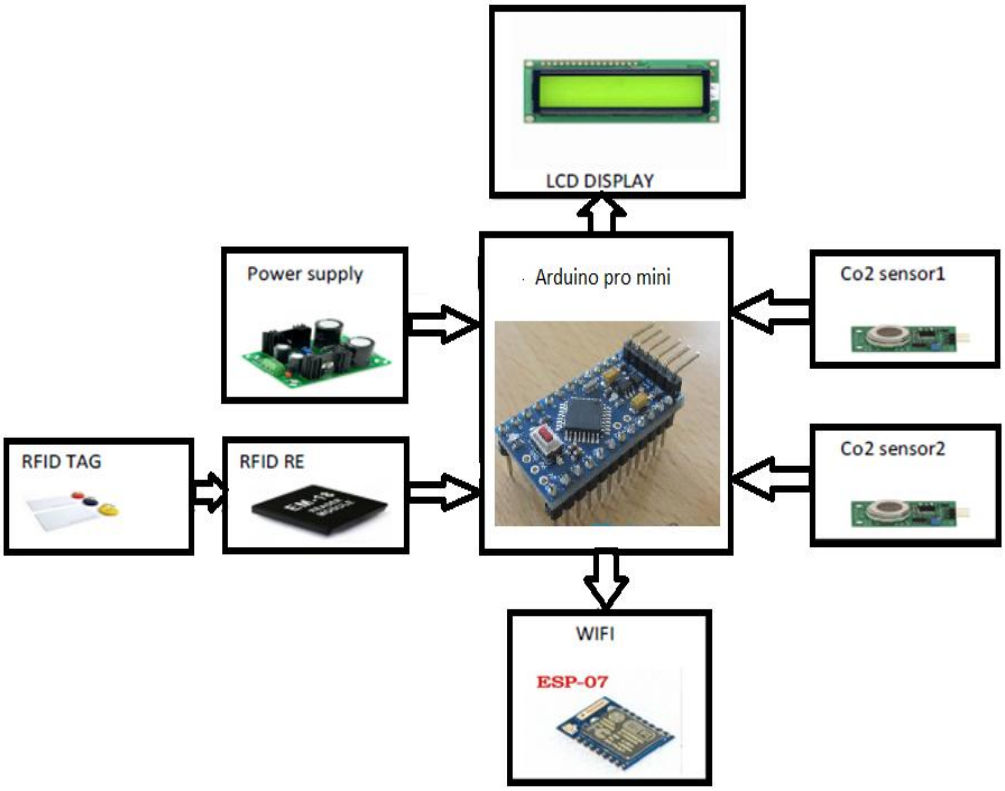

Fig 3.1 System block diagram

ARDUINO PRO MINI: Arduino is heart of the system. It has number of features and its controlled over all process. We can write code and load the controller for control real time application processes.The Arduino Pro Mini is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, an on-board resonator, a reset button, and holes for mounting pin headers. A six pin header can be connected to an FTDI cable or Sparkfun breakout board to provide USB power and communication to the board.The Arduino Pro Mini is intended for semi-permanent installation in objects or exhibitions. The board comes without pre-mounted headers, allowing the use of various types of connectors or direct soldering of wires. The pin layout is compatible with the Arduino Mini. There are two version of the Pro Mini. One runs at 3.3V and 8 MHz, the other at 5V and 16 MHz.

LIQUID CRYSTAL DISPLAY(LCD) : A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome.[1] LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels.

CO_2 SENSOR: Structure and configuration of MQ-8 gas sensor is shown below figure(Configuration A or B), sensor composed bymicro AL2O3 ceramic tube, Tin Dioxide (SnO2) sensitive layer, measuring electrode and heater are fixed into acrust made by plastic and stainless steel net. The heater provides necessary work conditions for work of sensitive

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components. The enveloped MQ-8 have 6 pin4 of them are used to fetch signals, and other 2 are usedfor providing heating current.

RADIO-FREQUENCY IDENTIFICATION DEVICE (RFID): RADIO-frequency identification device (**RFID**) uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically-stored information. Passive tags collect energy from a nearby RFID reader's interrogating radio waves. Active tags have a local power source (such as a battery) and may operate hundreds of meters from the RFID reader. Unlike a barcode, the tag need not be within the line of sight of the reader, so it may be embedded in the tracked object. RFID is one method of automatic identification and data capture (AIDC).

IoT: IoT (Internet of Things) is an advanced automation and analytics system which exploits networking, sensing, big data, and artificial intelligence technology to deliver complete systems for a product or service. These systems allow greater transparency, control, and performance when applied to any industry or system.
IoT systems have applications across industries through their unique flexibility and ability to be suitable in any environment. They enhance data collection, automation, operations, and much more through smart devices and powerful enabling technology. This tutorial aims to provide you with a thorough introduction to IoT. It introduces the key concepts of IoT, necessary in using and deploying IoT systems.

IOT − KEY FEATURES: The most important features of IoT include artificial intelligence, connectivity, sensors, active engagement, and small device use. A brief review of these features is given below:

- AI – IoT essentially makes virtually anything “smart”, meaning it enhances every aspect of life with the power of data collection, artificial intelligence algorithms, and networks. This can mean something as simple as enhancing your refrigerator and cabinets to detect when milk and your favorite cereal run low, and to then place an order with your preferred grocer.
- Connectivity – New enabling technologies for networking, and specifically IoT networking, mean networks are no longer exclusively tied to major providers. Networks can exist on a much smaller and cheaper scale while still being practical. IoT creates these small networks between its system devices.
- Sensors – IoT loses its distinction without sensors. They act as defining instruments which transform IoT from a standard passive network of devices into an active system capable of real-world integration.
- Active Engagement – Much of today's interaction with connected technology happens through passive engagement. IoT introduces a new paradigm for active content, product, or service engagement.
- Small Devices – Devices, as predicted, have become smaller, cheaper, and more powerful over time. IoT exploits purpose-built small devices to deliver its precision, scalability, and versatility.

III. RESULT AND DISCUSSION

All the respective components have been interconnected and suitable programs are installed in ARDUINO PRO MINI. The image has been given below. The co_2 sensors are able to sense the hydrogen, alcohol, LPG and CO_2 gases. We tested the system with LPG and CO_2 gases. The CO_2 sensor fixed near to vehicle silencer to sense the CO_2 .The sensor gives the gases values, which present in the air and sends the report promptly to the respective vehicle owner to adjust his vehicle CO_2values.

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Fig 4.1 IOT Start Up Display

Fig 4.2 Gas Sensor Value

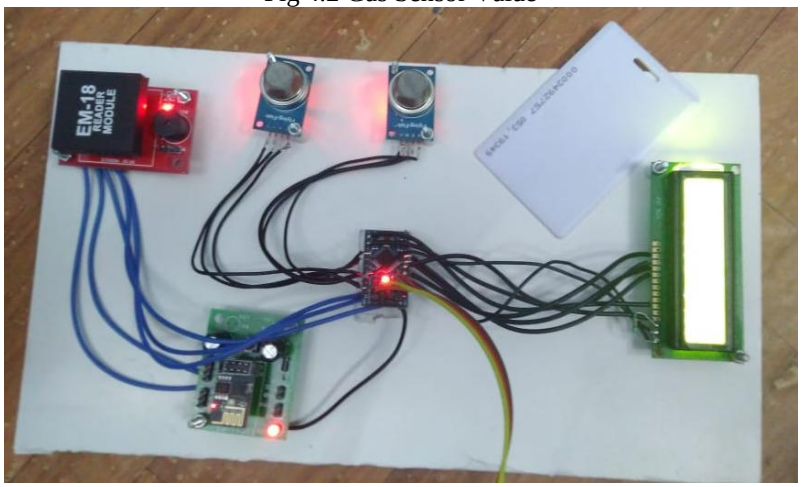

Fig 4.3 Experimental setup of entire system

VI. CONCLUSION

Working function of this system is good and such type of system is required to control the emission from vehicle and to save our environment of earth. However these systems has some disadvantages. In order to escape from system indication the system design may be modified by vehicle owner and the entire setup is fixed with the vehicle. So they can easily removed. RFID tag or they may damage the circuit components. If anyone does not response to be the

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intimation for more than 3 times, the report will automatically send to concem department to make legal action against to the respective person. Thus necessary modifications are required in this system to implement practically

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