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A Modern Approach for Enabling Vehicular Pollution Control and Avoidance

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ABSTRACT: In this system, the use of vehicles is eventually increasing. Because of this reason, the pollution and accidents are increasing enormously. A very few measures are taken to avoid and control the pollution and accidents caused by the vehicles. Even accident control measures are not followed properly. So a mechanism is proposed to avoid accident and control pollutions such as Air pollution, Noise pollution. Accident control is achieved by enabling speed control mechanism for vehicles on different zones. RFID communication controls the DC motor speed and direction. RF transmitter and receiver is used to avoid noise pollution and also a gas sensor is used to detect the level of air pollution caused by the vehicle. The details of all the actions performed by the vehicle is updated constantly with the help of an IoT module.

KEYWORDS : Accident control ,RFID communication , DC motor, gas sensor, IOT, Speed Control Mechanism.

I. INTRODUCTION

The monitoring system of harmful gas inside special vehicle has many advantages such as advance performance, high reliability, etc. The detection unit reaches the maximum threshold level, at the same detects any toxic gas it send an SMS through GSM Modem. User can send SMS and receive SMS through GSM Modem, based on that User can control some appliances in host section. This is a very compelling reason that justifies designing such a safety system. Many air pollution systems in various areas were reported in literatures. In 2011, Dan Stefan Tudose, Traian Alexandru Patrascu, Andrei Voinescu, Razvan Tataroiu, Nicolae Tapus et al. Proposed an environmental air pollution monitoring system that measures CO₂, NO₂, CO, HC & NH₄ concentration using mobile sensors in urban environment. The acquired information about air pollution in surroundings is then stored on central on-line repository system periodically. It uses a wireless GSM modem connection for transferring data to a central computer. In 2012, Amnesh Goel, Sukanya Ray, Prateek Agrawal, Nidhi Chandra et .proposed a wireless sensor network to monitor air pollution levels of various pollutants due to environment changes. This system proposes a method which mainly focuses on longer sustain time period of sensor network by effectively managing energy in sensor network, effectively processing of information between various sensor nodes [2]. In 2011, Wenhui Wang, Yifeng Yuan, Zhihao Ling et al. [3], in order to comply with requirements of oil and gas industry, an air quality monitoring system was proposed based on Zigbee wireless sensing technology. It uses Zigbee wireless network to send results to the monitoring center so that, if some abnormal situations happens, a quick warning will be generated to remind staff to take effective measures to prevent major accidents and protect human lives in industry. Volatile organic compounds the World Health Organization (WHO) states that 2.4 million people die every year of a result of air pollution so, continuous monitoring of air pollution is necessity to day.

II. LITERATURE REVIEW

In 2014 ,researchers Petros Spachos , Liang Song , Dimitrios Hatzinakos proposed a technique to monitor and locate gas leaks of a complex indoor environment based on gas leak detection and localization system through Wireless

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Sensor Network (WSN). Specifically, a mobile node is moving inside a building to monitor any leakage of carbon dioxide (CO₂), supporting and displaying the level and the location of the leakage.

In July 2014, Shiniang Wang, Yi Chai, Zhimin Yang tries to solve the problem related to timely detection and localization of the gas leak. A new scheme is presented to monitor and estimate the leak of gas source. In our proposed approach, the gas source is located by employing maximum likelihood (ML) while the gas concentration is collected by various wireless sensor nodes distributed in the field arbitrarily.

In 2016, Fabien Chraim, Yusuf Bugra Erol and Kris Pister proposed a Wireless Gas Leak Detection and Localization which monitors a network of 20 wireless devices covering 200 m², 60 propane releases are performed. The detection and localization algorithms proposed here are applied to the collected concentration data, and the methodology is evaluated.

In August 2016, Salman Ali, Adnan Ashraf, Saad Bin Qaisar and Muhammad Kamran Afridi attempts to solve the issues related to densely deployed linear network. To solve this issue, a linear sensor network deployment application for oil and gas pipeline is proposed using a custom sensor board accompanied with algorithms to solve network creation, leak interrupt detection, and routing of high-priority messages with reliability while keeping network alive at all times.

In 2017, G. S. Tamizharasi, H Parveen Sultanah, B Balamurugan Proposed a technique IoT-based E-health system security. A vision architecture elements and future directions IOT based E-Health Systems provides healthcare services across a series of interconnected networks and IoT devices. In such type of systems data security remains to be the major issue as the data generated from the E-health systems are accessed by the variety of users for medication, diagnosis, and research purposes. As a result, a comparative analysis of various architecture elements and security measures are discussed, and the most appropriate techniques are suggested.

III. PROPOSED SYSTEM

In the proposed system, to avoid noise pollution we enable the use of RF transmitter to send a signal to the nearby vehicles. The RF receiver placed in the nearby devices will sound the buzzer, when they receive the transmitted signal. Now the device which receives the signal starts sounding the buzzer, thereby reducing the noise pollution to some extent. To avoid accidents, we install an RFID transmitter device in every zone. So when the vehicle nears the zone, the RFID reader gets a signal indicating the maximum speed up-to which the vehicle can run in that zone. Based on the signal, the DC motor is controlled by the driver circuit installed to the controller. A smoke sensor is used to detect the smoke coming out of the vehicle. When the vehicle emits smoke, the buzzer connected to the vehicle starts alarming. An IOT module is used to update the status of the vehicle.

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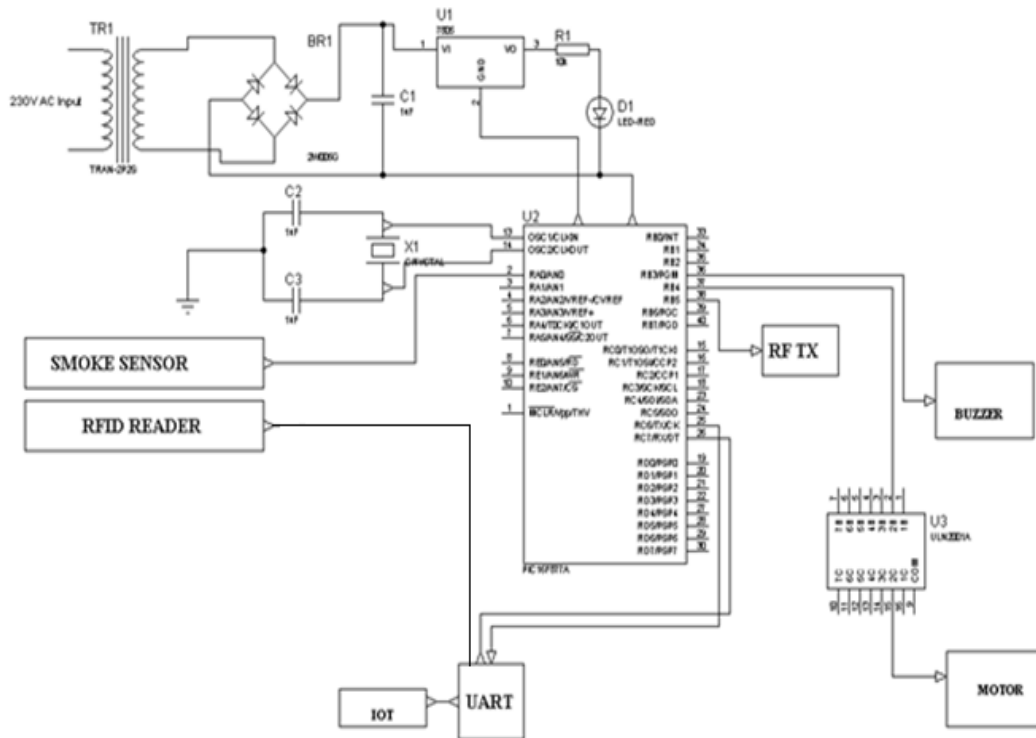


Fig 1.1 Architecture of Pollution and Accident Control

i. Smoke Sensor

This is a simple-to-use liquefied petroleum gas (LPG) sensor, suitable for sensing LPG (composed of mostly propane and butane) concentrations in the air. The MQ-6 can detect gas concentrations anywhere from 200 to 10000ppm. This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance. The drive circuit is very simple; all you need to do is power the heater coil with 5V, add a load resistance, and connect the output to an ADC.

This sensor comes in a package similar to our MQ-3 alcohol sensor, and can be used with the breakout board below. This LPG Gas Sensor (MQ6), ideal sensor for use to detect the presence of a dangerous LPG leak in your Home, car or in a service station, storage tank environment. This unit can be easily incorporated into an alarm unit, to sound an alarm or give a visual indication of the Combustible Gas / LPG concentration. The sensor has excellent sensitivity combined with a quick response time. The sensor can also sense iso-butane, propane, LNG and cigarette smoke. This LPG Gas Sensor can be used to make wireless Gas leak detector in home security system.

ii. RF Transmitter

The HT-640 IC encodes 12-bits of information and serially transmits this data on receipt of a Transmit Enable and a LOW signal on pin-14 /TE. Pin-17 the D_OUT pin of the HT-640 serially transmits whatever data is available on pins 10, 11, 12 and 13, or D0, D1, D2 and D3 to D7. The TWS-434 transmitter accepts both linear and digital inputs can operate from 1.5 to 12 Volts-DC, and makes building a miniature hand-held RF transmitter very easy. The P2_0,

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P2_1, P2_2 and P2_3 pin of controller is assumed as data transmit pins. The DATA_OUT pin of encoder is connected to the DATA_IN pin of RF Transmitter and then the RF Transmitter transmits the data to the receiver.

iii. PowerSupply

The potential transformer will step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op-amp. The advantages of using precision rectifier are it will give peak voltage output as DC, rest of the circuits will give only RMS output.

iv. UART

The Universal Asynchronous Receiver/Transmitter (UART) controller is the key component of the serial communications subsystem of a computer. UART is also a common integrated feature in most microcontrollers. The UART takes bytes of data and transmits the individual bits in a sequential fashion. At the destination, a second UART re-assembles the bits into complete bytes. Serial transmission of digital information (bits) through a single wire or other medium is much more cost effective than parallel transmission through multiple wires. Communication can be "full duplex" (both send and receive at the same time) or "half duplex" (devices take turns transmitting and receiving).

v. Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or key stroke. Buzzer is an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices. Active buzzer 5V Rated power can be directly connected to a continuous sound, this section dedicated sensor expansion module and the board in combination, can complete a simple circuit design, to "plug and play."

IV. IOT SUBSYSTEM

The internet of things (IOT) is the internetworking of physical devices, vehicles, structures and diverse things introduced with equipment, programming, sensors, actuators, and framework arrange that enable these articles to assemble and exchange data. Internet of Things (IOT) is a domain in which items, creatures or individuals are furnished with special identifiers and the capacity to exchange information over a system without expecting human-to-human or human-to-PC communication. The IOT empowers things to be identified and also controlled remotely crosswise over existing framework establishment, making open door for more clear coordination of the physical world into PC based systems, and achieving upgraded adequacy, precision and monetary advantage.

IoT has evolved from the convergence of wireless technologies, micro electro mechanical systems (MEMS) and the Internet. The concept may also be referred to as the Internet of Everything. The internet of things (IoT) is the internet working of physical devices, vehicles, buildings and other items—embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. A thing, in the Internet of Things, can be a person with a heart monitor implant, a farm animal with a biochip transponder, an automobile that has built-in sensors to alert the driver when tire pressure is low --or any other natural or man-made object that can be assigned an IP address and provided with the ability to transfer data over a network.

Internet of Things (IoT) is an environment in which objects, animals or people are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. The IoT allows objects to be sensed and/or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. IoT board featured with SIM900 GPRS modem to activate internet connection also

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equipped with a controller to process all input UART data to GPRS based online data. Data may be updated to a specific site or a social network by which the user can able to access the data. IoT

V. RESULTS

In this screenshots to explain the output and working of the proposed system. In fig 1. 1 shows the RF transmitter to send signal and receiver to detect the signal. In fig 1.2 represents the RFID signal which indicate the maximum speed up-to which the vehicle can run in that zone.



Fig 1.1 RF Transmitter and RF Receiver



Fig 1.2 RFID Reader

VI. CONCLUSION

In the real world, an accurate estimation of traffic state with loop detector data becomes more challenging. Thus, the RL-based VSL control could be in conjunction with some advanced traffic state estimation methods to strengthen the offline modeling component of the overall process. In the present study, a small freeway network with a merge bottleneck was used to test the effect of the proposed VSL control. Other types of bottlenecks caused by lane reduction, traffic incident or work zone also need to be investigated. A larger traffic network with multiple links or closely spaced bottlenecks could also be considered for validating the performance of the RL-based VSL control.

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Furthermore, some advanced machine learning methodologies, such as deep learning could be applied when developing the VSL control strategies. Authors recommend that future studies could focus on those issues.

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