Retraction

Retraction: Vehicle Speed Control and Accident Prevention System in Smog Zone (J. Phys.: Conf. Ser. 1916 012093)

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This article (and all articles in the proceedings volume relating to the same conference) has been retracted by IOP Publishing following an extensive investigation in line with the COPE guidelines. This investigation has uncovered evidence of systematic manipulation of the publication process and considerable citation manipulation.

IOP Publishing respectfully requests that readers consider all work within this volume potentially unreliable, as the volume has not been through a credible peer review process.

IOP Publishing regrets that our usual quality checks did not identify these issues before publication, and have since put additional measures in place to try to prevent these issues from reoccurring. IOP Publishing wishes to credit anonymous whistleblowers and the Problematic Paper Screener [1] for bringing some of the above issues to our attention, prompting us to investigate further.

[1] Cabanac G, Labbé C and Magazinov A 2021 arXiv:2107.06751v1

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Vehicle Speed Control and Accident Prevention System in Smog Zone

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Abstract. The air quality index (AQI) is a proportion of what air contamination means for one's wellbeing inside a brief timeframe. The higher the AQI esteem, the more noteworthy the degree of air contamination. In a smog zone, the air pollutants can be detected with an air quality detector that will provide information about invisible toxic pollutant matters present in the air. This paper is concentrated on vehicle collision avoidance in smog places. For instance in the road, the driver suffers from unclear vision because PM (Particulate Matter) enters his/her eyes which leads to vehicle collision. A vehicle collision avoidance system with a microcontroller and onboard sensors in the smog zone is developed. It mainly focuses on the digital driver-vehicle interface implementation by using CAN protocol. The framework of CAN lessens wiring by and large. In this system, information like humidity, temperature, and distance is obtained. The humidity module measures both the temperature and humidity content and an the ultrasonic sensor is adjusted to gauge the distance between the object and vehicle, if a hindrance is identified inside 300cm from the vehicle, the alarm gives a signal to the driver. Once an individual vehicle enters the smog zone, it lowers the speed.

Keywords: CAN (Controller Area Network), Ultrasonic Sensor, PM2.5 sensor, collision avoidance system

1. Introduction
As per the World Health Organization report, 1.35 Million people die each year because of road mishaps. The percentage of accidents that happen due to bad weather, distraction, collision, smog zone is shown in figure 1.
The accidents occur due to a smog is 11% of total accidents. Our system aims to prevent collisions among vehicles in the smog-affected area. The formation of smog is threatening to health because it is a result of the interaction of sunlight with certain elements in the atmosphere. The EPA (Environmental Protection Agency) has generated an air quality index (AQI) to describe air pollution levels to the general public based on the adversarial impacts encountered by humans. [1] elaborated According to EPA (Environmental Protection Agency), the smog is estimated in terms of (air quality index) AQI values, the level of health attention thus declared varies between the range of 0 – 50 as good; 51 – 100 as moderate; 101 – 150 as unhealthy and values above these ranges are hazardous for human health. For people to identify between good and bad air quality, EPA has made the system uncomplicated by announcing the results as values and colors. Based on the results of Air Quality Detector, the smog is filled with a variety of minute particles that are toxic to the human body, which can injure the well-being of individuals. Considering India has an enormous chain of road connections, the smog weather will have an impression on traffic safety and will quickly trigger traffic jams. In extreme instances, it will influence traffic tragedies due to the blurred vision of drivers and also several accidents are occurring because of the atmospheric pollutants that are being released when toxic substances are incinerated. Ground-level ozone and particulate matter (PM) are delivered noticeable around because of the complex photochemical responses between unpredictable natural mixtures (VOC), sulfur dioxide (SO2), and nitrogen oxides (NOx). The main sources of these pollutants are liberated directly into the air by industrial plants, which provokes serious health problems to humans. The standards of EPA is used to make residents aware of being safe, during seasons of high contamination because in industrial areas the emission of toxic gases like nitrogen, Sulphur, etc., causes eye irritation, which reduces the visibility of the driver hence zero - accident monitoring remains a vision of unachieved. At this point, the driver in vehicle suffers from low visibility so, the vehicles clash with each other. Thus series of accidents take place with the neighboring vehicles. To avoid vehicle interference an efficient delivery of data among transmitter and decoder modules using CAN communication with flexible sensors to screen the different boundaries and imagine them to vehicle driver through an LCD and buzzer is designed. The signal from the sensors, the miniature regulator unit imparts a sign to the engine to reduce the speed of the specific vehicle by changing the situation of the choke valve. Additionally, it imparts a sign to the slowing down unit for applying the brake naturally. [2] proposed that is to maintain a strategic distance from the accident during the time of vehicle running condition, the framework naturally applying the brake. Likewise when unapproved
individual attempts to take a vehicle then the framework gives cautioning by sending SMS to the approved. The following sections are organized as Section II consist of the literature review Section III proposed approach that consists of speed control, accident prevention system in smog zone. Section IV contains the entire experimental setup. At last, the outcomes are shown in section V and has a conclusion and reference paper.

2. Literature Review

[3] provided the improvement of the innovation, motor and some other vehicle constrained electronic gadgets. The principle goals of the vehicle parts advancement are to decrease fuel cost, limit contamination, diminish adornments and assembling cost and improve security. A current survey explains that due to unaware obstacles, driving a vehicle in a smog zone is a tedious task. The maximum rate of severe road accidents is boosted because the driver undergoes unclear vision since the atmosphere is contaminated by smog haze. The urgent need for the driver while driving the vehicle is the attention to his/her encompassing in any term of one or the other perceptible or visual admonition to indicate the driver about the obstacle ahead. Also, this framework is in the present vehicle, as an extraordinary element in the vehicles market. [4] proposed the future electric vehicle will adopt the proposed system because of the successful implementation featuring low cost and less hardware requirement. The road is the major type of transport system in India. According to the report by Bloomberg NEF, there will be 550 electric vehicle models available from global auto manufacture by 2020. This prediction helped us improve the air quality by replacing electric vehicle instead of fuel vehicle which emits toxic pollutants that pollutes the air. As air pollution levels in many cities exceed legal & WHO limits for P.M concentration, are found to be perilous to health. Since air contamination is the world's fourth-driving lethal wellbeing hazard, improving air quality is very much important. [5] elaborated that CAN is an ISO-defined serial communication bus originally developed to supplant complex wiring with a two-wire transport. The accident keeping away from the framework is dynamic wellbeing frameworks that alert the driver to a perilous circumstance to assist him with forestalling the accident. In warning devices, we normally use audio signals to indicate the collision [6]. In collision avoidance system uses V2X communication. V2X communication is of three types they are vehicle to vehicle (V2V) correspondence, vehicle to the framework (V2I) correspondence, and vehicle to person (V2P) correspondence. Due to this system of communication, the vehicle stays connected with other vehicles, surrounding infrastructure, and people.[7]. Despite mainstream thinking, just 1.5% of the mishaps are brought about by imperfect streets. In most of the cases (77%), the driver is to blame. We find an increase of 0.3–0.6% in the number of vehicles involved in accidents per day for each additional 1 μg/m3 of PM$_{2.5}$. The CAN Protocol was vital for the distinctive control frameworks (and their sensors) to trade data. This was typically done by the discrete interconnection of the various frameworks (for example highlight point wiring) [8-9]. Here we tend to use the ARM7 microcontroller, as a result of ARM7 is extremely economical to find resources on the web. Once a collision is detected microcontroller stops the vehicle [10]. At the point when the vehicle's motor is started, the MQ-9 CO gas sensor and Microcontroller framework are actuated [11]. CAS manages two fundamental item identification modes. The first is the deceleration range and another is the breaking range. The framework, which is given a snag detecting gadget, stretches out beyond the host vehicle, and the distance that item has been identified. CAN transport for vehicle framework is the main control network that associates a few articles. They are focal regulators, 4-entryways regulators, memory modules, and different segments [12-13].

3. Proposed Method
The block diagram of proposed method is shown in figure 2.

![Figure 2. Block diagram of entire setup](image)

3.1. Working

The principle objective of this framework is to decrease the mishap rates in the smog zone. When the vehicle enters the smog zone, the smoke sensor and AQI detector start to work for finding the threshold (value) if the case threshold is reached both send the request to the master node for displaying the respective humidity and temperature, distance computed from the ultrasonic sensor. In response to the command from the master block, the slave communicates the value to the master via CAN bus, a multi-master bus. The transmission of the information to the master which has to be displayed in the LCD is transmitted to the CAN transmitter module connected to the ARM STM 32 BLUEPILL (1) and info is received by the CAN receiver module connected to the ARM STM 32 BLUEPILL (2). Thus the information is displayed in LCD. Hence the acknowledgment from the slave to master is further displayed in the LCD interfaced with the STM in the master block. When all sensors read high, the speed of the vehicle reduces. Likewise, N number of slave nodes can be connected to the master according to the required application.

3.1.1 Master block

![Figure 3. Block diagram of master node](image)
The block diagram of master mode is shown in figure 3. ARM STM 32 BLUEPILL (1) is connected to LCD, buzzer, dc motor. Though the visibility reduces at smog zone, the driver still has hearing sense, to provide an impulse to the driver, the buzzer connected to ARM STM 32 BLUEPILL (1) gives an alert to the driver when the distance between obstacles reduces. The master receives sensed PM2.5 value and humidity value and these values are displayed in LCD connected to ARM STM 32 BLUEPILL (1). The speed of the vehicle is reduced by CAN controlled by controlling the applied voltage. To make the driver know the condition prevailing outside a liquid crystal display is used as a user interface. This setup helps in providing the user interface in a vehicle which helps the driver to know the situation. The buzzer connected helps to give signal when the distance between two vehicles below the set distance. It will help the driver to lower the speed of vehicle by hearing the buzzer sound.

3.1.2. Slave Block

The block diagram for slave node illustrated in figure 4

![Block diagram of Slave node](image)

The ARM STM 32 BLUEPILL (2) collects all the sensor values and transmits it, to the master block. The types of sensor includes, an ultrasonic sensor that detects the obstacle in front of them, which ranges between 0 – 400cm. The threshold set here is 300 cm when a neighboring vehicle violate and enter this range, a buzzer setup in the master turns ON. This helps vehicle’s driver to know situation prevailing. The humidity module connected to slave block provides both the humidity and temperature values, which is further communicated to the master via CAN module. The function of smoke sensor is to inform the vehicle driver if smoke detected. This slave node which helps in backend work of entire setup this CAN protocol gives multi-slae setup can be established in which multiple sensors connected.

4. Experimental Work

Process chart of experimental setup is depicted in figure 5. The flow chart commences with the initializing of LCD pins. The values of all sensors transmitted by STM 32 to master which the PM 2.5 sensor, when AQI detected 300ppm the LCD displays that smoke detected and value of AQI. If detected value is less than 300ppm the LCD displays that Smoke not detected & Atmosphere clear. The value of ultrasonic sensor senses the distance between the vehicle and obstacle if the value of ultrasonic sensor is less than
300 cm the buzzer give alert that the safety distance violated hence driver tries to control speed. The ultrasonic sensor depicts the distance between vehicles shown in figure 5. First step is initializing the pins of LCD and defines the threshold value set as safety value. when the distance between the vehicle gets reduce the buzzer turned ON, which helps driver to understand the situation in environment. When distance does not reaches or violates the threshold value the buzzer remains OFF.

![Figure 5: Process chart of experimental setup](Retracted)
The flow diagram of motor speed control is displayed in figure 6. It depicts the motor speed control using values of humidity sensor, PM 2.5 sensor and smoke sensor when the values of humidity, smoke and PM2.5 goes high (ie; 1) reaches the predefined values of humidity - 63%, smoke – 600, distance – 300cm, PM2.5 – 400ppm. The sensor reaches this values the impulse given to motor ,it starts to lowers the speed and sustains at same speed as shown in figure 7 and 8.

5. Experimental Result

![Figure 7](image7.png)

**Figure 7.** The distance between the vehicle and obstacle calculated, if the value of ultrasonic sensor is greater than 300 cm ,that the safety distance not violated. When the obstacle not detected, the LCD shows ‘no object detected safe zone’.

![Figure 8](image8.png)

**Figure 8.** The distance between the vehicle and obstacle calculated, if the value of ultrasonic sensor is less than 300 cm the buzzer give alert that the safety distance violated. If obstacle detected within 300cm then LCD shows ‘object detected’. 
Figure 9. The PM2.5 sensor gives the amount of particulate matter present in atmosphere hence based on the value of the PM2.5 sensor when the value of PM2.5 sensor goes higher than 400 the motor speed starts to reduce.

Figure 10. The values of humidity and temperature prevailing in surrounding shown in figure 10.

Figure 11. The alert to driver generated for controlling speed at smog zone, when value goes higher than 600.

The motor speed reduces based on values of sensors shown in figures 9, 10, 11. When the values of PM2.5 sensor, smoke sensor, humidity sensor reach its threshold value, 400ug/m3, 600 and 70% respectively. When all the sensors reaches threshold value, it becomes digital high (ie; Hval & Sval &PM2.5 = 1), motor starts to reduces its speed.

6. Conclusions

In this system, the CAN bus-based communication system is used for data transmission between controllers is designed. The status of the atmosphere like air quality, the motor speed of vehicle, humidity, smoke, temperature are displayed on LCD. The proposed system includes a CAN bus system that solves the problem of complex wiring in the vehicle. This system features the efficient transfer of data collected from various sensors and acknowledge of data to the driver through liquid crystal display. It also features that in the future electric vehicle will adopt this proposed system successfully.

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