An Ecosystem of Interconnected Sensors to Map, Sense and Detect the Automotive Parameters

Vinay Kadam[1], Advait Karandikar[2], Bhushan Shingate[3], Prof. S.N. Randive[4]
[1,2,3,4] *Department of Electronics & Telecommunication Engineering, Pimpri Chinchwad College of Engineering Research, Pune, Mahrashtra, India*

Abstract **- This project mainly concentrates on the problems like the light intensity which is directly perceived by the driver of a vehicle from incoming vehicles at night, to solve the above issue an automatic headlight dipper system has been designed, secondly the fuel tank indicator too fluctuates in a region where there is inclination. The fuel theft is increasing on pumps day by day, to prevent this antitheft fuel monitoring system has been designed, which shows the exact amount of fuel in the fuel tank. Also, issues like correct wheel pressure monitoring and pollution limiting has been looked upon and the proposed project aims to solve all these issues. The project comprises of an Pressure Sensor. Light dependent Resistor (LDR), Hall Effect based liquid flow measurement sensor and a Fuel injector.**

The pressure sensor is used to measure the pressure in the wheels and send the data to the micro controller. Also, the Light dependent Resistor (LDR) is used to measure the intensity of the incoming light, which gives us the data about any incoming vehicle at night. The hall effect-based flow measurement sensor is used to measure the liquid flow rate at the moment, which gives us the data regarding fuel which is poured in the fuel tank and a Fuel injector for pouring the fuel in engines. All these sensors sum to give data about the Real time conditions of the incoming vehicles, fuel in the fuel tank and the air pressure in the wheels at the moment. The MQ7 is a carbon monoxide sensor used to detect pollution values of the vehicle. With increasing population, theirs rise in pollution which is mostly contributed by vehicles. This has to be strictly monitored and restricted for well-being of human beings.

A system was to be designed for the lamp switching, tyre pressure sensing, anti- theft fuel system, pollution control system. The light switching mechanism was to be developed which would switch the upper beam to lower beam when a light was incident within a specific range. It should switch back to the upper beam as soon as the incident light passes away. The tyre pressure system needs to check tyre pressure at a certain instance and thus provide the current pressure value with a signaling mechanism. A way to analyse the flow of fuel and to give a accurate reading associated with the total volume present in the tank does providing a clarity of amount of fuel delivered within the price range. Keeping track of one's vehicles PUC condition is a hectic task and if not followed one has to deal with heavy charges. Thus, requirement of a system which will make PUC analyzing more simple and within limits is necessary. A sensor which can sense the carbon monoxide content in a vehicle within the specified limits has to be achieved.

INTRODUCTION

Today, most of the vehicle drivers have trouble driving at night. That's mostly due to the high Beam light of the headlights used by them. To avoid such situations, the driver just switches his Vehicles headlight to lower beam to see what's ahead. During this time frame it might happen that, there might be a sharp turn ahead or even a deep pothole, such cases might lead to fatal accidents. The fuel monitoring system too faces such issues, while a vehicle is passing through an inclined plane. The fuel level seems to be changing abruptly. Recently, many incidents of fuel theft were reported at many fuel pumps, this system helps one to be aware of such thefts and to avoid them. Also, while travelling in hot regions, situations arise when the wheel pressure shoots up to a great extent because of the increase in temperature. And due to the increase in pressure there are high chances of tire burst. This might lead to fatal accidents. Tyre burst contributes largely to many accidents thus this problem needs to be analysed and precautions need to undertook to avoid such issues. Air pollution is a major contributor for global warming which is harmful for us and our planet. Many vehicles running through do not follow the norms and regulations regarding pollution control. Thus, the constitution of carbon monoxide from vehicles increases which in results into deadly diseases and environmental conditions. Thus, limitation of this gas is necessary to restrict pollution.

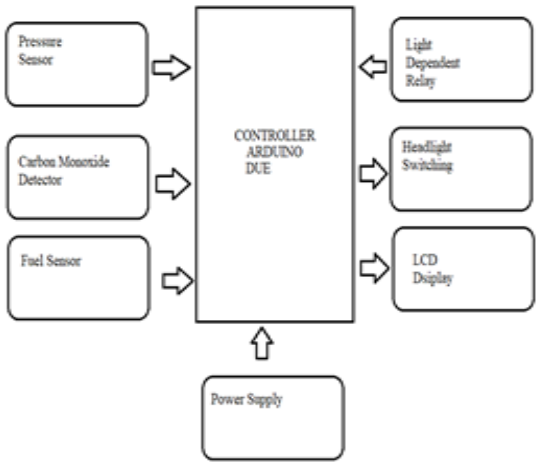
The project is based on three vehicle safety issues. Headlight switching of vehicles at night. Real time tire pressure monitoring and antitheft Fuel monitoring system. This would comprise of a tyre pressure Sensor (MPX5700) Light dependent Resistor (LDR). Hall Effect based liquid measurement sensor and a Fuel injector The Pressure Sensor (MPX5700GP) is used to measure the pressure in the wheels and send the data to the microcontroller. Also, the Light dependent Resistor (IDR) is used to measure the intensity of the incoming light, which gives us the data about an incoming vehicle at night. The Hall effect-based flow measurement Sensor is used to measure the liquid flow rate at the Moment, which gives us the data regarding fuel which is poured in the fuel tank and a Fuel injector for pouring the fuel in engines. All these Sensors sum to give data about the Real time conditions of the incoming vehicles, fuel in the fuel tank and the air pressure in the wheels at the moment. For the pollution control we have used a carbon monoxide sensor (MQ-7). The sensor is proficient in carbon monoxide detection. The gases generated during combustion are responsible for environment degradation. Among these product gases the most presence is of Carbon Monoxide.

RELATED WORK

For last few decades Automation has rapid growth in industries and day to day life.Due to this life becomes easier. It helps in better accuracy, fast work etc.
Few of most noticeable related to this project:
1. Smart digital fuel indicator.
It was developed by Saurabh Choudhary, Barapatre Shubham, bhong Kiran and Sarawale R.K. It was PIC based Model.
2. Adaptive Headlight System for accident prevention.
It has Atmel AT89S52 microcontroller. Developed by Shreyas S, Kirthanaa Raghuraman, Padmavathy AP, S Arun Prasad, G. Devaradjane.
3. Automated tire pressure monitoring and regulating system.
It has controller 16F877A, it regulates tire pressure and measures it. Developed by G Petchinathan, K Srinivasa, R R Bharath, T Thiyagarajan, S Sushanth Kumar.
4. A new approach to tire Pressure monitoring system.
It is GSM to detect pressure in tire while driving, it has ARM cortex M0 controller. Developed by Asha Mathai, Dr. P. Vanaja Ranjan.
5. Advanced headlight controlling system in vechiles.
It is a Headlight switching automatic module using a LPC 2138 controller. Developed by Mr. Vishal G. Nandokar, Prof. K. Sujatha, Prof. Harshvardhan.
6. Petrol level Detection using Ultrasonic sensor.
It is very cost-effective product using ATMEGA 16 controller. Developed by Rahul Gagawale, Sumit Sonawane, Om Swami, Prof. S.S. Devarandjane.

PROPOSED WORK

Our proposed project is divided in to four systems as follows.



The methodology indicates a model flow or a way of approach towards achievement of the required targets by solving the acquired problems in a systematic manner. Methodology specifies the component arrangement in a schematic manner combined to give a better efficiency and ease of performance with application. A controller is the core of this project which will be communicating with various important components. The components like the pressure sensor, carbon monoxide detector, fuel sensor and light dependent relay are the components that provide the data to the controller which is to be processed and then acted upon the components like a headlight switching relay, a buzzer and LCD display.
The block diagrams basically consist of four units. They are controller unit, display unit and sensors. There are 4 sensors used. Flow rate used for fuel monitoring, LDR for light switching, pressure sensor for pressure monitoring, gas sensor for carbon monoxide detection and 16x2 LCD for displaying the output. The controller will be programmed in such a way that it fetches input parameters for the sensor and

generate required output by performing some calculations. The controller takes input from LDR compare it with pre-defined threshold value and makes decision to switch height from higher to lower or not. At the same time pressure sensor also provide pressure parameters to the controller, compare it with some threshold value and make decision to send alert message or not. The flow rate sensor is used to get digital values of exact fuel present in tank. To get the exact value controller calculates real time difference between input fuel and outgoing fuel by sensing both ends continuously. The gas sensor provides parameters to the controller, while the controller compares these parameters with specific threshold values and accordingly sends alert signal to the driver if the readings exceed the threshold rate.

RESULT

1)Headlight swistiching system:
After testing the system under various conditions, the results of the tests were analyzed, and it is concluded that light intensity varies in the range 40-90 lux at night. The average light intensity of headlight of cars varied from 30-45 lux. All of these gives the clear indication that if ay 2 cars are approaching each other the average light intensity would sum up to 60-80 lux. Thus, taking in consideration all the above factors, the threshold for headlight switching to take place the light intensity is 60 lux.
2)Tire pressure monitoring:
The MPX5700GP sensor is used for tire pressure measurement as well as its monitoring. The proposed system also notifies the driver regarding the excess tire pressure and also detects punctures
3)Fuel management system:
The fuel sensor gives the exact value of fuel in the fuel tank, which used to give the approximate value of distance to empty. A well as the current mileage obtained.
4)Pollution control:
The mq7 sensor is used for pollution measurement as well as it also informs the driver if it exceeds the carbon mono-oxide level emitted by the car by buzzer.

CONCLUSION

We have developed a real time embedded system by using various electronic sensors, actuators which would solve the safety issues of vehicles while driving on highways, using flow-rate sensor shows exact fuel in fuel tank, using LDR system accidents can be reduce using headlight switching and by MQ7 sensor pollution in vehicles can be detected using buzzer.

REFERENCES

[1] Betta, G., A. Pietrosanto and A. Scaglione, IEEE Trans. Instrum. Meas.,45:551555.1996. A digital liquid level transducer based on opticalfiber.
[2] Gao Zhenhai, li-Yang, 2nd International Conference on Measurement, Information and Control (IEEE 2013). Control Algorithm of Adaptive front-lihting system based on Driver Preview Behavior.
[3] G.Bucci IEEE Trans on Instrumentation and Measurement, vol.46.pp.1241-1246.1997. Numerical method for transit time measurement in ultrasonic sensor applications.
[4] Mr. Prateek Khurana, Mr. Rajat Arora, Mr. Manoj Kr. Khuranna, IEEE 2014. Implemantation of electronic stability control and adaptive front lighting system for automobiles.
[5] Mr. Vishal G. Nandokarl, Prof. K. Sujatha, Prof. Harshvardhan Upadhyay PG Scholar (VLSI Embedded System) Shree Ramchandra College of Engineering, Lonikand, Pune, India, (Dept. of Electronics Tele-communications). Advanced Head-Light controlling system for vehicls.
[6] Shreyas S, Kirthanaa Raghuraman, Padmavathy AP, S Arun Prasad, G.Devaradjane, 2014 International conference on recent trends in Information Technology (IEEE 2014) Adaptive Headlight System for Accident Prevention.