



CASE STUDY IN GLOBAL AUTOSAFETY SYSTEMS IN AUTOMOBILES

¹Abhideep D. Ramnagariya, ²Akshay G. Wanjari
Dept. of Mechanical Engineering
Jawaharlal Darda Institute of Engineering & Technology Yavatmal
Email ID:- ¹Aramnagariya@gmail.com, ²Akshaywanjari15@gmail.com

I. INTRODUCTION

Automobile safety is the study and practice of vehicle design construction and equipment to minimize the occurrences and consequences of automobile accidents.

Automobile safety mainly include improvement in vehicle design and control of various parameters like speed, braking system, tyre pressure, and overheating of engine.

There are various system available in automobile:-

- [a] Night Vision Assistant (N.V.A).
- [b] Tyre Pressure Monitoring System (T.P.M.S)
- [c] Fire Alerting System (F.A.S)

N.V.A(Night Vision Assistant)

The Intelligent Night Vision System uses images obtained from two far infrared cameras positioned in the lower section of the front bumper to detect the position and movement of infrared heat-emitting objects and determine whether they are in or approaching the vehicle's path.

Based on size and shape, the system also determines if the detected object. In addition to the conventional night vision function of giving the driver an enhanced view of the road ahead, the system is the world's first to provide cautions that inform the driver of the presence of pedestrians that are on the road or about to cross the vehicle's path.

How Does N.V.A System Works?

Night Vision in Automobile given importance in various countries. In NVA the infrared camera is installed on bumper of vehicle. The camera senses the radiations emitted by various bodies in surrounding. This sensed radiations gives infrared image which is not clear to see so, this image is transmitted to EUC in the form of some

signals. The EUC recognise thermal signals to provide a better quality negative image.

The screen provides indirectly negative image of object with respect to atmosphere.



Major Benefits of Using This System

It makes night driving safer.

Increases reaction time of driver as visual clarity four times than an human eye when you rely on your vehicles headlights.

Problems Occurring With This Systems

- Driver need to trained with this systems or he must be familiar with this types of systems.
- Driver has to pay attention at both views of path across him that is on dashboard screen and windshield.
- System is costly.

- This do noting than showing you live images.

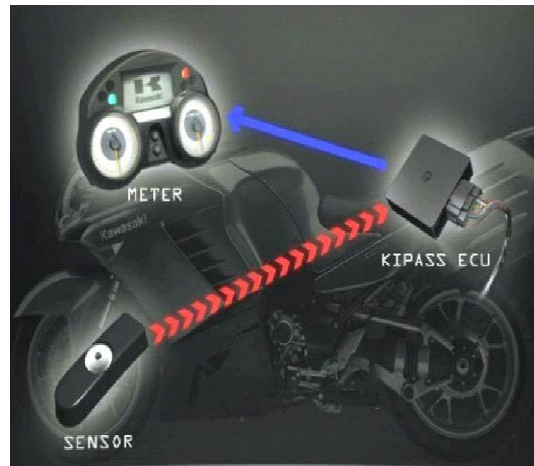
Solutions Over Above Problems

- The NVA system screen can be placed above the dashboard rather than placing on the dashboard. So, driver can focus on both the views of path across him that is on dashboard screen and windshield.
- No training required if first solution is followed.
- As this systems are imported ultimately its cost factor increases. For that we can disassemble this system, make some modifications in it and launch in our country.
- If automotive companies in our country select this product to manufacture so cost will reduce to a lot extent.
- And when you are going with this product at cheap cost no industry will excuse you, to manufacture this product.
- If we use image sensing in merge with this system and go through the micro-controller, you do whatever you want means if you want any alerting system in combination then you have to do just coding, burning and placing in electronic.



How Dose T.P.M.S Works?

In TPMS, a pressure sensing device is present on the rim of wheel. Which senses pressure inside the tyre. The sensor is coupled with RF transmitter. The sensed pressure signals is sent to ECU through RF transmitter. In ECU the processing is done to give meaningful data. The ECU is connected to the screen which indicates tyre pressure.



Major Benefits Of Using This System

- ✓ This system not only detects the tyre pressure but also it can also measure the temperature and speed if coupled with respective sensors or with micro-controller.
- ✓ This system alerts you when tyres are under-inflated, as under-inflation contribute in out off controlling of vehicle. The under inflation may occur due faulty pressure gauge. This happens when there is looseness in internal mechanism and pressure gauge respond more to less pressure with respect to calibration.
- ✓ This system also alerts you when your tyres are in over-inflated condition. This may happen when there is problem associate with pressure measuring device that is pressure gauge in our domestic automobile stores. Sometimes the pressure gauge may show you more reading than your actual tyre pressure, this happen when there is slight miss deflection of pointer due to inertia force because of frequent use. This lead to over-inflation. So, using this system avoids accidents as tyre blast contribute in accidents.
- ✓ As this system is electronic based so there are negligible errors in readings.
- ✓ No need to buy pressure gauges for daily domestic store as this system in already installed in vehicle which gives you accurate reading. So, while filling air in your vehicles you can see what is current pressure of your tyre in digital meter.

Problems occurring with this system

- ✓ The main drawback of this system is that you have to design a special rim over which you have to install our sensor.
- ✓ If there is fault in this system, then to repair it you have to take out tyre.

- ✓ This system utilize small battery of 9v and 0.01amp. Which shorter in life.

Solution Over Above Problems

- As we can't change internal construction of tyre only you can make changes over rim, so this problem can't be over come but we can bring total change in system if all automotive companies made to accept this safety systems through government law.
- As system is electronic so there is less chances of problem occurring in circuit, but there is be problem associate with sensor and sensor IC that's why we can place extra supporting IC and sensor to work properly.
- To increase life of power source we can use Lithium batteries which provide high amp of current and need less replacement.

F.A.S.(Fire Alerting System)

This auto safety system is in progress. It is currently introduce in various vehicles. It is important from safety point of view. This system is alert type system indicating the fire taking place inside the vehicle. This system is very sensitive system which activate buzzer and light within few seconds.

How Does The F.A.S Work?

In F.A.S, there is IR sensor is installed on engine and various parts of vehicle. Mainly it is fitted near electrical connections, battery, etc. The temperature sensor is nothing but infrared sensor which senses the radiations from hotter body. This sensor is wireless therefore the sensed signals is sent to ECU .In ECU the signals is processed. The processing is done with respect to program burn in the micro-controller IC. When the sense signal are above a set limit. Then the alarm and alert light is on which indicates driver that there is certain fire taken place inside a vehicle.

Major Benefits Of Using This System

- This system alerts you when any fire takes place inside vehicle and avoid accidents due to caught fire.
- As system is very sensitive it alerts you quickly. It can detect small flame inside vehicle.

Problems Occurring With This System

- This system only detects fire caught near engine.
- If sensor itself burnt because of high intensity of flame then this system is failure but there is less chances of occurring such high intensity flame.

Solutions Over Above Problems

We can detect fire caught at any part of vehicle by just placing sensors over there. Mostly the parts where there is danger of fire are battery, combustion engine, fuel

tank and other accessories like music system, mobile, charger, ac etc.

The fire may caught in combustion engine due to increase in high temperature that can burn parts near by it, here we can place infrared sensor.

The fire may caught at battery and accessories due to short circuit so we can place one sensor at near by battery and other near my our accessories.

The fire may caught near fuel tank so can place one more sensor over there.

By placing sensor in parts as I mentioned in above. We can make our vehicle totally fire alerted.

These are the following statistics for all three auto-safety system as I mentioned above:-

The cost is based on average currency conversion status For unmodified imported systems

Name	Cost in \$	Cost in Rs
Night Vision Assistant	2000	1,30,000
Tyre Pressure Monitoring System	139	9,035
Fire Alerting System	145	9,425
Total	2284	1,48,460

For modified imported systems

Name	Cost in \$	Cost in Rs
Night Vision Assistant	2700	1,75,500
Tyre Pressure Monitoring System	215	13,975
Fire Alerting System	185	12,025
Total	3100	2,01,500

For modified and self-country made system

Name	Maximum Investment
Night Vision Assistant	25000
Tyre Pressure Monitoring System	10000
Fire Alerting System	2500
Total	37500

Conclusion from statics

Hence we observed from above statics that if the production of this systems is done our country itself then there will be large difference in manufacturing cost which ultimately reduces selling price for that we just have to crack the technology

Note-All above cost specification is approximate value.

CONCLUSION

In this way we can make our driving safer by using all three safety systems as I mentioned in my paper and statics justify that this systems can be modified and their production cost can be reduced to a lot extent.

REFERENCES

Links

- [1] [\]http://en.wikipedia.org/wiki/Automobile_accessory_power](http://en.wikipedia.org/wiki/Automobile_accessory_power)
- [2] http://www.audi.in/sea/brand/in/models/a6/A6_Saloon/Equipment/safety/night_vision_assist

ant_with_highlighting_of_detected_pedestrians.html

- [3] http://www.youtube.com/watch?v=q1tpK_Rky7w
- [4] http://link.springer.com/chapter/10.1007%2F978-3-540-45243-0_74
- [5] http://en.wikipedia.org/wiki/Tire-pressure_monitoring_system
- [6] <http://auto.howstuffworks.com/car-driving-safety/safety-regulatory-devices/tire-pressure-monitoring-systems.htm>
- [7] http://www.hrpworld.com/index.cfm?form_cat_id=294&action=category

