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Advanced Driver Assistance System (ADAS)

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Abstract—**This paper proposes new approach for assisting vehicle drivers through safety warning during time of critical situations. The principle of ADAS is basically to provide anti-collision automatic control system, fuel level detection, lane change assistance and adaptive light control system to provide automatic manipulation of vehicle controls.**

***Keywords*— Advanced Driver Assistance (ADAS), Sensors, Dry Switches**

I. INTRODUCTION

Study shows that due to road accidents around 1.2 million deaths are taking place around the world. Table 1 shows crash survey due to various factors. Accidents are taking place due to issues such as traffic congestion, rash driving and lane change over. The intelligent driver assistance system provides solution to such problems by supplying automatic controls and slows down or stop the vehicle under emergency. This system monitors distance between a moving vehicles, monitors level of petrol, monitors obstacle.

ADAS are systems to help the driver in the driving process. Driver assistance system enables safe, relaxed driving, based on intelligent sensor technology.

TABLE I
CRASHES SURVEY DUE TO VARIOUS FACTORS

SrNo.	CRASHES DUE TO VARIOUS FACTORS	PERCENT
1.	Driver Factors	57%
2.	Poor Visibility	27%
3.	Vehicles problems + Driver factors	6%
4.	Roadway factors	3%
5.	Roadways + Driver + Vehicle factors	3%
6.	Vehicle factors	2%
7.	Roadways + Vehicle factors	1%

II. NEED FOR ADAS

ADAS is a vehicle control system that uses sensors to sense the parameters such as line change, collision avoidance, fuel level detection, etc. To give comfort to the driver. This will make the driver comfortable during driving as he will be able to Recognize as well as control during traffic situation.

Driver information system increases the driver's situation awareness and driver warning system actively warn the driver of a potential danger e.g. lane departure, Blind spot, low light intensity, obstacle in the path.

According to several surveys [6] ADASs can prevent up to 40% of accidents, depending on the Type of ADAS used and the type of accident. The overall objective of **this project is "to determine the** Requirements and design standards for a class of intelligent driver support systems which will Confirm with the information requirements and **performance capabilities of the individual drivers".**

III. PROPOSED ARCHITECTURE

The overview of our proposed architecture is shown in fig. 1.The inputs are taken from the sensors and given to the microcontroller. The input data is then processed by the microcontroller.

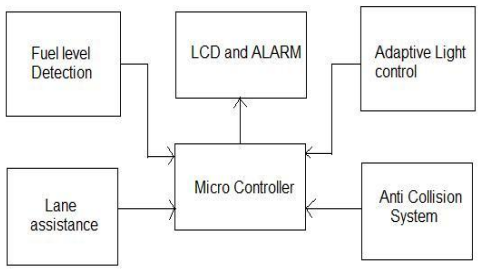

Fig. 1 Proposed System Architectural block diagram

IV. Safety Control Techiniques

The solution for problems mentioned in introduction is to provide safety techniques in the car such as,

A. Fuel detection system

Fuel level detector will sense the level of the fuel in the tank so as to measure the amount of fuel present in the tank. This technique uses magnetic float detector for the level detection. Fig. 2 shows the magnetic float detector.

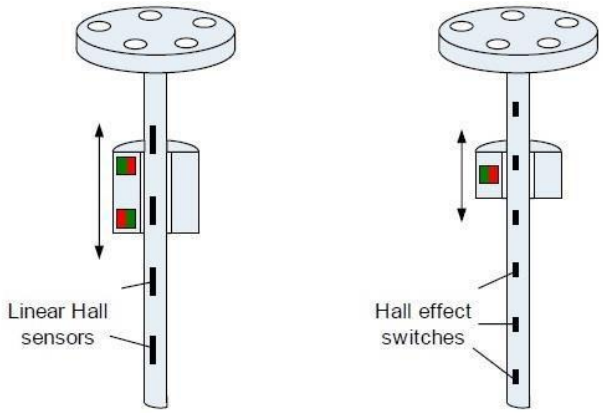

Fig. 2 Vertical float based liquid level detectors.

We are utilizing two magnets which are oppositely magnetized. This Fuel level sensor uses a vertically moving float. It also has linear hall sensors. We have to choose distance and size of magnet so that the horizontal field components are linear. The distance between hall sensors is made so that this is always one sensor in its range. Dry reed switches are used for monitoring tank levels. This reed switch is triggered when float level moves up or down because of change in fluid level. The current starts flowing when Reed switch is closed as magnet comes close to it and current stops flowing when magnet moves away from the reed switch.

B. Lane Change Assistance

A lane departure warning system [1] is a mechanism developed to warn a driver present behind our car, when the driver moves out of his lane on road.

This warning system is based on:

- Video sensors in the visual domain
- Laser sensors
- Infrared sensors

Fig. 3 shows the lane change assistance using IR LEDs.

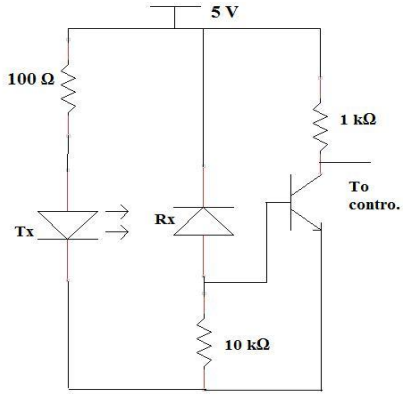

Fig 3 Lane change assistance using IR LED.

For calculating value of TX resister & Rx resister we have following calculations. As we have used IR Receiver its forward maximum current

$$IMAX= 50mA$$

Hence resistance in series with receiver can be calculated as

$$R=5V/50\ mA$$

$$=100\ \Omega$$

Hence resister value should be more than 100 Ω

C. Adaptive Light Control System

Adaptive light control moves the head light beam in response to vehicular steering as well as to ambient weather and visibility conditions. This mechanism relies on electronic sensors, transducers and actuators. Fig. 4 shows adaptive light control based on LDR.

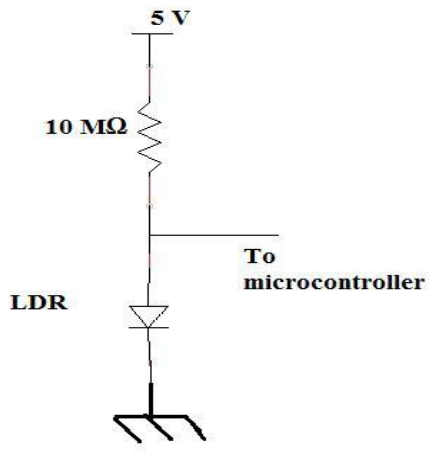

Fig. 4 LDR based light detection circuit.

When there is presence of light in front of the test Vehicle the resistance of the LDR is minimum. It is **about 250KΩ and when there is absence of light on** Vehicle then LDR will show the highest resistance **i.e.4MΩ.**

Microcontroller will accept the input from LDR so as to control the relay driver.

D. Anti-collision system

It includes system of sensors that will be placed in the car to show how close the other vehicle is, how much its speed needs to be reduced while driving in traffic. The sensors will send and receive signals from things like other car, obstacles on the road. For detection of vehicle present on road in front of our vehicle we have designed IR sensor circuit. Fig. 5 shows anti-collision system.

This system prevents the reference vehicle from colliding with a vehicle in front and behind the reference vehicle by monitoring the traffic status.

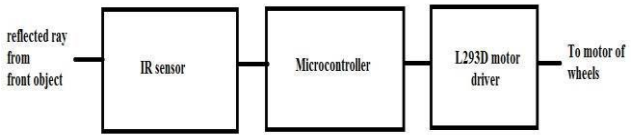

Fig. 5 Anti-collision system.

The system includes:

- Sensors: For measuring the approximate distance between reference vehicle and object in front or behind it
- Control Circuit: To control the speed of reference vehicle
- Microcomputer: For computing safety distance between vehicles according to foresaid distance.
- Driver Alerts: To alert the driver in case of any unsafe overtake.

V. CONCLUSIONS

In this paper, we have surveyed the current generation of advanced driver assistance systems. We have shown multiple ways in which such systems gather and analyses data in order to increase Traffic safety. We particularly observed two distinct categories of ADAS, systems that serve as warnings for the driver and systems that react in behalf of the driver. In the future, as the industry shifts towards self-driving cars, the second category of systems will become more dominant.

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