# ADVANCED DRIVER ASSISTANCE SYSTEM FOR INDIAN CONDITIONS

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## Abstract

Driver assistance system is useful because it helps the driver manage in the situations of concern. In this paper, **a four subsystem based driver assistance system** has been proposed. To make the system work, various advanced Deep Learning and computer vision based techniques have been proposed. The findings and observations suggest that driver assistance systems can have a **positive effect on the casualties and damage** resulting from road accidents. An accuracy **as high as 92%** was obtained from pedestrian detection system, Driver Drowsiness Detection was found to be highly effective, Driver Rating system worked well generally but seemed to give deviation in some cases.

## Introduction

Automobile accidents cause over **1 lakh fatalities** in India every year and these values are expected to rise by **65% over the next 20 years**. The National Highway Traffic Safety administration of India ensures proper safety of automobile vehicles. Manufactures have been involved to offer their customers the latest technology that will assist drivers in accident free driving.

Driver Assistance systems ensure **safety and accident free environment** in real time. Owing to their real time operation needs, driver assistance ECUs shall be able to take driver's inputs as well as inputs from various vehicle systems and produce scheduled outputs in real time without missing deadlines. This useful information provided to the driver in real time can be the difference between driver's safety and a possible fatality.

In this paper the advanced driver assistance system essentially consists of four subsystems namely:

- **Driver Drowsiness Detection**
- **Pedestrian Detection**
- **Driver Quality Indicator**
- **Driver Safety Alert System**

## Materials

Various sensors and other materials are required for making each of the subsystem and hence the whole ADAS possible.

- **Driver Drowsiness Detection-** Face camera, IR LED Camera
- **Driver Safety Alert System-** IR Distance Sensor
- **Driver Quality Indicator-** Front View Camera, Accelerometer, Brake pedal position sensor, GPS, IR Distance Sensor, gyroscope
- **Pedestrian Detection-** Front view camera

Besides this we also require microprocessor and GPU cluster for computation purposes.

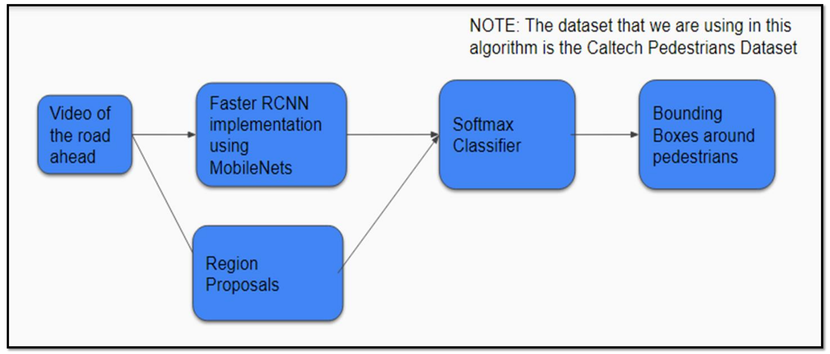


**Figure 1.** Pedestrian Detection System.

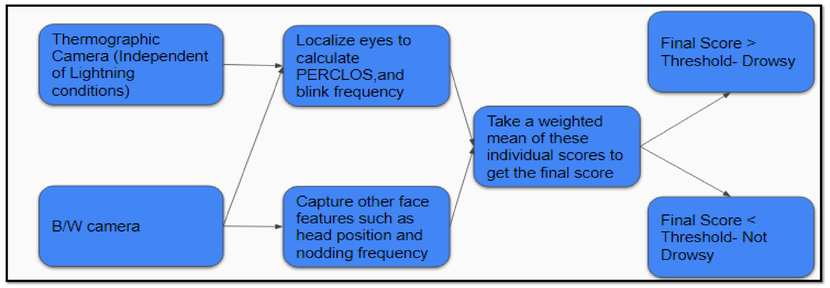


**Figure 2.** Driver Drowsiness Detection.

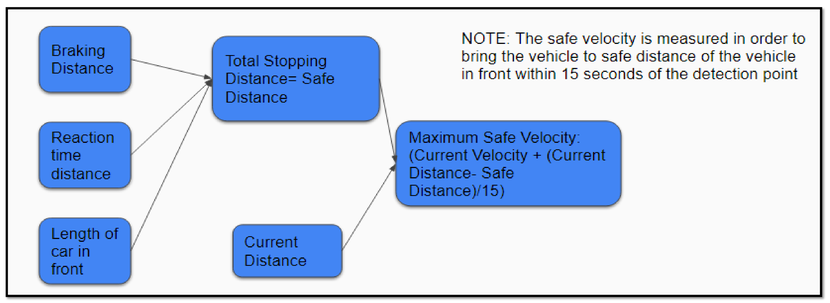


**Figure 3.** Driver safety Alert system.

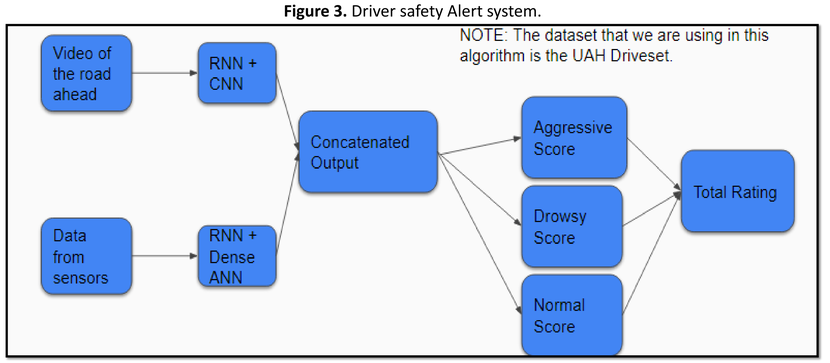


**Figure 4.** Driver Quality Indicator system.

## Results

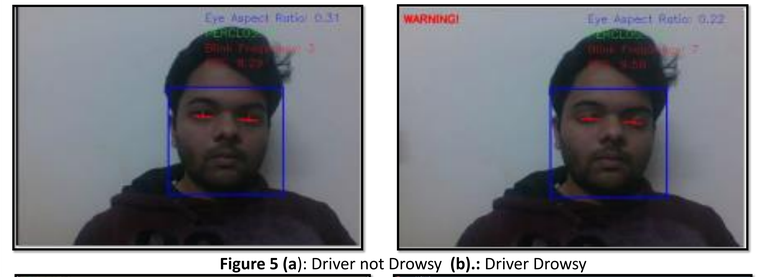


**Figure 5 (a)**: Driver not Drowsy **(b).:** Driver Drowsy

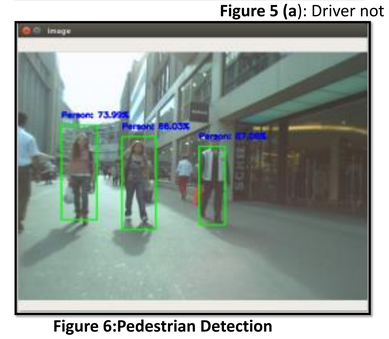

**Figure 6:Pedestrian Detection**


**Figure 7:Driver quality Indicator**

| Relative Speed(*m/s*) | Current Distance(*m*) | Safe Distance *(m)* | Safe Velocity *(m/s)* |
|---|---|---|---|
| 5 | 1 | -9.99 | 23.73 |
| -5 | 2 | 42.94 | 10.27 |
| -10 | 4 | 58.38 | 31.36 |
| 2 | 5 | 8.97 | 19.73 |
| -2 | 6 | 30.15 | 14.38 |
| 4 | 7 | -3.37 | 22.69 |

**Table1: Driver Safety Alert System**

## Conclusions

Advanced driver assistance systems are necessary nowadays at every place because of increasing population and hence increasing traffic on the roads.

We have been successfully able to design an ADAS which includes the four fundamental and very important subsystems namely Driver drowsiness detection, pedestrian detection, Driver quality indicator and, Driver safety alert system. All of the networks give a decent accuracy and hence satisfactory results are obtained from the ADAS. In the end the four subsystems are combined using a user interface to give a combined output to the driver.

There is always a scope of improvement when it comes to ADAS. The four systems that we have included are fundamental and we can include more subsystems to make the ADAS even better.

## Contact

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