

## AN ADAS SYSTEM USING SIGNAL PERFORMANCE BASED ON CAN CONTROL

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**Abstract:** Today large number of driver assistance systems is available for vehicles. Drivers who do not take regular break while travelling long distance have a high risk of having drowsiness. Driver assistance, accident, road surface condition affect the speed of the vehicle. Over speeding in drastic conditions may result in driver losing control of the vehicle. So there is a need to determine and control the vehicle. In this system monitors the function and sends information to the user using a CAN interface. The CAN provides faster transfer of data and also provides efficient transportation. The data is used to control the maximum speed of the vehicle by controlling its acceleration to a maximum. If the speed crosses the desired value, then the ADAS system switches the vehicle to OFF. This will enhance an efficient system even without a driver. We can also use the CAN bus to connect various components such as light switches, lamps and window drives into an individual system, which can be adjusted to our current request at any time.

**Keywords:** ADAS, Automobile, Control Area Network (CAN), Eye blink, Sensor.

### 1. Introduction

The health problems tackling the Indian society have been rapidly ever-changing since there is removal of controls by the government and sequent globalization. There is rapid increase in urbanization and industrialization the necessity to travel across the complete country by all age teams is happening. Today a large number of driver assistance systems are available for the vehicles. They help to maintain distance from the vehicle. Monitoring the surroundings from all directions needs data and information from the vehicle's sensors. The energy of the sensors and the processing control units manages to rise continuously, and highly advanced software is uses

this information in fractions of a second. In the coming days all cars will use the image from the surroundings in real time. The driving feature functions include "highway driving, "which in the case of highly autonomous driving will be used to define speed on road for this the driver has to activate the system. This takes away the stress during driving. The proposed system presents the progress and implementation of a driving scheme for a vehicle to improve the driver-vehicle interface. As more and more application are available, the connection between the vehicles network and information based system becoming widely used communication. The advance process in embedded system uses various new domains. The advantage in these technologies have opportunity to develop the transportation by the usage of communication process from one vehicle to another this type of communication is called as vehicle to vehicle communication.

### 2. Related Works

Different approaches for detection of driver sleepiness and lane detection are given below.

A context aware system is proposed that detects driver behaviour. A VANET (Vehicular ad hoc networks) is employed to detect abnormal behaviours of drivers and to warn alternative vehicles on the road to forestall accidents. A model based on Dynamic Bayesian networks (DBNs) in real time is planned that detects four styles of driving behaviour like traditional, drunk, reckless, and fatigue. By observing thirty five numbers of evidences completely differentiations between different drivers behaviour square measure discovered [1]. The experimental setup is developed in which twelve male Participates have performed check in two sessions. These sessions include completely different levels of sleep such as partial sleep deprivation and no sleep deprivation. This

experiment shows that sleep deprivation had greater impact on no sleep deprivation of ability primarily based psychological feature functions. When the drivers were sleep-deprived, their performance of responding to unexpected disturbances degraded, which caused distractions in lane trailing, vehicle following, and lane changing [2].

In alcohol detection system is ready that consists of an alcohol device connected to ADC and this ADC is interfaced to a Microcontroller which performs management action. When alcohol is detected the automotive is controlled automatically therefore that incidence of Drink and Drive is avoided [3]. A water-cluster-detecting (WCD) sensor is meant that works on breath detection. It detects breath in the style of water clusters within which activity of electrical currents of completely or charged particles gift in breath square measure separated by exploitation an electrical field. The WCD sensor consists of an alcohol sensor that detects the alcohol contents and at the same time detects the electrical signals of breath, which ensures that the sample is not a man-made supply however from a person's breath. This sensor is unbroken at a distance of regarding fifty cm and is testing the level of alertness of a driver sitting on the driver's seat. The designed WCD sensor is extremely sensitive to observe alcohol vapours and sleepiness of the driving force by activity breath peaks attributable to that drunk and drowsy driving is prevented [4].

A multiple-lane detection system works on detection of lane with the help of camera moreover as GPS module. GPS module generates digital map data of the road primarily based on vehicle's position. The camera is used for detection of lane with parameters like pitch angle. A real time system is presented by combining camera and GPS module. Developed system concludes with vehicle's location, camera position sensing and lane detection [5]. A system is developed to locate the road lane position with help of monocular vision in real time. This system works in five steps viz. edge detection of road lane, matching of road edges with texture database, searching the continuity of road edges, linking for enhancing road lines, localization with a K-means cluster. As no assumptions are made about road structure the presented system is generalized one [6]. A system is developed which uses an ARM controller as the main control unit and CAN bus within a car. ARM is used to obtain high performance. Use of CAN makes high-speed

communication in control networks and also helps sharing of data between all nodes which results in enhancing their collaborative work .

### 3. System Overview

#### 3.1. Need for Monitoring ADAS System

A lot of accidents occur due to driver drowsiness and obstacle detection. Various studies have suggested that around 10% of all road accidents of fatigue related up to 70% on certain roads. The system monitors the cars movements and assesses whether the vehicle is being driver in a control or uncontrolled way.

#### 3.2. Present Scenario and Drawbacks of Existing System

ADAS can prevent up to 40% of traffic accidents and it depends on the type of ADAS we are using. Despite this safety potential, market penetration of ADASs has gone bit slower. The main drawback is, hoe the customer understands the added value, liability exposure, and regulatory issues. Drivers want ADAS to be in highly modified in terms of performance, usage, reliability, and safety. Therefore, the ADAS must be used in different situations of high traffic and system should be able to analyze and handle. Unfortunately, excessive testing of ADAS system is usually impossible due to its expense and time. Not only for design, also for the validation of ADASs and also for the development process.

#### 3.3. Solution to Overcome the Challenges

In our work we present the development and implementation of a driving system for the vehicle to improve the driver-vehicle interface. As more and more application are available, the connection between the vehicles network and information based system becoming widely used communication.

Basically in automobile industries CAN protocol is used for communication. The system is able to monitor road lane violation drowsiness and obstacle detection. This system detects the mentioned parameters and makes the vehicle intelligent by maintain the parameters within specified safety condition and avoiding road accidents caused by drowsiness. The use of CAN protocol is used for communication between controllers. The system targets to increase the safety level of the vehicle

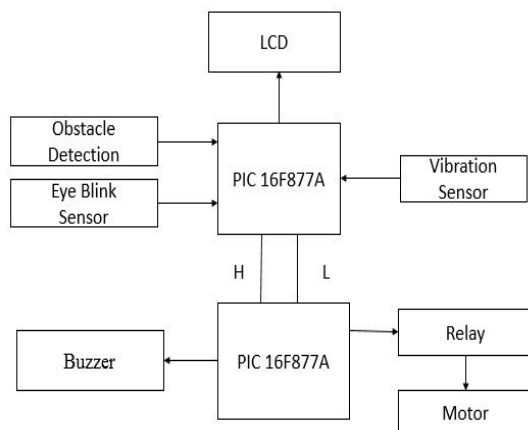


Figure.1 Architecture of the System

### 3.4. Objective

The main objective of the project is to improve the vehicle safety system like Obstacles detection, Driver assistance, Drowsiness detection, Accident/Road safety condition Detection, and it will assist to Driver through ADAS technology. The system will achieve reliability and minimized false alarm rate, event-related driver monitoring, strong system personalization to driver characteristics and traffic situation awareness.

## 4. System Architecture

### 4.1. Proposed Work

If a vehicle is in moving state then the obstacle detection sensor detects the obstacle and made to turn off the motor automatically. The drowsiness of the driver is detected using eye blink sensor and the vibration in the vehicle get increases. If vibration is low in the vehicle then the detection distance is high. Similarly if the distance is low between the other moving vehicles or obstacles then its display warning content in display unit. The entire architecture is shown in Fig. 1.

### 4.2. Implementation Process

The process is first carried out in proteus, when the display shows vibration is low then it indicates distance from the obstacle is high. The indication phenomenon through the LCD is shown in Fig 2. If the display shows the vibration is high then it indicates that distance from the obstacle is low, so the system will control the vehicle and makes it to stop. There is also a switch in the system, when the switch closed the

vibration is detected and when the switch is open the vibration is not detected. The system consists of two PIC controllers (pic 16f877a). The one pic acts as a slave and another pic act as a master. The slave pic consists of obstacle detection, eye blink sensor and vibration sensor. The eye blink sensor finds the number of eye blink counts, if the number is below the normal count then buzzer is been activated. The eye blink sensor will analyze the driver condition while he is driving. If any vehicle or object is detected the obstacle detector will send the information to the pic controller about the object. The vibration sensor is a part of an accelerometer. It will detect the motion and velocity of the object and sends the information about the objects motion and velocity to the slave pic controller.

The master pic controller consists of relay, motor and buzzer. This master slave structure is called as engine control unit. The buzzer will produce the beep sound when it detects an object. The relay will control the motor in order to stop the car when any obstacles are found. This obstacle is

detection indication scheme simulated result is shown in Fig 3. The output will be displayed at the LCD which is connected to the slave of pic controller. Both the PIC controllers, Master and Slave are connected to CAN bus protocol for exchanging the information and for communication. CAN is used for more faster and reliable communication. ADAS technology can detect objects, for classification, and provide alert

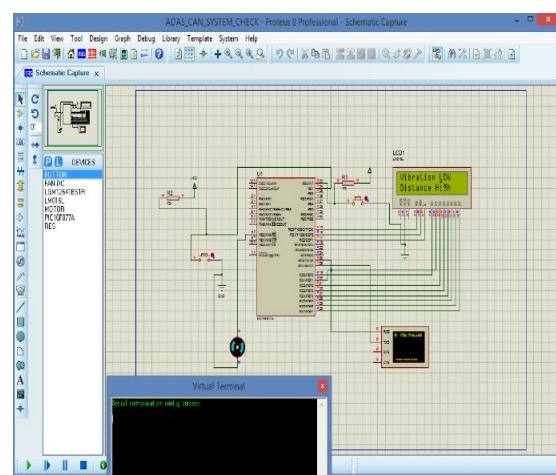


Figure.2 Vibration Notification to the Driver through LCD

to the driver on road conditions, and allows the

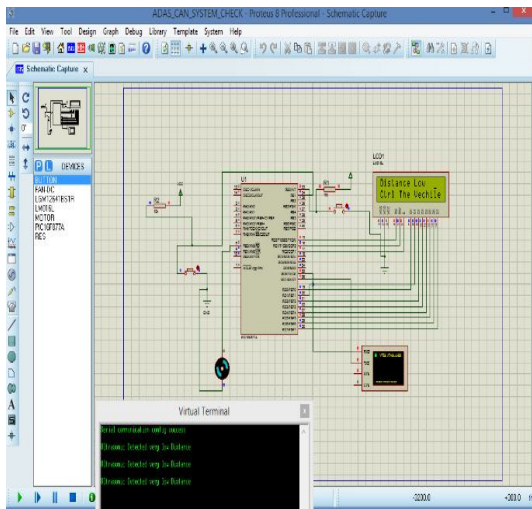


Figure.3 Obstacle Detection using Ultrasonic Sensor

vehicle to slow or stop. This level of ADAS is great for various applications such as blind spot monitoring, lane divert assistance, and forward collision warning.

## 5. Results

Prototype was developed using a model car and the proposed system was implemented. Fig.2 displays the working output which shows that when an object gets nearer to the vehicle that is around 1m, the LCD deployed inside the vehicle will notify the driver through vibration. Fig.3 indicates when obstacle gets very nearer to the vehicle that is around one meter, the vehicle's motor will stop immediately, and this was done using ultrasonic sensor. The output result of the work is shown in Table 1.

## 6. Conclusion

The aim of the project is to improve the vehicle safety from Obstacles avoidance Driver Assistance,

| SENSOR            | THRESHOLD VALUE | INDICATION RANGE                 | BUZZER/MOTOR |
|-------------------|-----------------|----------------------------------|--------------|
| Eye Blink Sensor  | 22 closures/min | Zero(if exceeds more than 3 sec) | ON/OFF       |
| Ultrasonic Sensor | 300 cm          | < 100 cm                         | ON/OFF       |
| Vibration Sensor  | 10 units        | < 8 units                        | ON/OFF       |

Table.1 Obtained Result

Drowsiness detection and it has been successfully

accomplished. In our work, we focused on signalized intersections only. This system deals with detection of obstacle avoidance and Drowsiness using sensors and accordingly precaution are made, which minimizes road accident. Future developments of this project deals with Additional electronic devices in motor vehicles for supporting the driver in certain driving situations. They focus on safety aspects, and on enhancing driving comfort.

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