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MONOPOLIZE THE AUTOMOBILES BASED ON HAZARDOUS STATUS OF DRIVERS USING IMAGE PROCESSING AND ARTIFICIAL INTELLIGENCE

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Abstract— *This paper presents drivers' hazardous physical and mental states (e.g., distraction, fatigue, stress, and high workload) have a major effect on driving performance and strongly contribute to 25-50% of all traffic accidents. They are caused by numerous factors, such as cell phone use or lack of sleep. Current road safety initiatives are approaching the limit of their effectiveness in developed countries. A paradigm shift is needed to address the preventable deaths of thousands on the roads. Previous systems have focused on one or two aspects of driving: environmental sensing, vehicle dynamics or driver monitoring. Our approach is to consider the driver and the vehicle as part of a combined system, operating within the road environment. In this, a driver assistance system is implemented that is not only responsive to the road environment and the driver's actions but also designed to correlate the driver's eye gaze with road events to determine the driver's observations. Such information would be very useful, as it would allow intelligent vehicles to better respond to a detected hazardous state. Driver observation monitoring enables an immediate in-vehicle system able to detect and act on driver inattentiveness, providing the precious seconds for an inattentive human driver to react. We present a prototype system capable of estimating the driver's observations and detecting driver inattentiveness. We show, however, that it is possible to detect missed road events and warn the driver appropriately.*

Keywords-Driver Assistance System, hazardous state, driver inattentiveness

I. INTRODUCTION

In recent years, on-road vehicle detection is gaining rapid attention in research on designing and improving driver safety system. Among the road crashes, rear end collisions are one of the most common forms of traffic accidents. The research on accident prevention and injury reduction is becoming more active among automotive manufacturers and universities. Since human negligence is the main reason for the occurrence of accidents, developing on-board automotive driver alert system can help in overcoming the increasing deaths and injury rates. A great deal of research has been conducted on real-time detection of overtaking vehicles. Most of the research is carried out for the detection of cars or four-wheel vehicles but only a few researches about detecting approaching motorcycles or a system including both categories.This paper presents a review of recent vehicle detection techniques using Radar, Laser, Lidar, sound sensors, optical sensors, and fusion of aforementioned techniques. Vehicle detection is a very challenging task due to huge variability in shape, color, and size of different kind of vehicles manufactured by different producers. Cluttered outdoors environment, illumination changes, random interaction between traffic participants, and crowded urban traffic system make the scenario much more complex for vehicle identification. On-road vehicle detection systems face two main challenges: computation and reliability. Processing time is also indirectly related to vehicle speed. The more the speed of a vehicle is, the less the time available for

processing a frame. Robustness is the other requirement that must be fulfilled if the ego car is on urban road and where the accident probability is greater than on rural roads or highways.

II.LITERATURE REVIEW

In the paper titled, ―Driver drowsiness has been implicated as a major causal factor in road accidents. Tools that allow remote monitoring and management of driver fatigue are used in the mining and road transport industries. Increasing drivers' own awareness of their drowsiness levels using such tools may also reduce risk of accidents. The study examined the effects of real-time blink-velocity-derived drowsiness feedback on driver performance and levels of alertness in a military setting.A sample of 15 Army Reserve personnel (1female) aged 21–59 (M = 41.3, SD = 11.1) volunteered to being monitored by an infra-red oculography-based Opt alert Alertness Monitoring System (OAMS) while they performed their regular driving tasks,including on-duty tasks and commuting to and from duty, for a continuous period of 4weeks. For approximately half that period, blink-velocity-derived Johns Drowsiness Scale (JDS) scores were fed back to the driver in a counterbalanced repeated-measures design, resulting in a total of 419 driving periods under "feedback" and 385 periods under "no-feedback" condition. Overall, the provision of real-time feedback resulted in reduced drowsiness (lower JDS scores) and improved alertness and driving performance ratings. The effect was small and varied across the 24-h circadian cycle but it remained robust after controlling for time of day and driving task duration. Both the number of JDS peaks counted for each trip and their duration declined in the presence of drowsiness feedback, indicating a dynamic pattern that is consistent with a genuine, entropy-reducing feedback mechanism (as distinct from random re-alerting) behind the observed effect. Its mechanisms and practical utility have yet to be fully explored. Direct examination of the alternative, random re-alerting explanation of this feedback effect is an important step for future research. [1]

In the paper titled, ―This review describes that Drivers' hazardous physical and mental states (e.g., distraction, fatigue, stress, and high workload) have a major effect on driving performance which results in 25–50% of all traffic accidents. They are caused by numerous factors, such as cell phone use or lack of sleep. First they analyzed the NASA-TLX results to verify that different workload levels were successfully induced with our driving environments, as described in Section "Effect of Causes of HDS on NASA-TLX Scores." Section "Independent Classification of Each Cause of HDS" then uses all combinations of three features sets (driver characteristics, vehicle kinematics, and physiology) to independently classify the presence or absence of four causes of HDS (cell phone use, sleep deprivation, low vs. high traffic density, clear vs. snowy weather). It also presents the most relevant features for classification, as selected by stepwise feature selection. Section "Classification of Each Cause of HDS Given Information about the Other Three Causes" then presents the results of classifiers that already know the presence or absence of three causes of HDS and attempt to classify the presence or absence of the fourth cause of HDS given this information. Cause of HDS using different combinations of input feature sets (driver characteristics, vehicle kinematics, and physiology) as well as information about the presence or absence of the other three causes of HDS. The increased dimensionality of the problem – the three additional features (presence of other causes of HDS) are not informative enough to set the increased number of features. They tell that the combination of all three data sources was the most accurate, and was able to classify alert vs. drowsy driving with an accuracy of 98.8%, the use of a cell phone with 82.3%, driving in dense vs. light traffic with 91.4%, and driving in clear vs. snowy weather with 71.5%. These accuracies were achieved in an experiment protocol where other causes of HDS may be present or absent, which represents a greater challenge for classification. As the next step, our algorithms for identification of the cause of HDS should be combined with intelligent decision-making systems that could tailor their response to the specific cause of negative driver. [2]

In the paper titled, ―This article deals with the collision on hazard detection for motorcycles via accelerometer measures. A machine bearing approach is proposed. A two phase method is developed that is capable of first detecting non-critical anomalies and critical hazards for which an airbag deployment could be needed. This method is based on self-organizing maps and has advantage over classical approach- (I)The machine learning approach easily scales with the number of sensors. (II)It is tuned using normal driving and doesn't require expensive crash-tests for tuning. [3]

In the paper titled, ― This review describes that road safety is a relevant them to study, due to the human as well as financial suffering caused by road crashes. The

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development of a diverse set of road safety related indicators is valuable in this respect. The road safety problem are consisting of five vertical levels from structure and culture (policy input) over safety measures and programs (policy output), safety performance indicators (intermediate outcomes) and number of killed and injured (final outcomes) to social costs due to road unsafety. Here they are using indicators, that an indicator should meet and taking the road safety context into account, eight selection criteria were identified, namely: the degree to which the indicator is relevant (and valid), measurable, understandable, has data available, is reliable, comparable (and coherent), specific and sensitive. On the basis of literature survey and the assumption of causality for road safety, we assume that the indicators are strong relevance for road safety. [4]

In the paper titled, ― This review describes a motorcycle irregularity and hazard detection and classification method has been proposed. The most immediate application for this kind of system is airbag deployment. The methods traditionally employed to develop automotive airbag deployment strategies may not be ideal for motorcycles because they are based on standard crash maneuvers. Because of their vehicle characteristics, motorists are exposed to a wider array of hazards. The proposed method addresses this problem using normal driving scenario data to tune the detection and classification algorithm. The machine learning approach is therefore capable of recognizing anomalous driving conditions that it has never been subject to before. The use of machine learning techniques also provides a more systematic way of tuning the classification method that is easily scalable to a high number of sensors. The proposed method has been tested on different kind of maneuvers, showing that it is possible to achieve zero miss detection and zero false positives with a maximum detection delay of 14 ms. [5]

III.PROJECT OBJECTIVES

The main objectives of the project considering the advantages and the disadvantagesare:-

1. Detect moving vehicles in our path of travel and give details of distance between the vehicles on the LCD display and also automatically controls the vehicle speed.
2. Detect possible pedestrian crossing which could be an obstruction and give a warning.
3. Detect the driver eye and head gaze position.
4. Alert the driver if he/she is out of concentration or out of focus on the road and stops the vehicle automatically.
5. Reduces the vehicle speed when the high beam intensity from the opposite vehicle falls on our vehicle.

IV. BLOCK DIAGRAM

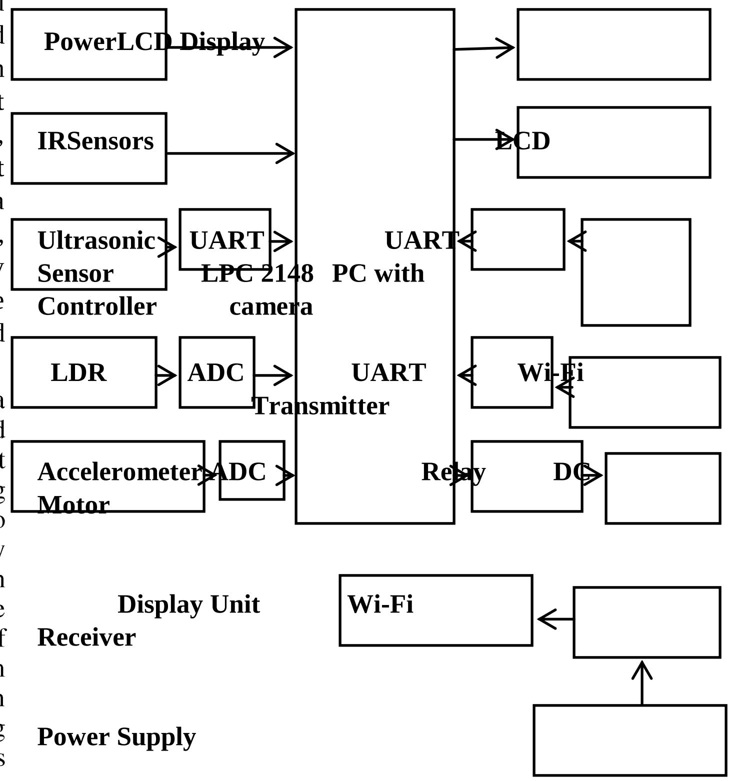


Fig. Block Diagram of a proposed system

Description in detail:

LPC 2148: The LPC2148 microcontroller is designed by Philips (NXP Semiconductor) with several in-built features & peripherals. Due to these reasons, it will make more reliable as well as the efficient option for an application developer. LPC2148 is a 16-bit or 32-bit microcontroller based on ARM7 family.ARM7 processor is commonly used in embedded system applications. Also, it is a balance among classic as well as new-Cortex sequence. This processor is tremendous in finding the resources existing on the internet with excellence documentation offered by NXP Semiconductors. It suits completely for an apprentice to obtain in detail hardware & software design implementation.

IR Sensor: An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion.An infrared sensor circuit is one of the basic and popular sensor modules in an electronic device. This sensor is analogous to human's visionary senses, which can be used to detect obstacles and it is one of the common applications in real time.

LCD display: It is used to show various messages on LCD. Although LCD does not have much use in actual application but still it is really very useful for testing purpose and while developing this project. Because we can show various messages like: Sending SMS or we can display longitude and latitude of current location on LCD display.

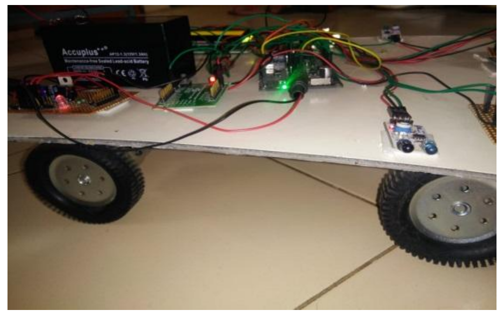
Ultrasonic Sensor: An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. By recording the elapsed time between the sound wave being generated and the sound wave bouncing back, it is possible to calculate the distance between the sonar sensor and the object.

LDR: Photo resistors, also known as light dependent resistors (LDR), are light sensitive devices most often used to indicate the presence or absence of light, or to measure the light intensity. In the dark, their resistance is very high, sometimes up to 1MΩ, but when the LDR sensor is exposed to light, the resistance drops dramatically, even down to a few ohms, depending on the light intensity. LDRs have a sensitivity that varies with the wavelength of the light applied and are nonlinear devices

Relay:A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal.

V. EXPERIMENTAL RESULTS

If the vehicle is near, then the ultrasonic sensor will detect and display as "UR TOO NEAR".If the vehicle is sideways, the IR sensor will detect and display it as "VEHICLE IS IN UR LEFT/RIGHT".If the high intensity of opposite vehicles light falls, then LDR display it as "HIGH INTENSITY LIGHT" and automatically it dims the light. When the driver's eye and head is out of focus on road, then the driver assistance system alerts the driver and also reduces the vehicle speed.When the driver is drowsy, the vehicle stops automatically.



V. CONCLUSION

If many instruments are equipped in a high speed vehicle to provide more than necessary information to the driver they will draw the driver to pay particular attention to these instruments and furthermore he needs to learn how to maneuver there instruments. Diversion, fatigue are two fatal factors in the car accidents. The main task of our study is trying through the study of driver's driving behavior and in coordinating with the information provided from the pre-warning system to decelerate the vehicle speed prior to the happening of accident and if accident happens to reduce the damage to the least level. In our study we also realize that in addition to the items we have tested and verified they still have some tasks we can study in the near future such as the task when the car is running along a sloppy road how the driving behavior monitoring system can be incorporated with vehicle speed data, which is transmitted and obtained through the data bus system, to provide relevant data to the monitoring system to reflect a more accurate vehicle's moving condition and environment. To provide a moreconcise format for the data transmitted in thedata bus system to save some system memory is also a challenge task.

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