IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

ENHANCING ROAD SAFETY WITH IOT-BASED DROWSINESS DETECTION SYSTEM FOR ELECTRIC VEHICLES

MR.Srinath Yadhav S 1 , Viswas M 2 , SanthoshKumar M 3 and Sri Hari Prasad R 4

1 Assistant Professor, Computer Science and Engineering, V.S.B Engineering College, Karur,Tamilnadu, India

2 Student, Computer Science and Engineering, V.S.B Engineering College, Karur,Tamilnadu ,India

3 Student, Computer Science and Engineering, V.S.B Engineering College, Karur,Tamilnadu ,India

4 Student, Computer Science and Engineering, V.S.B Engineering College, Karur,Tamilnadu, India

Abstract—

Driver drowsiness and fatigue are key causes of road accidents. Every year, they increase the number of deaths and fatalities worldwide. In this project, an Advanced Driver Assistance System (ADAS) module is offered in order to minimise the frequency of accidents caused by driver drowsiness and thereby boost transportation safety. Based on visual information and Artificial Intelligence, this technology detects and prevents driver fatigue and accidents. We suggest utilising an Arduino controller to detect driver sleepiness using artificial intelligence. To analyse driver tiredness, this research created a prototype integrated system that combines machine vision-based sleepy driver monitoring technology with accident prevention system analysis of operator/vehicle performance. The goal of this system is to accurately assess commercial motor vehicle driver sleepiness and offer a real-time warning to the driver as well as a control output to the commercial steering or other systems as needed. The cloud-based server will process the data received from the microcontroller and use machine learning algorithms to detect signs of drowsiness. The server will send alerts to the driver through the vehicle's dashboard display or beep alerts when it detects signs of drowsiness. The system will also send alerts to the vehicle's owner or fleet manager to notify them of the driver's drowsiness. This system can be useful for electric vehicle owners and fleet managers to ensure safe driving and reduce accidents due to driver drowsiness. It can also be used by public transportation companies to ensure the safety of passengers. The system can be easily integrated into existing electric vehicles, and it can be customized according to the needs of the user.

The objective of this project is to develop an Internet of Things (IoT) based driver drowsiness system for electric vehicles. The system will detect the drowsiness of the driver by monitoring various parameters like head movements, eye blinking patterns, and steering wheel movements. The system will alert the driver in real-time when it detects signs of drowsiness to prevent accidents and ensure safe driving.

***Keywords*—ARDUINOUNO,IOT,CAMERA,VIBRATION MOTOR, DC MOTOR**

INTRODUCTION

The majority of traffic accidents are caused by tiredness and intoxicated driving, as well as workplace conditions, lack of sleep, and time constraints. Drunk driving impairs decision-making skills and perception level due to driver tiredness and exhaustion. These two circumstances have an impact on the capacity to operate the vehicle. Several strategies are used to identify tiredness in drivers, such as monitoring driver operation or physiological aspects of the driver, such as vehicle movement. Advanced Driver Assistance Systems (ADAS) use a range of aiding technologies to simplify and support the driver in monitoring, warning, braking, and steering responsibilities. . The primary purpose of these systems is to provide driver safety and aid in the prevention of road accidents. ADAS systems are unquestionably one of the automobile industry's fastest expanding segments. They provide greater automobile and road safety by providing technologies that notify the driver to possible hazards, assisting in the avoidance of crashes and accidents when developed with a safe human-machine interface.

An IOT based driver drowsiness system in electric vehicles could provide real-time monitoring of driver behavior and alert the driver when they

become drowsy or distracted, potentially preventing accidents and saving lives. The system would use sensors to monitor various parameters such as steering wheel movement, eye movements, and head posture, and send alerts when it detects signs of drowsiness.

In addition to improving road safety, an IOT based driver drowsiness system could also have economic benefits, such as reducing insurance costs and vehicle downtime due to accidents. Overall, such a system has significant potential to improve the safety and efficiency of electric vehicles and help accelerate the transition to a more sustainable transportation system.

The system will consist of a camera, vibration motor, IOT, LCD, buzzer, relay and dc motor will be connected to a microcontroller, which will process the data and send it to a cloud-based server using IoT technology.

LITERATURE SURVEY

[1] We investigate the impact of face direction during traveling by Standing-Type Personal Mobility Device (PMD). The use of PMD devices has been a popular choice for recreational activities in the developed countries such as in the USA and the countries in Europe.

[2] Professional drivers are particularly exposed to drowsiness and distraction inasmuch as they drive for long periods of time and as a daily routine. Therefore, several studies have been conducted to investigate drivers´ behavior, supported by controlled experiments (e.g. naturalistic and driving simulator studies).

[3] Nowadays, more than half of the world's web traffic comes from mobile phones, and by 2020 approximately 70 percent of the world's population will be using smartphones. The unprecedented market penetration of smartphones combined with the connectivity and embedded sensing capability of smartphones is an enabler for the large-scale deployment of Intelligent Transportation Systems (ITS).

[4] We propose Sentio1; a Reinforcement Learning based algorithm to enhance the Forward Collision Warning (FCW) system leading to Driver-in-the-Loop FCW system. Since the human driving preference is unknown a priori, varies between different drivers, and moreover, varies across time for the same driver, the proposed Sentio algorithm needs to take into account all these variability's which are not handled by the standard reinforcement learning algorithms.

[5] A novel driving behavior recognition system based on a specific physical model and motion sensory data is developed to promote traffic safety. Based on the theory of rigid body kinematics, we build a specific physical model to reveal the data change rule during the vehicle moving process.

[6] Drowsy driving is one of the major causes of road accidents and death. Hence, detection of driver's fatigue and its indication is an active research area. Most of the conventional methods are either vehicle based, or behavioral based or physiological based. Few methods are intrusive and distract the driver, some require expensive sensors and data handling.

[7] The main reason for motor vehicular accidents is the driver drowsiness. This work shows a surveillance system developed to detect and alert the vehicle driver about the presence of drowsiness. It is used a smartphone like small computer with a mobile application using Android operating system to implement the Human Computer Interaction System.

[8]. New models and methods have been designed to predict the influence of the user's environment and activity information to the driving style in standard automotive environments. For these purposes, an experiment was conducted providing two types of analysis: (i) the evaluation of a self-assessment of the driving style; (ii) the prediction of aggressive driving style based on drivers' activity and environment parameters

[9] Truck drivers, company car drivers and shift workers are the most at risk of falling asleep while driving. Majority of the accidents occur due to the drunkenness of the driver. The burden of which lies on the company owner as they are made liable. It can lead to economic loss.

[10] Recently, cutting edge technologies to facilitate data collection have emerged on a large scale. One of the most prominent is the in-vehicle data recorder (IVDR). There are multiple ways to assign the IVDR's data to the different drivers who share the same vehicle.

PROPOSED METHOD

An IoT-based driver drowsiness system in electric vehicles can be an effective solution to prevent accidents caused by drowsy driving. The proposed system can be designed to monitor the driver's vital signs, such as heart rate and breathing patterns, using sensors and transmit the data wirelessly to a central processing unit. The system can then analyze the data in real-time to detect signs of drowsiness and alert the driver accordingly. The driver alert can be given in different forms, such as visual or auditory alarms, seat vibrations, or automatic adjustments in vehicle speed or lane deviation correction. The system can also be designed to communicate with other systems in the vehicle, such as the GPS and cruise control, to adjust the vehicle's behavior based on the driver's condition. To implement this system, the electric vehicle can be equipped with various sensors, such as EEG sensors, ECG sensors, or even camera-based systems that can detect facial expressions and movements. The data collected from these sensors can be processed by an edge device or transmitted to a cloud-based server for analysis and alert generation.

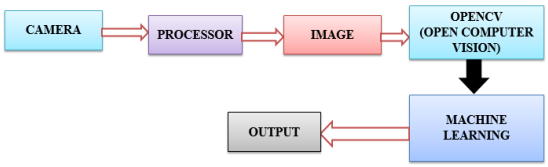
SOFTWARE DESCRIPTION

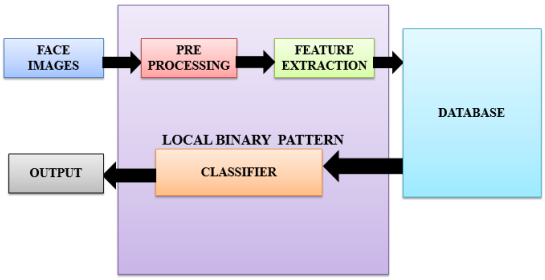
ARDUINO IDE

In addition to a text editor for writing code, a message area, a text terminal, a toolbar with buttons for frequently used operations, and a number of menus, the Arduino Integrated Development Environment, sometimes known as the Arduino Software (IDE), is also available. In order to upload programs and communicate with them, it connects to the Arduino hardware. Sketches are computer programs created using the Arduino Software (IDE). These drawings are created in a text editor and saved as files with the.ino extension. The editor offers functions for text

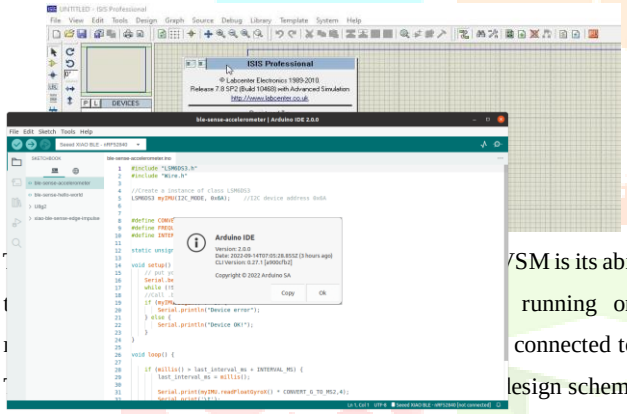
replacement and text searching. While saving and exporting, the message section provides feedback and shows errors. The console shows text generated by the Arduino Software (IDE), including error messages in their entirety and other data. The configured board and serial port are visible in the window's bottom right corner. You may create, save, and save drawings, validate and upload programs, view the serial monitor, and more using the toolbar buttons. The configured board and serial port are visible in the window's bottom right corner. You may create, save, and save drawings, validate and upload programs, view the serial monitor, and more using the toolbar buttons.

SOFTWARE DIAGRAM



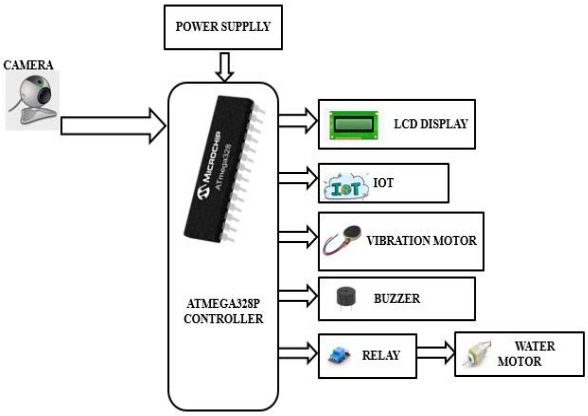


PROTEUS



VSM is its ability running on a connected to it. lesign schematic together with the other parts. It simulates how your object code would run on a real chip (machine code). The logic levels in the circuit change in accordance with what the program code sends to a port, just as in real life. Likewise, if the circuit affects the status of the processor's pins, your program code will be aware of this. The VSM CPU models provide a precise simulation of the I/O ports, interrupts, timers, USARTs, and other peripherals of each supported processor. As the complete system is replicated and the interaction of all these peripherals with the external circuit is properly represented down to the waveform level, it is anything from a straightforward software simulator. Proteus VSM continues to be the top option for embedded simulation thanks to its support for over 750 microprocessor types, hundreds of embedded SPICE models, and one of the largest libraries of embedded simulation peripherals in the world.

HARDWARE BLOCK DIAGRAM



HARDWARE BLOCK DIAGRAM

HARDWARE EXPLANATION

The ATMEGA328P controller is used to detect driver sleepiness using artificial intelligence. In this suggested system, we will use AI and OpenCV to locate people in real time. After acquiring a picture, it must be pre-processed and compressed. The model is trained using images. It is learned by extracting the desired pattern from the image using feature extraction. The image is then compressed using feature fusion and dimension reduction for dependable and real-time performance. This system comprises of a web camera that captures the driver's sleepy behavior and an ultrasonic sensor that detects an obstruction in front of the car; it gives notifications to the driver via vibration motor and also sends mail to the owner via IOT.

A potentiometer is used to monitor vehicle speed performance, while a gyro sensor detects steering movement. If the steering and wheel do not move (most accidents occur due to loss of control in vehicle speed), the alert will sound. The driver is driving at cruising speed and is unable to control the car in an abrupt turn, resulting in a collision.). An alcohol sensor is used to detect alcohol in the driver, and an alert is triggered if alcohol is detected. The suggested system is utilized to identify real-time drowsy behavior as well as accident avoidance with driver intake care. All detected information are presented on the LCD display and are updated on the IOT.

METHODS

MODULE LIST

- CAMERA
- POWER SUPPLY
- LCD DISPLAY
- IOT
- VIBRATION MOTOR
- BUZZER
- RELAY
- WATER MOTOR

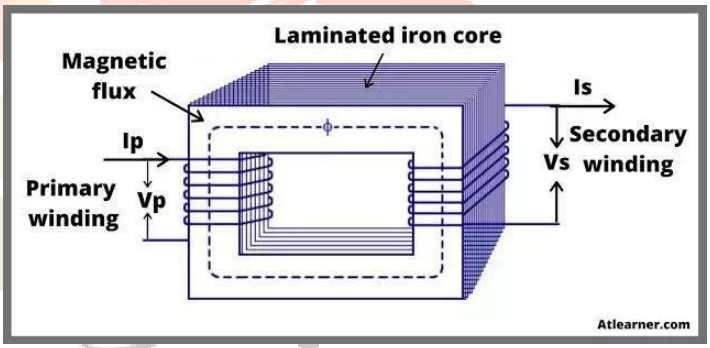
MODULE DESCRIPTION

CAMERA

The camera obscura was the predecessor to the photographic camera. The natural optical phenomenon known as camera obscura (Latin for "dark room") occurs when an image of a scene on the other side of a screen (or, for example, a wall) is projected through a small hole in that screen and forms an inverted image (left to right and upside down) on a surface opposite to the opening. The first recorded description of this idea is by Han Chinese philosopher Mozi (c. 470 to c. 391 BC). Mozi was accurate when he stated that the picture in the camera obscura is inverted because light flows in straight lines from its source. A camera is an optical device used to capture images. Cameras are, at their most basic, sealed boxes (the camera body) with a small hole (the aperture) that allows light to enter and capture an image on a light-sensitive surface (usually photographic film or a digital sensor). Cameras use a variety of methods to manipulate how light falls on a light-sensitive surface. Lenses concentrate the light entering the camera, the aperture may be broadened or narrowed to admit more or less light in, and a shutter mechanism controls how long the photo-sensitive surface is exposed to light.

POWER SUPPLY

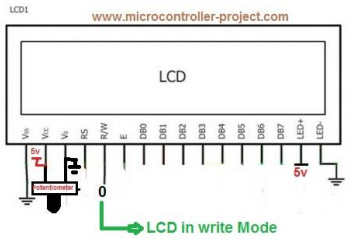
A regulated power supply is an integrated circuit that transforms uncontrolled alternating current (AC) to steady direct current (DC). It transforms the alternating current source into direct current using a rectifier. Its purpose is to provide a constant voltage (or, less frequently, current) to a circuit or device that must operate within certain power supply restrictions. The output of the controlled power supply might be alternating or unidirectional, although it is almost usually direct current (DC) (direct current). The sort of stabilisation utilised may be limited to ensuring that the output remains within defined limits under different load situations, or it may incorporate compensating for fluctuations in its own supply source. With the same power rating, switching-mode power supplies are lighter, more efficient, and more compact, making them appropriate for high-power applications. More efficiency implies less heat production at the same output power, resulting in less lost energy and cooling required. Also, in order to function worldwide, they may be able to work on a greater MAINS input voltage range, often about 110 to 240 volts, rather than a portion of around twenty volts on only one end of the range. AC adapters that charge battery-powered devices such as mobile phones, laptop computers, and electric bicycles employ similar switching technology.



LIQUID CRYSTAL DISPLAY (LCD)

Millions of pixels make up a display. The number of pixels on a display is widely used to describe its quality; for example, a 4K display has 3840x2160 or 4096x2160 pixels. A pixel is made up of three subpixels: red, blue, and green (often referred to as RGB). A distinct colour can be formed when the subpixels of a pixel change colour combinations. When all of the pixels on a display work together, it may produce millions of distinct colours. A image is generated when the pixels are quickly turned on and off. LCDs can have a passive matrix or an active matrix display grid. A thin film transistor (TFT) display is another name for an active matrix LCD. The passive matrix LCD is made out of a grid of conductors with pixels at each junction. To regulate the light for any pixel, a current is delivered through two conductors on the grid. An active matrix features a transistor at each pixel intersection, needing less current to adjust a pixel's brightness. As a result, an active matrix display's current may be turned on and off more often, increasing screen refresh time. Certain passive matrix LCDs offer dual scanning, which means they scan the grid twice with current in the time it would take to scan once in the original

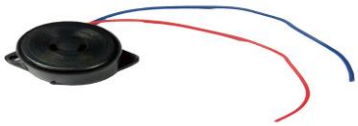
technology. Nonetheless, active matrix remains the best technique of the two.



LCD display unit

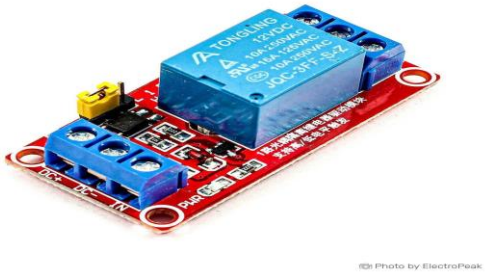
BUZZER

Certain passive matrix LCDs offer dual scanning, which means t hey scan the grid twice with current in the time it would take to scan once in the original technology. Nonetheless, active matrix remains the best technique of the two. Because the self-excited buzzer is powered by DC voltage, it does not require an AC signal to operate. To make the buzzer sound, it merely has to output the driving level at the drive port and amplify the driving current through the triode. It's quite easy, and the self-excited buzzer isn't covered here. This document solely discusses the other excited buzzer, which requires a 1/2-D square wave signal to operate. The most popular compact sound signal device employs a piezoelectric buzzer, which produces vibration and sound primarily through the piezoelectric effect. This buzzer is classified into two types: those with and those without a vibration source. The direct current signal is utilised to power the buzzer with the vibration source, but the alternating current signal is required to power the buzzer without the vibration source.



RELAY:

Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal. Relays were first used in long-distance telegraph circuits as signal repeaters: they refresh the signal coming in from one circuit by transmitting it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations. The traditional form of a relay uses an electromagnet to close or open the contacts, but relays using other operating principles have also been invented, such as in solid-state relays which use semiconductor properties for control without relying on moving parts. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called protective relays. Latching relays require only a single control pulse to activate the switch continuously. Another pulse applied to a different set of control terminals, or a pulse with the opposite polarity, resets the switch, although repeated pulses of the same type have no effect. Magnetic latching relays are helpful in situations where power interruption should not influence the circuits controlled by the relay.



WATER MOTOR

A water pump's operation is primarily based on the positive displacement concept as well as kinetic energy to push water. Some pumps utilise alternating current (AC) or direct current (DC) to power the water pump's motor, although others can be powered by other types of drivers such as gasoline engines or diesel engines. A pump is a mechanical device that moves water from a low-pressure level to a high-pressure one. Essentially, the pump shifts the energy flow from mechanical to fluid. This can be employed in process processes that need a lot of hydraulic force. This procedure may be seen in heavy-duty machinery. This apparatus requires a low suction pressure and a high discharge pressure. Due of the low force at the suction side of the pump, the liquid will pick up from a specific depth, however the strong force at the expulsion side of the pump will propel the liquid to pick up till it reaches the desired height. Since then, the pump has evolved into a wide variety of shapes, sizes, and applications. This article provides an outline of what a pump is and how it works. A pump's operating concept is that it increases the pressure of the fluid to produce the driving force required for flow. The pressure filter supply pump is typically a centrifugal type, and the operating principle is that slurry enters the pump through the revolving impeller's eye, causing a circular motion.

NODEMCU

The Internet of Things, or IoT, refers to the collective network of linked objects and the technology that enables communication between devices and the cloud, as well as between devices. We now have billions of devices connected to the internet, thanks to the development of low-cost computer processors and high-bandwidth telephony. This implies that commonplace products such as toothbrushes, vacuum cleaners, automobiles, and machinery may employ sensors to collect data and respond intelligently to consumers. The Internet of Things connects ordinary "things" to the internet. During the 1990s, computer engineers have been attaching sensors and processors to common things. But, because the chips were large and cumbersome, development was first slow. RFID tags, which are low-power computer chips, were originally employed to track valuable items.

VIBRATION MOTOR

The first vibrator motor was invented in 1960 for product massage, but motor research took a new turn in 1990 when people required vibration calls on their cell phones. Nowadays, motor designers and users have found from mobile phones that mobile alerting with vibration is an excellent method to inform mobile carriers to an occurrence. Little vibrating motors are now employed in a variety of applications, including scanners, tools, GPS trackers, control sticks, and medical devices. These motors are also the primary actuators for force feedback, which is a cost-effective way to increase the value of a product. The vibration motor is a coreless DC motor that is small in size. The primary function of this motor is to notify the user when a phone call is received without using sound or vibration. These motors may be used in a variety of applications such as pagers, telephones, cell phones, and so on. The key characteristic of this motor is that it has magnetic qualities, is lightweight, and has a tiny motor size. The motor performance is extremely constant based on these characteristics. These motors may be configured in two ways: one as a coin model and another as a cylinder model. The most important vibrator motor specs are type, maximum operating torque, maximum centrifugal force, weight range, rated current, and output.

CONCLUSION

In conclusion, an IoT based driver drowsiness system in electric vehicles is a promising solution to ensure road safety. The system uses various sensors, such as cameras, accelerometers, and heart rate sensors, to monitor the driver's vital signs and behavior. By analyzing the collected data, the system can detect signs of drowsiness, such as drooping eyelids, slow reaction time, and changes in heart rate. When the system detects drowsiness, it triggers an alarm or warning to alert the driver and prevent accidents. The system can also notify the authorities or emergency services in case of an emergency.

ADVANTAGES

- Improved road safety
- Easy installation
- Real-time monitoring
- Customization
- Cost-effective
- Energy-efficient
- Automatic operation

DISADVANTAGES

- False alarms
- Privacy concerns
- Limited applicability
- Driver distraction

APPLICATION

- Personal vehicles
- Commercial vehicles
- Fleet management
- Ride-sharing services
- Delivery services
- Emergency services
- Military vehicles.

FUTURE WORKS

- Enhanced accuracy: Future work could focus on improving the accuracy of the system by using more advanced sensors and algorithms.
- Machine learning: Future work could involve the use of machine learning techniques to analyze data and improve the system's ability to detect signs of drowsiness.
- Personalization: Future work could focus on personalizing the system to suit the individual needs and preferences of each driver, improving their driving experience.
- Integration with other systems: Future work could involve integrating the drowsiness system with other vehicle safety systems, such as collision detection and lane departure warning systems, to provide a more comprehensive safety solution.
- Real-time intervention: Future work could focus on developing real-time intervention strategies, such as changing the vehicle's speed or

adjusting the seat position, to prevent accidents caused by drowsy driving.

REFERENCES

[1]. M. Wu, S. Zhang, and Y. Dong, "A novel model-based driving behavior recognition system using motion sensors," Sensors, vol. 16, no. 10, p. 1746, Oct. 2016.

[2] B.-G. Lee, B.-L. Lee, and W.-Y. Chung, "Mobile healthcare for automatic driving sleep-onset detection using wavelet-based EEG and respiration signals," Sensors, vol. 14, no. 10, pp. 17915–17936, Oct. 2014.

[3]. E. E. Galarza, F. D. Egas, F. M. Silva, P. M. Velasco, and E. D. Galarza, "Real time driver drowsiness detection based on driver's face image behavior using a system of human computer interaction implemented in a smartphone," in Proc. Int. Conf. Inf. Theoretic Secur. Jan. 2018, pp. 563–572.

[4] D. Kim, J. Choi, H. Yoo, U. Yang, and K. Sohn, "Rear obstacle detection system with fisheye stereo camera using HCT," Expert Syst. Appl., vol. 42, nos. 17–18, pp. 6295–6305, Oct. 2015.

[5] S. Sivaraman and M. M. Trivedi, "Looking at vehicles on the road: A survey of vision-based vehicle detection, tracking, and behavior analysis," IEEE Trans. Intell. Transp. Syst., vol. 14, no. 4, pp. 1773–1795, Dec. 2013.

[6] I. Lashkov, A. Smirnov, A. Kashevnik, and V. Parfenov, "Ontologybased approach and implementation of ADAS system for mobile device use while driving," in Proc. 6th Int. Conf. Knowl. Eng. Semantic Web, Sep. 2015, pp. 117–131.

[7] A. Kashevnik et al., "Context-based cyclist intelligent support: An approach to e-bike control based on smartphone sensors." in Proc. Int. Conf. Next Gener. Wired/Wireless Netw. Cham, Switzerland: Springer, Aug. 2018, pp. 16–22.

[8] J. Kim et al., "Impact of the face angle to traveling trajectory during the riding standing-type personal mobility device," in Proc. Web Conf. (MATEC), vol. 161, Apr. 2018, Art. no. 003001

[9] National Center for Statistics and Analysis. (2018). Early Estimate of motor Vehicle Traffic Fatalities for the First Half (Jan- Jun) of 2018. Accessed: Feb. 12, 2019.

[10] L. Moreira-Matias and H. Farah, "On developing a driver identification methodology using in vehicle data recorders," IEEE Trans. Intell. Transp. Syst., vol. 18, no. 9, pp. 2387–2396, Sep. 2017.