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RESEARCH ARTICLE

SURVEY ON COMPACT DRIVING SYSTEM USING IOT

*Priya, B., Keerthana, R. and Rathina Priya, V.

Department of Computer Science and Engineering, Easwari Engineering College, Chennai--600089, India

ABSTRACT

In recent years, driver's drowsiness is the main cause of accidents causing severe physical injuries, death and economic loss. The purpose of this paper is to develop an automatic moving car with a predefined destination incase of Somnolence and less heartbeat detection techniques for identifying driver's current state. Driver's Somnolence is analyzed by his/her eye blink movement and also we can measure the heart rate of driver during Somnolence. If heart rate goes abnormal then the message intimation will automatically send to the nearer hospital. And the main aim of this system the vehicle will automatically moves on to the particular location (hospital/home).

Key words: Internet of things (IoT), Sensors, Microcontorler.

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INTRODUCTION

Humans occupy the major part of the living system in the world, thus rash driving has been increasing rapidly. Each and every day accidents are occurring. Most of the accidents are occurring due to the negligence of the driver and tiredness. By driving over speed or by sleeping during driving these accidents occur. To reduce these accidents and protect their life an effective system need to be developed. Thus in the proposed system we are using new technology to detect the abnormality of the driver. The heart beat sensor will check the heartbeat of the driver. If the heart beat went abnormal the vehicle will be stopped. If the driver is sleepy and if he closes the eye then eye blink sensor will detect it and alert the driver using buzzer for the first time then next time vehicle will be stopped. The driver distraction has been identified as one major cause of unsafe driving. In Existing system more number of accidents occurs.

Related works

"Interaction of Automation Visibility and Information Quality in Flight Deck Information Automation", Michael C. Dorneich, Senior Member, IEEE, Rachel Dudley, Emmanuel Letsu- Dake, William Rogers, Stephen D. Whitlow, Michael C. Dillard, and Erik Nelson proposed an empirical study evaluated key human factors is-sues related to automation visibility and information quality, based on a refined definition of information automation.

***Corresponding author:* Priya, B., Keerthana,**
Department of Computer Science and Engineering, Easwari Engineering College, Chennai--600089, India

Next-generation air transportation system operational concepts will dramatically affect the types and amount of information available on flight decks. Information automation systems collect, process, and present information to support pilot tasks and awareness. The definition of flight deck information automation was refined to differentiate it from other types of automation. Pilots interacted with an example information automation system to investigate the premise that automation visibility will have an impact on the ability of pilots to detect problems resulting from poor information quality. Poor information quality appeared to be difficult for pilots to detect, even when presented with high automation visibility. Pilots tended to over-trust automation, so when reporting high workload and information was missing, they chose the top plan suggested by the automation even though it was not the best. Trust in automation was reduced by low information quality, but compensated for by increased automation visibility. Added information to help pilots understand information automation state and outputs, given a level of information quality, should be balanced against potential increases in pilot workload due to the time and attention needed to process the extra information.

"Vehicle Positioning and Trajectory Tracking by Infrared Signal-Direction Discrimination for Short-Range Vehicle-to-Infrastructure Communication Systems", Wern-Yarng Shieh, Senior Member, IEEE, Chen-Chien James Hsu, Senior Member, IEEE, and Ti-Ho Wang proposed a reliable method to determine the coming direction of an infrared signal, where the direction of the signal sent by the vehicle relative to the receiver is determined by amplitude comparison. We utilize a simple symmetric structure comprising four identical planar receiving modules, each with a specific tilt angle relative to the receiving plane, to construct the receiver. The coming direction

of the signal is extracted by comparing the signal strengths received by these four receiving modules. With the aid of a simple geometric relation, the trajectory of a vehicle is tracked, i.e., its positions are located, from the coming direction of the signal originated from this vehicle when it travels through the communication area of the system. For several vehicles simultaneously appearing in the communication area, the vehicles can be distinguished in the frequency domain from different frequencies sent by different vehicles. Our signal-direction discriminator proposed in this paper is able to locate the position of the vehicle in a communication area of 6 m in width and 20 m in length. In the lateral direction, this area sufficiently covers a typical traffic lane; in the longitudinal direction, it meets the general requirements of shorter than 20 m for common short-range vehicle-to-infrastructure communication systems, such as electronic-toll-collection applications.

"Relating Random Vector and Random Finite Set Estimation in Navigation, Mapping and Tracking", Keith Y. K. Leung, Member, IEEE, Felipe Inostroza, Student Member, IEEE, and Martin Adams, Senior Member, IEEE has concluded that The formulation of navigation, mapping, and tracking problems using the RFS framework can be related to the RV formulation, only through the application of ideal detection conditions, which assume no clutter, a single and correct permutation of data association and a known map cardinality. In contrast, the RFS approach considers all possible permutations of data association while accounting for detection statistics, and unknown map cardinality. This is true not only for Bayesian filtering, but also ML batch estimation. A feasible solution to RFS-based batch estimation is however still an open problem and therefore the findings were validated using Bayesian filtering approaches. The RFS based PHD-SLAM algorithm was shown to perform similarly to the RV based FastSLAM and MH-FastSLAM algorithms under close-to-ideal detection conditions. When conditions became non-ideal with low probabilities of detection and high clutter, PHD-SLAM continued to produce estimates with lower errors, whereas the estimates from the RV approaches diverged. This is due to their implicit assumption of ideal detection conditions, and the possible bias caused by the utilization of a single data association hypothesis. It should also be noted that the PHD filter is the simplest approximation of an RFS Bayes filter. More advanced RFS filters, such as the CPHD and the MB filters, are expected to yield improved results. In particular, the LMB filter has been implemented for solving the SLAM problem. Through the understanding obtained in this article, the simpler RV formulation can be successful when detection conditions are close to ideal, where data association is unlikely to fail. However, in realistic cases of feature misdetections and high clutter, the more complex RFS framework provides a more robust approach.

Wearable Mobile-Based Emotional Response-Monitoring System for Drivers Boon Giin Lee, Member, IEEE, Teak Wei Chong, Boon Leng Lee, Hee Joon Park, Yoon Nyun Kim, and Beomjoon Kim has proposed a negative emotional responses are a growing problem among drivers, particularly in countries with heavy traffic, and may lead to serious accidents on the road. Measuring stress- and fatigue-induced emotional responses by means of a wireless, wearable system would be useful for potentially averting roadway tragedies. The focus of this study was to develop and verify an emotional response-monitoring paradigm for drivers, derived from electromyography signals of the upper trapezius muscle, photoplethysmography signals of the earlobe, as well as inertial motion sensing of the head movement. The relevant sensors were connected to a microcontroller unit equipped with a Bluetooth-enabled low-energy module, which allows the transmission of those sensor readings to a mobile device in real time. A mobile device application was then used to extract the data from the sensors and to determine the driver's current emotion status, via a trained support vector machine (SVM). The emotional response paradigm, tested in ten subjects, consisted of 10 min baseline, 5 min prestimulus, and 5 min post stimulus measurements. Emotional responses were categorized into three classes: relaxed, stressed, and fatigued. The analysis integrated a total of 36 features to train the SVM model, and the final stimulus results revealed a high accuracy rate (99.52%). The proposed wearable system could be applied to an intelligent driver's safety alert system, to use those emotional responses to prevent accidents affecting themselves and/or other innocent victims.

"Real-time Driver Drowsiness Detection System Based on PERCLOS and Gray scale Image Processing ", Jun-Juh Yan, Hang-Hong Kuo, Ying-Fan Lin, Teh-Lu Liao proposed This study develops a real-time drowsiness detection system based on gray-scale image processing and PERCLOS to determine if the driver is fatigued. The proposed system comprises three parts: first, it calculates the approximate position of the driver's face in grayscale images, and then uses a small template to analyze the eye positions; second, it uses the data from the previous step and PERCLOS to establish a fatigue model; and finally, based on the driver's personal fatigue model, the system continuously monitors the driver's state. Once the driver exhibits fatigue, the system alerts the driver to stop driving and take a rest. They concluded that it is a real-time, gray-scale simulation system to detect driver drowsiness by image processing. In testing and results, and based on the fatigue model, the system can help monitor the drivers' physical state, and remind drivers if they are tired, which they themselves may not noticed. The biggest difference between commercially available products and the system proposed in this study is the use of gray-scale images, which means that detection of skin color is not required. Although the proposed system features additional calculation steps, it requires less memory and could be applied in different environmental conditions. For example, it could be used even when the driver is wearing glasses or a respiratory mask.

"Neuromorphic Visual Information Processing for Vulnerable Road User Detection and Driver Monitoring", W. S. Han, I. S. Han has proposed a system considering the number of fatalities and serious injuries of road users, the safety enhancement has begun to gain more attention, in particular the innovation and application of Advanced Driver Assistance System Technologies. We have proposed that the neuromorphic visual processing algorithm based on the biological vision system is an effective approach for making detection of human figures from a moving vehicle, with the focus on either the driver or other vulnerable road users, such as the pedestrians or cyclists on the road. The effectiveness of proposed neuromorphic networks of visual processing is evaluated for the vulnerable road user detection technology via the 99% (day time) and 88% (night time) of successful detection rate. The post enhancement with deep networks showed that further applications could be sought from incorporating neuromorphic visual processing into Driver State Monitoring for the purpose

Title	Author	Technique	Issue	Result
Interaction of Automation Visibility and Information Quality in Flight Deck Information Automation	Michael C. Dorneich, Rachel Dudley, Emmanuel Letsu- Dake, William Rogers, Stephen D. Whitlow, Michael C. Dillard, and Erik Nelson V	Information Automation	Creates workload, slower performance, more attention is needed and too much automation visibility information.	It provides information about trade offs and reinforcing the need to balance visibility with increasing information processing requirement.
Vehicle Positioning and Trajectory Tracking by Infrared Signal-Direction Discrimination for Short-Range Vehicle-to-Infrastructure Communication Systems	Wern-Yarng Shieh, Chen-Chien James Hsu, and Ti-Ho Wang	Infrared Communication	It tracks only the position of the vehicle based on the direction within the limited angles.	More robust solution in low probabilities of detection.
Relating Random Vector and Random Finite Set Estimation in Navigation, Mapping and Tracking	Keith Y. K. Leung, Felipe Inostroza and Martin Adams	Signal Processing	It only does mapping and tracking if the target is found to be lost.	A feasible solution to RFS-based batch estimation is however still an open problem and therefore the findings were validated using Bayesian filtering approaches.
Wearable Mobile-Based Emotional Response-Monitoring System for Drivers	Boon Giin Lee, Teak Wei Chong, Boon Leng Lee, Hee Joon Park, Yoon Nyun Kim and Beomjoon Kim	Human-Machine system	It measures only the head posture and heart beat.	It demonstrated a high potential for implementation as a wearable emotional response evaluative system , based on head motion and physiological signals.
Real-time Driver Drowsiness Detection System Based on PERCLOS and Gray scale Image Processing	Jun-Juh Yan, Hang-Hong Kuo, Ying-Fan Lin, Teh-Lu Liao	Grayscale image processing	Grayscale images are hard to identify the skin region rather than color images.	Monitor the driver's physical state, and remind drivers if they are tired.
Neuromorphic Visual Information Processing for Vulnerable Road User Detection and Driver Monitoring	W. S. Han, I. S. Han	Neuromorphic visual processing algorithm	It only monitor driver's head movements rather than face.	Intelligent driver's safety based on the portable computer
Research on Driver's Face Detection and Position Method Based on Image Processing	Jia Mingxing, Xu Hengyuan, Wang Fei	Pattern Recognition Technique (Image processing	Monitors face position detection	Detects and position driver's face under various kinds of complex conditions.
EyeAwake: A Cost Effective Drowsy Driver Alert and Vehicle Correction System	Akshay Bhaskar	Deep Learning Technique	Difficult to implement it in real time while keeping the cost and complexity of the system low.	A low cost simple embedded system is presented in this paper to detect drowsy driving.
Fine-grained Abnormal Driving Behaviors Detection and Identification with Smartphones	Jiadi Yu,Zhongyang Chen, Yanmin Zhu, Yingying Chen, Linghe Kong and Minglu Li	Mobile Computing	This type of application only focus on identify driver driving behaviors, used external hardware's and high cost	Automatically identify abnormal condition and also notify location to respected users

of enhancing vulnerable road users' safety. The early implementation demonstrated the advantages of fast and robust neuromorphic vision with either the small embedded system or the portable computer based emulator, and the orientation processing of 30 frames per second with the neuromorphic ASIC and FPGA. The proposed intelligent system of neuromorphic visual recognition is evaluated successfully for its applicability and feasibility to the improved driving safety, by both the simulation with real video data sets and the real time experimentation based on the portable computer or FPGA. The operational speed is achieved to 15 frames per second, on the primitive test device of FPGA embedded system. The feasibility of digital neuromorphic CMOS ASIC was also demonstrated for the real time neuromorphic orientation processing for High Definition video streams, based on the VLSI of 0.18um CMOS developed by the industry collaborator of an Electric Vehicle component supplier. The stand-alone neuromorphic ASIC demonstrated the speed performance of 30 frames per second and it works without any peripheral memory or complex programming. In addition to the pedestrian and VRU detection, the robustness of neuromorphic visual information processing is demonstrated by the successful human object detection in the dark car park. "Research on Driver's Face Detection and Position Method Based on Image Processing", Jia Mingxing, Xu Hengyuan, Wang Fei has proposed a face detection system for fatigue driving detection.

Due to the complicated situation when driving, conventional methods that applied in detecting driver's face take a large amount of time and are at low accuracy rate. For this reason, an ellipse with self-learning radius is taken to instead of 2d Gaussian Distribution Model, and some other promoted methods are also used in this paper such as Integral Projection, Barycenter Adjustment method, etc. All of these achieve the purpose of positioning face accurately and quickly in various complicated cases such as complex illumination, small angles of side face, etc. Nowadays, traffic accidents result in great economic damages and casualties, and fatigue driving is one of the most important reasons owing to traffic accidents. So how to identify driver's fatigue state accurately and quickly is of significance to reduce the number of traffic accidents. The openness of driver's eyes reflects his fatigue condition directly. Therefore, detecting the state of driver's eyes is an effective way to research the fatigue state of drivers; above all, the first important thing is to position driver's face. At the present time, the methods of detecting and positioning the face of driver's mainly include: Based on Skin color Characteristic, SVM, Probability Model, Template Matching, etc. And among them, as the algorithm based on Template Matching is difficult to get an effective template to present the common property of human face results from ignoring the fact that face is a plastic model, it is in rare use now.

This research on the method of detecting driver's face is of great significance. With the development of robot vision and Pattern Recognition Technique, especially Face Recognition Technology, the algorithms of detecting driver's face emergent like mushrooms after rain. That emphasize on non-contact is an important aspect, and this paper's research is based on video. In the process to detect and position driver's face under various kinds of complex conditions, such as frequently move, body vibration, etc, realized the accepted demands. "EyeAwake: A Cost Effective Drowsy Driver Alert and Vehicle Correction system", Akshay Bhaskar putforth that, drowsy driving has become a leading cause of accidents. Detecting and correcting drowsy driving before an accident occurs is crucial. Several drowsy driving detection systems have been developed. However, most of these systems rely on complex image processing algorithms which don't work well especially at night when ambient lighting is low or not present at all. Also, low cost drowsy driving detection and alert systems with satisfactory accuracy are not widely available. This paper presents a cost effective drowsy driver alert and vehicle correction system called EyeAwake. It is also capable of providing exterior visual notifications to other drivers and pedestrians on the road to steer clear from the drowsily driven vehicle. EyeAwake monitors the behavioral and physiological characteristics of the driver such as eye blinking rate, unnatural head nodding/swaying, breathing rate and heart rate to detect drowsy driving. A wide range of sensors are used to monitor these parameters. EyeAwake achieves a remarkable 70% accuracy on road and costs approximately US$40 to build.

"Fine-grained Abnormal Driving Behaviors Detection and Identification with Smartphones", Jiadi Yu,Zhongyang Chen, Yanmin Zhu, Yingying Chen, Linghe Kong and Minglu Li proposed a Real-time abnormal driving behaviors monitoring is a corner stone to improving driving safety. Existing works on driving behaviors monitoring using smartphones only provide a coarse-grained result, i.e. distinguishing abnormal driving behaviors from normal ones. To improve drivers' awareness of their driving habits so as to prevent potential car accidents, we need to consider a fine-grained monitoring approach, which not only detects abnormal driving behaviors but also identifies specific types of abnormal driving behaviors, i.e. Weaving, Swerving, Sideslipping, Fast U-turn, Turning with a wide radius and Sudden braking. Through empirical studies of the 6-month driving traces collected from real driving environments, we find that all of the six types of driving behaviours have their unique patterns on acceleration and orientation. Recognizing this observation, we further propose a fine-grained abnormal Driving behavior Detection and iDentification system, D3, to perform real-time high-accurate abnormal driving behaviors monitoring using smartphone sensors. We extract effective features to capture the patterns of abnormal driving behaviors. After that, two machine learning methods, Support Vector Machine (SVM) and Neuron Networks (NN), are employed respectively to train the features and output a classifier model which conducts fine-grained abnormal driving behaviors detection and identification. From results of extensive experiments with 20 volunteers driving for another 4 months in real driving environments, we show that D3 achieves an average total accuracy of 95.36% with SVM classifier model, and 96.88% with NN classifier model.

Conclusion and Future Work

From the review of various journals, it is concluded that, the driver's safety has been detected. And the proposed system will detect the driver's safety and it automatically drives to the secured destination like home and hospital. If there is any abnormal detection from the driver it immediately trace the current position of the car and heads to the nearby safe place. The future implementation of this project can also be used in trains and boats by detecting the driver's condition and by using gps, it can automatically head to the destination.

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