VEHICULAR PARAMETER:

Vehicular parameter-based technique try to detect driver drowsiness based on vehicular features such as frequent lane changing patterns, vehicle speed variability, steering wheel angle, steering wheel grip force, Vehicle before the drivers vehicle. this method can be identified by adding sensors on vehicle parts like steering wheel, accelerator, brake pedal, and ADAS sensors in the vehicle

[1] The study about driver drowsiness detection based on steering wheel has been derived introducing new method based on neuro-fuzzy logic has been proposed which states that it is the combination of filter methods and neuro-fuzzy-wrapper method. Adaptive training of the parameters has been considered in the first step four different filter methods such as FisherT test, correlation and Mutual information have been exploited and used to determine the important indexes, then fuzzy inference system has been designed and for this inputs are taken from the classification of four filter methods have been used to find the feature. PSO as an evolutionary optimization algorithm has been exploited to train Adaptive Neuro Fuzzy Inference System (ANFIS). Classifier accuracy has been used as feedback for the adjustment of parameters in the fuzzy membership functions. The features which have importance degree more than a predefined threshold value have been employed in the support vector machine binary classifier (SVM).

[2] Non-interference driving fatigue detection system based on intelligent steering wheel. Have been performed by a steering wheel with an embedded ECG collector. this signal has been collected by holding the steering wheel with both hands. This method has also included Cycle-generative adversarial network to realise the interconversion of palm data and chest data this have been collected by using ECG. then they have used FNN and CNN algorithm to improve the stability of model. With this the authors states that this method can process time series signals better and improve the accuracy of fatigue detection. the validity and reliability of there method are proved by a series of experiment.

[3] In this paper the Driver Drowsiness identification method that is based on the driving behaviour signals that are observed while the driver is following another vehicle. In this the authors have compared the difference between two methods namely physical dynamic model and stastical, non-parametric model. The driving behaviour signals of the accelerator pedal, brake pedal, vehicle velocity and distance to the vehicle in front where measured using driving simulator the authors states that the identification rates are 81% for using simulator based driving method and 73% for using actual vehicle and conclude that the physical model and statistical model is not competitive model.

[4] Unobtrusive drowsiness detection methods can avoid catastrophic crashes by warning or assisting the drivers. this paper gives an experimental analysis of driver’s drowsiness condition and evaluates the performance of a neural network-based algorithm which monitors the drivers steering input .an artificial neural network is trained to learn steering input of drivers driving state. The data for this experiments has been taken by stimulation method and is been used for test and training ANN. the road curvature steering wheel angle has been removed before testing the filter data has been pre-processed and output has been received for the input the result for this accuracy has been stated for truck and car and the accuracy rate has been similar for both and the rate is 86%. With this the authors states that this proposed method holds the promise of safer roadways when coupled with a warning system

[1] Sadegh Arefnezhad, Sajjad Samiee, Arno Eicberger and Ali Nahvi. Driver Drowsiness Detection Based on Steering Wheel data Applying Adaptive Neuro-Fuzzy Feature Selection. Sensors.2019,19(4),943;

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<https://doi.org/10.3390/s19040943>

[2] Guanglong Du, Huijin Wang, Kangu Su. Non-Interference Driving Fatigue Detection System Based on Intelligent Steering Wheel.IEEE.13 October 2022, article sequence number 3527711, **INSPEC Accession Number:**22236488

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[3] T.Wakita, K Ozawa, C.Miyajima . Driver Identification using Driving Behaviour signals. IEEE.16 September 2005, **INSPEC Accession Number:**8750177

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[4] Azim Eskandrarian, Ali Mortazavi. Evaluation of smart Algorithm for commercial Vehicle Driver Drowsiness Detection. IEEE. 13 August 2007. **Print ISSN:** 1931-0587. INSPEC Accession Number:9800164

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In summary, although several methods have been used in the study of driver fatigue detection, there is still room for improvement.

1) Fatigue detection based on vehicle status information is limited to the driver’s driving habits and road conditions, and its generalization ability is poor.

2) Fatigue detection methods based on drivers’ external performance have the advantage of non-invasive but are susceptible to the effects of light and facial occlusion. Therefore, this type of method has strict requirements in the experimental environment.

3) Most of the approaches that monitor driving fatigue through drivers’ internal physiological indicators will interfere with driving operations and endanger driving safety when collecting physiological signals.