

# **Design of driver drowsiness detection system using infrared light and image processing techniques**

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**Alertness level reduction and driver drowsiness are important factors in occurring of car accidents which cause many life and financial losses. One of the methods of fatigue and drowsiness detection is the usage of driver face monitoring systems. These systems extract the signs of drowsiness driver's face by receiving and processing the images camera. In this thesis, a real-time drowsiness detection system is designed which determine the level of driver alertness reduction by extracting the signs of drowsiness the eyes area. The imaging of the proposed system is done in the infrared light spectrum using two sets of infrared diodes which can display the pupil as shiny and bright. Then, using image processing methods, areas of the image that are the best candidates for the eyes are extracted. In this system, two parameters are extracted for detection of driver drowsiness: Percentage of Eye Closure (PERCLOS) and Eyelid Distance Changes (ELDC). Eyes parameters are extracted based on horizontal projection changes of open and closed eyes area. Then, these parameters are processed by a Fuzzy Inference System (FIS) to determine the level of the driver drowsiness. Due to the usage of infrared spectrum lighting, the proposed system has proper accuracy and function in different light conditions. The results of the experiments on the videos produced in the real and laboratory environment, show that the proposed method has a good accuracy in the extraction of parameters and detection of the driver drowsiness.**

**Keywords : Drowsiness Detection - Driver Alertness - Image Processing - Infrared Light - Fuzzy Inference System**

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