

## **ABSTRACT**

*The high number of accidents on the highway requires an improvement in technology to prevent that number from increasing. There are many causes of accidents on the highway, one of them is drowsy driver. To lessen the accident caused by drowsy drivers, it is needed to make drowsiness detection system.*

*This Final Project conducted a drowsiness expression detection system based on digital image processing. This drowsiness expression detection is focusing on the facial expression of sample object by combining the state of the eyes and mouth. This study uses the images in RGB layer in .mp4 format as the dataset to do the face detection and detect the facial expression that is shown by the object in each frame . The face detection is carried out with the Viola-Jones algorithm to get the face image. The part of eyes and mouth of the face image then being cropped according the determined coordinate by the system to obtain the eyes and mouth images. After that, the eyes and mouth images are extracted using Gray Level Co-occurrence Matrix (GLCM) method. Furthermore, the state of the eyes and mouth are classified using Support Vector Machine (SVM) classifier to classify whether the eyes/mouth is (are) closed or opened, then the result is being checked whether the eyes and mouth states considered to represent normal, fatigue, or drowsy expression.*

*In the detection system that is designed, the testing is performed on the performance parameters which are accuracy and computation time. The testing scheme conducted is the use of color space layer types, offset angle ( $\theta$ ), pixel distance ( $D$ ), kernel types ( $D$ ), and the  $\sigma$  value of gaussian kernel. From the result, the best performance of the system is obtained in the scheme of  $\theta = 0^\circ$ ,  $D = 5$ , color space layer of grayscale in gaussian kernel, and  $\sigma = 1$  with the accuracy of 73.73% and computation time for 0.043 seconds.*

**Keywords** : *Drowsiness, face detection, Viola-Jones, Gray Level Co-occurrence Matrix, Support Vector Machine*