

## **ABSTRACT**

This study aims to create a website for a fatigue detection system using Machine Learning to determine whether a person is fatigued or not. The background for developing this fatigue detection system is due to a request for system automation from PT Kereta Api Indonesia (KAI). Before working, every train engineer and assistant engineer is required to undergo a health check, a brief assessment, a locomotive condition check, and comply with the Standard Operating Procedures (SOP) in their work. The health checks currently conducted are still manual, involving a question and answer process between healthcare workers and the on duty train engineers, making the health check process less flexible and time consuming. Therefore, a solution is needed to quickly and more flexibly address the issues in checking the health condition of train engineers.

The proposed solution to address the inflexible and time consuming health check process is to use Image Processing and Machine Learning technologies. In this study, Convolutional Neural Network (CNN) will be used as the Machine Learning method. Three architectures will be used: VGG-19, ResNet50, and EfficientNetV2. The architecture with the highest accuracy will then be integrated into the website, facilitating health condition checks through eye condition analysis.

In the testing phase, the dataset was obtained from 32 individuals for the fatigued class with a total of 315 samples and 30 individuals for the non-fatigued class with a total of 298 samples, VGG-19 achieved an accuracy rate of 98%, while ResNet50 achieved 75%, and EfficientNetV2 achieved 86%. This indicates that the VGG-19 architecture has a better ability to classify fatigue through eye conditions. Thus, it can be concluded that this study successfully developed a fatigue detection system through eye conditions. The use of the CNN method with the VGG-19 architecture provides a high accuracy rate in classifying fatigue. The fatigue detection website, integrated with the system, can be used easily and flexibly. Therefore, this study provides an effective solution to facilitate health condition checks for fatigue.

**Keywords:** Machine Learning, Convolutional Neural Network, VGG-19, ResNet50, EfficientNetV2