

IoT Based Railway Track Faults Detection and Localization using Acoustic Analysis and Signalling

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Abstract: Ensuring the safety and efficiency of rail transportation is paramount, necessitating timely inspection of railway tracks to prevent potential hazards. This research introduces an innovative approach by implementing an Internet of Things (IoT)-based autonomous railway track fault detection system. Various track components, such as rail surface defects, broken sleepers, missing fasteners, and irregular ballast levels, can lead to hazardous situations if not properly monitored. This master's thesis proposes an efficient method for classifying track components using image processing techniques and deep learning algorithms. Specifically, it focuses on detecting missing fasteners by analyzing images captured by a line camera. Experimental results demonstrate the method's effectiveness and robustness in complex environments. Future work aims to develop a comprehensive model capable of classifying all track components simultaneously. Image processing is utilized to extract individual components such as fasteners, rail, ballast, and sleepers, with the model trained to classify fastener states. This research contributes to advancing railway inspection methods, mitigating operational costs, preventing accidents, and enhancing passenger experience.

Keywords: Railway track inspection, Internet of Things (IoT), Autonomous fault detection, Image processing, Deep learning, Missing fasteners

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