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Enhancing Railway Safety and Efficiency: Advanced Object and Signal Detection Using Cameras and Sensors

This paper explores the integration of advanced camera and sensor technologies for object and signal detection on railway tracks, aiming to enhance safety and operational efficiency. The study reviews the functionalities and applications of high-resolution cameras, infrared cameras, LIDAR, ultrasonic, and infrared sensors in monitoring and analyzing the railway environment. By leveraging machine vision algorithms and real-time data processing, the system offers comprehensive monitoring capabilities, including obstacle detection, signal compliance, and track maintenance. The research highlights the advantages of integrating these technologies to improve the accuracy of detection and response times, addressing challenges such as environmental conditions and data overload. Future trends, including advancements in artificial intelligence and autonomous systems, are also discussed, emphasizing their potential to further revolutionize railway safety and efficiency.

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Track Classification: Innovation and Technology for Sustainability