Abstract Title: Development Technology to Analyse, Evaluate and Prevent Human Errors of Railroad workers

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Recent incidents of railway derailments and worker fatalities have highlighted the ongoing issue of railway safety accidents. Despite advancements in high-speed trains and automated, complex railway systems, operations and maintenance still heavily rely on human workers. Human error remains a significant factor in these accidents, underscoring the critical need for system improvements and advanced safety management frameworks to prioritize safety and mitigate human error-related risks. This study, supported by the Korean government, aims to develop such preventive technologies.

The research encompasses four major topics: (1) development of a system for collecting and analyzing data on railway workers' human factors, including health checks, work hours, camera footage, and biometric information like blood pressure and heart rate; (2) implementation of real-time safety support systems for railway workers using smart helmets and paperless tools; (3) creation of an integrated management system for evaluating and predicting human errors through task analysis, identifying safety and non-safety tasks, and quantifying their impact factors, similar to human reliability analysis; (4) development of a multi-user virtual training system for joint emergency response training, allowing multiple railway workers to train simultaneously, with real-time comprehensive analysis of training effectiveness based on trainees' biometric signals.