Bundesministerium
Klimaschutz, Umwelt,
Energie, Mobilität,
Innovation und Technologie

RailPrev

Preventive automatic damage pattern analysis of imperfections on rail infrastructure components to optimize maintenance processes

Ein Projekt finanziert im Rahmen der 11. Ausschreibung
des FTI-Programms **Mobilität der Zukunft** durch das BMK
Condition-Based Maintenance im System Bahn

A safe and smooth rail journey is currently possible with regularly scheduled inspections and maintenance of the rail network. The assessment of rail infrastructure components on the track and in the station area is currently carried out by manual visual inspection either in periodic cycles or reactively due to malfunctions. The replacement of rail infrastructure components, such as insulation on the rails for signaling, switch hearts as well as the rail itself, is costly and usually interferes with regular rail traffic. This is naturally associated with high direct and indirect costs. Continuous automatic monitoring and the resulting proactive maintenance of the rail infrastructure thus bring corresponding monetary and processing advantages.
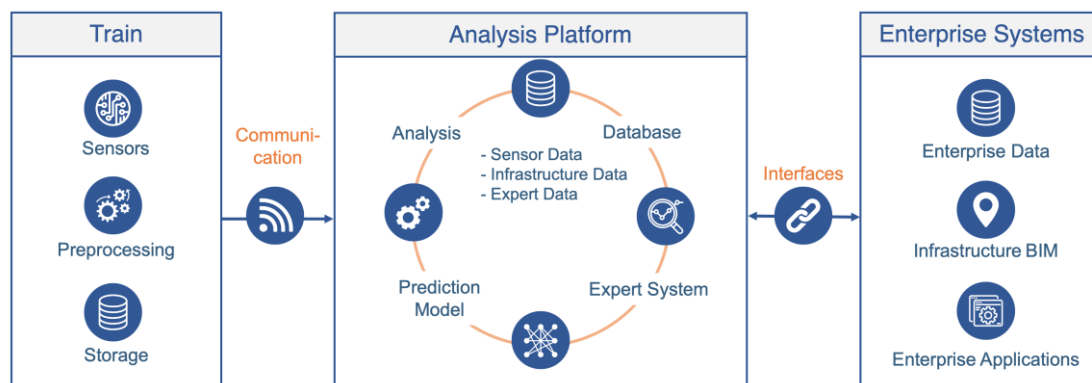

Figure 1: RailPrev Workflow

The main objective of the RailPrev project is to develop a system for efficient condition monitoring based on recorded sensor data, intelligent processing and data communication, and data analysis carried out on this data, and subsequently to achieve a predictive maintenance solution. In the RailPrev project, an overall concept is implemented that derives regular, comprehensive and, above all, objectified condition information for rail infrastructure components and offers preventive maintenance management for integration into existing company systems.
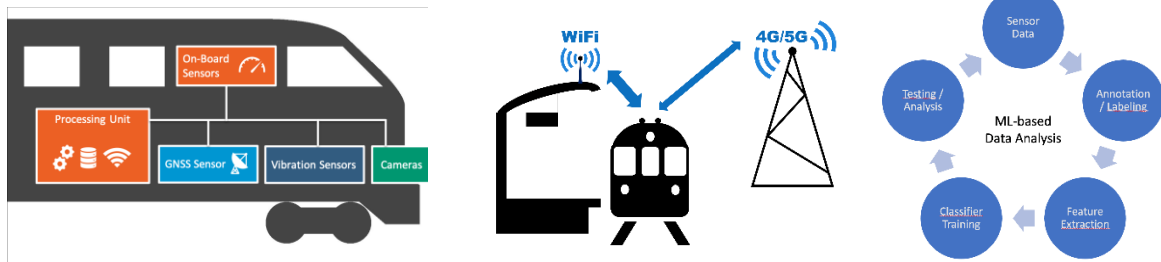
Figure 2: RailPrev – Recording plattform, communication and data analysis module

Based on the results of the ÖBB project SISSI (detecting disturbances at the insulating joints of rails by means of preventive damage pattern analysis in maintenance), in which defective infrastructure components were detected by means of vibration measurements, it was shown in RailPrev that developments in the field of data transmission, data management and data analysis procedures, enable essential optimizations for maintenance. The innovative solution developed in RailPrev includes vibration sensors, a positioning system and an intelligent transmission system that adapts the transfer of data depending on the available infrastructure. The central element is the developed data management system, which can manage sensor data distributed over very large spatial distances and recorded at high data rates. In addition, interfaces have been provided to import inventory data and export results for external company systems. Tools for visualizing and integrating expert knowledge into the analysis process and for digitizing maintenance operations were developed in the form of a web application and mobile application, respectively. Classification algorithms are applied to this information, which can automatically detect faults in infrastructure components during operation and subsequently make predictions about the condition of the components as a basis for maintenance recommendations.
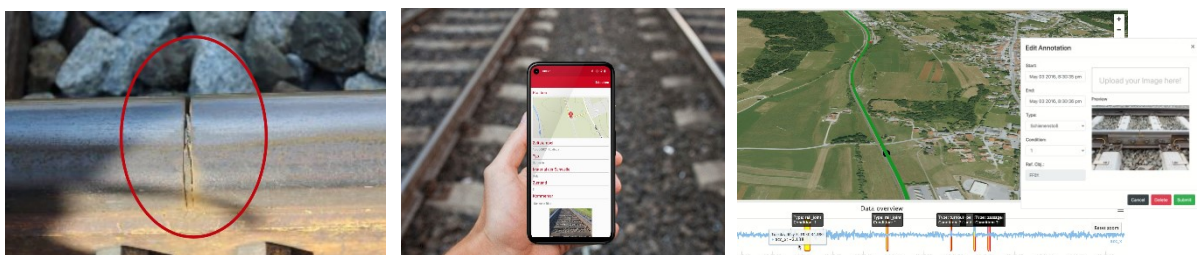

Figure 3: RaiPrev - Steps of expert labelling

Mobilität der Zukunft

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