

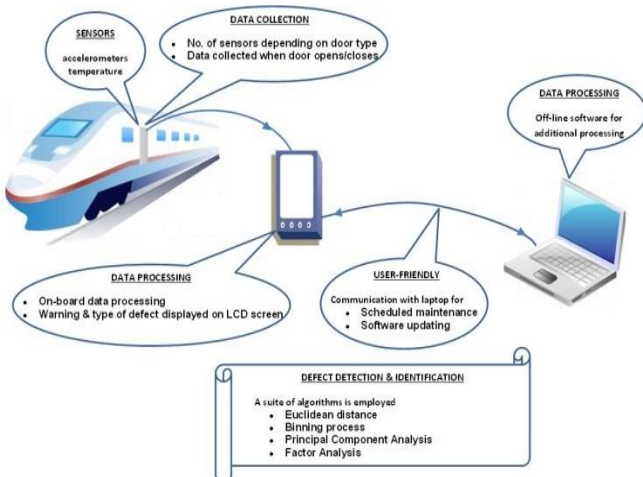
VA-RCM - Remote condition monitoring using vibration analysis for train door control system

Technical faults cause 19% of all transport delays in the rail network with malfunction of automatic train doors accounting for 20% of these technical faults. The root cause of unusual electronic conditions are usually mechanical wear faults of multiple causes, which eventually cause excessive noise, overheating and electrical failure.

Project objective

Vibration monitoring is a long established technology, as is the use of accelerometers for vibration detection. However, present commercial practice consists of periodic measurements with hand-held vibrometers. Existing approaches monitor electronic parameters and door opening/closure time profiles which provide only indirect indications of the source faults of door malfunctions which are usually mechanical.

Vibration changes are the most direct indication of all mechanical faults in door mechanisms. The low frequency vibration response of accelerometers permits full door coverage from one sensor location. No other sensor for detecting mechanical changes can achieve this.



The proposed system for remote condition monitoring using vibration analysis (VA-RCM) for train door control systems will automatically detect wear in door rollers, the linear shaft assembly, ball bearings and misalignments in the shaft and door panels in the very early stages, before breakdown of the door mechanisms occur. Early stage fault

detection may also make it possible to carry out low cost repairs at the scheduled maintenance intervals, avoiding the costly replacement of major door components and improving the component lifetimes. The intelligence of the VA-RCM system will arise from the signal processing applied to the analysis of the received accelerometer data.

The VA-RCM system is completely different to existing technologies in:

- Providing a single on-line vibration condition monitoring module for total coverage of automatic door mechanisms.
- Using a single accelerometer and single channel data acquisition system to provide total condition monitoring covering all critical door components (making the low cost possible).
- Providing automatic early warnings (LED warning lights changing from green to amber) of which components are likely to develop faults to the extent that the components require replacement at the next scheduled maintenance interval.

For further information, please visit the project website at www.va-rcm.com.

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