Applying Artificial Intelligence to Enable Predictive Maintenance

The KONUX Predictive Maintenance System

Benjamin Jansen, VP of Sales at KONUX
Railway is the safest, cheapest, and most sustainable means of transportation.
Our mission:

EMPOWER THE RAIL INDUSTRY TO OPERATE WITH THE HIGHEST AVAILABILITY
We combine industry knowledge with technology experience

Customers

ISO 9001 for building predictive maintenance systems
Q1 supplier of Deutsche Bahn

Board & advisers

Dr. Dieter Wilhelm
f. Board Knorr-Bremse

Andy Bechtolsheim
Co-founder SUN Microsystems

Heinrich von Pierer
f. CEO Siemens AG

Dr. Sören Hein
f. VP Technology Infineon

Dr. Volker Kefer
f. Board DB AG

Dr. Greg Papadopoulos
f. CTO SUN Microsystems

Awards & recognition

Technology Pioneer

German Digital Prize

#1 in Europe for Cyber-Physical Systems

German Mobility Prize

AI 100

Certifications

DB

SNCF

UIC Railway Asset Management Global Conference 2019
DIGITALIZATION STARTS WITH A QUICK WIN
“Going digital” requires a paradigm shift

Scheduled Manual Checks

Single measurements on the track provide a snapshot of the current condition

Continuous, Autonomous Monitoring

Continuous measurement enables daily monitoring and trend detection from the comfort of your office

Predictive & Prescriptive Maintenance

Machine learning models enable the prediction of critical conditions and recommendation of the appropriate maintenance measures
The KONUX hardware is autonomous, maintenance free and can be installed within minutes.

- High precision acceleration sensors
- Data Reader
- Pre-processing/Encoding
- 32GB Storage
- 4G GSM modules
- Processing unit
- Battery (>2 years)
The KONUX Predictive Maintenance System

KONUX System

Use cases
- Track bed (Ballast)
- Frog (Crossing)
- Locking System
- Point Machine

User Interface

KONUX AI Core

Analytics and Reporting Engine

IoT Sensors
- Acceleration
- Temperature, Weather
- Geolocation

Client System

Sensor and operational data
- Train schedules, Switch parameters, Maintenance Information, Electric current etc.

Client System
- e.g. SAP, IBM Maximo, etc.
**Dashboard:**
Stay on top of your most urgent issues

**Issue list**
- Ensure your maintenance actions have the highest impact on availability
- Easy and convenient workflow

**Personal overview**
- Keep an overview of the state of your switches
Adapt cycles of inspection based on the actual usage of the asset to achieve higher availability and save costs

- Compare actual vs. planned usage
- Train classification: cargo, passenger, highspeed
- Better strategic planning & optimized use of resources

Switch Usage: Know your true usage 24/7
Switch Load: Know the true usage of your switch

Always know how your switch is being used to timely adjust planning of inspection, maintenance or replacement.

- Detect 100% of all trains
- Compare actual vs. planned load
- Detect and avoid unnecessary speed restrictions to improve availability
Verify and monitor the quality of performed maintenance

- **Immediate effect validation**
- **Compare** the **impact** of maintenance actions
- **Avoid failures** as a result of ineffective maintenance

**Maintenance Validation:** know what works best for your assets
Our AI Core predicts how the trackbed condition will develop and notifies you when actions need to be taken.

- **90 days** outlook
- **Machine Learning** powered prediction with an average **90% hit rate**
- **Continuous improvement** of prediction accuracy

Trackbed forecast: See and prevent failures
Plan grinding and welding measures where they are needed to avoid failures and extend the life of your frogs

- Detect 90% of plastic deformations on frogs
- Trend analysis
- Warning notifications
We deliver actionable insights, easier

**Digitize the infrastructure**
through automated 24/7 condition monitoring

**Improve availability**
through early warnings of critical conditions and targeted maintenance

**Reduce maintenance costs**
through condition based effective maintenance actions

**Increase asset lifetime**
through condition based and targeted maintenance & quality assurance of conducted maintenance activities
Key takeaways

• Digitalization starts with a quick win

• Reliable predictions require continuous monitoring and AI-powered analysis

• For a predictive maintenance system to be adopted, it has to provide actionable insights, and make people’s lives easier in the process.
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