# Train Application Example
PCIe on Tracks

Driving on worn train tracks results in further damages of the track itself and the environment as well as railway bed and train bogie. Furthermore the vibrations and the noise are uncomfortable for passengers and staff.

Therefore train tracks have to be inspected regularly and exchanged on demand. But the higher frequency of vehicles causes problems with smaller time slots for the inspection.

As a solution, the speed of the test train needs to be increased without reduction of the inspection accuracy.

To fulfill these requirements our solution uses four PCIe based high resolution cameras together with a cluster of dedicated Intel core-i7 CPU boards connected by PCIe and real-time EtherCAT fieldbus for camera and flashlight triggering.
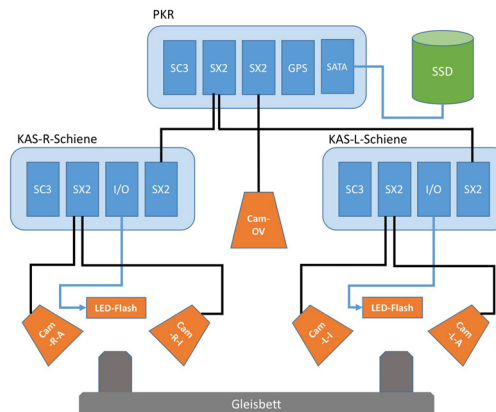
Benchmark:

+ up to 70 km/h driving speed

+ Clustered CPU boards with PCIe interconnection

+ Four 20 Mpx PCIe cameras with PCIe x4 Gen2 4GBit/s

+ One picture corresponds to 25cm track length at Full HD 3x8 Bit

+ Real-time EtherCAT connection

+ High speed mass storage connection via PCIe

+ Software tools for online processing are available

Future Proof:

The concept is modular for extension with four further dedicated cameras for driving at higher speed.

Rugged Products
For Railway Application

Train Application Example
Internet in Trains

Internet is everywhere, and of course we need it at a lot of branches of our daily life. The "Internet of Things" strictly consist of the capability to access the Internet at every time.

Owing to the construction of contemporary railway vehicles and also the high driving speeds, the connectivity of current devices is not comfortable enough at all stages of the journey.

The operational communication of the vehicle will be realized by GSM-R connection at the route or via WirelessLAN at stations, but the higher amount of information and the need of real-time information for train status, infotainment services and passenger information systems drives these technologies to the max.

To fulfill the requirements, trains can be equipped with external antennas for LTE connections and voice repeaters. Internally the data connection will be established via WirelessLAN.

With usage of different providers and frequencies an independent and high performance connection is possible, also with suitable providers by crossing borders to different countries at calculable costs.

Application Areas:

+ Internet access for passengers

+ Passengers Information Systems

+ Infotainment services

+ Status information of the vehicle

+ Video Surveillance

Configuration:

Flexible hardware for modular extension with various interfaces such as:

+ WiFi as LTE/UMTS or WLAN

+ GSM-R

+ GPS

+ 10Gbit Eth @ SFP+

+ 1GBit @ M12

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IVU TRAFFIC TECHNOLOGIES AG

EKF
SYSTEM

EKF Elektronik GmbH
Industrial Computers and
Information Technology
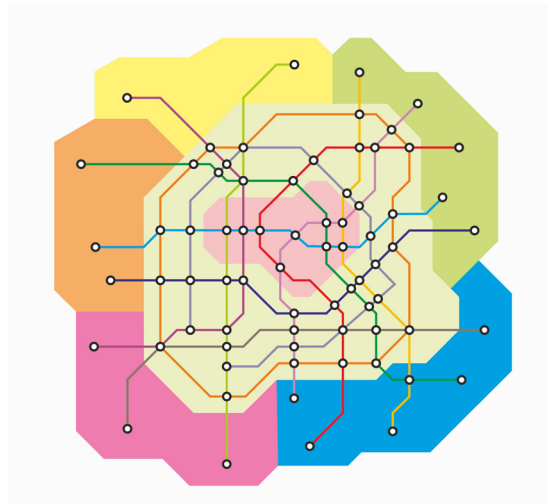
www.ekf.com

Train Application Example
Passenger Information System

Passenger Information Systems inside of a vehicle and stationary at a station are more and more used to offer dynamic information about the status of bus, ship, tram, underground or railway connections.

Passengers rely on the topicality and reliability of this information, therefore the same requirements are valid for the hardware and software which work in the background.

Rough environments due to extend temperature, rain, ice, shock and vibration are just some of the failsafe topics which must be addressed to reduce down times to the minimum.

The flexibility of a modular IPC with different interfaces to support existing cabling or installed screens and a component based software are the relevant parts of this solution for a new PIS or for the update of an existing installation.

Performance:

Server and client Software out of one hand

Processing power with low power and high performance Intel CPU boards

Flexible hard- and software configurations for integration in existing installations

Connections (up- and downstream):

+ RS232/485 galvanic isolated

+ up to 10GBit in copper and optical

+ audio in, for FFT of analog signals

+ audio out, for voice messages

+ various fieldbus and railway protocols

+ analog and digital I/O

Peripheral:

Positioning via GPS or incremental

LTE/UMTS and voice connection

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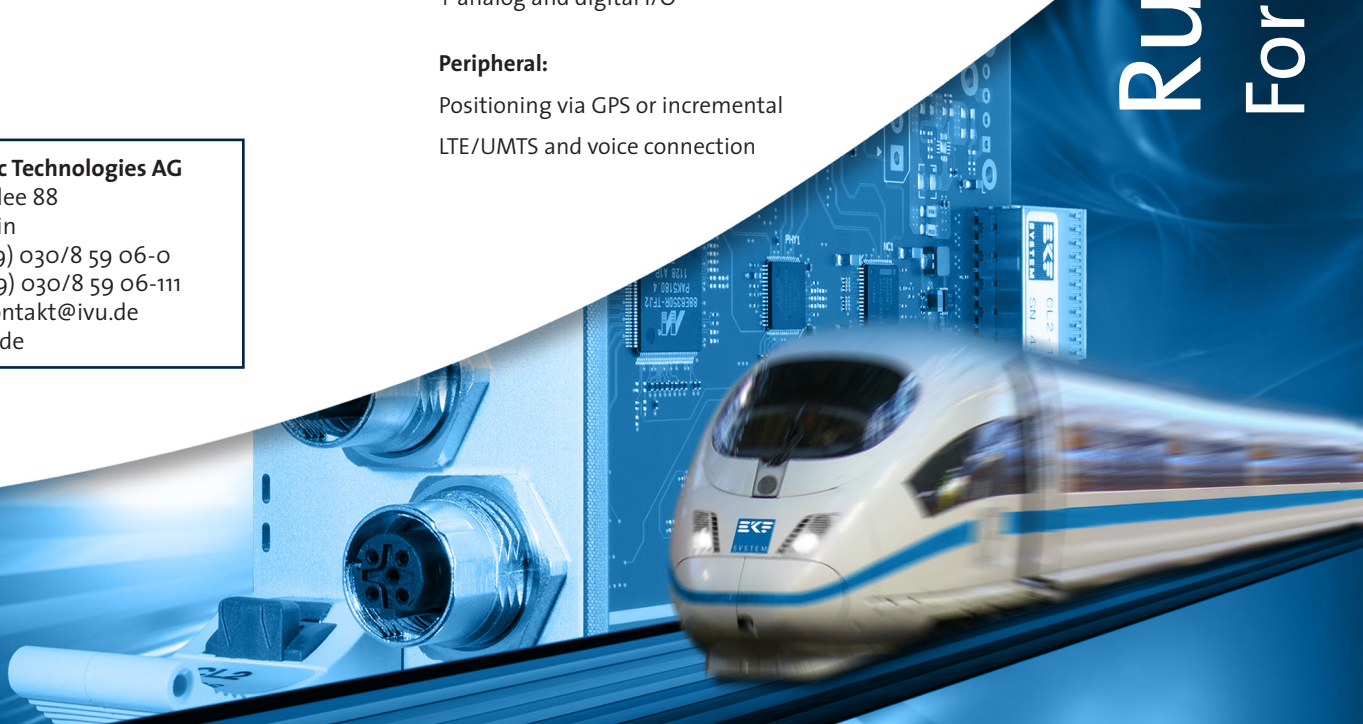
Train Application Example
Dynamic Passenger Information

Passenger Information Systems inside of a vehicle and stationary at a station are more and more used to offer dynamic information about the status of bus, ship, tram, underground or railway connections.

Passengers rely on the topicality and reliability of this information, therefore the same requirements are valid for the hardware and software which work in the background.

Rough environments due to extend temperature, rain, ice, shock and vibration are just some of the failsafe topics which must be addressed to reduce down times to the minimum.

The flexibility of a modular IPC with different interfaces to support existing cabling or installed screens and a component based software are the relevant parts of this solution for a new PIS or for the update of an existing installation.

		Bahnhof Mitte		🕐 12:58
	Linie	Richtung		Abfahrt
Tram	1	Prohlis		sofort
Tram	6	Wölfnitz		1 min
Tram	1	Leutewitz		1 min
Tram	6	Wölfnitz		2 min
Tram	2	Kleinzschachwitz		3 min
Zug	RE 18	Dresden-Hauptbahnhof		4 min
Tram	2	Gorbitz		5 min
Tram	10	Messe		5 min
Zug	SB34	Kamenz		13:04
Tram	6	Albertplatz		5 min

VCDB — Beratung, Planung und Service zu allen Fragen und Problemen des Verkehrswesens

Performance:

Flexible client Software

Processing power with low power and high performance Intel CPU boards

Flexible hard- and software configurations for integration in existing installations, complete service out of one hand

Connections (up- and downstream):

+ RS232/485 galvanic isolated

+ up to 10GBit in copper and optical

+ audio in, for FFT of analog signals

+ audio out, for voice messages and read out

+ various fieldbus and railway protocols

+ analog and digital I/O

Peripheral:

Positioning via GPS or incremental

LTE/UMTS and voice connection

Rugged Products
For Railway Application

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MESSLOT

Train Application Example
Measurement of Railway Driving Wire

EKF Elektronik GmbH
Industrial Computers and
Information Technology

www.ekf.com

During use every driving wire will naturally wear down from abrasion and combustion.

Messlot GmbH modifies a standard current collector with two measurement units which use laser technology to simultaneously generate a light profile at the wire and detect it.

The complete driving wire will be measured automatically and continuously during the run with driving voltage activated. In parallel the data will be evaluated and results will be illustrated online. Comments of the user can be included dynamically during the representation.

Example of typical usage:

At 80 km/h with 15 kHz sampling rate, the distance between each reading is 1.5 mm.

Benchmark of the solution:

+ Driving speed: above 100 km/h

+ Measure rate: 15.000 values/s

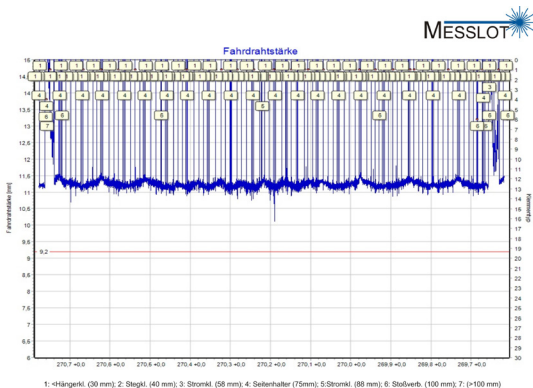+ Resolution: 14 um

+ Accuracy: ± 0.2 mm

Measurement of:

+ Driving wire height

+ Temperature

+ Clamps

Position can be taken from incremental shaft encoders

Online measured values

Extensions:

+ Measurement of the position of the driving wire

+ Digital video system

+ GPS coordinates for positioning

+ Functional test according to
   DN Netz AG (F1, F2, F3)

**Rugged Products
For Railway Application**

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