ONLINE MONITORING FOR THE ANALYSIS OF THE DYNAMIC BEHAVIOR OF ROLLER COASTERS

Foto: © Mack Rides GmbH und Co KG

www.i4m-tech.de www.nemi.one

i4M technologies GmbH
intelligence for mechanical systems

nemione
made by i4M technologies

MACK RIDES GmbH & Co KG

Use Case Roller coaster monitoring

Customer: Mack Rides GmbH und Co KG

OBJECTIVE

- Continuous online monitoring to analyze the dynamic behavior of roller coasters and the condition of their tracks

PERIOD

- 2021

CHALLENGES

- Extreme demands on the radio link due to dynamic driving behavior and magnetic interference fields
- Limited energy supply while vehicle is on track
- Weather conditions
- No cabling possible between cars
- Enormous data volumes (several gigabytes per day) to be transmitted via 4G cellular connection

REALIZATION

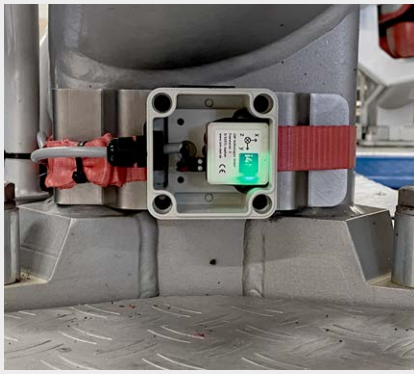
- Wireless nemione measurement system based on three compact sensor / telemetry modules and a gateway with integrated sensors
- Flexible installation of the nemi G+ acceleration sensors in the front and rear area of the train in weather-resistant boxes; accelerations, rotations and magnetic fields are measured in each of 3 axes (9 DoF IMU)
- Localization of the train on the roller coaster track using inductive and optical switching sensors connected to the telemetry module nemi DAQ
- Mounting of the gateway nemi EdgeBase underneath the train in a weather resistant box
- 9 DoF IMU & temperature sensor integrated in nemi EdgeBase
- Due to low power technology of all components, power can be supplied by supercapacitors, which are charged in the station via 24 V on-board network
- Transmission of measurement data from the sensor / telemetry modules to the gateway via nemi Link 2400 - i4Ms radio technology in the 2.4 GHz frequency band
- Data collection and transmission via VPN-tunneled 4G cellular connection & (S)FTP server

ADVANTAGES

- Simple and fast mounting / dismounting due to compact, lightweight components
- Uncomplicated handling of wireless sensors
- Reliable data through i4M´s robust radio technology nemi Link 2400

DEPLOYED nemione® PRODUCTS

- nemi G+
- nemi DAQ
- nemi EdgeBase



„At Mack Rides, i4M's wireless nemione measurement system was used to monitor a catapult roller coaster. The compact components convince us with easy installation, robust wireless data transmission even in case of magnetic interference field and high data quality. We thank the team of i4M for the good cooperation and the fast implementation of the project."

Felix Maier
Design / Structural Analysis
Mack Rides GmbH und Co KG

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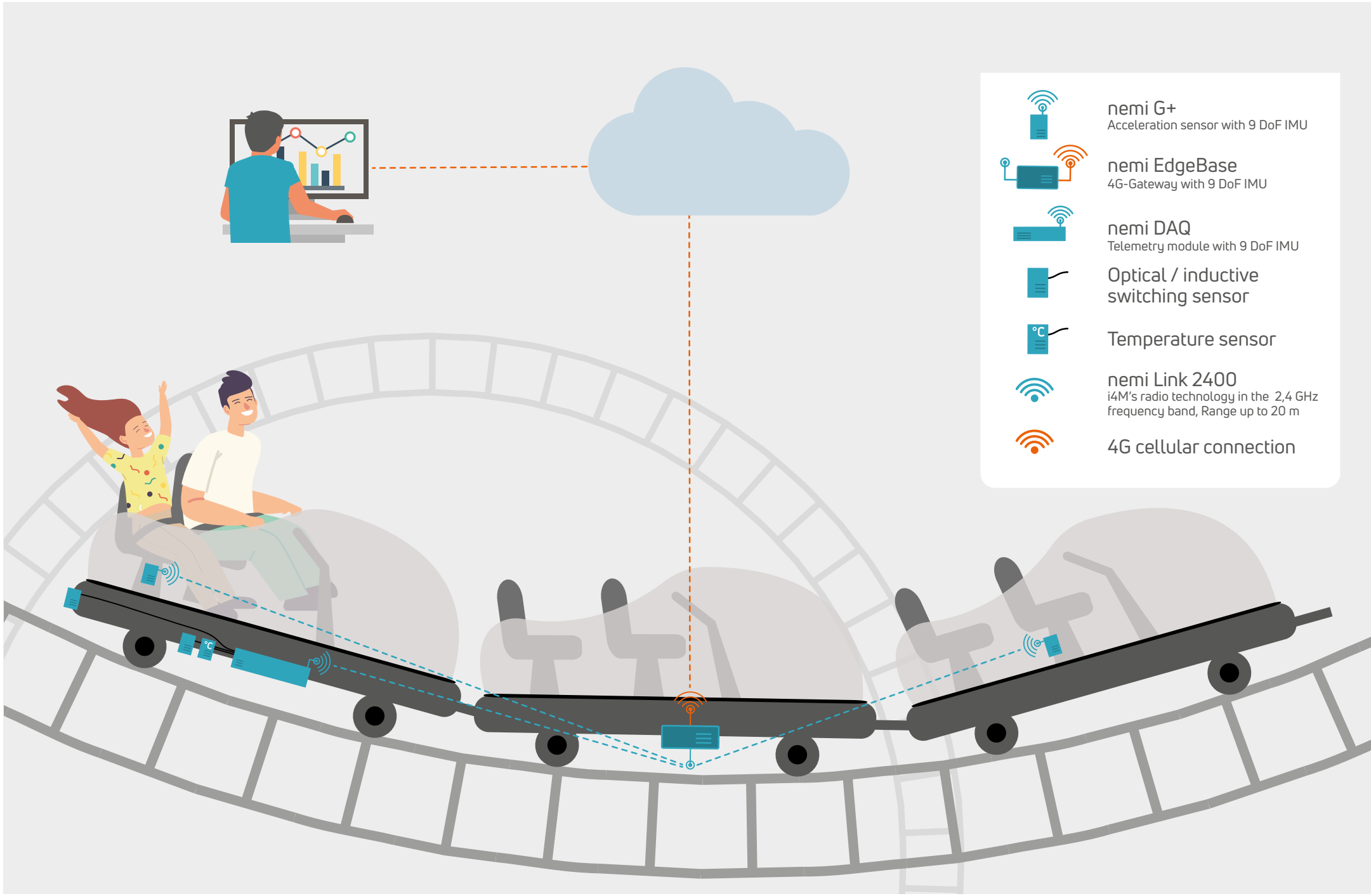

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