intelligence on wheels

Train Collision Avoidance

Although rail transport is extremely safe, collisions of railway vehicles happen occasionally. Our innovative safety overlay system adopts a concept very successfull in aircraft for avoiding the collision of trains. It combines three core technologies: a direct train-to-train communication system, an accurate localization system and a cooperative situation analysis and decision support system. As opposed to "traditional" technical train safety systems, our system does not require any technology in the infrastructure, i.e. along the railway track, but entirely relies on onboard technology.

19˝ fix mounted Onboard Unit

The 19" train unit of the train collision avoidance system is intended to be mounted in standard 19" rack installations available in most modern locomotives or passenger trains. It contains a processing module, a communication module, a localization module and a power module. The train unit acts as the heart of the collision avoidance installation in each train, being connected to peripherals such as communication & navigation antennas, additional sensors, one or more train driver displays and battery system.

EUROPEAN RAIL CONGRESS
EXCELLENCE IN SAFETY & SECURITY AWARD
WINNER 2013

PROF. MANFRED FUCHS
INNOVATION AWARD
2015

ICCA
INTERNATIONAL CRITICAL COMMUNICATIONS AWARDS
2016
WINNER

The main processing module is an EN50155 certified industrial rugged embedded computer designed for railway operation. The direct train-to-train communication (i.e. no base stations required) is based on TETRA radio which operates on a frequency band between 380-470 MHz and is one of the key assets of the approach. Simply when in range (i.e. closer than 5km), trains exchange information about their position on the track, speed, driving direction etc. using this communication module. The localization module consists of a multi-sensor setup combining a GPS and a 6 degree-of-freedom inertial measurement unit (IMU) in a very innovative way, which fulfills the demanding cross-track accuracy and localization availability requirements of the collision avoidance application. The unit internal power management has a cascaded architecture. An EN50155 certified galvanically isolated, transient and short circuit protected power adapter supports a wide power of 50W in average, with peaks below 75W. A variety of train driver displays can be connected to the 19" unit, depending on the customer's requirements. The most recommended option is an EN50155 certified intelligent display with touch sensitive areas or simple border buttons.
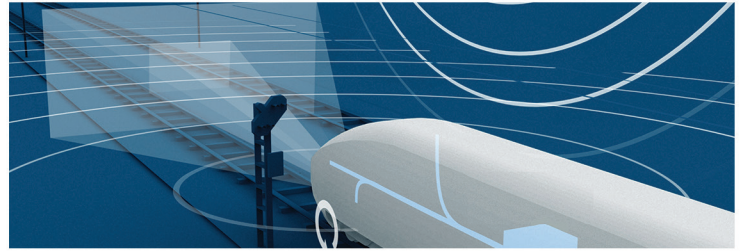
Capabilities of the Processing Module

- Intel Celeron 1047UE processor (2MB cache, 1.40 GHz)
- 2 independent DVI-I display ports
- 2 Gigabit Ethernet ports with M12 X-coded connectors
- 4 GB RAM, 32 GB Solid State Disk via SATA-II
- 3 bootable USB 2.0 ports (2 type A, 1 M12 D-coded)
- 4 RS-232/422/485 ports (DB9 male)
- CFast socket
- -40 to 70°C wide temperature range
- Compliant with EN 50121-3-2, EN 50121-4, IEC 61373 and more
- Essential compliance with EN 50155
- Conformal Coating

Capabilities of the Communication Module

- TETRA radio on a frequency band 380-470 MHz with 1..10 W transmit power for direct train-to-train communication in DMO mode
- UMTS/GSM wide area radio for service access
- Wireless local area network radio for on-site maintenance

Various Display Options
(all compliant with EN 50155)

- 6,5" touch sensitive railway VGA monitor
- 8,4" intelligent railway monitor with 32 front keys
- 6,5" intelligent railway monitor with 6 front keys and sound

Capabilities of the Localization Module

- SBAS/EGNOS enabled (D)GNSS
- 6 degree-of-freedom MEMS IMU
- High Definition Electronic Track Map Database

Power Module

- EN50155 certified galvanically isolated, transient and short circuit protected power adapter
- Wide input range of 14,4V-33,6V DC
- Charging and consumption control

Power Supply Option

- Uninterruptable Power Supply based on rechargeable lead-gel batteries
- Charging controller with LED indicators, a control display, wiring, fuses, terminal block
- Input voltage 230V AC, output 24 V DC. Capacity designed for 48 hours of operation at average power consumption of 50W

About Intelligence on Wheels

Intelligence on Wheels, founded in 2012, is a spin-off of the German Aerospace Center (DLR) committed to the commercialization of an innovative train collision avoidance system. It is our vision that every train will be equipped with our technology as additional means of technical train protection. In doing so, the safety level will be lifted from whatever safety technology is installed along the track or in the train to a higher level.