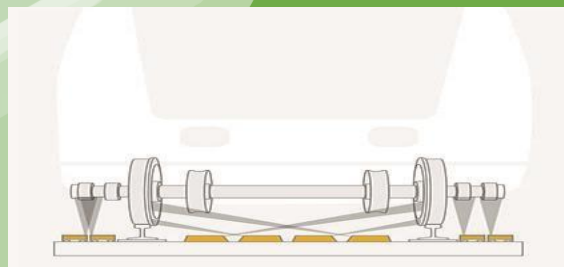




# RAILTRO'S HBD/HWD

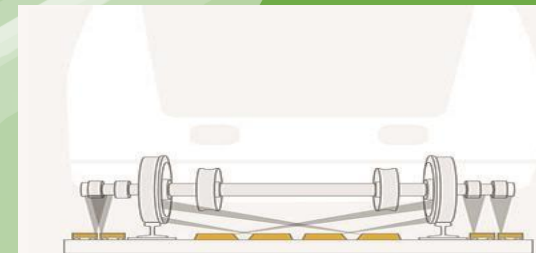
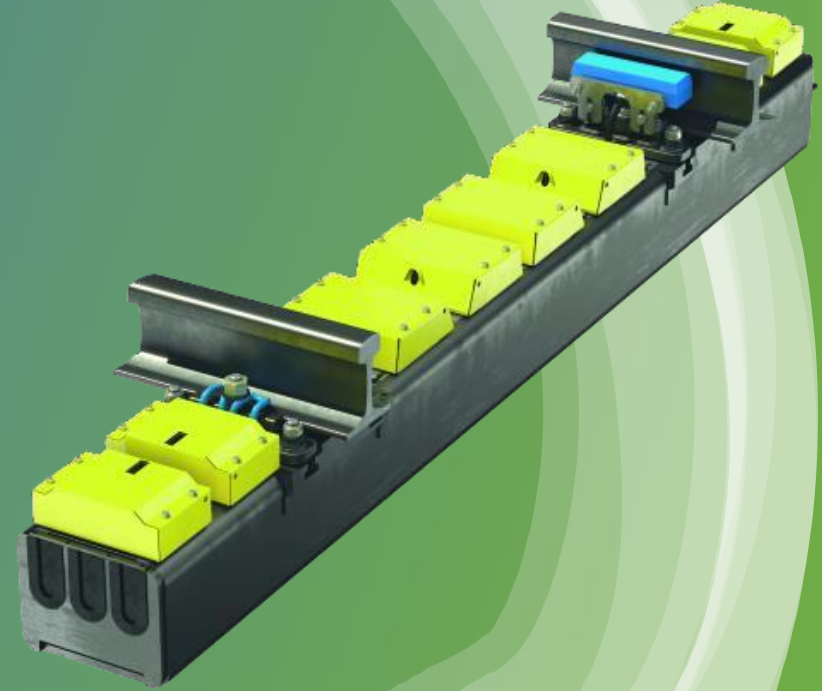
## HOT BOX AND HOT WHEEL DETECTION SYSTEM WITH MULTI BEAM TECHNOLOGY



# Intelligent Rolling Stock Monitoring

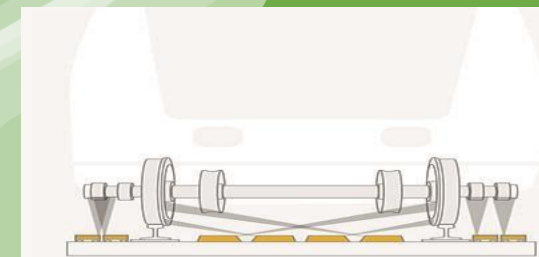
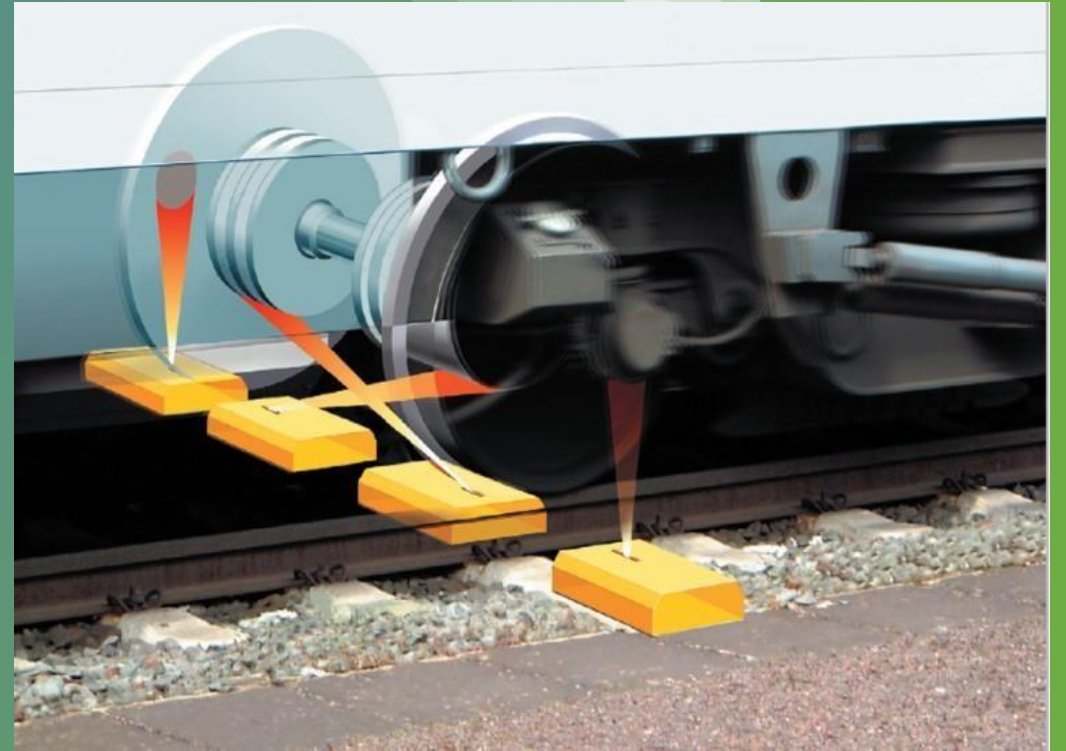


Hot wheels and hot boxes are a major threat for any railway operation. A hot box can lead to fractures of axle journals that might cause a derailment. Remarkable operational hazards are caused by locked brakes, due to overheated loosened wheel rims as well as broken wheel disks. A locked brake can cause fire and is one of the main reasons for the formation of flat spots. Additionally, not functional brakes can lead to very dangerous situations and significant wear and tear. The Hot Box and Hot Wheel Detection functions Railtro's HBD/HWD are solutions to decrease the mentioned faults to guarantee a safe railway operation. Monitor reliably the temperature of axle bearing boxes, wheel rims and brake discs of passing trains up to 300 km/h.



# Benefits of HBD/HWD:

- Safety management of railway operations
- Mitigating risks and asset protection
- Improving operational performance by reducing train interruption
- Performance monitoring
- Condition based maintenance
- Modular design for simple and fast mounting without any adjustment
- Up to eight multi-beam scanners per sleeper cover a wide range of wheel set designs
- Low power consumption
- Scanners can be clustered for redundancy
- Self-calibration, self-diagnostic and health monitoring
- No influence on regular track maintenance



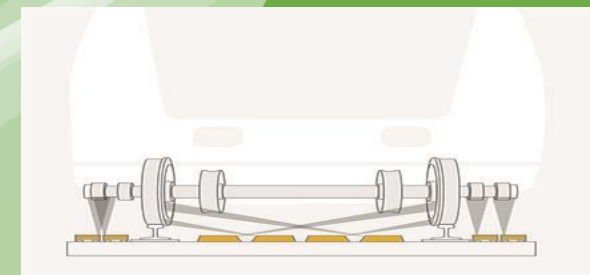
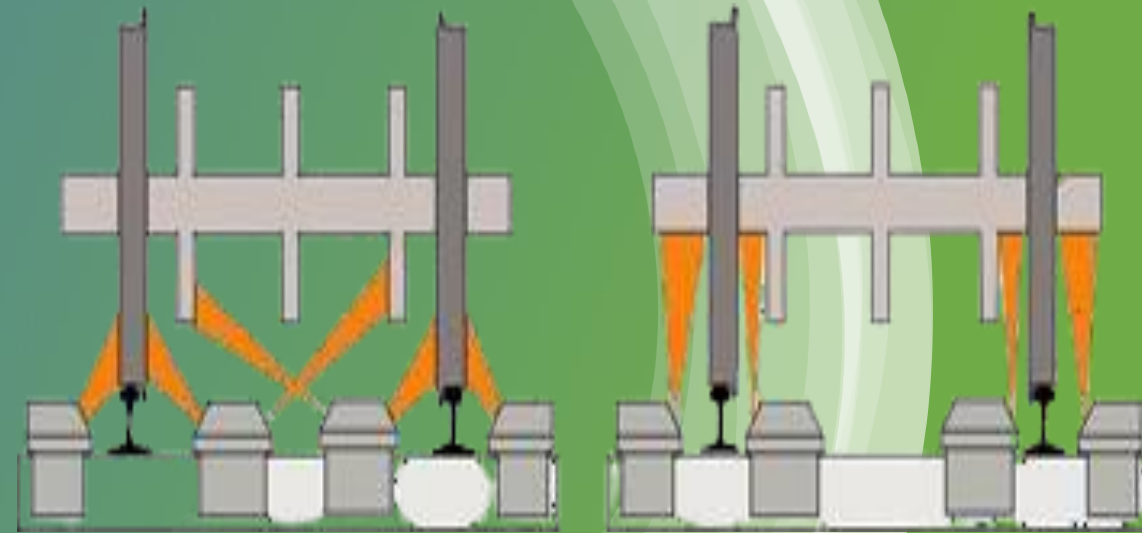


# Additional Features

Multiple temperature limits can be set based on vehicle classification (locomotive, cargo or passenger) evaluated by the axles' layout analysis, video detection or external source (traffic database etc.).

Modular design of the infrared sensor allows adaptation to a broad range of axle box types and therefore guarantees reliable identification of all possible hazard conditions.

Even higher safety can be achieved by using more sensors in a redundant configuration.

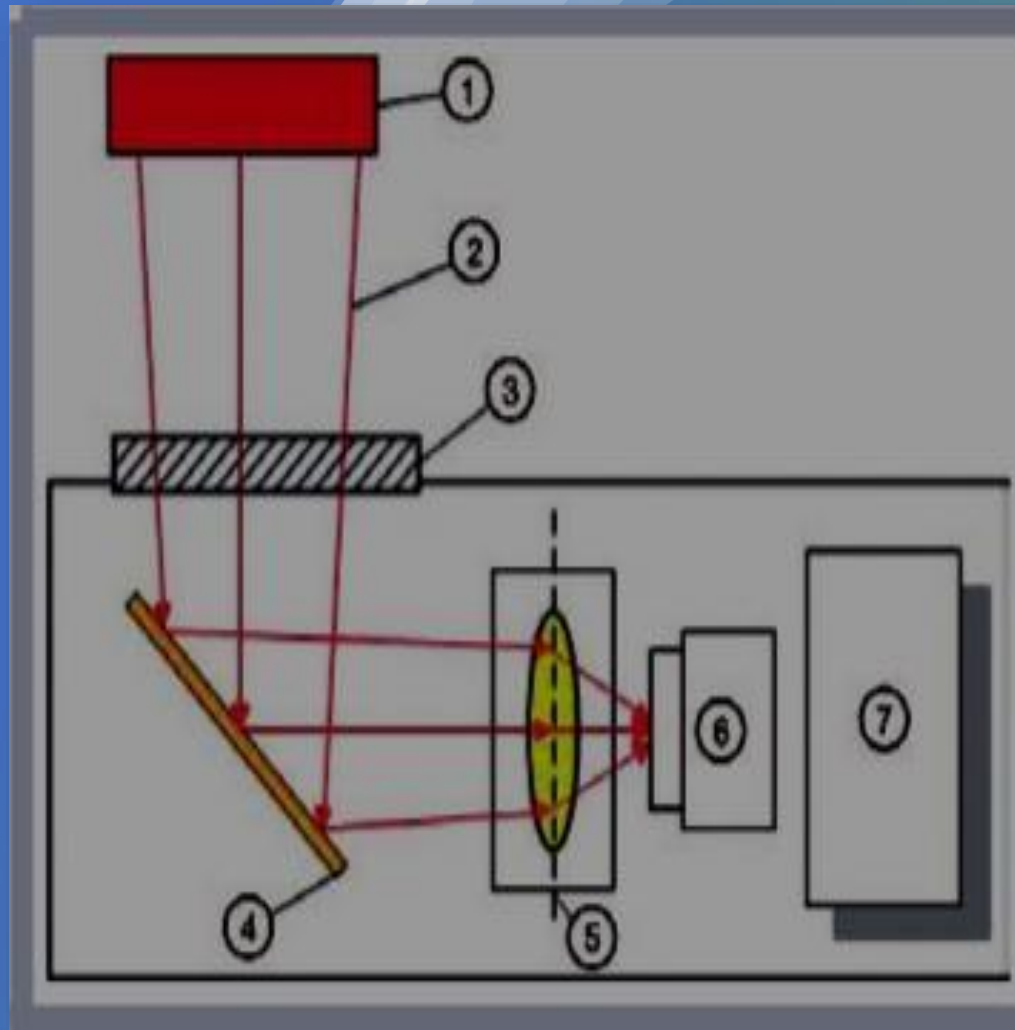


# Installation

The measuring system requires a special sleeper placed into the railway and several in-track wheel sensors for measurement initialization and measured data triggering.

Both systems can be combined in a required combination (1 HW+2 HB, 2 HW+2 HB, etc.).

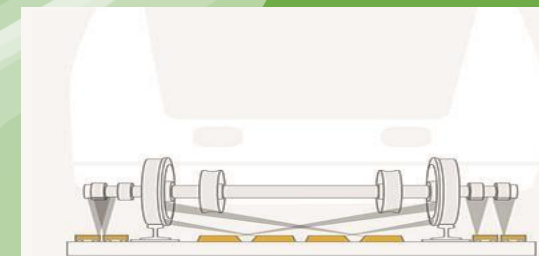
# Contactless Temperature Measurement



In order to be able to contactless and very quickly measure temperatures in the range from  $0^{\circ}\text{C}$  to  $650^{\circ}\text{C}$  special infrared detectors are used (quantum detectors), which convert the thermal radiation of the target into electric signals especially in the infrared range.

Like a photo-camera the measuring systems consist of lenses, mirrors and infrared detectors.

- (1) Heat target such as axle bearing, wheel, brake disk
- (2) Thermal radiation
- (3) Shutter
- (4) Deflection mirror
- (5) Optical system
- (6) Infrared sensor
- (7) Electronics



# Principle of a HBD/HWD Detection System

The essential structure of a HBD/HWD detector is shown schematically and it consists of the following function blocks:

- (1) Infrared measuring systems (pyrometers) in the track (in a sleeper or on the rail)
- (2) Rail contact on the track (axle counter)
- (3) Evaluation electronics near the track
- (4) Data transmission and network
- (5) Display unit at the dispatcher's work-place.

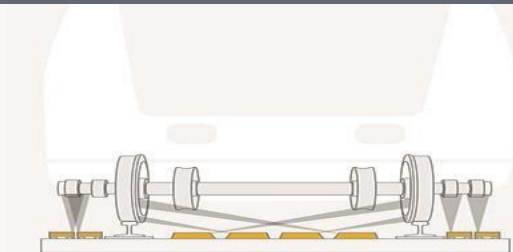
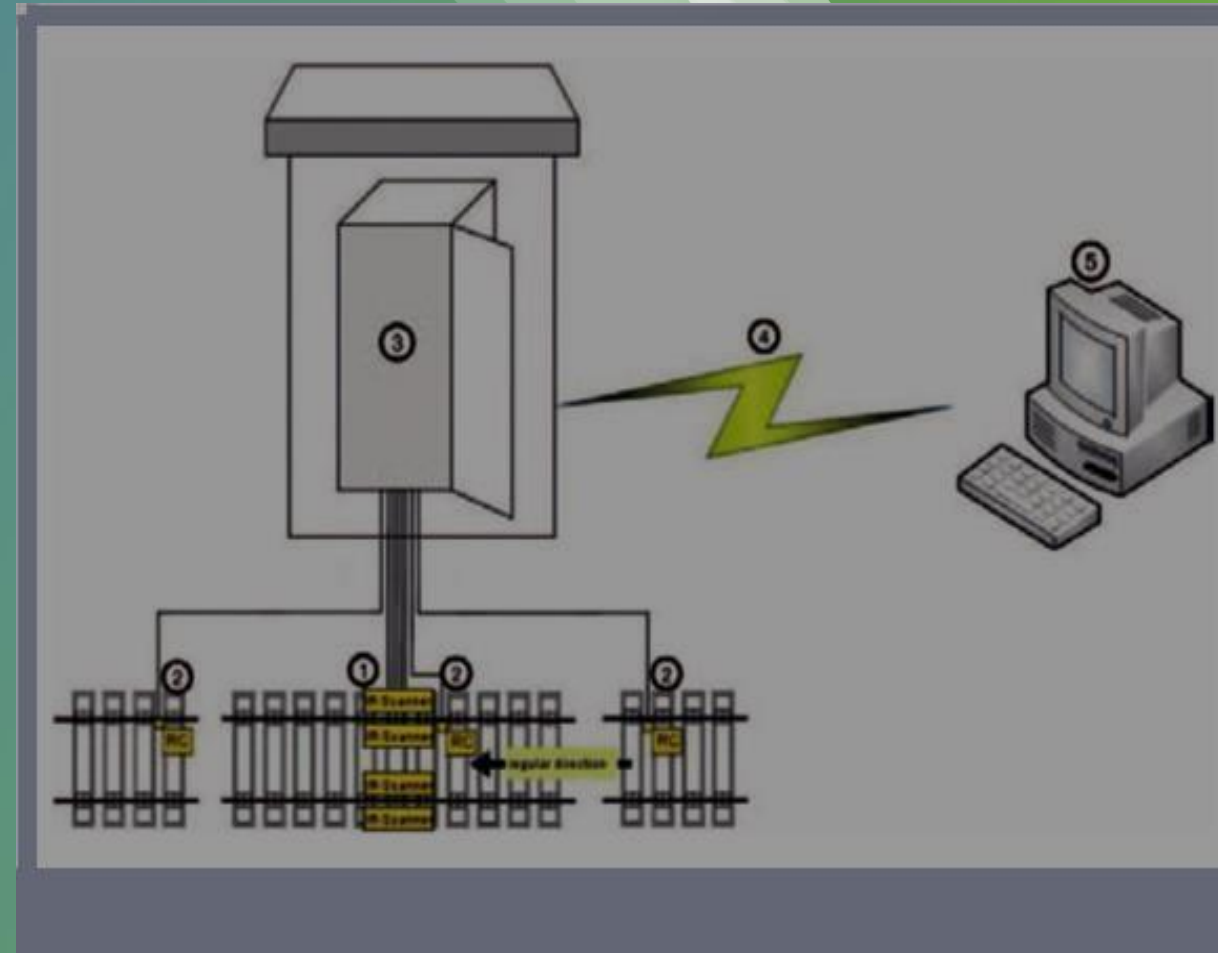
### General function:

If a train approaches the measuring system, a rail contact (2) passed over activates the system and it becomes ready for measuring.

When the wheel passes the infrared measuring system (1) and the axle counters located there, the temperature values of the left - hand and the right-hand axle box cases, the temperatures of the wheel and of the brake disc (depending on the system con-figuration) are recorded and allocated to the axle number in the train consist. In the case of a dangerously high temperature, an alarm is triggered and the dispatcher (5) receives the following information at least:

- type of alarm (e. g. hot alarm, warm alarm)
- value of the temperature measured
- place of the measuring point
- type of temperature measured (bearing box, wheel, brake disc)
- number of the axle on which the alarm was detected
- side of the train on which the temperature was measured
- direction of travel of the train

Depending on the type of construction of the system, additional information can be collected and reported. The individual evaluation of temperature values to generate further different customer-specific alarms is possible.



# Remote Access Software Panel

**Train stats**

Train ID: 20150902T053051  
 Arrived at: 2.9.2015 5:30:51  
 Left at: 2.9.2015 5:30:56  
 Category: Passenger  
 Processing status: Finished

Direction: Right  
 Count of wagons: 5  
 Count of axles: 20  
 Speed: 74,2 km/h  
 Length: 122,0 m

ID	Image	Category	# of axles	Name	UIC image	UIC	Status
0		Locomotive	4	Z30_etc		CZ-CD505422-44136-8	Identified
1		Passenger	4	Bdmlee_etc		CZ-CD505422-44318-2	Identified
2		Passenger	4	Bdmlee_etc		CZ-CD505422-44318-2	Identified
3		Passenger	4	Bdmlee_etc		CZ-CD505422-44273-9	Identified
4		Passenger	4	Bdmlee_etc		CZ-CD505422-44195-4	Identified

[Back to overview](#)
[Show selected wagon](#)
[Change train data](#)

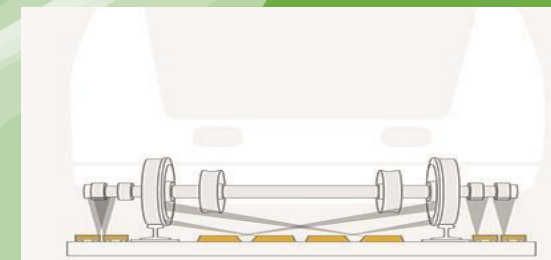
05.1.2015 9:32:40 | Trains in database: 48 | Selected trains: 34 | Data loaded: 2/2

**Overview**

Train ID	Time arrived	Direction	Category	# of axles	# of wagons	Avg. speed [km/h]	Status
20150902T111202	02.09.2015 11:12:02	Right	Control	28	7	142,8	Separ.
20150902T110722	02.09.2015 11:07:22	Right	Passenger	24	8	96,3	Separ.
20150902T110142	02.09.2015 11:01:42	Right	Passenger	20	5	84,2	Separ.
20150902T103825	02.09.2015 10:38:25	Right	Passenger	20	5	70,9	Separ.
20150902T103110	02.09.2015 10:31:10	Right	Passenger	32	8	184,7	Separ.
20150902T101428	02.09.2015 10:14:28	Right	Locomotive	12	3	73,7	Separ.
20150902T100342	02.09.2015 10:03:42	Right	Passenger	16	4	73,3	Separ.
20150902T100116	02.09.2015 10:01:16	Right	Passenger	20	5	58,5	Separ.
20150902T093222	02.09.2015 09:32:22	Right	Passenger	20	5	70,6	Separ.
20150902T092847	02.09.2015 09:28:47	Right	Passenger	36	9	139,6	Separ.
20150902T091542	02.09.2015 09:15:42	Right	Control	24	6	144,5	Separ.
20150902T091005	02.09.2015 09:10:05	Right	Passenger	20	5	68,7	Separ.
20150902T083241	02.09.2015 08:32:41	Right	Passenger	20	5	77,6	Separ.
20150902T082904	02.09.2015 08:29:04	Right	Passenger	32	8	158,1	Separ.
20150902T081023	02.09.2015 08:10:23	Right	Control	24	6	111,2	Separ.
20150902T080957	02.09.2015 08:09:57	Right	Locomotive	8	2	66,5	Separ.
20150902T074355	02.09.2015 07:43:55	Right	Locomotive	8	3	80,4	Separ.
20150902T073456	02.09.2015 07:34:56	Right	Locomotive	4	1	61,1	Separ.
20150902T073027	02.09.2015 07:30:27	Right	Passenger	20	5	70,2	Separ.
20150902T072700	02.09.2015 07:27:00	Right	Passenger	28	7	163,7	Separ.
20150902T071937	02.09.2015 07:19:37	Right	Locomotive	20	5	57,4	Separ.
20150902T071636	02.09.2015 07:16:36	Right	Passenger	12	3	64,9	Separ.
20150902T071334	02.09.2015 07:13:34	Right	Passenger	36	9	119,0	Separ.
20150902T065856	02.09.2015 06:58:56	Right	Passenger	20	5	65,9	Separ.
20150902T063323	02.09.2015 06:33:23	Right	Passenger	20	5	58,7	Separ.
20150902T061641	02.09.2015 06:16:41	Right	Locomotive	6	3	50,7	Separ.
20150902T061006	02.09.2015 06:10:06	Right	Control	28	7	137,8	Separ.
20150902T060222	02.09.2015 06:02:22	Right	Passenger	20	5	61,9	Separ.
20150902T054454	02.09.2015 05:44:54	Right	Passenger	12	3	70,2	Separ.
20150902T053051	02.09.2015 05:30:51	Right	Passenger	20	5	74,2	Separ.
20150902T043102	02.09.2015 04:31:02	Right	Passenger	20	5	65,2	Separ.
20150902T035859	02.09.2015 03:58:59	Right	Cargo	60	15	77,8	Separ.
20150902T013727	02.09.2015 01:37:27	Right	Locomotive	12	3	97,0	Separ.

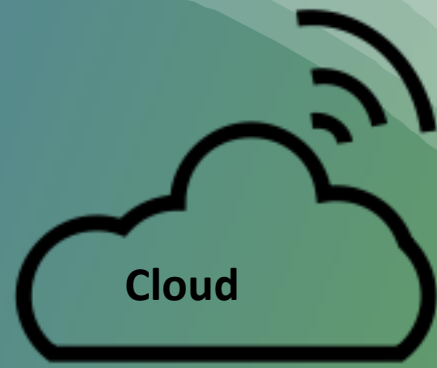
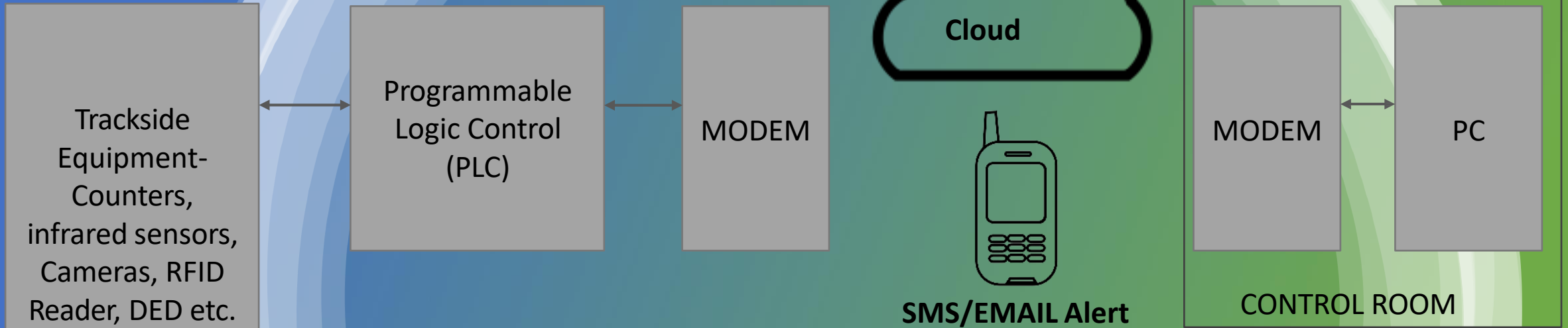
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 Interval: From 15. ledna 2016 To 15. ledna 2016  
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 Service: Control, Locomotive  
 Direction: Left, Right, All  
 Clear filter Apply filter  
 Refresh all trains  
 Show details

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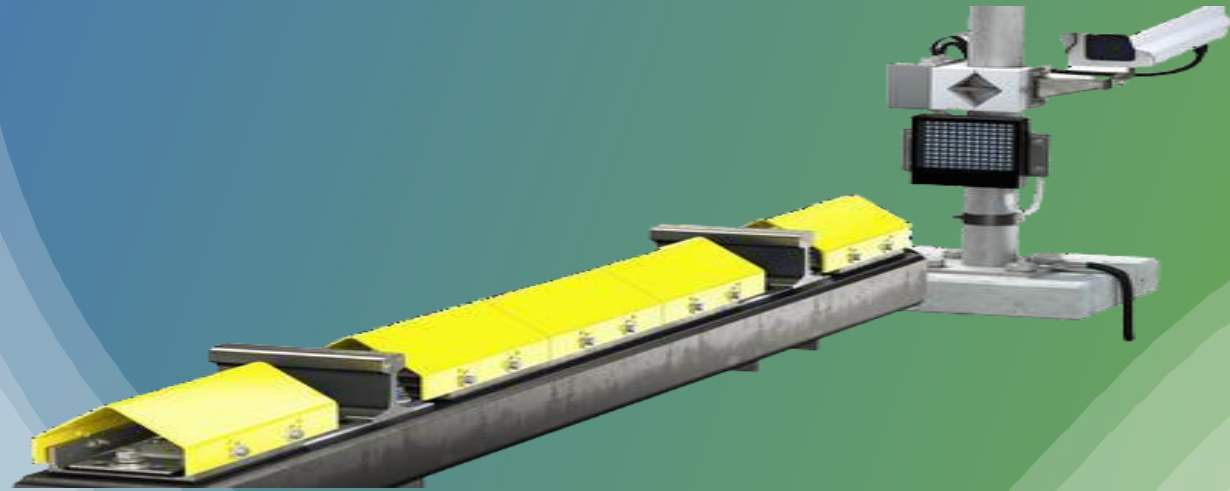




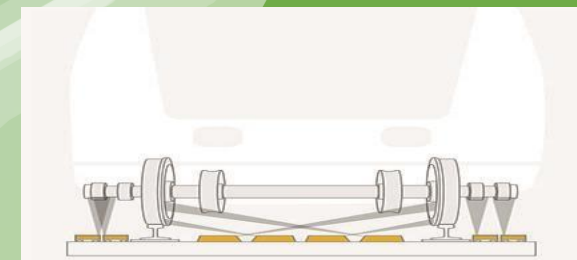
# Block Diagram



SMS/EMAIL Alert



Dragging Equipment Detection using accelerometer with camera







## Contact Us:

# RailTro Engineering Private Limited.

**Registered Office :** 527 / 6C Preet Vihar Roorkee – Uttarakhand

**Factory Address :** Hapur Road, Shastrinagar, Modinagar, Ghaziabad - 201204, Uttar Pradesh, India

**Registered Office :** 527 / 6C Preet Vihar Roorkee – Uttarakhand

**Factory Address :** Hapur Road, Shastrinagar, Modinagar, Ghaziabad - 201204, Uttar Pradesh, India

**Branch Address :** 2/18 East mada street Darshan Block-B, Second floor no 18. Thiruvanmiyur.  
Chennai 600041

**Branch Address :** 402 Vinay Block, Harmony Heights, Namalagundu ,Secunderabad 500061 Mr. R  
Vasudevan 9985913169

**For Any Enquiry :** 9560307279

**Website :** [www.railtro.com](http://www.railtro.com) **Email id :** [railtro7@gmail.com](mailto:railtro7@gmail.com)

# THANKYOU

