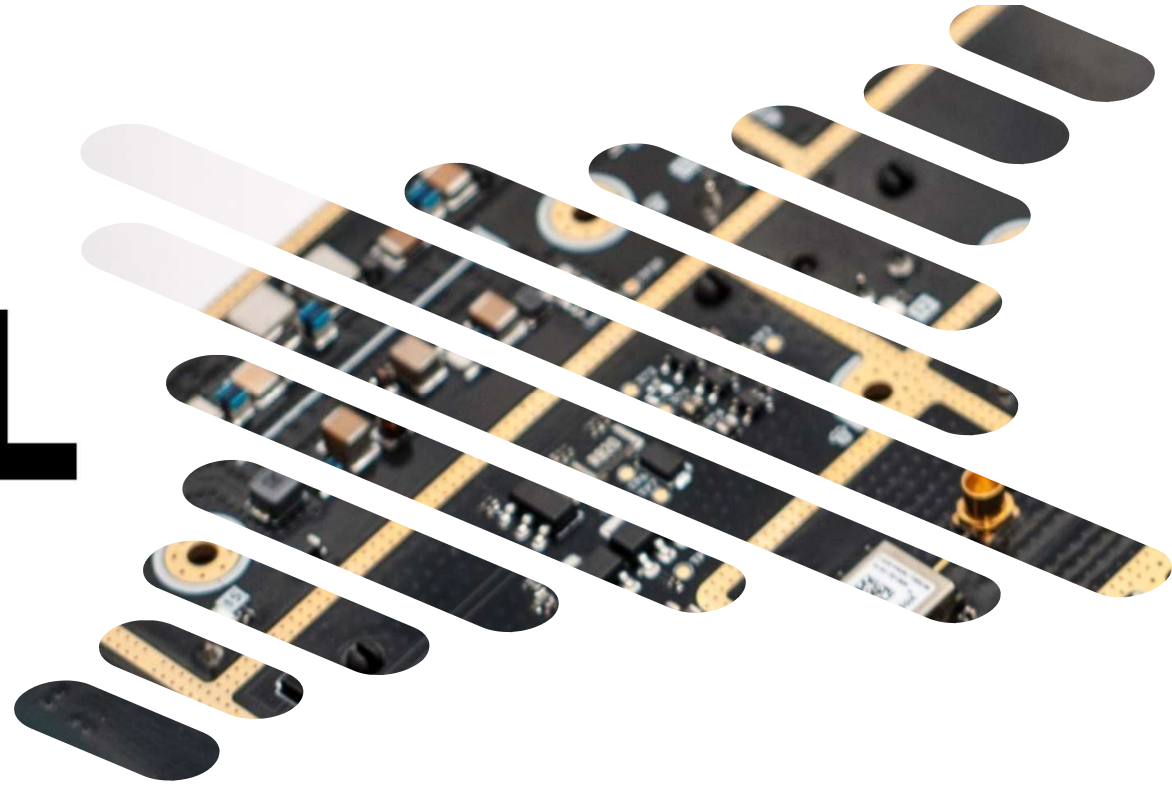
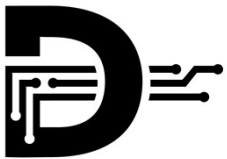
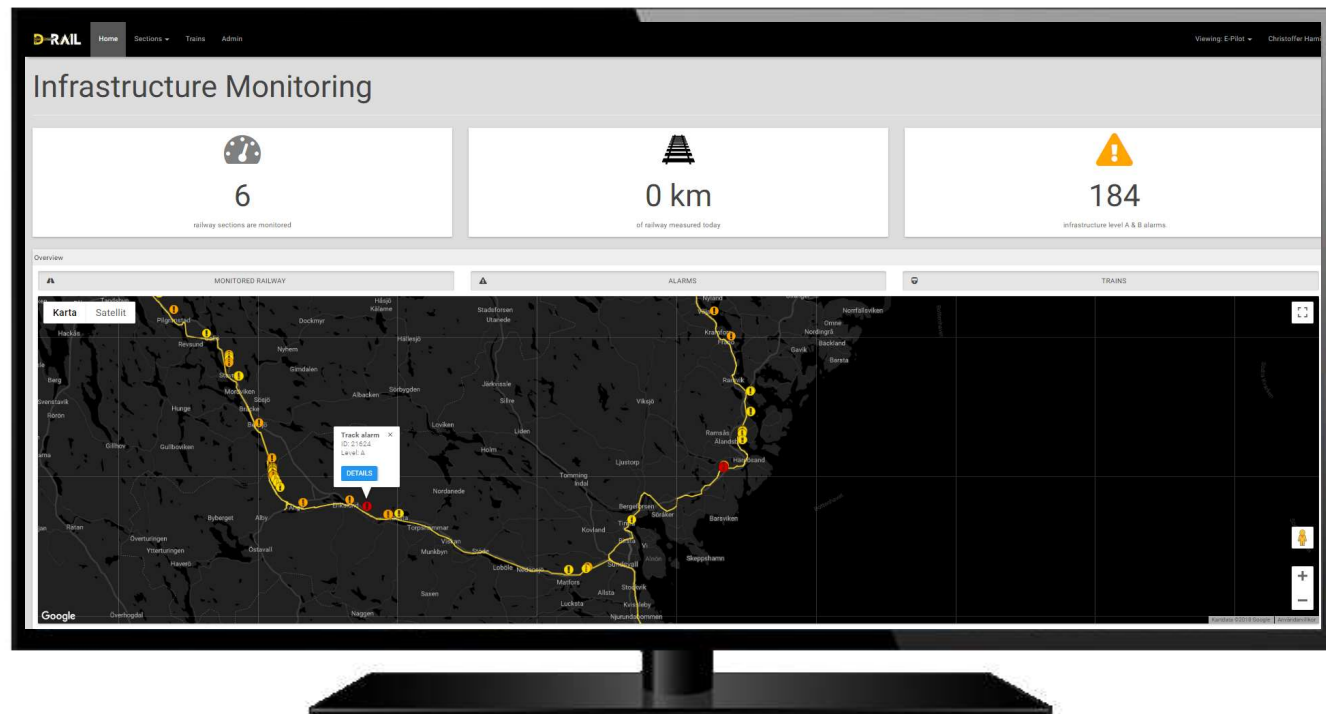


D-RAIL

KEEPING TRACK

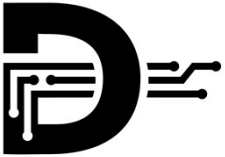


Infrastructure Monitoring As A Service

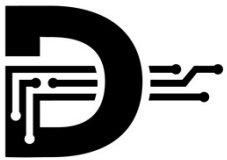


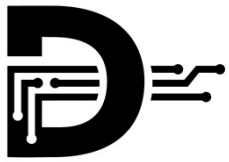
CHRISTOFFER HAMIN

FOUNDER CEO

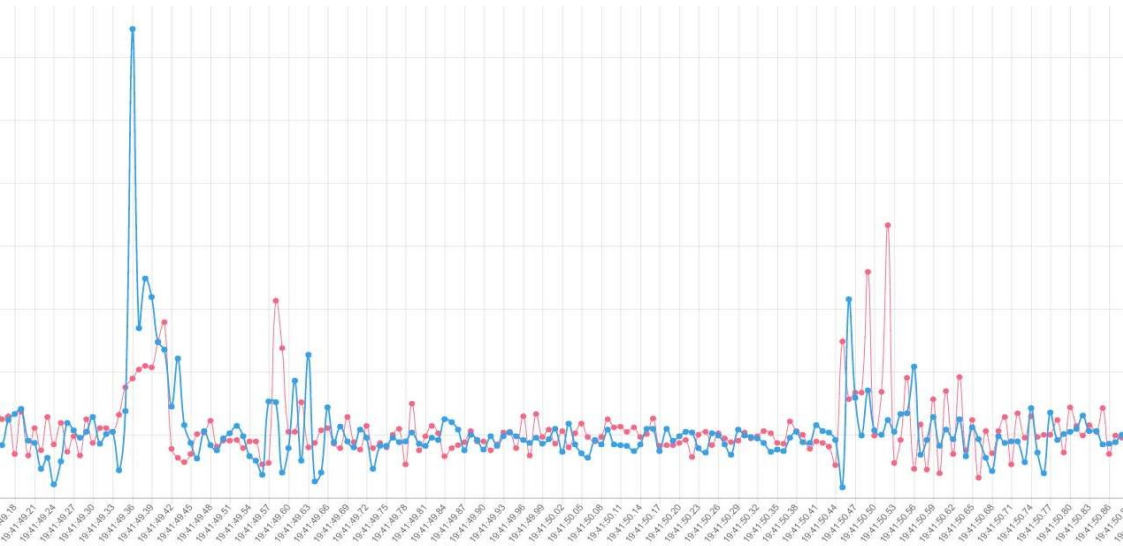


WE NEED TO CHANGE THIS





D-RAIL Vision



“We are very pleased with the help we recieved locating a defect on the rail that was damaging wheels on vehicles of the Green line ”

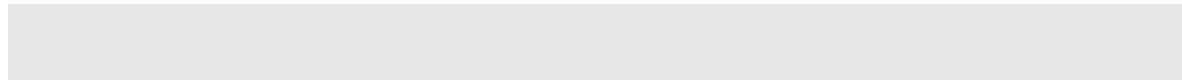
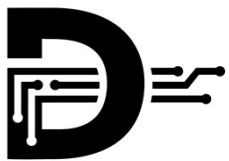
MAGNUS LÖFGREN

FLEET MANAGER MTR Tech

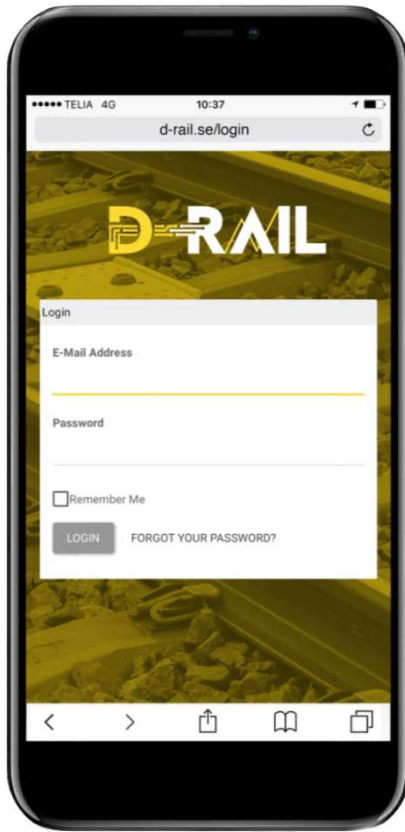
“I do not believe that our staff has even noticed that there is measurement equipment onboard”

LENNART SKOOG

FLEET MANAGER TKAB



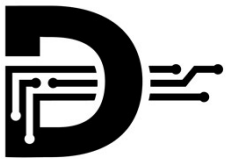
IMAAS



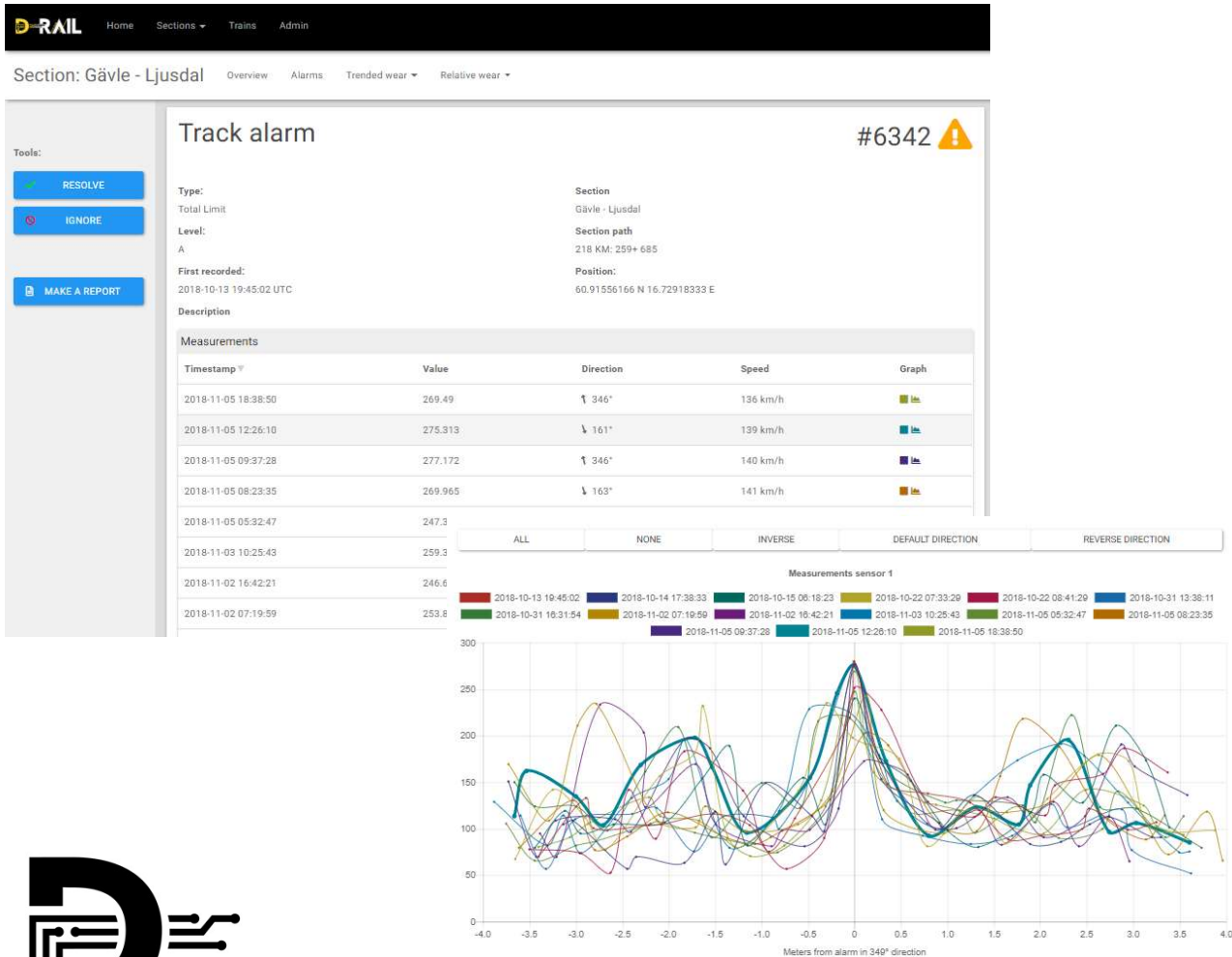
We provide a real time information online, from any device.

All information online is analysed and processed in the cloud by us.

The information does not need to be downloaded or processed locally.



The system



MEASUREMENT:

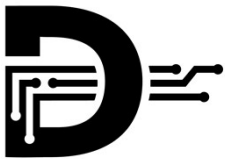
Relative movement and vibrations in very high frequency are harvested from specific locations to determine the indirect infrastructure status.

Unique blockchain inspired data management are used to make false or misplaced data impossible.

Unique handling from the very sensor chip all the way to the cloud is planned in the smallest detail.

All data is combined with positioning in millisecond level.

A few trains with a few sensors can save time, money and lives



The system

PLATFORM OR API:

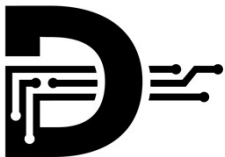
D-RAIL provides a platform for measurement analytics, alarm handling, internal communication, predictive maintenance and relative point of view to be able to prioritize maintenance needs.

The information can also be sent to a customer's data hub if there is already a working platform at the customer.

The screenshot displays the D-RAIL web interface. At the top, there is a navigation bar with 'Home', 'Sections', 'Trains', and 'Admin'. The current view is 'E-Pilot' for user 'Christoffer Hamin'. The main section is 'Gävle - Ljusdal', with tabs for 'Overview', 'Alarms', 'Trended wear', and 'Relative wear'. On the left, there are filter buttons for 'ACTIVE', 'IGNORED', and 'RESOLVED', along with a 'RESET ZOOM' button. The central table lists alarms with columns for ID, Type, Last indication, and Subsection. A map on the right shows the rail line with colored markers. A detailed view of a sensor (ID 13) is shown on the right, including its status (Inactive), voltage, temperature, and last contact time. A second map below shows the location of the sensor in Gävle.

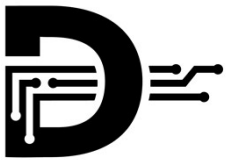
L	ID	Applies to	Type	Last indication	Subsection, pos
▲	20444	Track	Total Limit	2018-11-14 13:57:06	218 KM 297+ 128
▲	20445	Track	Total Limit	2018-11-16 10:13:34	217 KM 322+ 266
▲	20446	Track	Total Limit	2018-11-16 10:29:32	217 KM 344+ 443
▲	20448	Track	Total Limit	2018-11-16 11:42:50	217 KM 325+ 351
▲	20451	Track	Total Limit	2018-11-10 12:01:52	218 KM 299+ 018
▲	20452	Track	Total Limit	2018-11-16 16:11:51	218 KM 298+ 959

Status	ID	Active	Mounted on	Voltage	Temp	Last contact
⊘ Inactive	13	No	Pantograph	V	°C	
⊘ Inactive	23	No	Bogie	0 V	0 C	2018-10-26 21:38:08
⊘ Inactive	24	No	Bogie	3.81 V	0 C	2018-11-17 09:53:29
⊘ Inactive	26	No	Pantograph	3.65 V	0 C	2018-11-19 22:11:54





**EXAMPLE OF AN ALARM,
UNDERMINATION CAN COME SUDDEN AND CAUSE ACCIDENTS**



PREDICT

RAIL

Waves, defect joints and sun curves. Track geometry

SWITCHES

Relative behavior of switches when under load.
Point installed sensors for continuous monitoring

CATENARY

Relative height, position, wear and defects.

TRACK BED

Undermination, slopes and banking of track.

THIRD RAIL

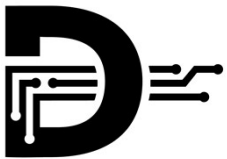
Misalignment and defects.

BALISES

Relative function of balises regarding correct sending
and modulation.

WHEEL DEFECT DETECTION

Point installed sensors can act wheel monitoring



VALUE

AUTOMATIC ALARMS

Triggered algorithms pin-point errors with type, severity and position.

TRENDED WEAR

How does the infrastructure change at one geographic position over time?

COMFORT

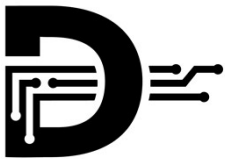
Spot passenger comfort problems by relative forces in the train.

RELATIVE CONDITION

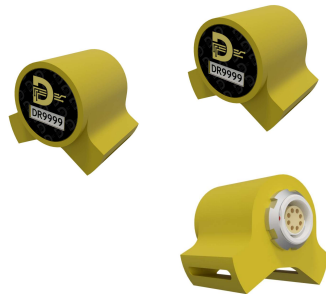
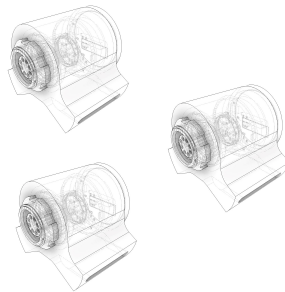
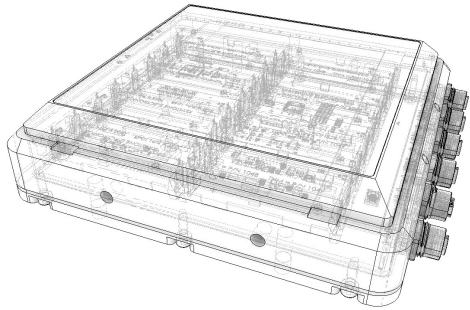
The condition of the railway is shown relative, and differences along the same route on the same day.

VEHICLE STRESS

Spot places where the trains receive stress-related problems on wheels, bogies and pantographs.



The system



SENSORS:

Cutting edge technology designed for minimum maintenance and maximum performance.

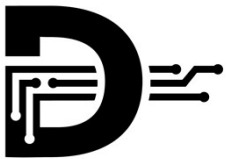
The sensors are developed to measure the status of tracks, track bed, catenary and signal system, and can do this from any train.

They are designed to fulfill EN50155, EN50121, CE, IP68 and IK10. etc.

The sensors are completely autonomous with a battery life, without energy harvesting, up to 2,5 years in full operation.

Combined with an energy harvesting circuit (magnetic field harvesting) extends the battery life up to infinity.

Without energy harvesting, the sensor is charged on the train inside the depot. 1 hour = full charge.



The system



INSTALLATION:

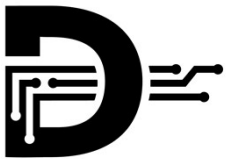
1 gateway & 2 sensors (with 2 or 3 sensing devices) per train is all that is needed.

The sensors are developed for maximized ease of installation and done without a single hole being drilled.

Train specific documentations prior to installation is produced together with train operator/owner and signed by the necessary parts.

The system is CSM-RA considered to be a non significant change. And 100% reversible.

The system is owned and insured by D-Rail.



REFERENCES



TRAFIKVERKET



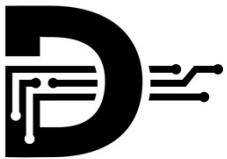
At the very first POC run with our very first prototype put together in the basement we found defects in the railway infrastructure needing repair.

The evolution of our R&D and our reference projects we have (at least) saved overhead wires from falling down and preventing thousands of wheels getting damaged by pin pointing defects early.

From having asset managers afraid of the amounts of alarm that would come when measuring every day to later thanking us and asking for more information.



I SAMARBETE MED  Tågkompaniet





LAUNCH FEBRUARY 2019

**Ready to change the world,
disrupt the industry with real time
railway information and prediction.**

**Ready to make railways more safe
and save, time, money and lives
around the world.**

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