REMOTE MONITORING FOR RAIL

Use remote monitoring technology to manage earthworks, track and structures - protect people and infrastructure throughout the asset lifecycle.

Senceive
Wireless condition monitoring

Rail engineers have trusted Senceive technology for more than a decade. It is designed and built for the tough demands of railway applications and provides precise, reliable structural and geotechnical data to help you address the unique pressures and challenges of your rail project.

Senceive solutions are used by operators, contractors, professional surveyors and engineers around the world. Approved, accredited and proven in the field, the technology is the natural choice where long-term performance in critical applications is required. That's why more than 10,000 of our rail sensors were installed this year alone.

Limited Time

Ideal where only short access windows are available

- Installed in minutes
- Works straight out of the box
- Still working after 10 years

Limited Space & Difficult Access

Compact, autonomous sensors will not interfere with your operations

- No clearance issues due to small size
- Measure where it matters most
- No wires needed and therefore less risk of damage

Tough Conditions

Long life performance

- Rugged instruments proven in railway applications
- Withstands extremes of heat, cold, water and more
- Robust mesh networks can resist damage to elements without systematic loss of performance

Changing Needs

Adapt the monitoring system as your project progresses

- Flexibility to move sensors to fit project needs
- Change settings without leaving your desk; share data with your whole team
- Integrate structural and geotechnical sensors

Protect People & Infrastructure

Early warning of distress and defects without leaving your desk

- Automated alarms when trigger levels are breached
- Early warning of failure such as landslip or structural movement
- Fewer site visits means reduced risk exposure

Stay on Budget

Cost-effective monitoring for cost-effective rail construction & maintenance

- Save money through reduced site visits and enhanced long life performance
- Increased confidence and productivity through reliable real-time data
- Predict and prevent costs less than fail and fix

WIRELESS MONITORING FOR RAIL

As with any of our wireless monitoring solutions, a typical rail monitoring system will comprise **three key elements:** sensors, a cellular communications Gateway and an online data portal.

For dense sensor networks and highly responsive reporting, choose our FlatMesh™ intelligent mesh platform.

Where sensors are widely dispersed and where you need to transmit data through physical obstructions (including soil and rock) our long-range GeoWAN™ platform may be more suitable.

Data transmission from the Gateway to online data portal can use radio, ethernet or Wi-Fi depending on site conditions.

A wide range of sensors can be integrated with our platforms to provide geographically dispersed stakeholders with data from track, structures and earthworks:

TRACK MONITORING
Measure changes in track geometry including rail cant/ cross-level, twist, superelevation/ settlement and slew/buckle

SLOPE & ROCKFALL MONITORING
Get early warning of landslides, rockfall or subsidence to prevent disruption and danger

BRIDGE MONITORING
Prevent failure through structural health monitoring

CONSTRUCTION MONITORING
Manage your liabilities to third parties

TUNNEL MONITORING
Understand ground and structural movements

DRAINAGE MONITORING
Flood detection with immediate alerts

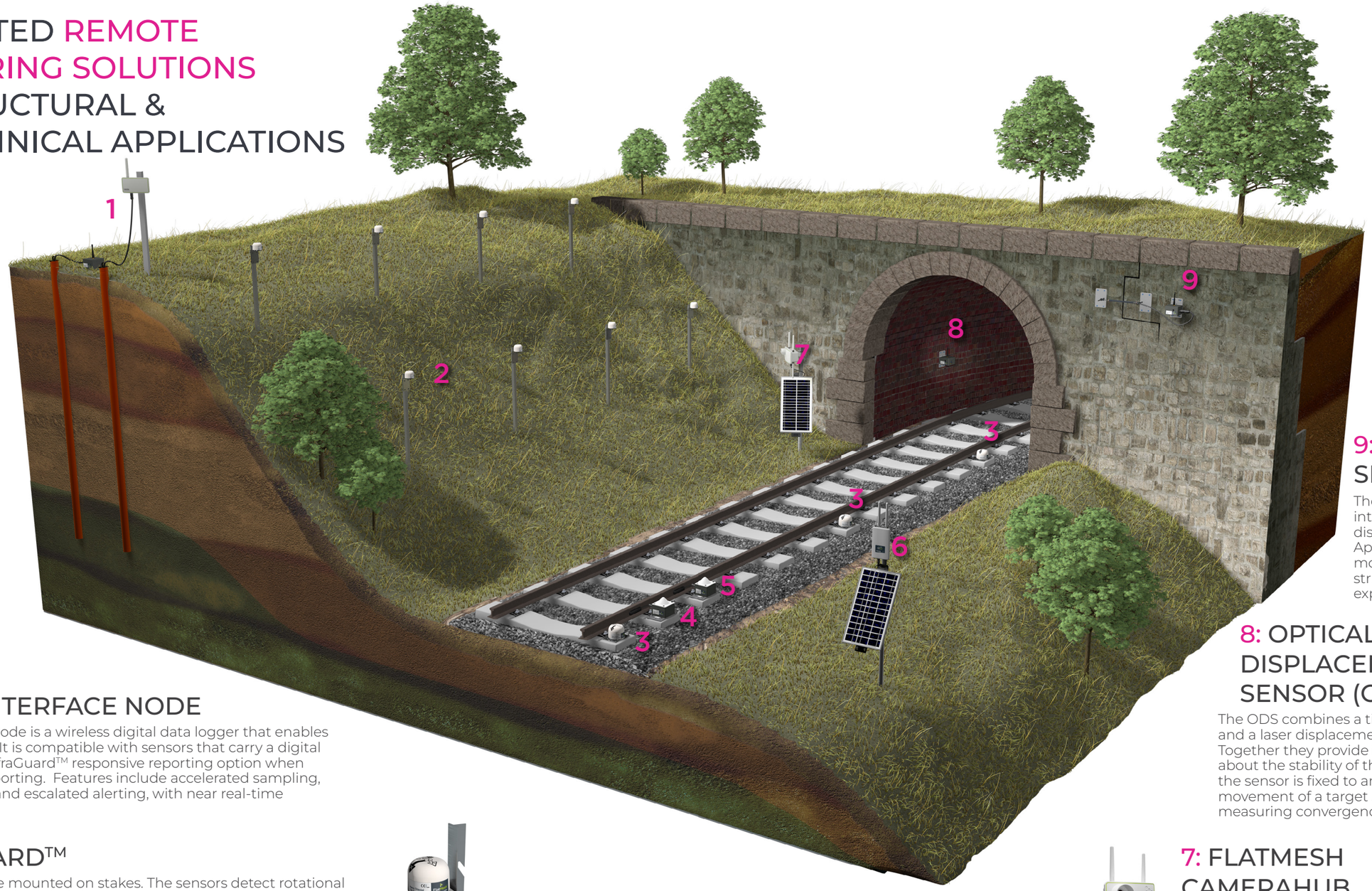
EASE OF USE

We know that access windows are precious; that's why we've built our monitoring solutions to be:

- Fitted in minutes
- Reporting before you've left site
- Still reporting more than 10 years later.

Precise, reliable instruments installed with no specialist skills required.

INTEGRATED REMOTE MONITORING SOLUTIONS FOR STRUCTURAL & GEOTECHNICAL APPLICATIONS



1: DIGITAL INTERFACE NODE

The Digital Interface Node is a wireless digital data logger that enables automated sampling. It is compatible with sensors that carry a digital output. Choose the InfraGuard™ responsive reporting option when you need dynamic reporting. Features include accelerated sampling, triggered site photos and escalated alerting, with near real-time notifications.

2: INFRAGUARD™

Wireless tilt sensors are mounted on stakes. The sensors detect rotational movements and send scheduled data reports. Sudden movement events are also detected as they happen, regardless of the pre-set sampling schedule. When a camera is integrated into the system, photographs are taken on a scheduled basis and when triggered by sudden movement.

3: NANO TRIAXIAL TILT

The Nano delivers the same precise measurements as our IX Triaxial Tilt Node in a more compact, robust enclosure, and offers more user-interaction. Used here to monitor track movement.

4: MILLIVOLT SENSOR

The Millivolt Sensor Node enables a variety of structural and geotechnical sensors to be integrated into a wireless monitoring system. Strain gauges on trackbed are just one example.

5: TEMPERATURE SENSOR

The PT100 RTD Sensor Node enables precise temperature monitoring and critical rail temperature alerting. Can be supplied with an integrated High-G triaxial tilt sensor for combined tilt and temperature monitoring.

6: 4G GATEWAY

The FlatMesh™ 4G Gateway provides all the functionality required to operate a wireless sensor network in a remote location. With a solar panel no fixed power supply is required. Data is transmitted from the sensors to the Gateway and onwards to a secure cloud-based server and data management platform.

9: CRACK SENSOR

The crack sensor node interfaces to a linear displacement sensor. Applications include crack movement, pile separation, structural movement and expansion joint monitoring.

8: OPTICAL DISPLACEMENT SENSOR (ODS)

The ODS combines a tilt meter and a laser displacement sensor. Together they provide information about the stability of the structure the sensor is fixed to and relative movement of a target structure. Here it is measuring convergence of the tunnel intrados.

7: FLATMESH CAMERAHUB

Solar-powered 4G Camera with built-in EdgeHub. Clear, high-quality images day or night. Used as an integral part of InfraGuard™ monitoring solution with automated triggering and wireless communications for remote locations.

TRACK

Wireless monitoring helps you **assess long- term trends, and detect sudden movement** that could represent a safety issue.

Clients around the world choose Senceive solutions when they need precise, near real-time track geometry data, even with challenging trackbed conditions. Quick, simple installation reduces the need for boots on ballast, lowering risks and improving safety.

Safe and efficient rail operations depend on stable track geometry. Remote wireless monitoring helps manage the risk of movement in critical areas, including those impacted by nearby construction activity, weather events, or traffic loading.

STRUCTURES

Use wireless technology to **monitor bridges, tunnels, buildings** and **other structures** such as electrification gantries and retaining walls.

Our technology is chosen by rail engineers throughout the asset lifecycle. During construction our range of **robust, highly portable sensors** can **safeguard** the structures being built and manage risk to third parties. And on operational structures, monitoring can support your asset management by identifying where significant movement is taking place and intervention is needed.

It can also **identify structural movement** that is within acceptable bounds and therefore prevent unnecessary intervention.

Helping you manage risk and extend the life of rail structures.

EARTHWORKS & GEOTECHNICAL

Use wireless monitoring **ground movement** and **geotechnical parameters**.

Monitor railway earthworks such as cuttings and embankments for **early warning of landslips/ landslides** and **failures.**

Receive automated alerts with near real-time photo verification for rapid decision-making.

4G cameras are automatically triggered by sudden events to capture and transmit high quality images - day and night.

Using unique and proven intelligent monitoring technology you can be confidant that next time the ground moves, the trains can be stopped.

Senceive

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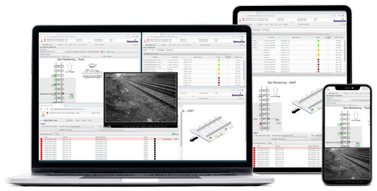
"Some of the big advantages we saw to [Senceive's] system were we now had sensors installed every 10 feet along the freight track, we couldn't reasonably do that with any of our previous monitoring systems. Another huge advantage, especially compared to our AMTS, was that we're getting a reading every 5 minutes even if the sensors are buried in snow or a train is passing, we are always getting our readings because we don't have to rely on line of sight. A huge plus is that it is completely wireless, anyone who has worked with wired systems know they are a huge hassle."



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Luke Hanson, PE
Project Manager, Terracon

Senceive

Harnessing intelligent monitoring to keep people and infrastructure safe

Eddyfi Technologies
Remote Monitoring Solutions

Senceive

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