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TraffiClair Monthly Updates

2026.05: Slope Reliability & Bridge Health Monitoring Radars

TraffiClair Team

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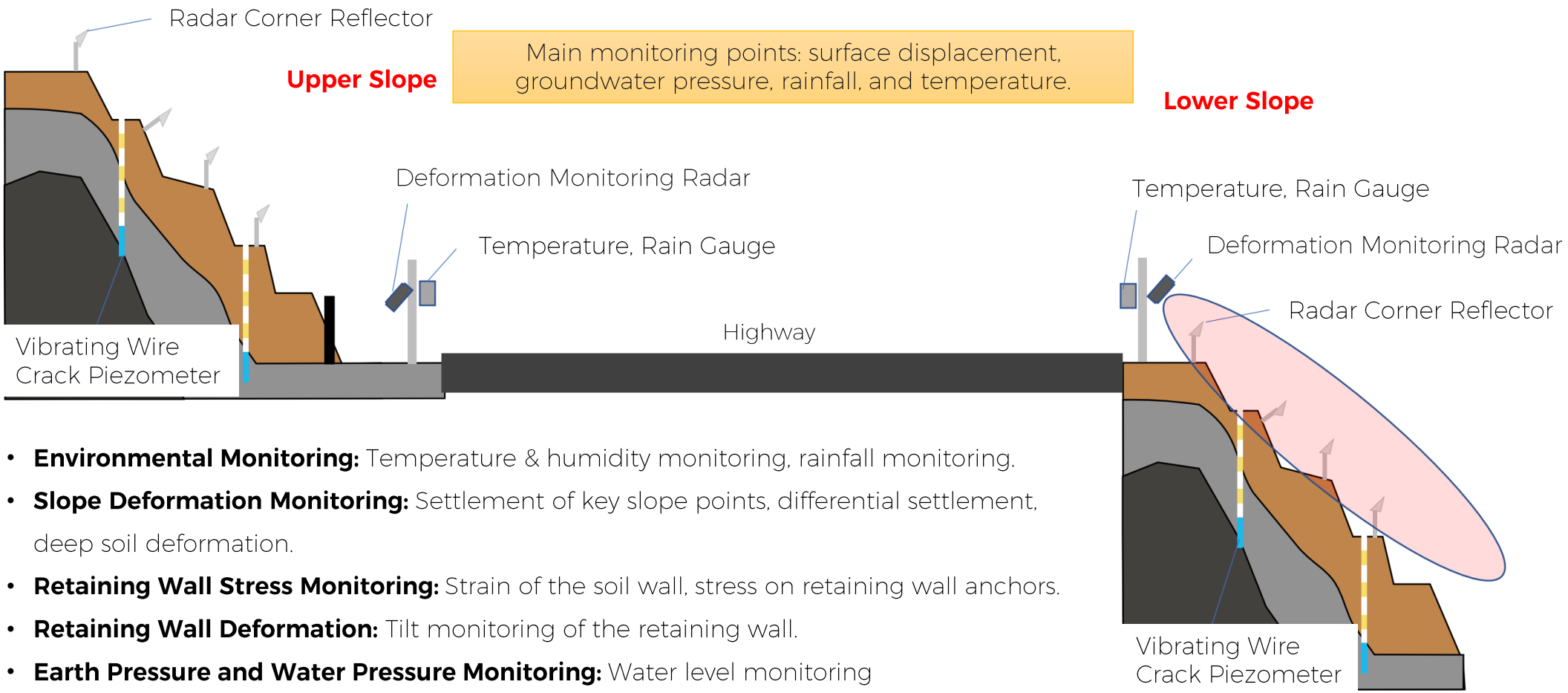
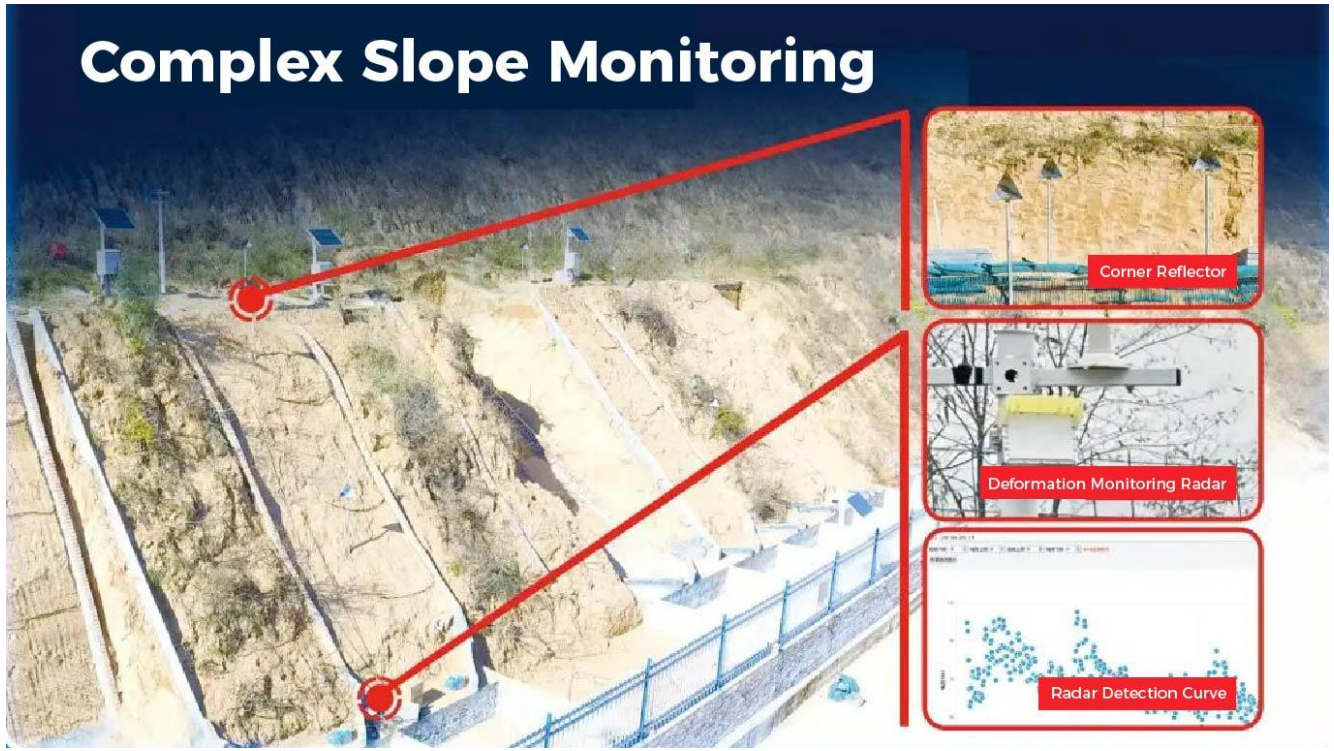
Key Aspects of Slope Monitoring



- **Environmental Monitoring:** Temperature & humidity monitoring, rainfall monitoring.
- **Slope Deformation Monitoring:** Settlement of key slope points, differential settlement, deep soil deformation.
- **Retaining Wall Stress Monitoring:** Strain of the soil wall, stress on retaining wall anchors.
- **Retaining Wall Deformation:** Tilt monitoring of the retaining wall.
- **Earth Pressure and Water Pressure Monitoring:** Water level monitoring

Real-Time Slope Stability for Safer Roads

ClairWav-MD10 Micro-displacement Monitoring Radar



Landslides, slope failures, and dam deformations can happen without warning—but the ClairWav-MD10 helps you stay ahead.

This next-gen phased array radar delivers **millimeter-wave precision** to capture micro-displacement changes on slopes, mountains, mines, and dams. Deployed roadside along expressways (every 25–35m), it monitors both upper and lower slopes with upward/downward-facing units.

Key advantages:
✅ All-weather, continuous monitoring
✅ ≤0.5mm ranging accuracy at up to 200m
✅ 1 fps data updates for real-time trends
✅ Automatic alerts when corner reflectors shift or disappear

Product Webpage **Datasheet**

ClairWav-MD10 Principle & Deployment

Product Webpage **Datasheet**

Principle of Operation

- Based on changes in the relative position between the radar and the corner reflector.
- Determines whether the corner reflector has shifted.
- If the corner reflector disappears or changes position, an alert is triggered

Device Deployment

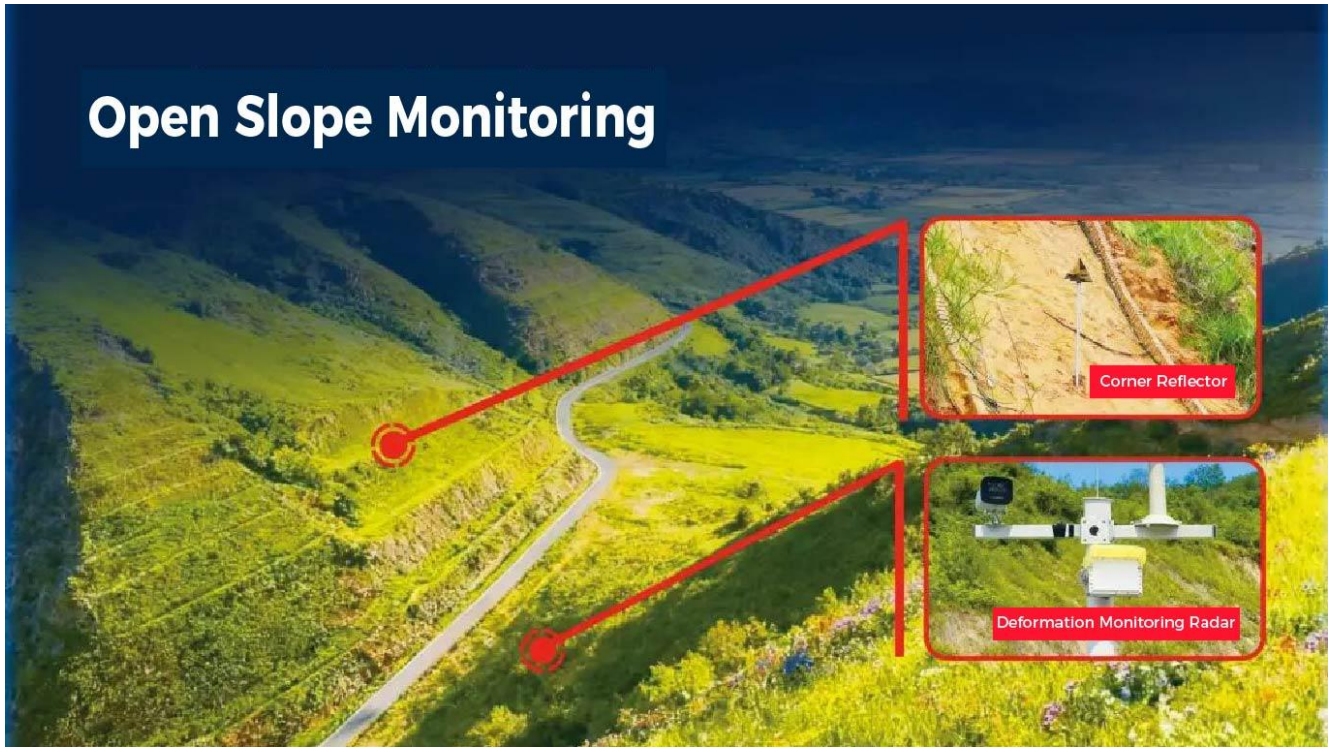
- Installed roadside along the expressway.
- One radar unit every 25m–35m.
- Upward-facing radar for upper slopes.
- Downward-facing radar for lower slopes.
- Corner Reflector Installation-Installed along the radar observation direction at intervals of 10m–35m.

Device Specifications

- Maximum monitoring distance: 200m.
- Monitoring angle: Horizontal:±7°, Vertical:±7°.
- Ranging accuracy: ≤0.5mm.
- Data rate: 1fps

Millimeter Precision, All-Weather Reliability

Keep Slopes & Dams in Check with ClairWav-SD1K Imaging Radar



Designed for large-area applications (slopes, mountains, reservoir dams, rockfill dams), this system delivers real-time, sub-millimeter precision on displacement, deformation, and crack propagation.

Key Highlights:

- Millimeter-wave radar – captures tiny shifts across a wide field of view
- All-weather, continuous monitoring – reliable updates even in harsh conditions
- 500m range – one scan covers hundreds of meters
- Multi-variable detection – deformation, displacement, and cracks simultaneously
- Automatic analysis & alerts – no manual intervention needed
- Easy deployment – works in complex terrain

Product Webpage **Datasheet**

ClairWav-SD1K Principle & Deployment

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Principle

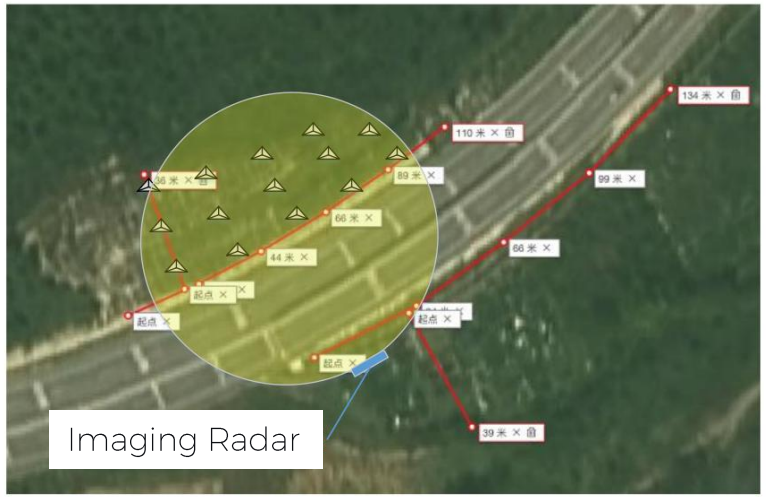
- The displacement of a corner reflector is determined by detecting changes in its position relative to the radar.
- Whether a corner reflector has moved is determined by analyzing the change in its position relative to the radar.

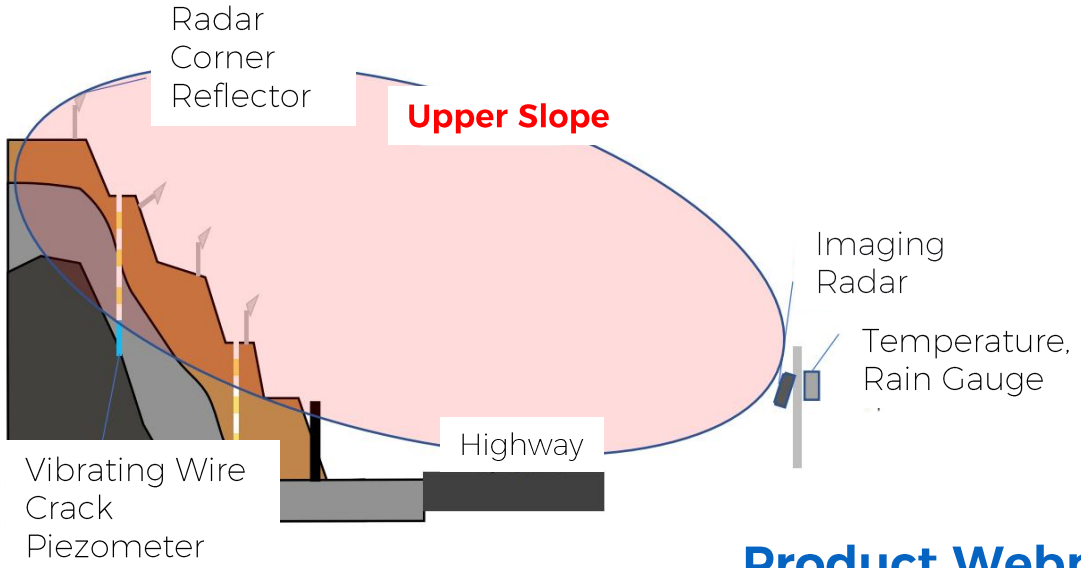
Deployment

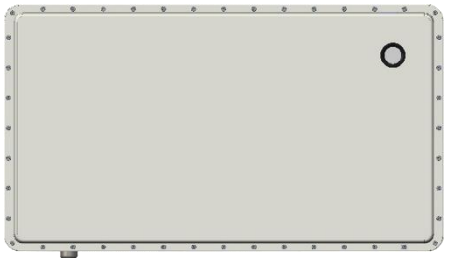
- Installed in opposite orientation, with the distance to the slope greater than the slope length.
- Corner reflectors installed at intervals of 10 m to 35 m.

Specs

- Maximum monitoring distance: 500m.
- Monitoring angle: Horizontal:±50°, Vertical:±8°.
- Ranging accuracy: ≤1mm.
- Data rate: 1fps.



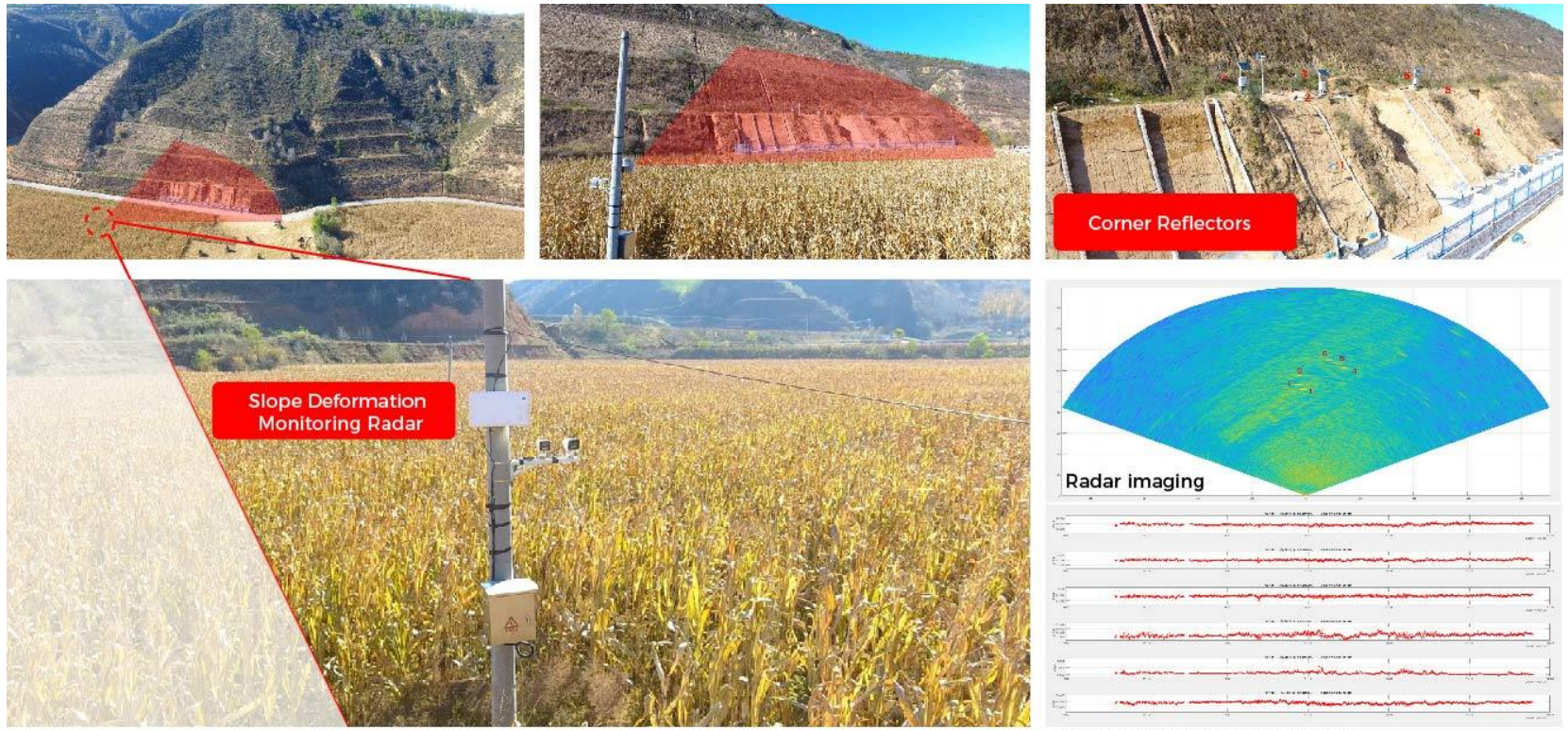




Imaging Radar ClairWav-SD1K

Product Webpage **Datasheet**

Case Study: Yan’an Slope Stability Monitoring Pilot Project

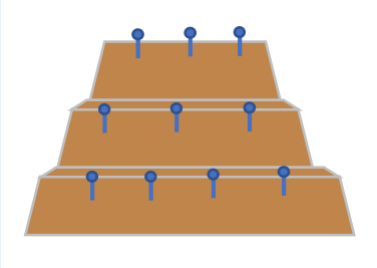
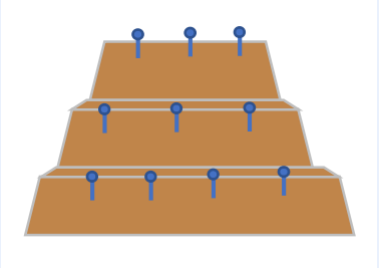
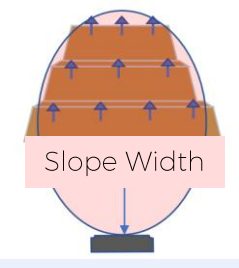
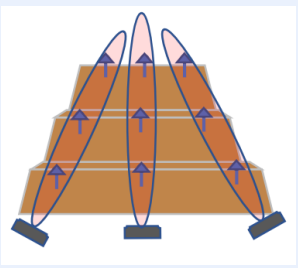
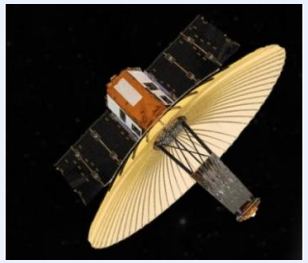


Corner reflector ranging results

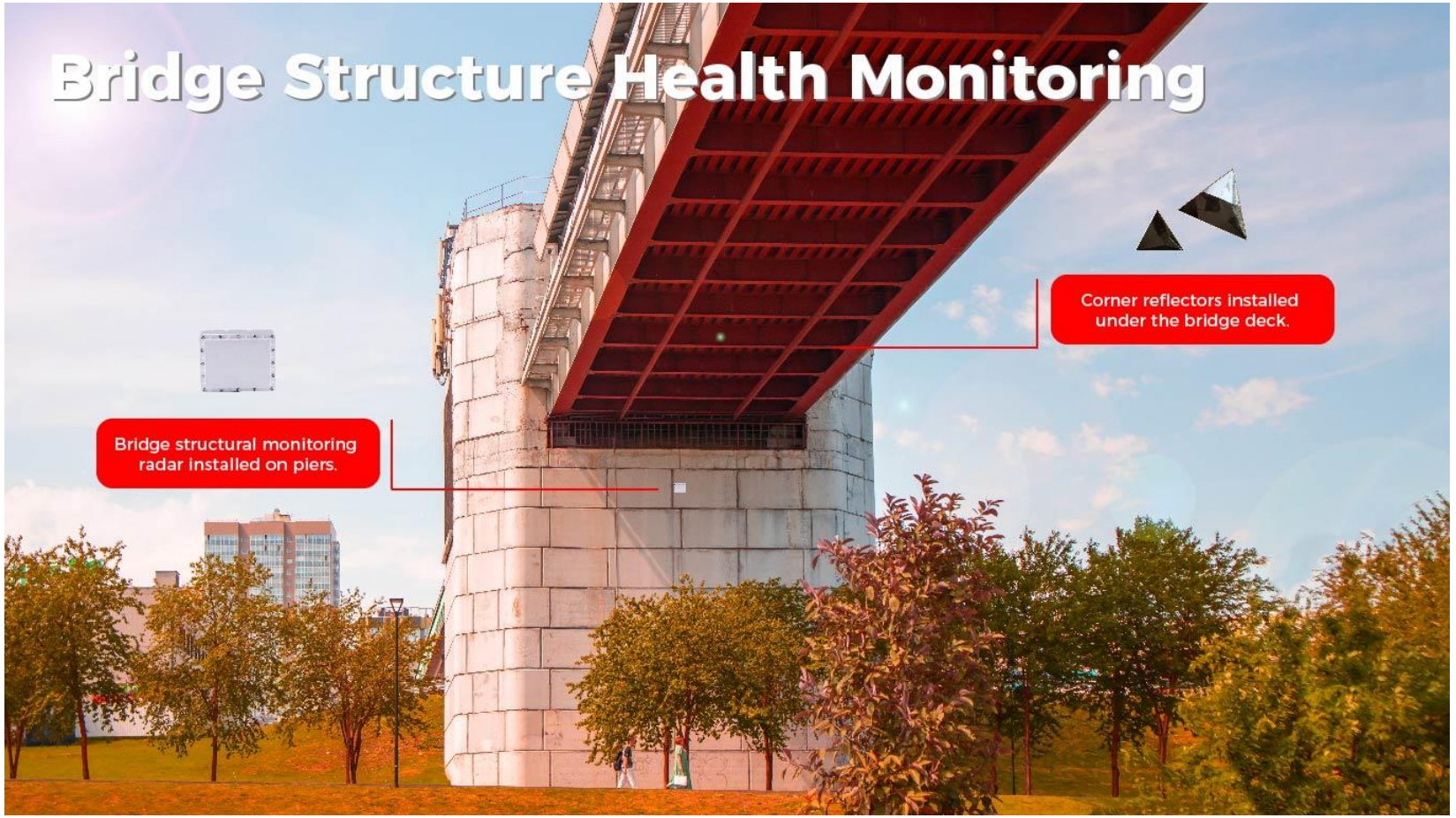
The Yan’an region, characterized by mountainous loess terrain, faces significant slope stability challenges due to natural and anthropogenic factors. The project area is dominated by thick loess coverage with well-developed gullies and vegetation cover below 40%. The rainy season brings frequent and intense rainstorms, which easily generate surface floods carrying large amounts of sediment, resulting in severe soil erosion. Poorly developed drainage systems on slopes lead to inadequate water runoff, allowing rainwater to impact slope surfaces and cause loess caves, subgrade settlement, and other instability issues, posing major safety risks to slope stability. To enhance early warning capabilities and ensure public safety, a pilot slope stability monitoring project was conducted using advanced radar technology. The primary objective was to achieve high-precision, real-time monitoring of surface displacement and environmental parameters.

Full Story

Comparison of Surface Displacement Monitoring Technologies

	Inclinometer	Differential GPS	Imaging Slope Radar + Corner Reflector (SD1K)	Micro-displacement Monitoring Radar + Corner Reflector (MD10)	Satellite Radar Imaging + Corner Reflector
Principle	Using the inclination of monitoring poles to detect surface movement of slopes.	Measuring the absolute displacement of each monitoring point to track slope surface movement.	Monitoring surface movement by measuring the radial displacement of corner reflectors relative to the radar.	Surface movement is monitored by measuring the radial displacement of corner reflectors relative to the radar.	Microwave signals are transmitted from a satellite, and the reflected signals are received to generate high-resolution images.
Benefits	• Low cost • Can be used in scenes with complex vegetation cover	Distributed and capable of operating in areas with complex vegetation coverage.	Large monitoring coverage with low equivalent cost per monitoring point.	Low cost; low equivalent cost per monitoring point.	Data can be acquired periodically to support long-term slope stability analysis.
Challenges	1. Unable to measure sliding deformation of the slope. 2. It has been verified that slope landslides are dominated by surface translation in the early stage, and this technology cannot achieve landslide early warning.	High cost per monitoring point.	1. Cannot operate in areas with complex vegetation cover. 2. Not suitable for scenarios with dense or complex vegetation. 3. The system cannot function properly under complex vegetation coverage.	1. Cannot operate under complex vegetation cover. 2. Requires deployment of multiple units.	1. Long revisit interval, typically 15–30 days. 2. Requires large corner reflectors, typically over 1 meter in diameter.
Deployment					

Bridge Health Monitoring Radar – ClairWav-BH10



Bridges are critical infrastructure but keeping them safe across changing environments is a constant challenge. We're proud to introduce the ClairWav-BH10, a smart, millimeter-wave radar solution designed for continuous, real-time bridge monitoring.

🔍 **How it works**

Mounted on bridge piers, the BH10 detects micro-displacements of corner reflectors installed under the bridge deck. It calculates deflection and vibration with ±0.5mm accuracy at up to 100m range — all automatically.

✅ **Key benefits**

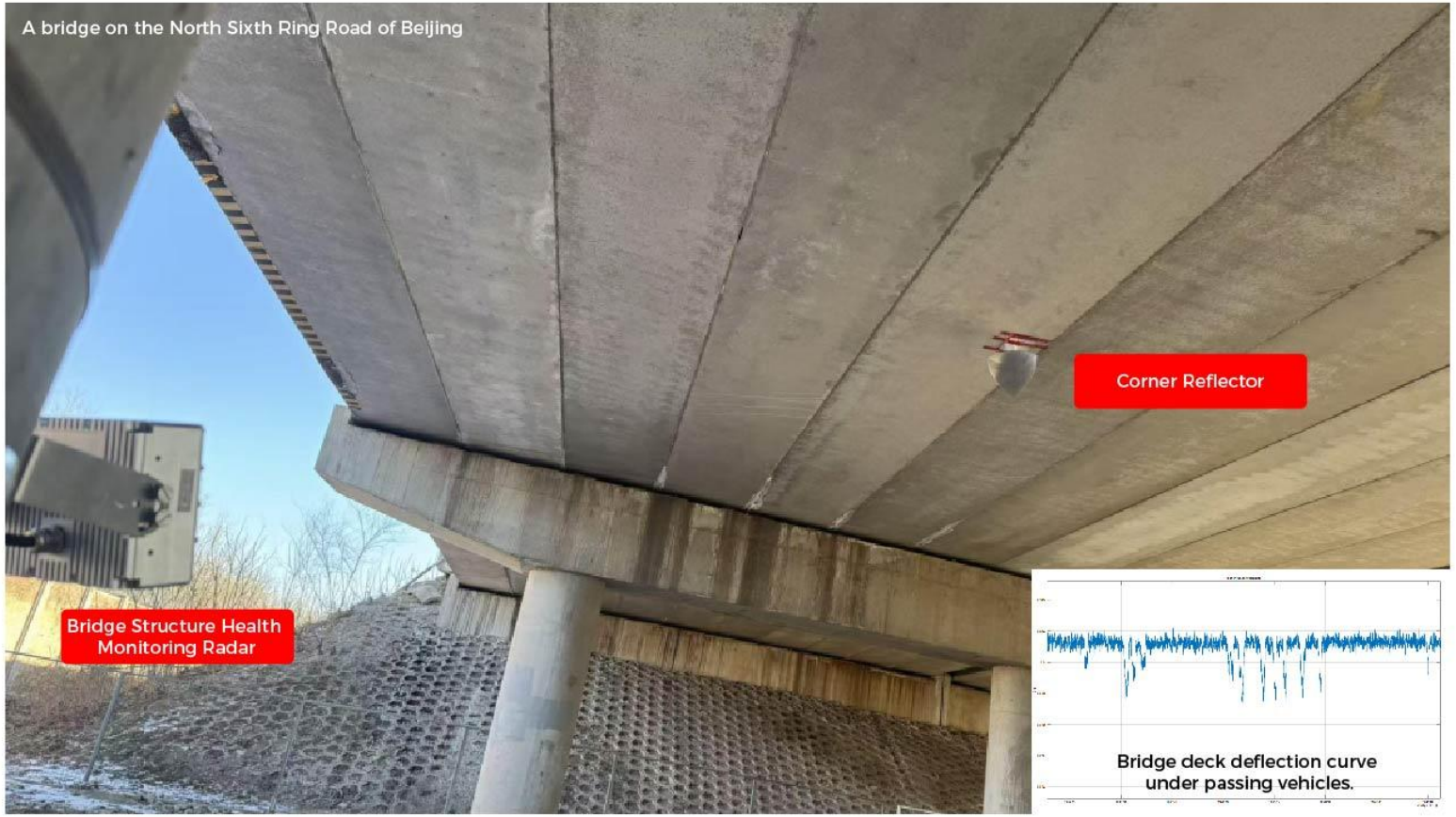
- All-weather, 24/7 operation
- Real-time alerts – no manual intervention
- Low-cost, easy deployment (power + network ready on piers)
- Supports 20+ measurement points per unit

Whether for long-span bridges or urban viaducts, the ClairWav-BH10 delivers actionable, real-time data for smarter maintenance and safer infrastructure.

Product Webpage

Datasheet

ClairWav-BH10 Principle & Deployment



Principle of Operation

- Install corner reflectors on the underside of the bridge deck.
- Install radar on the bridge pier to detect micro-displacements of the corner reflectors relative to the radar, and calculate bridge deck deflection through conversion. Bridge vibration can also be monitored simultaneously.

Device Deployment

- Radar is mounted on the bridge pier, with the line of sight between the measurement point and the bridge deck forming an angle greater than 30°.
- Corner reflectors are arranged on the underside of the bridge deck, supporting more than 20 measurement points.

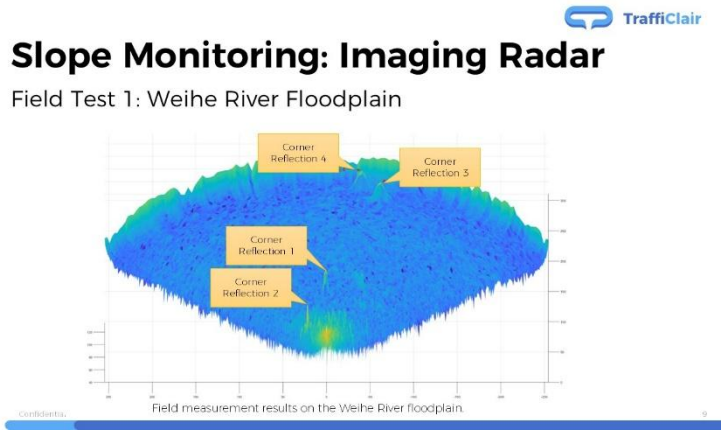
Device Specifications

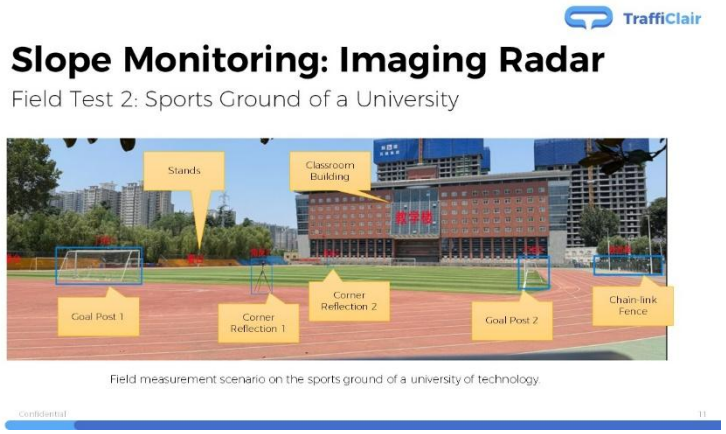
- Maximum monitoring distance: 100m.
- Monitoring Angle: 4°-10°.
- Displacement measurement accuracy: ±0.5mm.
- Data rate: 10-20fps.

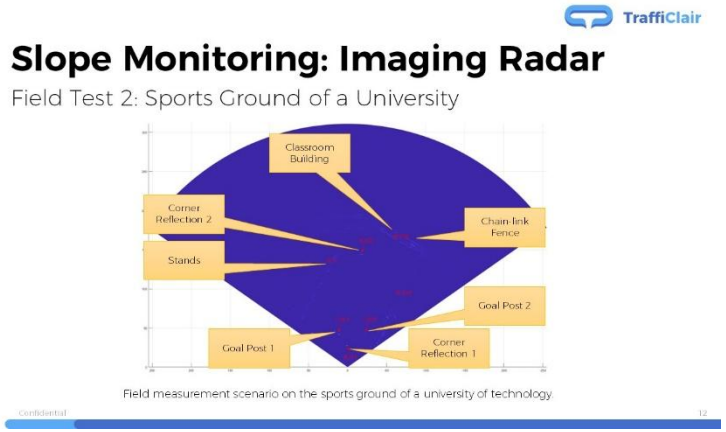
Product Webpage

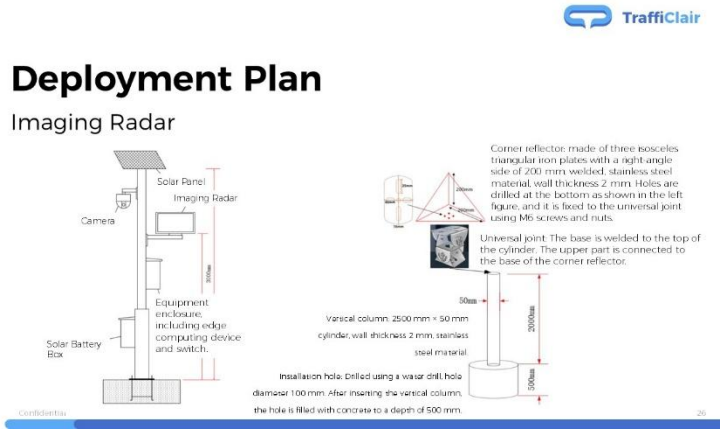
Datasheet

Solution Presentation









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- Beijing North 6 Ring Bridge Pilot

Intelligent Monitoring Platform

Product Presentation

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202603: Introducing ClairSaf VillagePeace & Full Safe Mobility Family
202604: Stronger AI, Smarter Signals
All previous issues...
Catalogue V1.10

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Thanks

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