

Detecting subtle slope angle variations on Taiwan National Freeway No.3

Country

Taiwan

Project type

Slope monitoring

Sector

Civil infrastructure

Main product

Monitoring solution

Challenge

In Taiwan, slopes are categorised into four main types: Type A and B slopes are considered highly critical and require long-term monitoring, while Type C slopes require occasional inspections and Type D slopes do not require any monitoring.

However, in November 2022, a significant landslide occurred on a Type C slope, leading the government to introduce new regulations mandating real-time monitoring for all Type C slopes. As a result, a large-scale project was initiated on the Formosa Motorway, also known as National Freeway No. 3. Due to the proximity of the landslide to the Lunar New Year in 2023, when high traffic volumes are expected, the government urged monitoring contractors to expedite the deployment of real-time monitoring systems on these slopes before the festive season.



Solution

The objective was to proactively address any potential threats and ensure timely intervention to prevent a possible catastrophe. Faced with challenging slope movement conditions, [Sanlien Technology](#), a pioneering Taiwanese company in slope monitoring and geotechnical solutions, implemented the [LoRa wireless automated monitoring system](#) from WorldSensing.

Sanlien Technology deployed several devices to monitor the highway slopes, including:

- More than 100 gateways, one for each slope, powered by solar panels to avoid power outages
- Tiltmeters, operating at a sampling interval of 15 minutes, to address the intricacies of the slope
- Vibrating Wire data loggers for monitoring load cells

The LoRa-based solution provided real-time monitoring, enabling Sanlien to detect even the slightest variations in slope angles. This level of precision helped ensure the safety of motorists and maintenance crews while minimising potential disruptions.

“We take immense pride in contributing to infrastructure stability. Worldsensing solution has proven to be a game-changer in this project, exemplifying our commitment to innovation and safety in the field of slope monitoring. We continue to lead the way in technological advancements for a safer, more reliable transportation network.”

Leon Hsieh,

Manager

Sanlien Technology

Benefits

Thanks to the battery-powered nodes and solar panels, SanlienTechnology was able to ensure uninterrupted data collection and avoid potential power outages and cable installations. The road operator can now monitor the data 24/7 and conduct timely inspections and corrections whenever anomalies are detected.

The combined expertise in slope monitoring and collaboration in remote solutions has elevated the standards for integrating advanced technology to safeguard motorists as they travel through Taiwan's challenging topography.



Photo courtesy of Sanlien Technology

Advantages

- A global understanding of the project, from ground movement to load cell monitoring, was achieved through the deployment of various instruments such as tiltmeters and vibrating wire data loggers.
- Continuous monitoring and remote access to data provided an accurate understanding of the topography and slope movements, minimising the need for on-site inspections.
- The remote monitoring system mitigated potential environmental and community impacts.

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