

Wireless technology for landslide monitoring in residential areas

Country

Malaysia

Project type:

Remote landslide monitoring

Sector:

Structural health

Main product:

Monitoring Solution

Challenge

Landslides are among the deadliest hazards across countries which experience wet seasons. And due to climate change, landslides triggered by rain no longer occur only during rainy seasons. Unlike a flood, where water levels rise gradually, there is not much time to get to safety when landslides occur.

In Malaysia, population increases and urbanization have led to the development of new residential areas in mountainous areas where there is an increased risk of slope failures. Continuous, heavy rain can lead to water retention, which can cause a slope to lose stability and result in a landslide. Many recent cases of landslides in Malaysia can be attributed to soil instability due to change of the ground water content because of monsoonal rainfall.

The Highland Tower collapse in 1993, which claimed 48 lives, and the 2011 Hulu Langat incident, where 15 children and a caretaker in an orphanage were killed, are well-known examples. Overall, 600 lives have been lost since 1973 in Malaysia because of landslides.

Traditionally, slope maintenance is carried out manually, in intervals spanning as long as every five years. Worldsensing partner MySTAR took on the challenge of monitoring three residential areas in the cities of Perak, West Malaysia, Terengganu, East Malaysia, and Langkawi Island.

The question was how to cost-effectively monitor these environments while ensuring as much data as possible was collected.



Langkawi project site

Advantages

- Wireless monitoring provides notice of potential landslides, allowing for remedial action to be taken to protect local ecosystems.
- Obtaining more frequent slope stability readings improves the safety conditions for residents.
- Wireless technology has lower material and embodied energy content than cabled systems.

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Solution

MySTAR deployed four Worldsensing wireless tiltmeters and four gateways to remotely monitor slope stability and the structural integrity of affected buildings across the three project sites. Readings are conducted as frequently as 42 times per day. The wireless tiltmeters are low-power long-range LoRa nodes that can transmit tilt readings to the gateway for months without in-field maintenance. To protect the devices and to ensure readings in case of an incident, most tilts were placed in numbered, metal boxes for easy in-field maintenance.

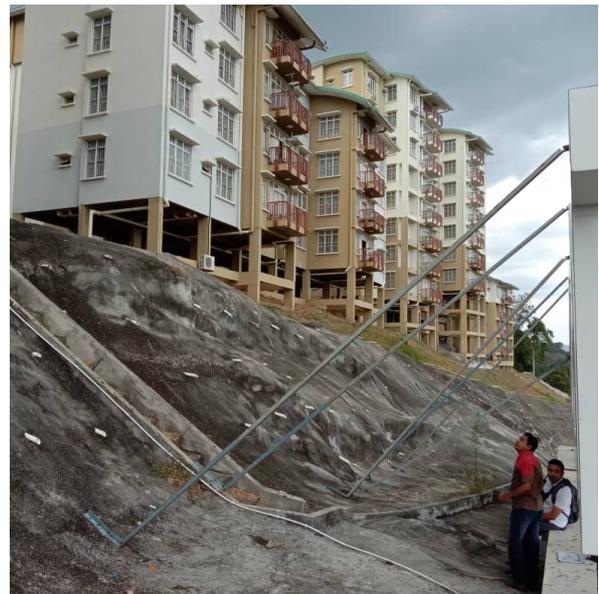
While the projects in Terengganu and Langkawi use Worldsensing's on-premise Connectivity Management Tool (CMT), CMT Edge, to transmit data from the gateway to a local server, CMT Cloud is used to store and share tilt readings through the cloud for the project in Perak. All data from Worldsensing's CMT is integrated with MySTAR's data visualization software through MODBUS TCP in the case of CMT Edge and API in the case of CMT Cloud.



Gateway at the Perak site

About MySTAR

MySTAR provides engineering solutions, acts as a project engineering, procurement, and construction contractor and provides maintenance services for industries including oil and gas, telecoms and civil and geotechnical engineering. MySTAR provides multiple solutions under one roof to deliver high project values to clients. MySTAR is a privately held company formed in 2006 and is registered with the Ministry of Finance of Malaysia.



Langkawi project site

Benefits

Compared to manual data collection, the Worldsensing solution allows MySTAR to collect data more frequently and at lower cost, helping to ensure there is plenty of warning of impending landslides.

Worldsensing wireless tiltmeters and gateways offer easy click-and-connect deployment and the smooth software integration with the partner's data visualization software, further reducing costs.

Finally, the wireless monitoring system is more cost effective and resilient than cabled systems, with lower maintenance requirements. Worldsensing offers an easy-to-scale solution which provides autonomy and agility when having to re-deploy and configure sensors in the network.



Worldsensing's Tiltmeter at the Terengganu site