Hi-Target

Landslides and mudslides caused by heavy rainfall bother people every year and automated geohazard monitoring is a major solution to reduce the risk effectively. ***Hi-Target is now responsible for the construction of monitoring systems around the country. Let's learn how the geohazard monitoring system is established.***

Automated Geohazard Monitoring

Application in Yunnan, China

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Overview

China is a mountainous country with countless geological disasters such as landslides and mudslides caused by heavy rainfall every year. Geohazard monitoring, which mainly includes landslide monitoring, rock collapse monitoring and mudslide monitoring, is becoming increasingly important.

The Chinese government has invested more than 4 billion RMB, establishing a nationwide geological disaster monitoring and early warning system. It covers 17 provinces and has been completed by April 15th, 2021. As a major solution provider, Hi-Target is responsible for the construction of monitoring systems in several provinces. *This article will introduce Hi-Target's geohazard monitoring system in Yunnan Province, China, as an example.*

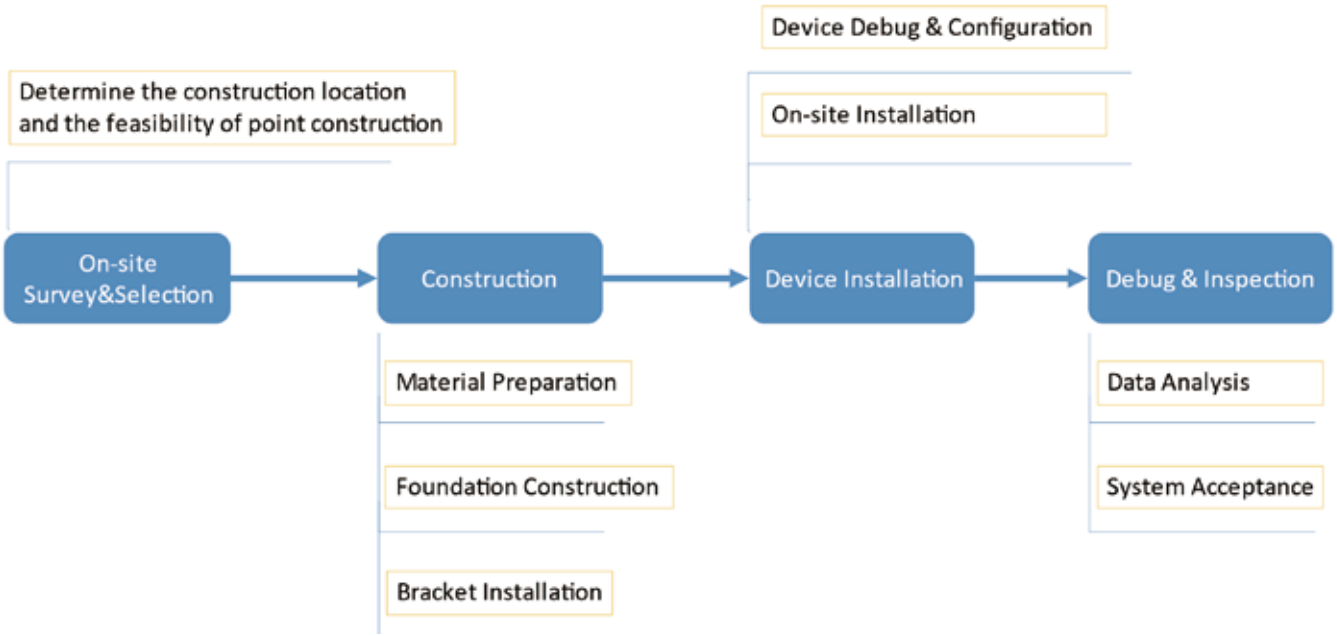
Key Words:

Landslide Monitoring
GNSS
Automatic Monitoring

Project Background

Take Lijiang City in Yunnan Province as an example. Hi-Target remediated a total of 166 hidden spots and built a total of 784 monitoring points. The project involved the application of 12 types of equipment and monitoring sensors. The construction period was 53 days, and the equipment on-time and online rate was over 98%.

The whole project construction process can be divided into site survey and selection of points, infrastructure construction, equipment installation, and device debug & inspection. The points construction is mainly for landslide monitoring, rock collapse monitoring and mudslide monitoring.



Construction Process FIG1

1.Geohazard Monitoring Process - On-site Survey & Selection

First, depending on the topography of the site and the potential disaster situation, determine what equipment we need to build and where to build.

The main stations are divided into four categories, GNSS station to monitor the displacement of the mountain, rainfall station to observe the change of rainfall, mud level meter to monitor the mudslide disaster, acousto-optic alarm station to issue a timely warning. Others are some sensors for further auxiliary.

Disaster Type		Monitoring Device							acousto-optic alarm
		GNSS	Crack	Inclination	Acceleration	Soil Moisture	Rainfall	Mud Level	
Land Slide	Stony	●	●	○	○		●		If Needed
	Soil	●	●	○	○	○	●		
Collapse	Stony	○	●	●	●		●		
	Soil	○	●	○	○		●		
Mudslide	Gully					○	●	●	
	Slope			○	○	○	●	○	

Monitoring Type **FIG2**

Next, a site survey will determine the specific construction site with the coordinates, monitoring items and dates marked on the map.

Points Map **FIG3**

As shown in the table below, rainfall gauges are required in most areas because most geohazard disasters such as landslides are caused by heavy rainfall. Therefore, it is necessary to build some acousto-optic alarm stations near the villages and along roads to warn our citizens at once.

2.Geohazard Monitoring Process - Construction

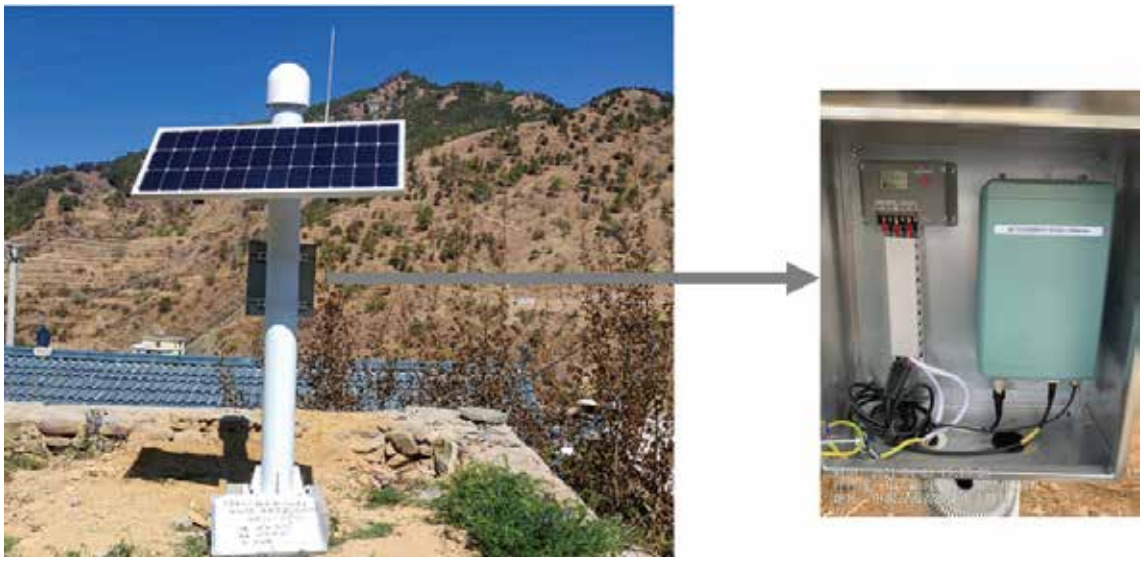
When we complete the site checkpoint, the project will enter into the construction phase. Then, it includes foundation construction, battery compartment pre-burial, main bracket installation, and guardrail installation.

Different devices and sensors will have different construction processes. All construction standards are according to the standard uniform specification defined by Hi-Target. Meanwhile, all materials will be sent to the project site directly by Hi-Target for installation.
The standard for all of our monitoring projects is that there is no need to rework on site. Just install it directly and uniformly according to the installation specifications.

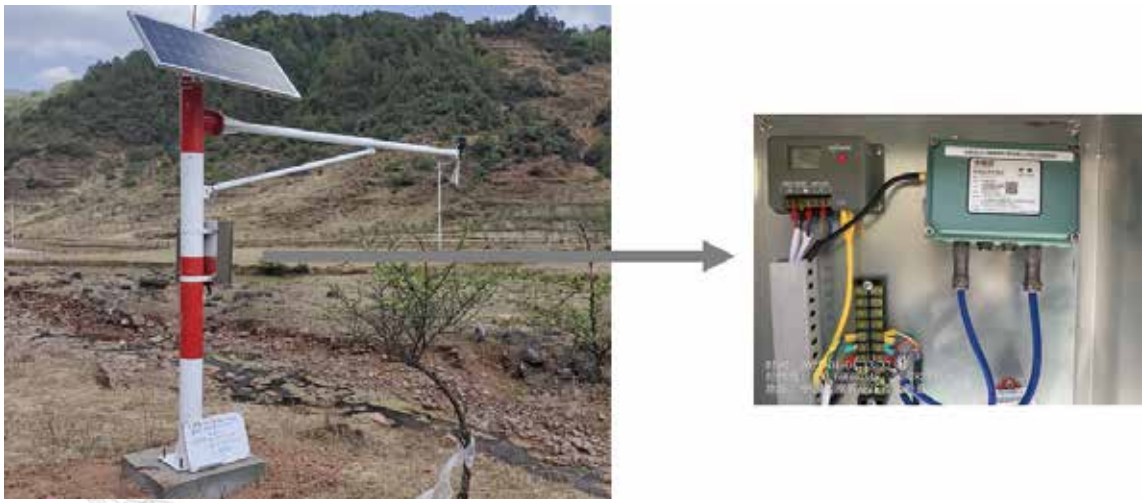
Foundation Construction FIG4

3.Geohazard Monitoring Process - Device Installation

When all foundation construction and bracket construction are completed, the field installation of the device will be carried out and all devices will be uniformly installed on the engineering boxes and brackets according to the specifications, going as shown in the following figure.



GNSS Receiver Installation FIG5



Monitoring Sensor Installation FIG6

Collapse Sensor Installation FIG7

4.Geohazard Monitoring Process - Debug & Inspection

Finally, data forwarding and online commissioning of the system will be performed to ensure that all devices are working properly.

In this case, eventually, all data will go back to the government's unified early warning system for centralized management.

The following pictures show the 4 most representative stations in geohazard monitoring: landslide monitoring station, mudslide monitoring station, crack and collapse monitoring station, and rainfall monitoring station.

On-site Data

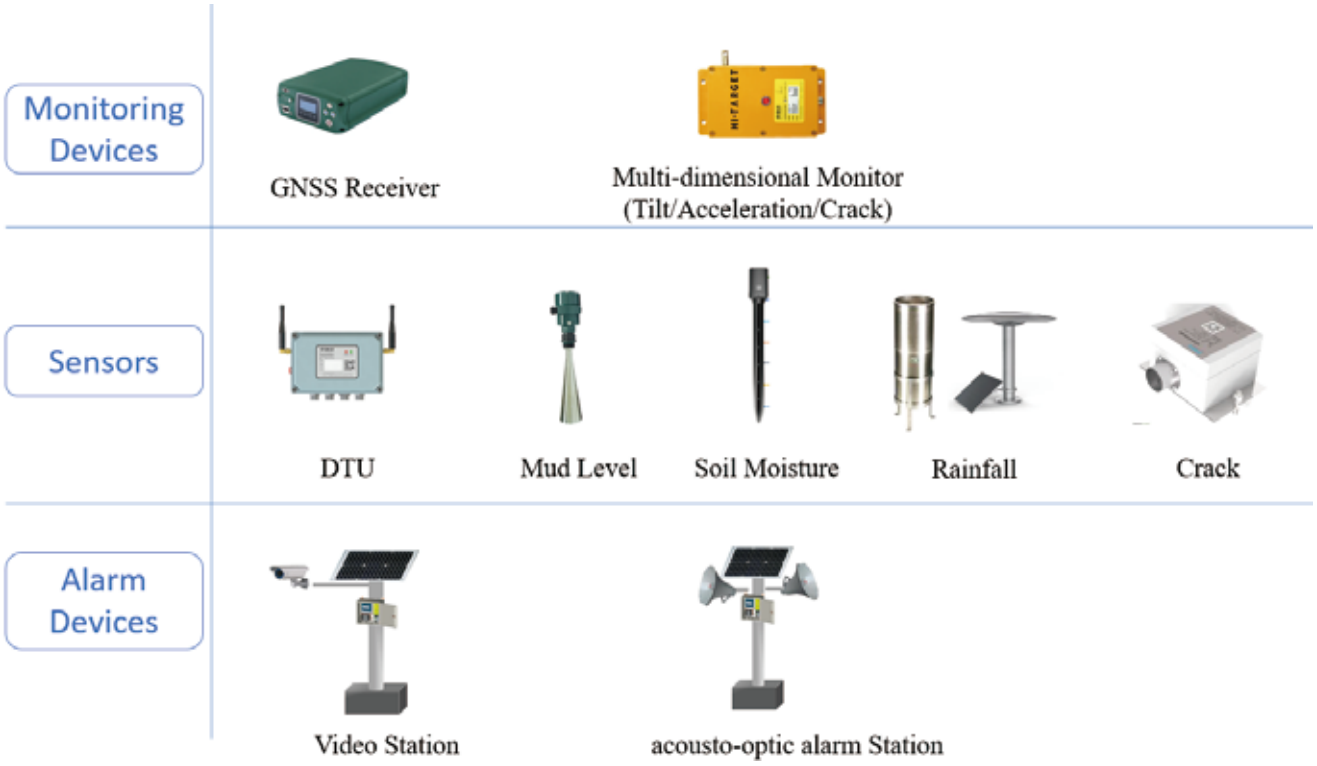
Online Cloud Platform

Data Forwarding FIG8

End

Lastly, I would like to briefly list all the Hi-Target monitoring devices applied to this project. It includes GNSS receiver, multi-dimensional monitoring device(tilt/acceleration/crack), geotechnical sensors, DTU and various alarm devices.

All of them are low-power products and solar panel is the support. They are also wireless communication and are widely used in hundreds of projects.



Monitoring Hardware FIG9

More information at https://en.hi-target.com.cn/become-our-partner/

About Hi-Target

Established in 1999, Hi-Target is the first professional high-precision surveying and mapping instrument brand to be successfully listed in China.

Hi-Target provides a wide range of surveying equipment including GNSS receivers, CORS stations, Total Station, 3D Laser Scanners, GIS Data Collectors, UAV/UAS, and Hydrographic products to offer complete commercial solutions for various industries.

As the leading brand in the geospatial industry, Hi-Target invests heavily in research and development, on top of collaborating with more than 100 universities globally to bring the latest positioning technology and innovation for product development.

For over 20 years, Hi-Target has approximately 3,300 employees worldwide, with an established network of 64 subsidiaries, 28 branches and more than 200 partners in over 60 countries to service and support our customers.

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