SureStar

GENIUS

Mini UAV LiDAR System

Ultra Light | Ultra Small | Integrated | Efficient | Precise | Flexible | Convenient | Affordable

Introduction

Mini UAV LiDAR System

Genius Mini UAV LiDAR is developed by Surestar, a cost - effective surveying grade LiDAR solution. Genius is integrated with a R-fans multi-beam Laser Scanner, a POS (GNSS/IMU), a computer control unit and data storage unit. Genius is featured as accurate, highly integrated, ultra light, easy to operate, fast to install/dis -assemble, and convenient to carry. As a user affordable solution, Genius adapts to most UAV systems. The highly integrated design awards Genius its portable system distinguish performance and stability. Genius enables surveyors to rapidly obtain Digital Surface Model and images for efficient geospatial applications.

01/02

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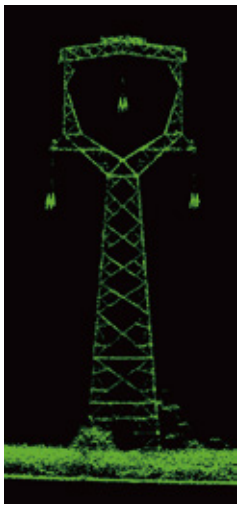
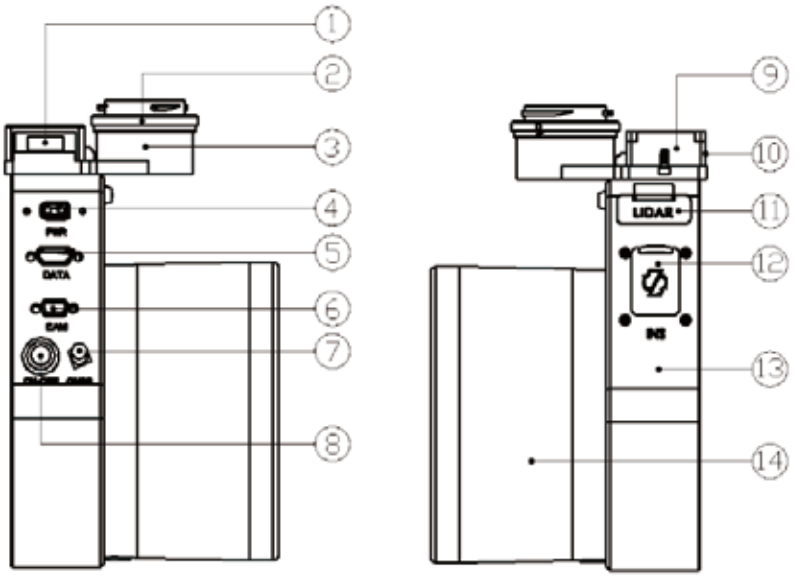


▶ Genius mini UAV LiDAR System

Diagram of Genius UAV LiDAR



1. Branch box
2. DJI_SKYPORT
3.Single mounting frame
4. Power supply input port
5.Device data interface
6. Reserved camera interface
7. Antenna interface
8.Device switch
9. Skyport line of communication
10. Branch box power supply output
11.LiDAR data storage SD card
12. GNSS storage USB disk
13. Master capsule
14. LiDAR

Features

Small Size,light weight
Supports various UAV platforms
System weight 1056 g / 1.7 kg with camera

Long Range, high frequency and high accuracy
Max measure range 200m

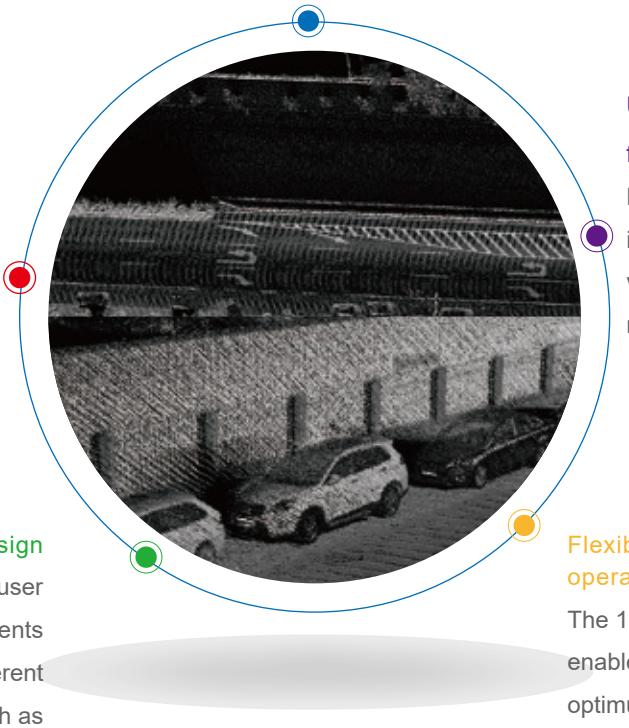
Max pulse frequency 640,000 pts/s

Typical point density >200 pts/m²

Measurement accuracy +/- 2cm

Absolute accuracy <15cm

Satisfies 1:1000 scale topographic mapping accuracy



Universal design for multi-platform
Not only being used on UAV, it can also be used for vehicle mapping or backpack mobile mapping platform.

Modular design
Can be customized accordingly to user requirements

Can be integrated with different sensors, such as

Standard RGB camera, Multispectral, Hyperspectral or other sensors

Flexible and convenient operation
The 1.2 kg weight of Genius enables the UAV to fly at its optimum speed and longest distance.

Genius does not require special landing field with its strong environmental adaptability.

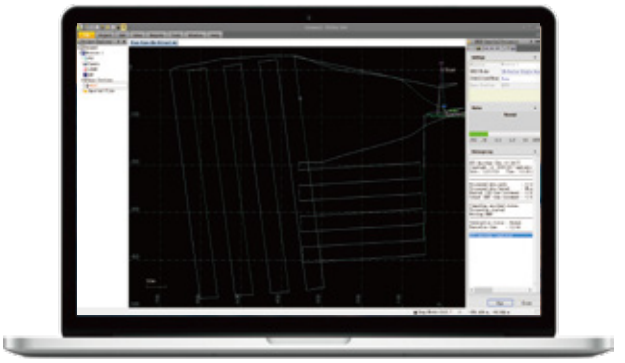
The superior low-altitude performance makes the system very easy to operate, thus greatly improving work efficiency.

Specifications

	Item	Genius-16	Genius-32
System	Max measurement Range	200m (ρ= 20%)	250m (ρ= 80%)
	Pulse frequency	320 kHz	640 kHz
	Refresh rate	5-20 Hz	
	Typical range	50-150 m	
	System vertical accuracy	＜0.1 m	
	Relative/absolute horizontal accuracy	＜0.10 m/0.15 m	
	Mapping scale	1:500 1:1000 Topographic mapping	
	Point density	＞100 pt/m²	＞200 pt/m²
	System weight	1056 g（on DJI M200/M210/M300 installation）/1.7 kg with camera	
Laser Scanner	Scanner model	R-Fans-16	R- Fans-32
	Scanning FOV	360°x 30°	360°x 31°
	Scanning accuracy	2 cm	
	Echo number	1/2 returns	
	Intensity resolution	8 bits or 12 bits	
	Scanner weight	738 g	
GNSS/IMU Unit	POS output	200 Hz	
	Satellites	GPS L1/L2, GLONASS L1/L2, Beidou B1/B2	
	Position accuracy(Post processed)	Horizontal : 2 cm Vertical : 5 cm	
	Heading accuracy(Post processed)	0.08°	
	Pitch and roll accuracy(Post processed)	0.025°	
Camera (optional)	No. of pixel	42 MP	
	Camera FOV	81°x59°	
	Min. capture rate	1.5 s	
Software	PosPac UAV	GNSS/IMU Post Processing Software	
	UI-RF	Point Cloud Pre Processing software	
	SS-Powerline	Powerline Inspection software	
	SS-Survery	Point Cloud Post Processing software	

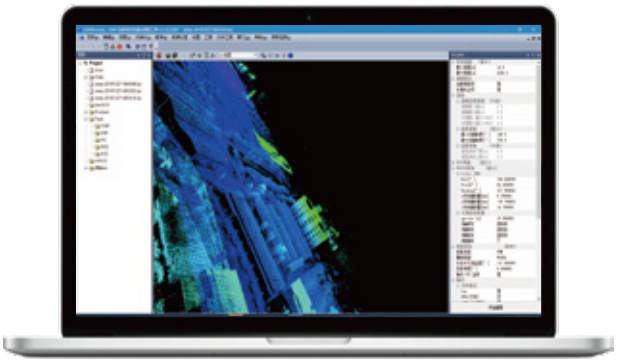
About Software

Pre-processing



Trajectory software: POSPac

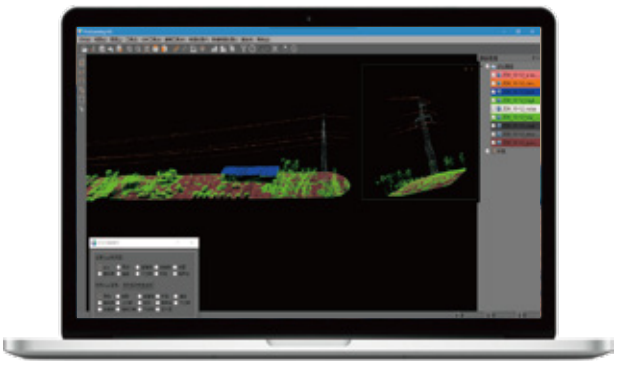
• Differential GNSS Inertial post-processing software for highest accuracy
• Applanix In-Fusion™ GNSS-Inertial technology for superior position and orientation performance
• 200 Hz navigation solution (position ,velocity, orientation, rates, accelerations)
• Forward and reverse processing with optimal Smoother



Point Cloud Pre Processing software: UI-RF

• Flight trajectory file + Laser RAW data fusion
• Point cloud visualization: data checking, grey scale projection, coordinate transformation and calculation
• Data output: Las, xyzi format

Post-processing



Powerline inspection software: SS-Powerline

• Point cloud data fast classification, output analysis report
• 3D digital model established with power line model and point cloud
• Power line safety simulation, evaluation and intelligent alarm analysis

Point Cloud Post Processing: SS-Survey

• Automatic filtering, construction objects point cloud automatic generation, classification, road semi-automatic generation
• Contour lines generation
• Quality checking

Application Project Stories

Mining Survey Project

- Project requirements

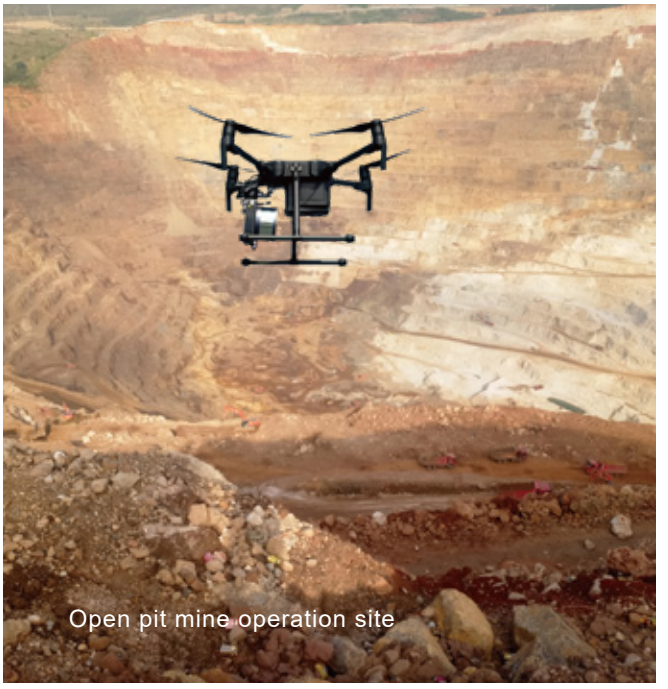
Volume calculation and DEM generation for open pit mining in Yun Nan Province

- Flight execution

Area: 0.2 km^2 Flying height (AGL): 40-70 m
Flight speed: 6 m/s Point density: 300 pts/m^2
No. of flights: 2

- Conclusion

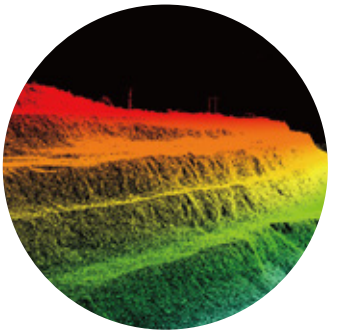
Genius has advantages in open pit mining application due to its tolerance to harsh environment and climate, easy takeoff / landing on mountainous terrain.



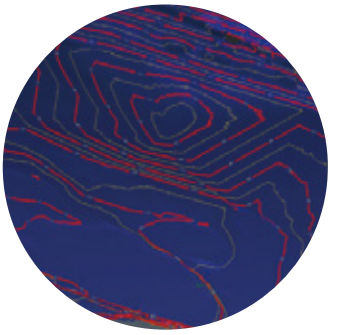
Open pit mine operation site

- Achievements

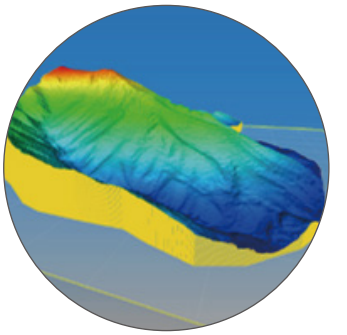
Point cloud



DEM



Filling volume



Powerline Monitoring

- Project requirements

Generation of powerline inspection report for a Guizhou power supply company using high density, high accuracy pointcloud data.

- Flying execution

2 opposite flight lines Flying height (AGL): 60-80 m
Power line length: 2.5 km (with 5 power towers)
Flight speed: 4 m/s No. of flights: 2

- Conclusion

UAV LiDAR is a safe, fast and high efficiency tool for powerline inspection. Point cloud data can be used to generate 3D model, to locate existing / potential hazards by measuring distance between powerline and hazards.

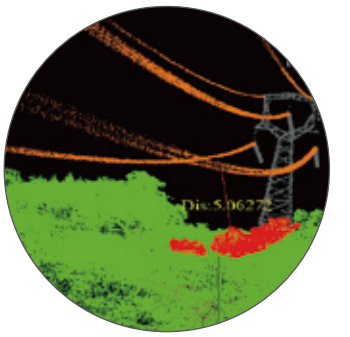
- Power line inspection report

Powerline inspection reports can be generated with powerline analysis software. This project is based on the 220KV specification and regulation.

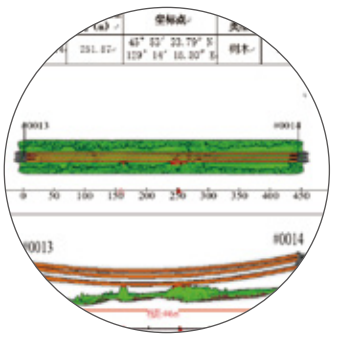
- Achievements

Point cloud

Danger point analysis for trees



Report



Topographic Surveying Project

- Project requirements

DEM and contour lines generation

- Flight execution

Area: 3 km²
Flying height (AGL): 50-100,
Lines spacing: 45 m
Flight speed: 5 m/s
Point density: 300 pts/m²
No. of flights: 5

- Conclusion

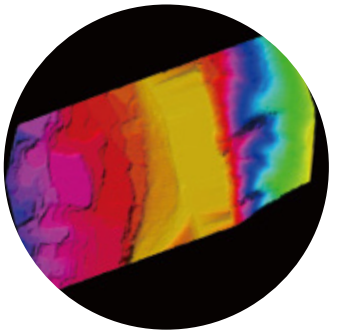
Genius can complete this task with two staffs only. The system efficiency is mostly demonstrated with flight area about 5km².

Endurance time for Genius: >70 mins

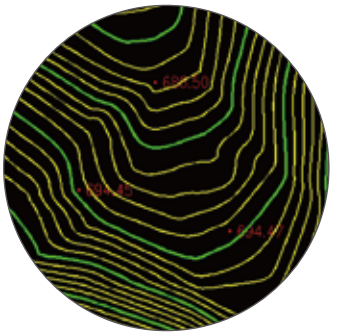
- Achievements

Ground model

DEM

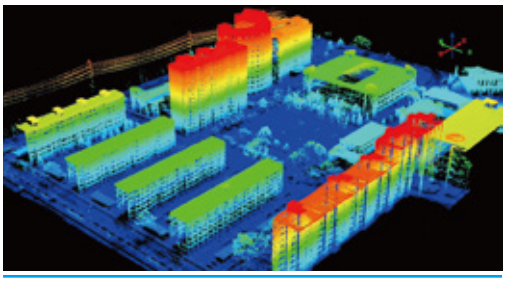


contour lines



3D modeling

- Point cloud shaded by height

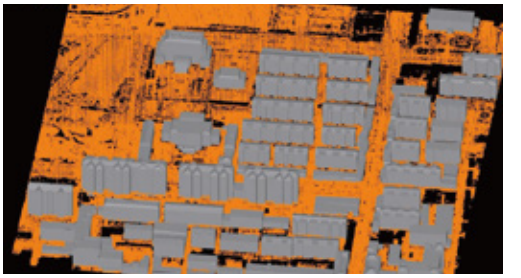


- Classified point cloud

- Image-mapped point cloud

- Associated oblique camera images

- Raw 3D model

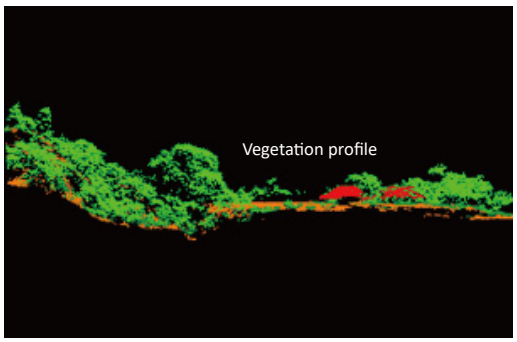


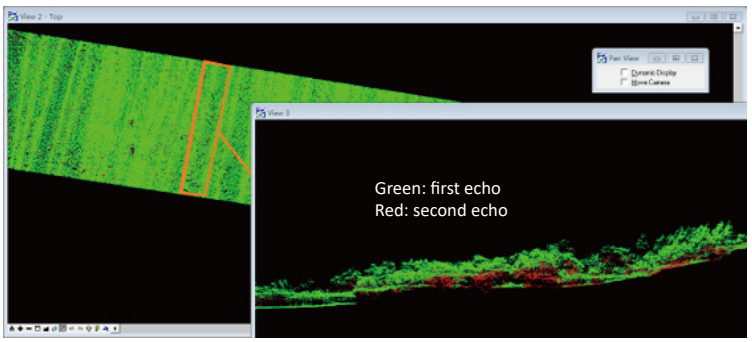
- Image-mapped 3D model

Agriculture and forestry survey

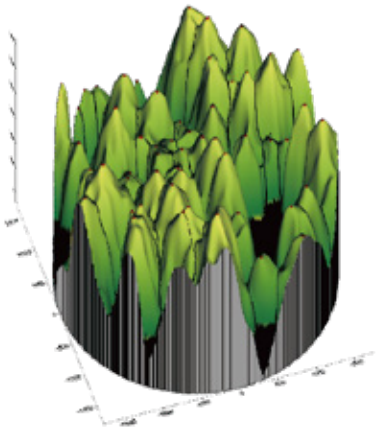
- Applications:
  Vegetation coverage survey;
  Determination of forest parameters;
  Volume computation;
  ……

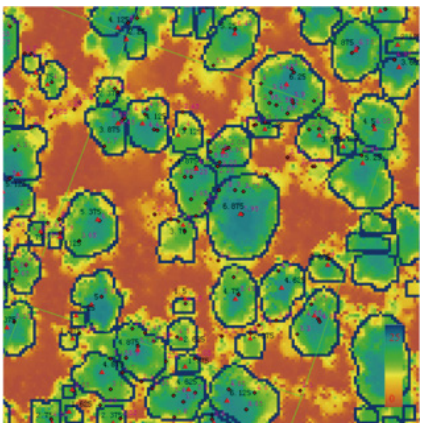
- Forestry point cloud data:

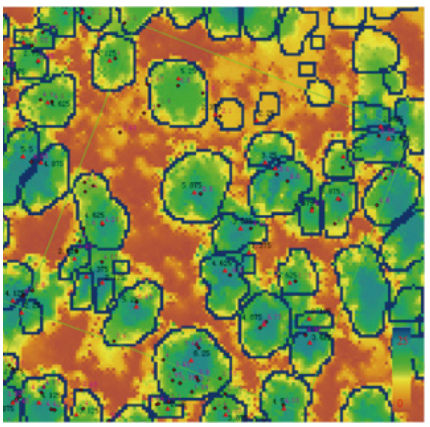




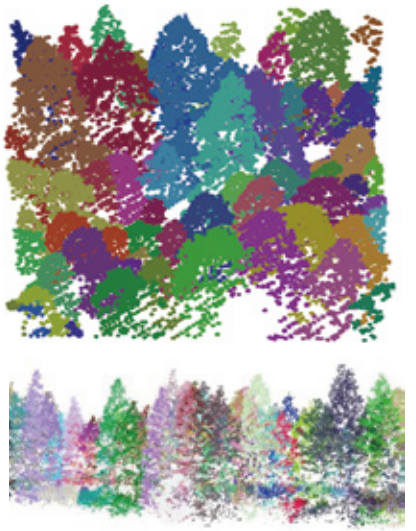
- Digital canopy model and individual tree segmentation:

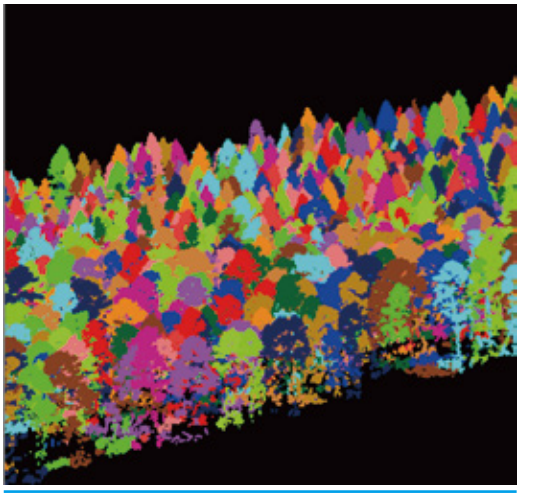




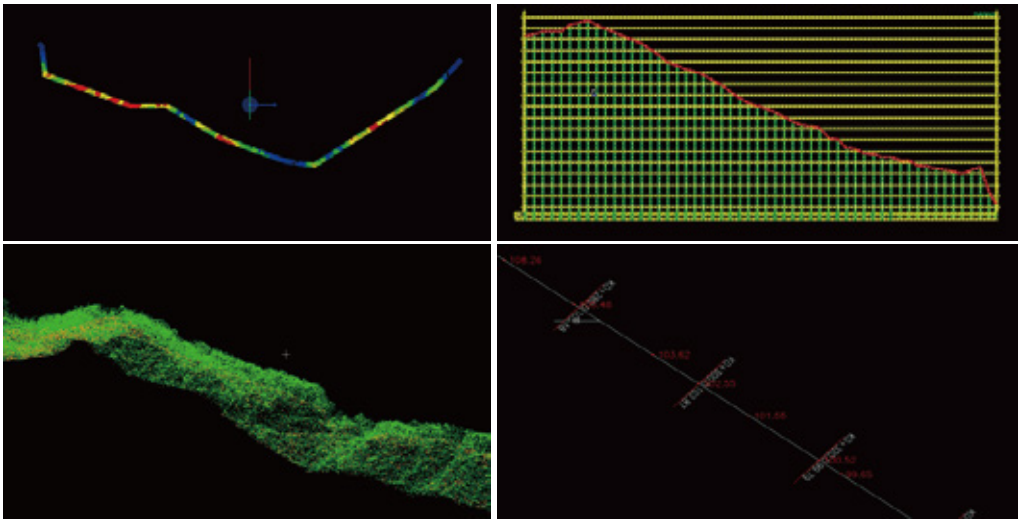


- Individual tree parameter estimation by point cloud clustering:

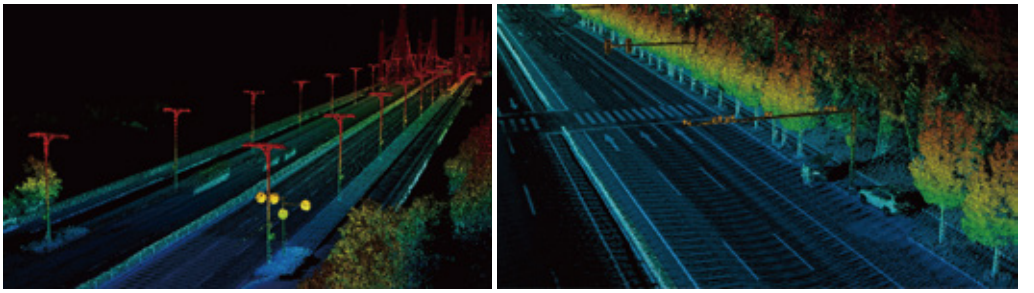




Construction surveys



High definition maps



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