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WHERE PRECISION MEETS INNOVATION

FALCON X
RTK & SLAM
HYBRID MEASURING SYSTEM

FALCON X
SLAM RTK

INTRODUCE

ALPHA GEO proudly presents the Falcon X-a groundbreaking surveying mobile terminal that integrates GNSS, high-precision vision modules, and LiDAR systems to redefine traditional RTK workflows. By combining SLAM technology with high-accuracy RTK and a powerful core processor, it delivers real-time point cloud coordinate calculations and establishes a unified coordinate system across both indoor and outdoor environments. With no need for post-processing, the data is immediately ready for engineering design, greatly improving efficiency and precision.

DUAL OPERATING MODES

RTK MODE «««

The **Falcon X** operates with a centering pole, delivering centimeter-level positioning accuracy in open-sky environments. This mode retains the precision of traditional surveying while providing real-time point cloud output, making it ideal for ground feature collection.

SLAM MODE »»»

The **Falcon X** operates as a handheld scanner, enabling real-time point cloud mapping in GNSS-denied environments such as tunnels, underground spaces, and buildings. With dual side cameras, it provides a 360° panoramic view, producing true-color point clouds with high scene fidelity and situational awareness.

FALCON X

NON-CONTACT MEASUREMENT

The system employs **active laser scanning technology** combined with **Simultaneous Localization and Mapping (SLAM) algorithms** to deliver high-precision spatial data acquisition, even in dynamic environments.

With a rapid **200,000 points-per-second sampling rate**, it achieves a measuring range of **0.1 m-40 m at 10% reflectivity** and **0.1m-70m at 80%** reflectivity, adapting seamlessly to different surface materials.
Driven by an **embedded real-time processing engine**, the system provides:
· **Instant point cloud coordinate output** for immediate application.
· **Post-processing point cloud optimization** for enhanced accuracy.

1408 CHANNELS,
FULL CONSTELLATION & FULL FREQUENCY BAND

The **Falcon X** is powered by a 1408-channel chipset that supports full-constellation tracking (GPS,GLONASS,Galileo,BeiDou, QZSS,IRNSS) and all-frequency-band signal reception, ensuring exceptional satellite signal acquisition and tracking performance.

With multi-frequency anti-jamming tehnology and multi-step adaptive filtering algorithms, the system effectively suppresses signal interference in complex environments, delivering hight-stability RTK fixed solutions with centimeter-level accuracy.

ANY LINK, ANYWHERE

The **Falcon X** adopts a multi-mode communication architecture,ensuring reliable connectivity in diverse field conditions. Supported channels include:

- 4G cellular networks for wide-area coverage.
- UHF radio for long-distance communication.
- Wi-Fi for fast local data exchange.
- Bluetooth for seamless device pairing.
- Supporting multi-source differential data access (e.g.,NTRIP, RTCM), the Falcon X delivers all-weather, multi-path, high-precision positioning services. It ensures centimeter-level accuracy even in complex and challenging environments.

HDR TRUE-COLOR POINT CLOUDS
MEET AR NAVIGATION

The **Falcon X** Integrates **dual 48 MP panoramic lenses**. Using **binocular synchronous acquisition technology**, the system achieves **360° omnidirectional imaging**, generating **true-color point clouds** with outstanding scene fidelity and detail reproduction.

Equipped with a **5 MP visual layout camera** and integrated **Augmented Reality (AR) navigation**, the Falcon X delivers **real-time on-site positioning guidance with centimeter-level accuracy,** greatly enhancing field operation efficiency.

MULTI-DIMENSIONAL DATA AT A GLANCE

The **Falcon X** features a **1.3-inch industrial-grade HD display with high brightness** and a **240x240px resolution**, ensuring clear real-time visualization of critical device information, including scanning time, distance, disk capacity, GNSS solutions, and other data streams, even under direct sunlight.

SLAM ON 18:16:33	
SCAN	SCAN_READY
Time	00:05:24
Dis	215. 406 m
Disk	1/238GB
Info	EC_Success
FIXED	

APPLICATION SCENARIOS

Tunnel Surveying

Urban Renewal

Underground Utility Tunnel Surveying

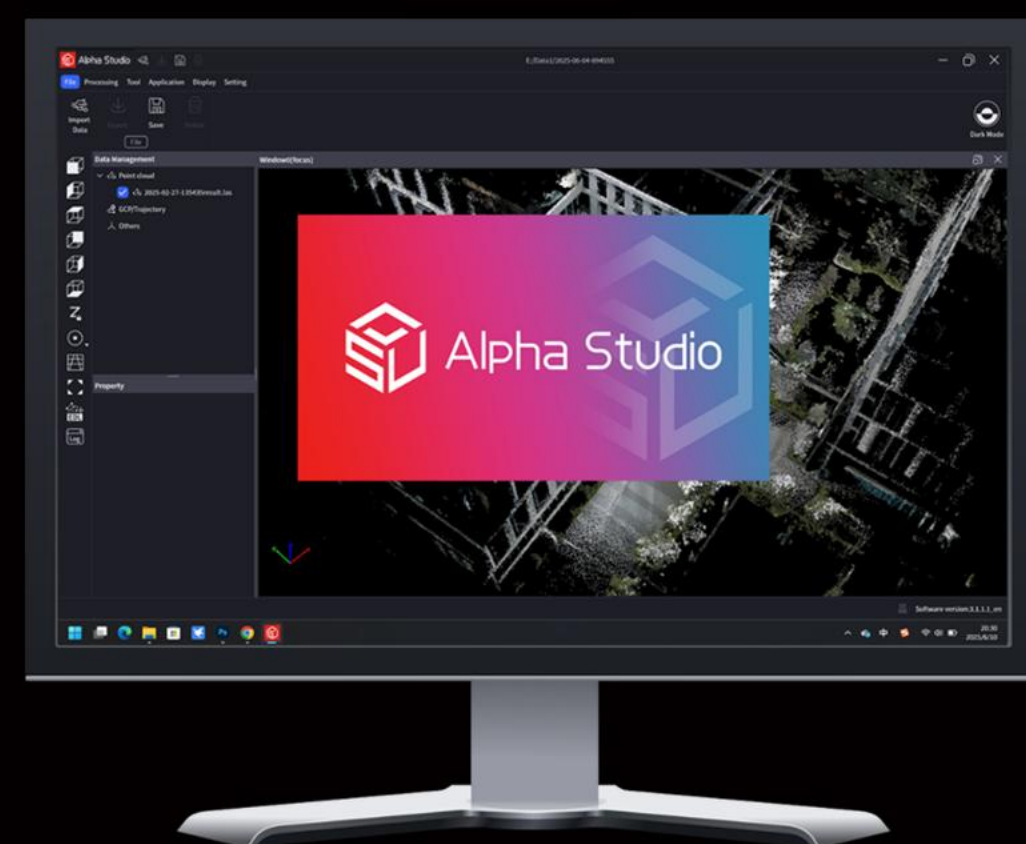**Forestry Survey**

Volume Calculation

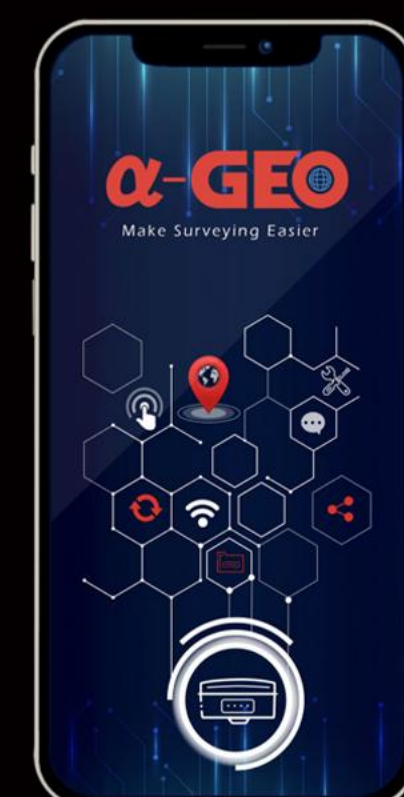**Architectural plan and elevation surveying**

SOFTWARE

PC

Alpha Studio

APP

SurPro 6.0

α-GEO
Make Surveying Easier

WHAT WE CARE ABOUT

The Falcon X delivers point cloud absolute accuracy of ≤6 cm in RTK-favorable outdoor environments, and point cloud absolute accuracy of ≤5 cm indoors environments（under experimental environment）.

Even in RTK-denied conditions, the system maintains ≤5 cm positioning accuracy within a 50-meter range, enabled by its multi-sensor fusion technology（GNSS/IMU/LiDAR/vision）, adaptive SLAM algorithms, and real-time Kalman-filter-based trajectory optimization, the system ensures continuous positioning through advanced visual-inertial odometry, enabling smooth accuracy transition between indoor/outdoor environments while sustaining sub-decimeter performance in GNSS-challenged scenarios.

UNIFIED COORDINATE FRAMEWORK FOR INDOOR AND OUTDOOR

point
x: 441446.428 m, y: 2564226.837 m, z: 80.943 m
r: 167, g: 160, b: 156
intensity:31

point
x: 441447.705 m, y: 2564178.402 m, z: 75.555 m
r: 82, g: 76, b: 84
intensity:63

Specifications

GNSS PERFORMANCE

Signal tracking	GPS: L1 C/A, L2C, L2P, L5
	GLONASS: L1, L2, L3*
	BDS: B1, B1C, B2, B2a, B2b, B3
	GALILEO: E1, E5a, E5b, E6*
	QZSS: L1, L2, L5, L6*
	IRNSS: L5*
	SBAS: L1, L5
L-Band	B2b（BDSPPP），E6B（HAS）
Channels	1408
Cold start	<60s
Hot start	<15s
Positioning output rate	1Hz ~ 50Hz
Signal reacquisition	<1s
RTK initialization time	<5s
Initialization reliability	>99.99%
Time accuracy	20ns

GNSS ACCURACY[1]

Code differential GNSS positioning	H: 0.25 m + 1 ppm RMS V: 0.50m + 1 ppm RMS
SBAS differential positioning accuracy[2]	Typically < 5 m (3DRMS)
Static GNSS surveying	H: 2.5 mm + 0.5 ppm RMS V: 5 mm + 0.5 ppm RMS
RTK surveying(baseline<30km)	H: 8 mm + 1 ppm RMS V: 15 mm + 1 ppm RMS
Network RTK[3]	H: 8 mm + 0.5 ppm RMS V: 15 mm + 0.5 ppm RMS

TILT PERFORMANCE

IMU	4D IMU initialization in 3 seconds
Update rate	400Hz
Accuracy	<2.5 cm within 120°
Tilt compensation	0~120°

SLAM PERFORMANCE

Laser channels	40
Scanning range	0.1 m ~ 40 m @10% reflectivity, 0.1 m ~ 70 m @ 80% reflectivity
Measurement rate	200,000 points/s
Scanning speed	10Hz
Laser FOV	360°*-7°~52°
Laser safety class	CLASS 1
Laser wavelength	905 nm
Processing mode	Real-time & post-processing
Point cloud format	.las
Real-time color point cloud	No
Processing color point cloud	Yes
RTK fusion processing	Yes

SLAM ACCURACY

Absolute accuracy (Indoor)[2]	≤ 5 cm
Absolute accuracy (RTK)[3]	≤ 6 cm
Point cloud thickness	≤ 3 cm
Relative accuracy	< 1.2 cm
Horizontal angle resolution	≤ 0.05 °

CAMERA

Cameras	3
Camera resolution	2*48MP
FOV	190°*190°
AR camera	5 MP

COMMUNICATIONS

I/O interface	1* LEMO5
	1* TF card slot
	1* NanoSIM card slot
	1* Type-C interface
	1* SMA UHF antenna interface
	1* 1.3-inch color LED with resolution 240*240
Internal UHF	Internal 1.5W UHF
Frequency band	410MHz ~ 470MHz
Protocols	Trimtalk450S, Alphatalk15, South, Satel, PCC-EOT
Cellular network	Full frequency multi-band 4G modem, supports TDD-LTE/FDD-LTE/WCDMA/CDMA2000
WiFi	802.11a/b/g/n/ac
Bluetooth	Bluetooth 5.2
Differential data format	RTCM2x, RTCM3x

DATA STORAGE

Memory	256GB, extendable up to 512GB

ELECTRICAL

Battery	14.4V, 47.52Wh Li-ion battery
Battery life	180 min SLAM mode, typically 8 hours RTK mode (Phone internet)
Battery charging	2 hours
Power consumption (SLAM)	< 25W
Power consumption (RTK)	2.5W

PHYSICAL

Materials	Magnesium alloy
Dimensions (with battery&plate)	138 mm (Φ) * 301 mm (H)
Weight	1.8 kg
Operating temperature	-20℃ ~ +50℃
Storage temperature	-40℃ ~ +80℃
Waterproof/Dustproof	IP67

[1] The accuracy performance and reliability may be subject to anomalies due to different factors such as signal obstruction, tilting angle, observation time, multipath and atmospheric conditions.
[2] [3] The accuracy obtained under ALPHAGEO test scenarios may deviate in certain situations.
[4] The battery life is tested in the ALPHAGEO experimental environment, the actual endurance is subjected to the actual usage environment.