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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.

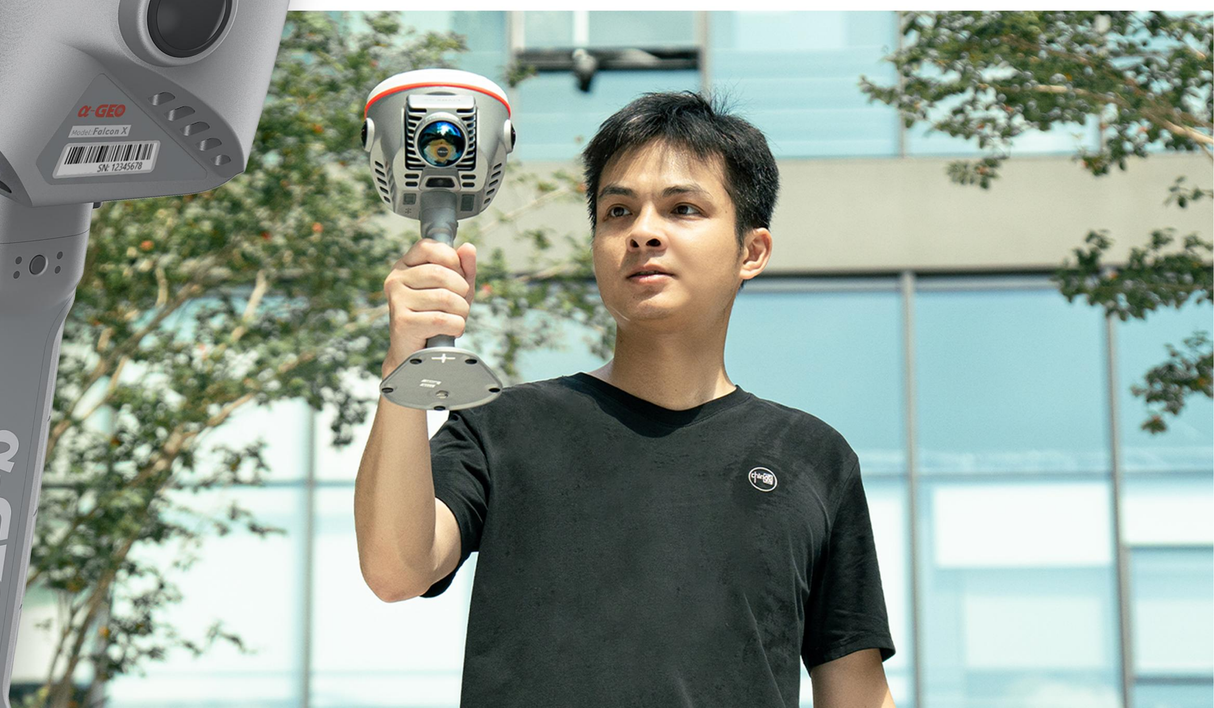
DUAL OPERATING MODES

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

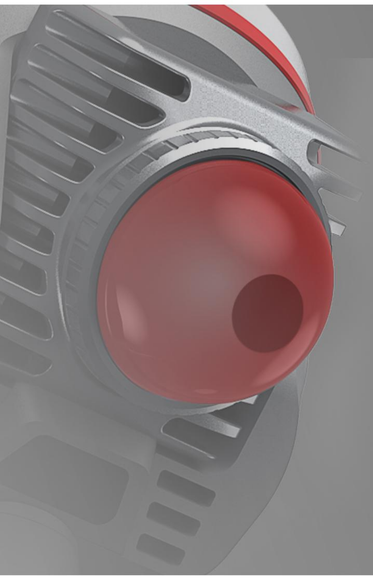
The **Falcon X** operates as a handheld scanner, enabling real-time point cloud mapping in GNSS-denied environments such as tunnels, underground spaces, and buildings. With dual side cameras, it provides a 360° panoramic view, producing true-color point clouds with high scene fidelity and situational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



FALCON X

01

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.

02

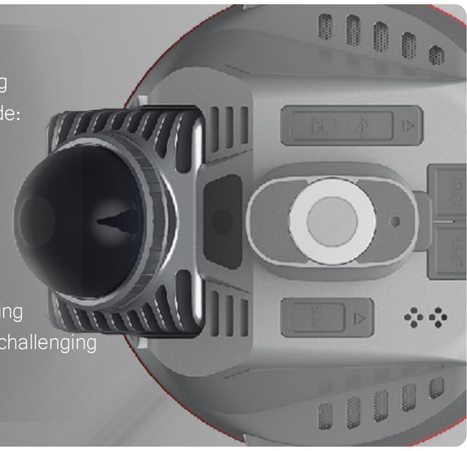
1408 CHANNELS, FULL CONSTELLATION & FULL FREQUENCY BAND

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.

03

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.

04

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.

05

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.

APPLICATION SCENARIOS

Tunnel Surveying

Forestry Survey

Urban Renewal

Volume Calculation

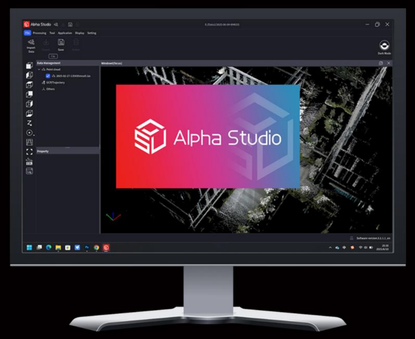
Underground Utility Tunnel Surveying

Architectural plan and elevation surveying

SOFTWARE

PC

Alpha Studio



APP

SurPro 6.0

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

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.