LiAir X4

Autonomous Flight LiDAR Acquisition System

Quick Start Manual

Contents

Disclaimer

Before using this product, please carefully read and follow the quick start manual, user manual, and other relevant product manuals. Using this product shall be deemed as having read and accepted all the terms related to this product.

Safety Tips

1. The LiDAR and camera have been calibrated before the device was shipped from the factory. Do not disassemble the device privately, as this may result in device damage and abnormal precision.
2. In weather conditions with poor visibility, such as rain, fog, and haze, the effective measurement range of the LiDAR will be reduced, which may lead to incomplete ground scanning or a large number of noise points. Please use the device with caution.
3. Do not aim the laser scanner window at strong light sources, such as laser beams or other working lasers, as this may cause irreparable damage to the laser scanner.
4. If the device exhibits issues such as decreased point cloud precision or layering due to prolonged use, dropping, or other reasons, please contact the GVI for assistance.
5. The device has Level 4 autonomous flight capabilities, which can achieve autonomous powerline inspection flight, self-adaptive terrain following flight, and self-obstacle avoidance in constrained environments. During autonomous flight, please constantly monitor the status of the aircraft and take manual control immediately if any abnormalities occur.

Packing List

LiAir X4 LiDAR System×1

USB Cable×1

OSDK Communication Cable x1

GNSS Antenna Assembly Kit×1

GNSS Antenna×1

256GB TF Card×1
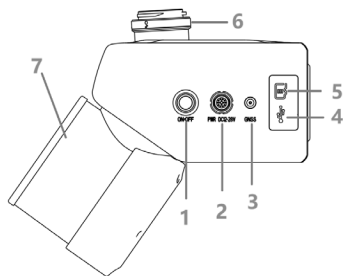
Card Reader×1

USB Flash Drive×1

Product Documentation×1

⚠ Please Note: The actual product list is subject to delivery!

Product Structure


1. Power button (ON/OFF) and indicator light: Device power-on and project creation button (shared), also displays device working status.
2. Power Connection Port (PWR): Connect the OSDK communication cable to the aircraft, or connect the power cable to power the device.
3. GNSS Interface: Connects to GNSS antenna feeder to obtain GNSS signals.
4. USB-C interface: Used for communication between computer and device, including system upgrade, data download, etc.
5. Memory card slot: Equipped with 256GB TF card for data storage.
6. Gimbal Interface: DJI SKYPORT interface for device mounting and power supply.
7. LiDAR: 32-channel rotating laser scanner.

System Installation

This product is equipped with DJI SKYPORT interface, supporting installation on the DJI M350/M300RTK UAV.

1. Replace the four original damping balls with bigger ones provided by the device.
2. Align the white dot of the SKYPORT interface with the red dot of DJI Gimbal Connector, and fix the equipment (align the red dot).
3. Install the GNSS antenna assembly and the GNSS antenna.
4. Connect the OSDK communication cable and the GNSS antenna feeder.

3M Adhesive Cable Clip

OSDK Connector

GNSS Cable

OSDK Communication Cable
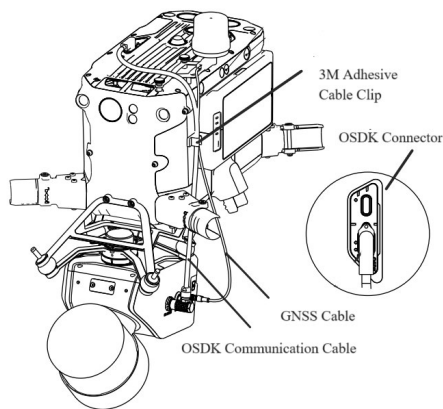
Control Software

The device is equipped with the self-developed GreenValley APP software, which can perform route flight, autonomous powerline inspection flight, or terrain following flight to acquire point cloud data, set flight parameters, and view real-time color point cloud and camera video streams.
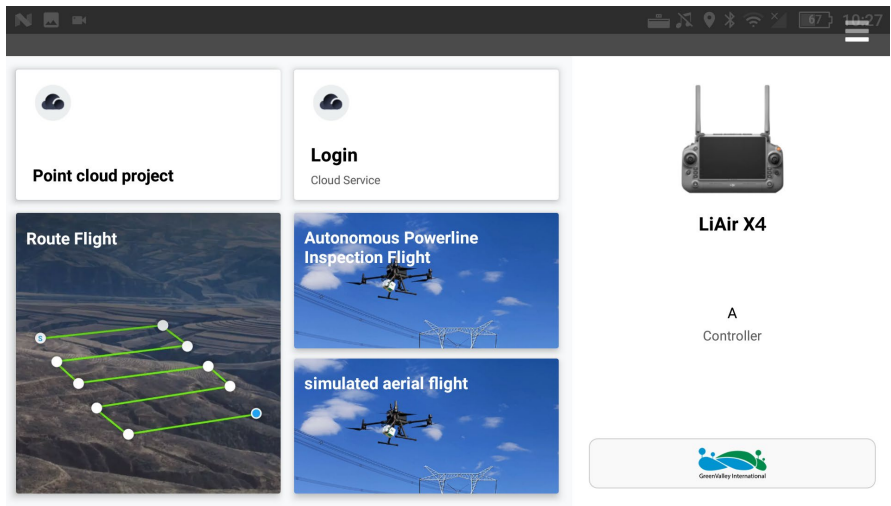
⚠️ Note: Autonomous powerline inspection flight and terrain following flight must be performed using the GreenValley APP. For detailed operation procedures, please refer to the APP user manual.

Preparation

Device activation. The device is in an unactivated state when shipped from the factory. It needs to be activated through the GreenValley APP before normal use. For detailed activation procedures, please refer to the product user manual.

Data Collection

Setting up base station

1. The base station is set up in an open area, without vibration, away from signal interference sources (TV stations, communication towers, etc.).For projects with high precision requirements, set up base stations and collect base station coordinates in accordance with surveying and mapping specifications.
2. Compared with the startup and shutdown time of the LiDAR system, the startup time of the ground base station should be 15 minutes earlier and the shutdown time should be 15 minutes after operation.

System Installation

1. Mount the device on the M350/M300RTK drone and make sure that the damping ball is intact.
2. Confirm that the accompanying cables and GNSS antenna bracket are securely connected.
3. Make sure there is enough space for the TF card of the device, and insert it into the device.
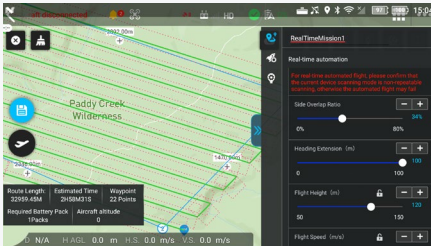4. Remove the camera lens and laser scanner protector covers.

Autonomous powerline inspection parameter setting

The operation parameters can be set through the GreenValley APP.

Device Parameter Setting (GreenValley APP)	Enable Multiple Flight Mode	ON
	Inspection Height	The default value is 15 m
	Inspection Speed	The default value is 6 m/s
	Clearance Distance	The default value is 3m
	Camera interval	The default value is 2s. Input the value as needed (not less than 1S)
	Camera shutter	The default value is 1/900. It can be adjusted according to ambient lighting conditions.
	Grid type	By default, it is distribution grid. Select according to the scanning line type. Distribution grid: 35 KV or below Master grid: 66 KV or above

Work flow

1. Press the device ON/OFF button for more than 3 seconds to power it on. Wait until the indicator is green.
2. Press the ON/OFF button for 0~2 seconds. The indicator blinks in green once per second. A project is created, with starting to record IMU data.
3. Turn on the remote control, start the GreenValley software, and log in to the LiCloud account.
4. Enter the "Autonomous Powerline Inspection Flight" or "simulated aerial flight" interface and execute the task according to the corresponding procedure.
5. After the operation is completed, press the ON/OFF button for 0~2 seconds to stop IMU data recording and shut down the project. The indicator will be solid green.
6. Press the ON/OFF button for more than 3 seconds. The ON/OFF indicator is off and the system is powered off.

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Above powerline following flight	① Click "Autonomous Powerline Inspection Flight" and enter the operation interface. ② Before taking off, manually switch the flight controller to P mode and then back to non-P mode to ensure that the aircraft is released from the take-off protection in non-P mode. ③ After the plane takes off, the laser scanner and camera data collection automatically starts. ④ Manually control the plane to fly above the powerline 8-15m from the tower, and the nose of the plane aligning with the direction of the powerline. ⑤ Switch the remote control to P mode or click "Turn on line automation" in the APP, the device will automatically track the wire and keep a fixed distance from the powerline and fly at a constant speed. ⑥ The device can automatically continue inspection over the tower and climb over the crossing powerlines. When encountering a bifurcated powerline, the device will automatically hover in front of the tower. The APP pop-up box prompts the customer to select the route to fly, and the aircraft will automatically fly along the selected route. ⑦ After the inspection is over, switch the remote control to non-P mode or use APP to stop autonomous flight , then manually operate the aircraft to return.
Terrain follow flight	① Click " simulated aerial flight" to enter the terrain following interface, and open the "Real-time automation" interface. ② Plan the flight route and set the flight parameters, including the overlap rate, flight altitude, speed, etc. ③ After saving the flight route, upload and execute the flight plan. ④ After the aircraft takes off, the laser scanner and camera data collection automatically starts. ⑤ After the flight plan is executed, the aircraft will return and land. When the aircraft lands, the laser scanner and camera data collection will automatically end.

Data Download

1. All data of LiAir X4 stored in TF card, including engineering files, LiDAR data, IMU data, camera images and log files. You need to insert the TF card into the computer and copy the corresponding project files to the local hard disk.
2. Copy the base station data to the Base folder under the project folder.

📁 Base	2024/5/24 18:04	文件夹
📁 Calibrate	2024/5/24 18:04	文件夹
📁 Cam	2024/5/24 18:04	文件夹
📁 GeoreferenceResult	2024/5/24 18:09	文件夹
📁 INSRaw	2024/5/24 18:09	文件夹
📁 LaserCalibration	2024/5/22 10:06	文件夹
📁 LaserRaw	2024/5/24 18:09	文件夹
📁 LiNav	2024/5/22 10:06	文件夹
📁 Log	2024/5/24 18:10	文件夹
📁 Replay	2024/5/22 10:06	文件夹
📄 2024-05-22-10-06-21.live	2024/5/22 10:06	LIVE 文件

Data Processing

1. Open the LiGeoreference software, select the *.live file of the corresponding project to open the project.
2. Click "Settings" to set the project parameters, including LiDAR settings, camera settings, POS processing, and smoothing parameters.
3. Select the processing workflow, including POS Process, Georeference, Smooth, and Colorization.
4. After the processing is complete, check the point cloud results in the software to confirm if it's normal.
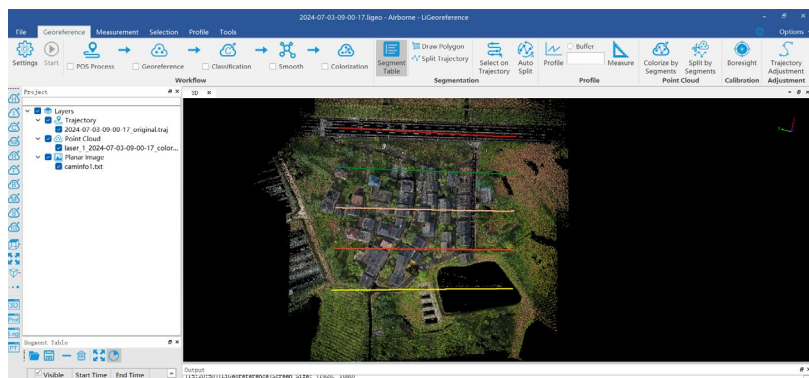
Specifications

System Specifications

Detection Range	80 m @ 10% reflectance 200 m @ 54% reflectance 300 m @ 90% reflectance	System Accuracy (Vertical)	<5cm@100m
		Typical Flight Speed	8m/s
Storage	256GB TF Card + 512GB Internal SSD	Weight	1.44kg
Dimensions	210×120×183mm	Voltage	12-28V
Power Consumption	31W	Operating Temperature	-20~50℃
Storage Temperature	-30~60℃		

LiDAR Sensor Technical Parameters

Wavelength	905nm	Number of Channels	32
Laser Class	Class1	FOV	360°(Horizontal)×40.3°（Vertical）
Scan Frequency	5Hz~20Hz	Returns	3
Point Rate	1920 kHz(Triple return)		

Inertial Navigation System

GNSS	GPS、GLONASS、Galileo、BeiDou	Azimuth Accuracy	0.038°
Attitude Accuracy	0.008°	IMU Data Frequency	200HZ

Camera

Pixels	26MP	Focal Length	16mm/24mm (Equiv. Focal Length)
Image Size	6252x4168		

Software

Control Software	GreenValley	Pre-Processing	LiGeoreference
Post-Processing	LiDAR360/LiPowerline(Optional)		

If you have any questions or suggestions about the manual, please contact us through the following methods:
E-mail: info@greenvalleyintl.com
Address: 729 Heinz Avenue, Suite 9, Berkeley, California 94710, USA

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www.greenvalleyintl.com