

# **Drone Assembly**

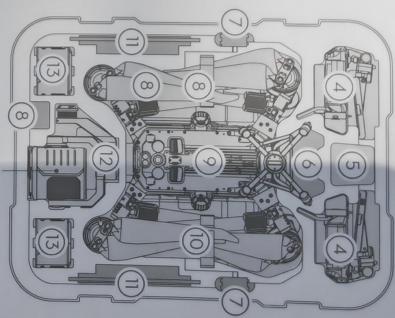
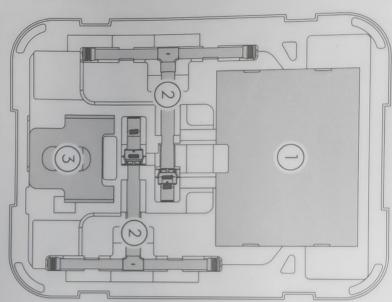
## **Box Arrangement**

Check The Paper in the Matrix300 Box

## Carrying Case Description / 运输箱说明

This diagram is intended to illustrate how to place the M300 RTK parts and components. In-the-box items are subject to the contents received.

图仅用于说明部件摆放放置，实际物品请以收到内容为准。



1. Propeller x4  
2. Landing Gear  
3. Aircraft Protector  
4. Remote Controller  
5. Remote Controller Lanyard  
6. Upward Gimbal Connector  
7. WB37 Intelligent Battery  
8. USB Charger  
9. Aircraft Body  
10. CSM Radar  
11. Mobile Device (e.g. iPad)  
12. Gimbal and Camera (H20 / H20T)  
13. TB60 Intelligent Flight Battery

**⚠** Please note that the sleeves of the landing gears should be put in the way shown in the diagram, to avoid damage on the propellers when the carrying case is closed.  
在将M300 RTK 的起落架收納到运输箱时，请注意起落架的套筒应放置在如图的槽位中，以免对桨叶造成挤压。

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# Assembly

- Adding the bracket part



- Tightening the bracket part by making sure the red dot is matched



- Spread the wind and make sure that the wind has been fixed by make sure that the red do are matched





- One needs to find the drone looks like this:



- One needs to make sure the batteries for drone are correctly installed





- One needs to turn the lock to make sure the batteries do not fall out



- Finally install the Lidar, you also needs to make sure the red dot is matched with each other:



- do not forget to take off the mask of the lidar:



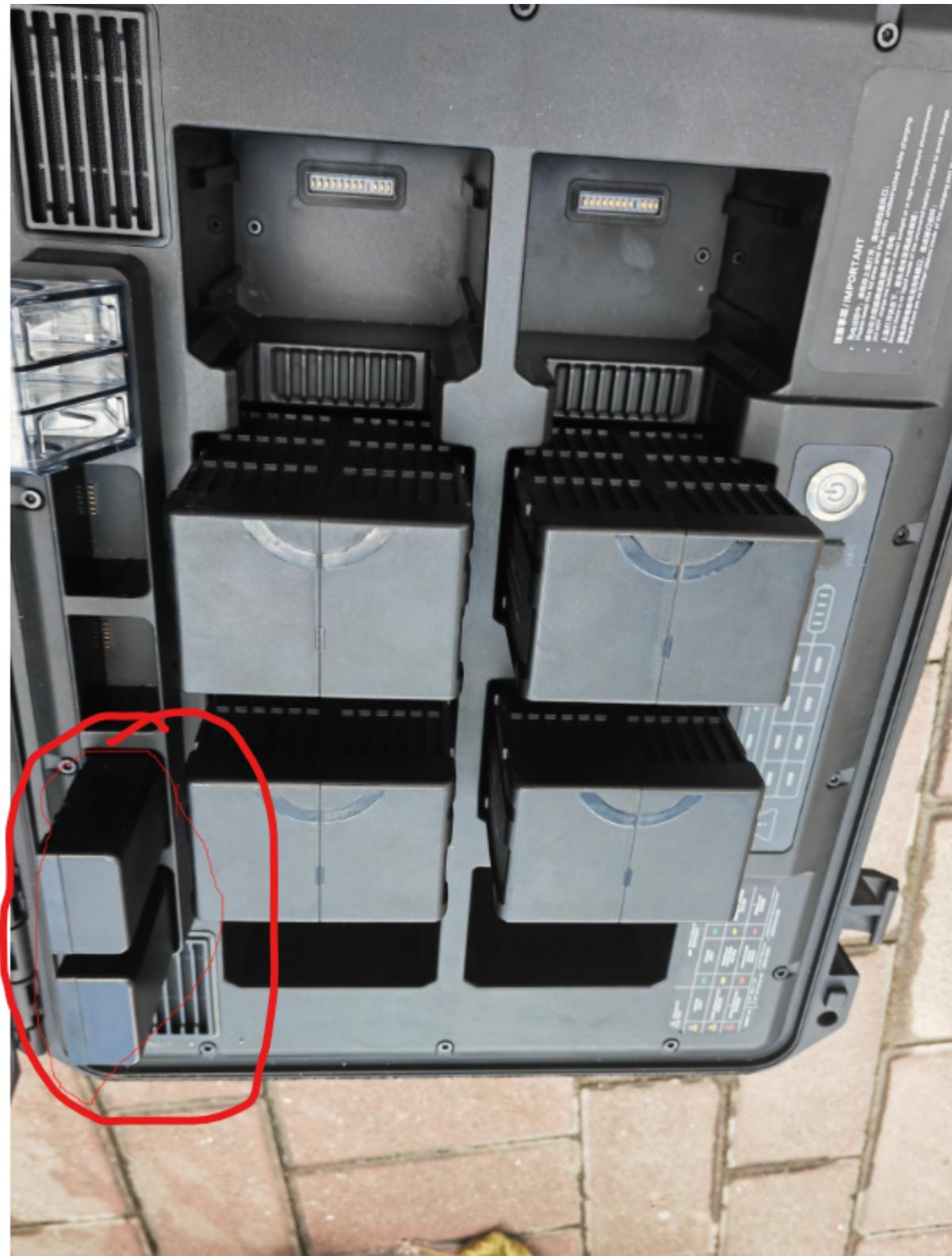
- After assembly all of this drone, press this bottom long enough so that you can hear the sound and see the green light, then the drone is turned on:





# Controller Assembly

- Put the battery on the back of the controller



- Press This bottom one time short followed by a long press to turn it on



- One needs to wait for several minutes to make sure this yellow lines to go away so that one can use Lidar normally. (You can fly normally with this yellow line)



- To take off, one needs to correctly pull the controllers to the indicated side:

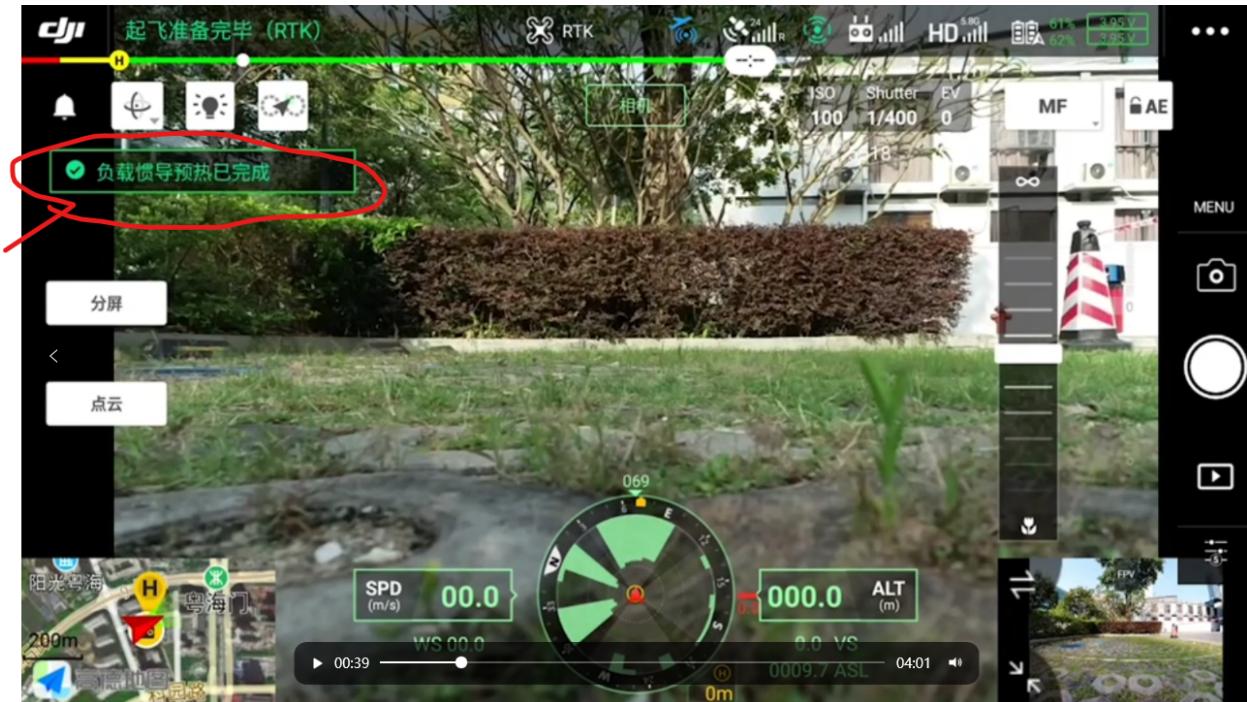


# Controller Path Planning

Need to First Set the RTK Service Routine in Pilot(2) App on Controller



Making Sure the Drone&Lidar is All Set Up (Lidar Wam up complete)



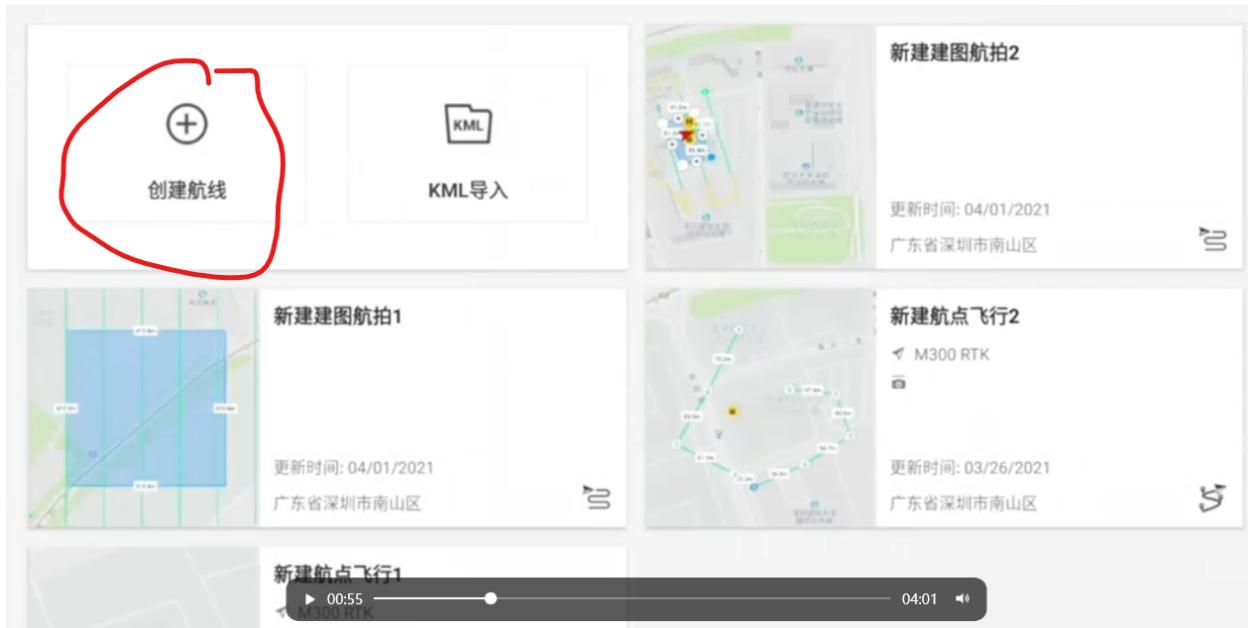
## Adjust the Exposure on MF Setting



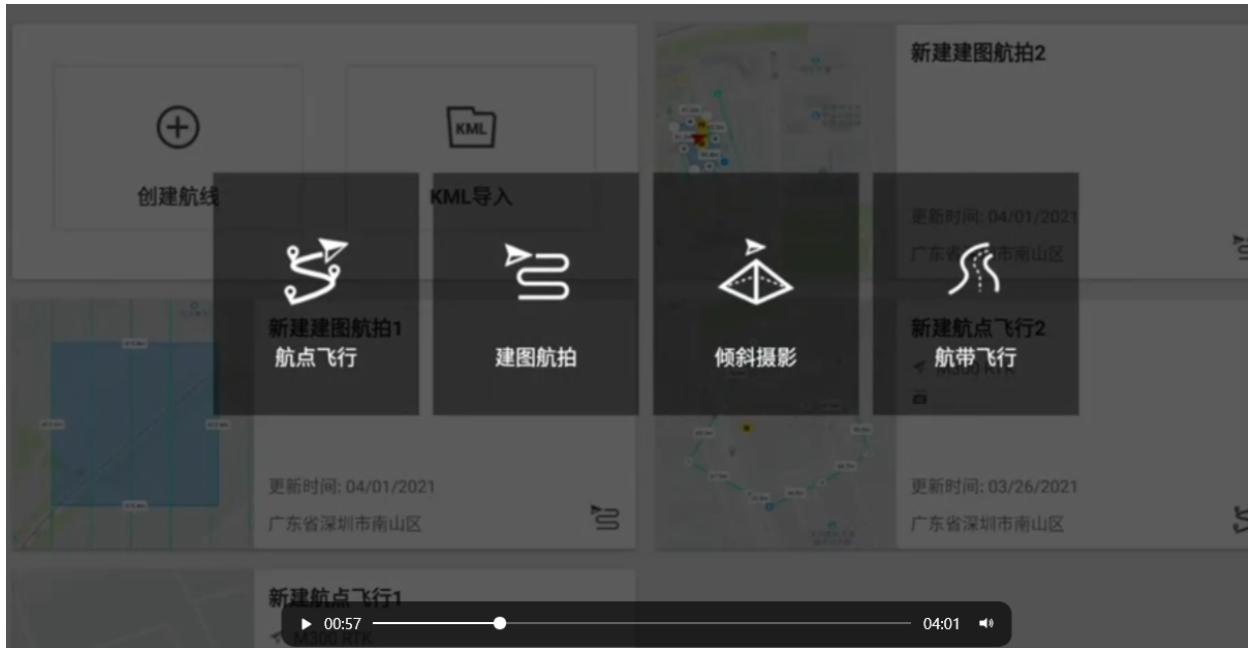
## Go Back to the Main Page Select the Routing Flying



## Create a new Routing Plan



## Selecting Constructing Map



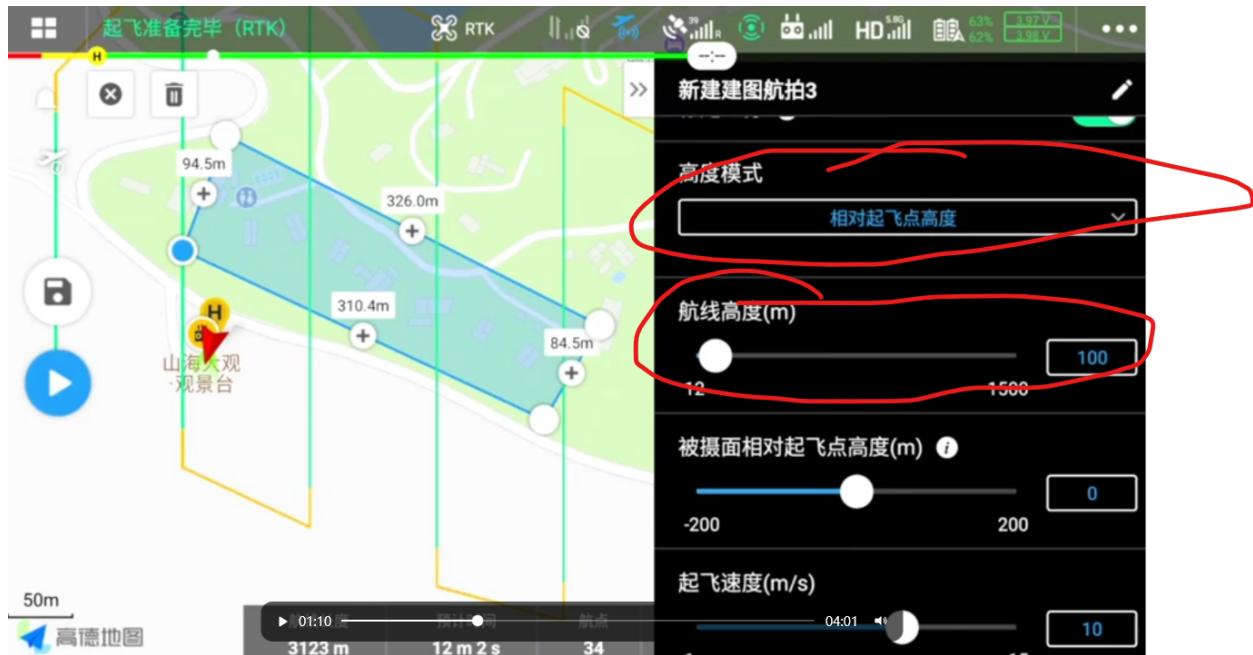
## Selecting the Camera Zenmuse L1 Lidar Mapping



## Turn On Calibration Flight(标定飞行)



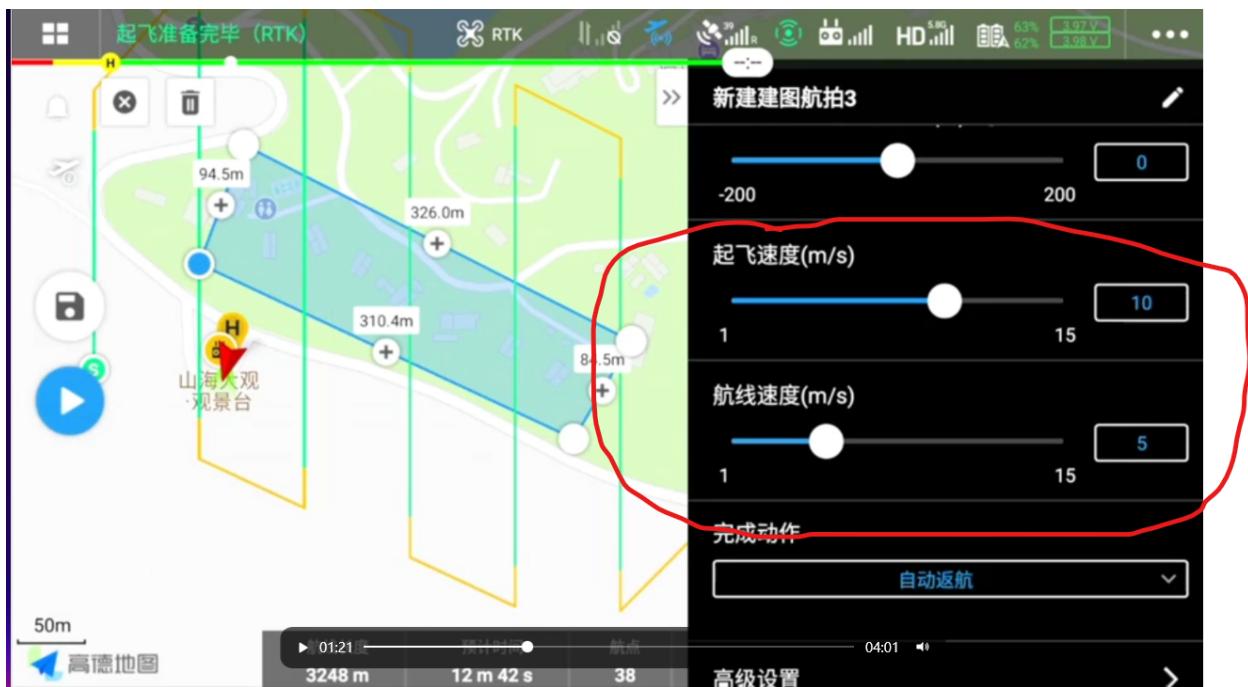
## Setting Reasonable Fly Height (IMPORTANT)



The flying attitude is related to the take off position. So if there is some change on the attitude, say there is a mountain or a slope, one must need to consider that. To get a reasonable accuracy for the point cloud, one needs to set the relative attitude lower than 150m. Therefore, I usually will set the relative hight to 75m for lower campus for CUHK SZ.

## The Flying Velocity

The take off velocity usually will be set to 10. And the velocity of the flying velocity is around 5 to 10 meters per second to ensure we have a good accuracy on the collected data:



## Advance Setting



## Change the Laser side phase overlap rate(激光旁相重叠率)



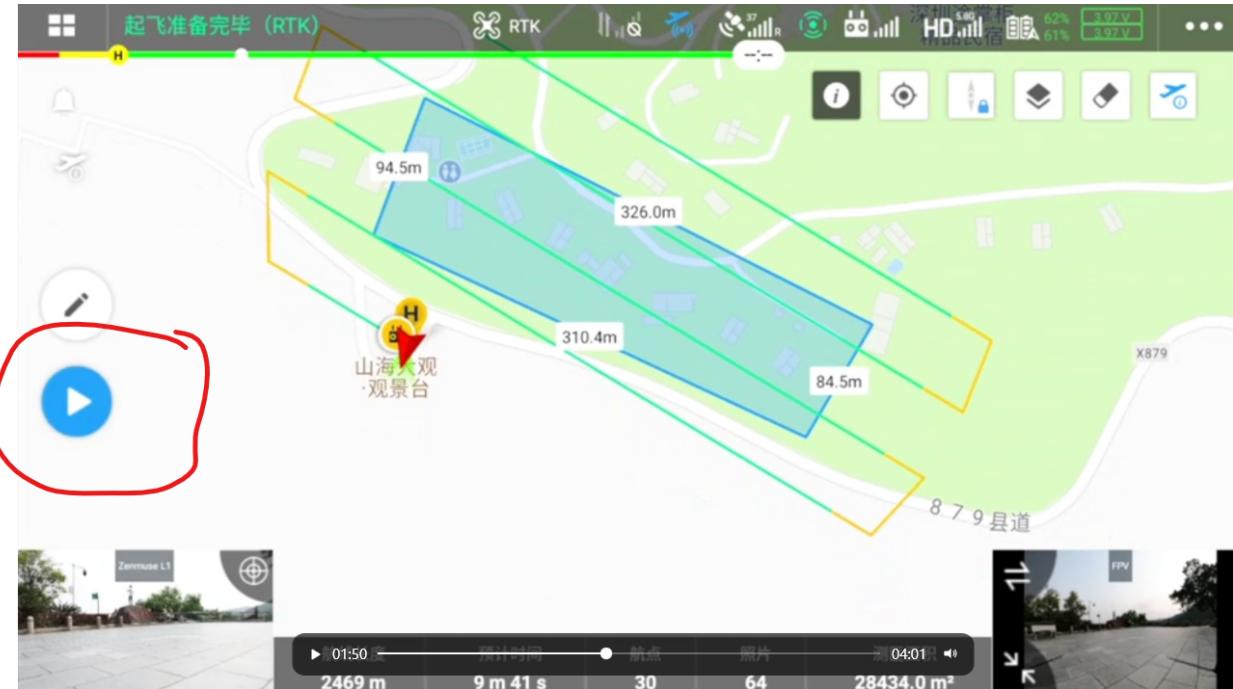
## Change the Load Setting



## Adding the True Color(真彩上色)



## Selecting the Play Bottom:



## Setting Finishing Movement and Losing Control Movement, and Storage Location



## Finally: Upload Flying Setting and Fly

Finetuning the Shooting Result

# Safety and Protection

## Need at Least One Person Stay at the Parking Places

This protocol is very important !!!!!!!!!!!!!!!

When the drone starts the pre-planed flying mission, there will be some time it disconnected from the controller!!!

If you sent the drone back to its original position as you indicate in mission planning details, it will fly back to the place where its starts. When the battery drop below to 10 percent, it will forced landing. No matter if there is a person, or an object. Therefore, in the worst case, there will be someone die.

## Don't Let the Battery Drop Lower than 30%

This protocol is very important !!!!!!!!!!!!!!!

If the battery of drone is around 30%, please land it manually as soon as possible. The flying time for a drone which is using Lidar is about 25mins.

The reason for that is because the real amount of power left is not accurate, and it will decrease really fast when its power is low. And again, if the battery is lower the 10%, it will land forcefully.

## Don't Relay on Obstacle Avoidance System Too Much

This protocol is relatively important

Although, most of the obstacles can be avoided (it means the drone just stop) such as walls, and buildings, trees and so on, there are something that the system cannot assure the 100 percent detection accuracy that is the wire and line. So don't relay on the system too much.

The common way to solve this problem is by setting the attitude to a high enough value so there will be no obstacles there.

Otherwise, you may loose about 300, 000 RMB.



# Drone Data Post-Processing

After we flying the drone according to the routing planning or manually controlled method

The next procedure is to transfer the lidar data to post-processing data using so called DJI Terra.

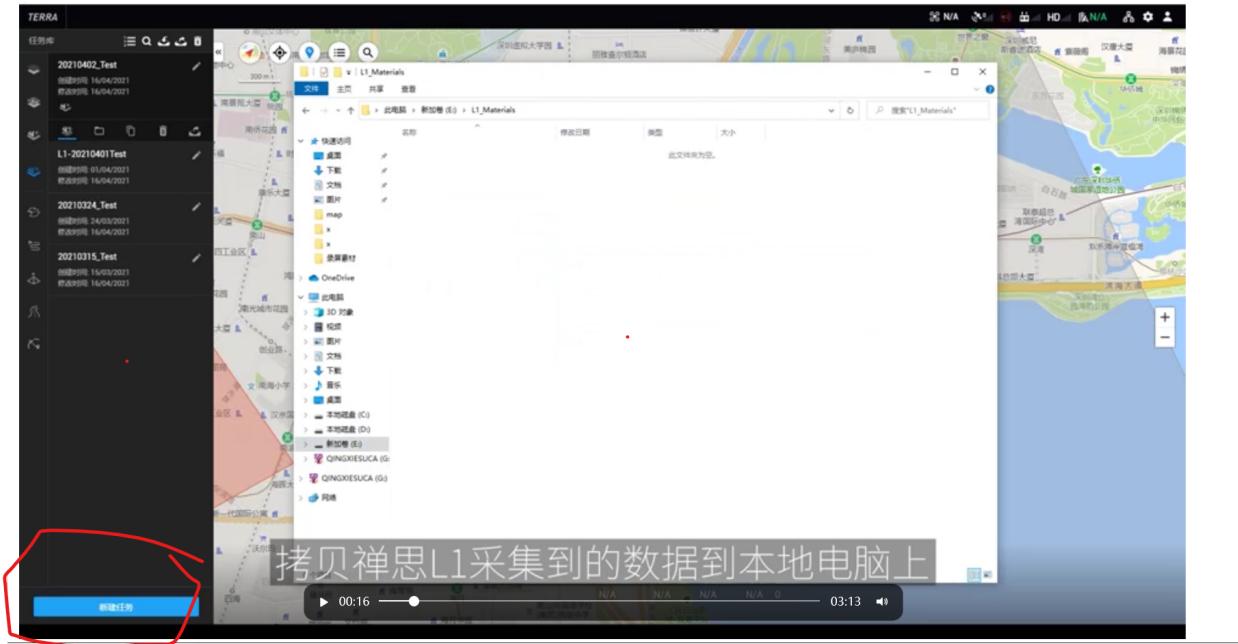
But before that we need to take out the SD card from (Zenmuse L1 Lidar)

## Get the Card

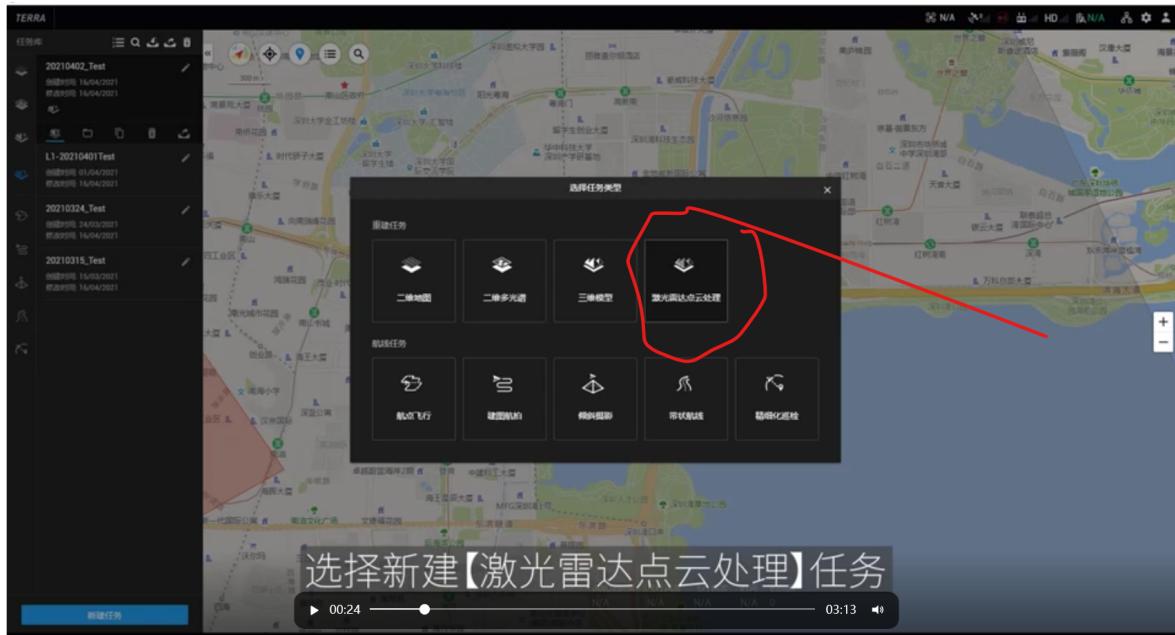


Then read the data and process it on the DJI Terra

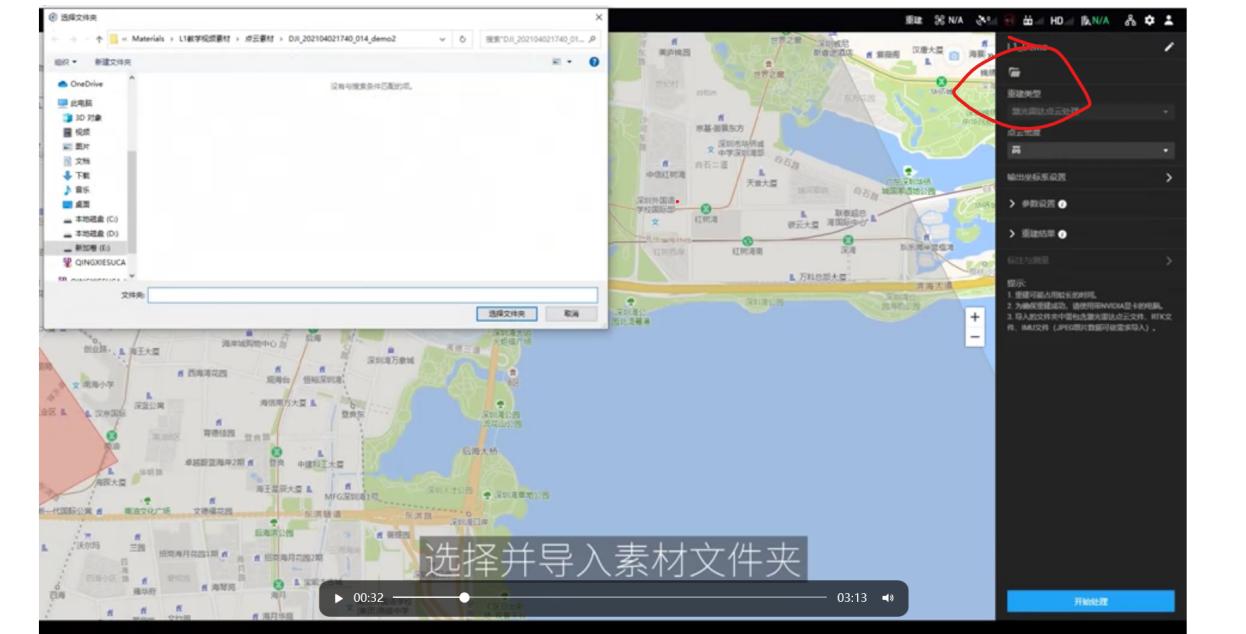
## Using DJI Terra to Create a New Task



## Selecting the Lidar Reconstruction



## Selecting the Folder You Want to Process



Notice that the folder should be some where in DCIM in the SD card. One can checkout the time when one collecting the data.

## The Coordinates

This is crucial for the following data processing task. Most of the time we need to combine several test result to same graph, we need to use the same absolute coordinates. (still testing, don't know how exactly it is done)



**Finally, Start the Conversion by Clicking the Blue Bar**

# Manually Collecting the Lidar Data

## Controller Introduction

If you are Chinese, here is the video you can checkout episode 9

第九集：遥控器按键功能介绍\_哔哩哔哩\_bilibili

第九集：遥控器按键功能介绍是大疆禅思L1教学集的第9集视频，该合集共计20集，视频收藏或关注UP主，及时了解更多相关视频内容。

[https://www.bilibili.com/video/BV1iM411r7vw/?p=9&share\\_source=copy\\_web&vd\\_source=fa44d907dda7244d7f3e747cd14f52b1](https://www.bilibili.com/video/BV1iM411r7vw/?p=9&share_source=copy_web&vd_source=fa44d907dda7244d7f3e747cd14f52b1)



If you are not Chinese, here is another very detailed introduction to L1 (Check Page 7 for detailed information for Remote Controller)

[https://dl.djicdn.com/downloads/Zenmuse\\_L1/20210518/Zenmuse\\_L1\\_User\\_Manual\\_EN\\_1.pdf](https://dl.djicdn.com/downloads/Zenmuse_L1/20210518/Zenmuse_L1_User_Manual_EN_1.pdf)

## Manually Calibration

There is an important procedure emphasized in the manual and by some professional drone pilot that we need to calibrate our Lidar. One can check this video out if you are Chinese check the episod 18.

### 第十八集：如何手动飞行L1采集数据\_哔哩哔哩\_bilibili

第十八集：如何手动飞行L1采集数据是大疆禅思L1教学集的第18集视频，该合集共计20集，视频收藏或关注UP主，及时了解更多相关视频内容。

[https://www.bilibili.com/video/BV1iM411r7vw/?p=18&share\\_source=copy\\_web&vd\\_source=fa44d907dda7244d7f3e747cd14f52b1](https://www.bilibili.com/video/BV1iM411r7vw/?p=18&share_source=copy_web&vd_source=fa44d907dda7244d7f3e747cd14f52b1)

If you are not Chinese, please check page 13 of the manual.

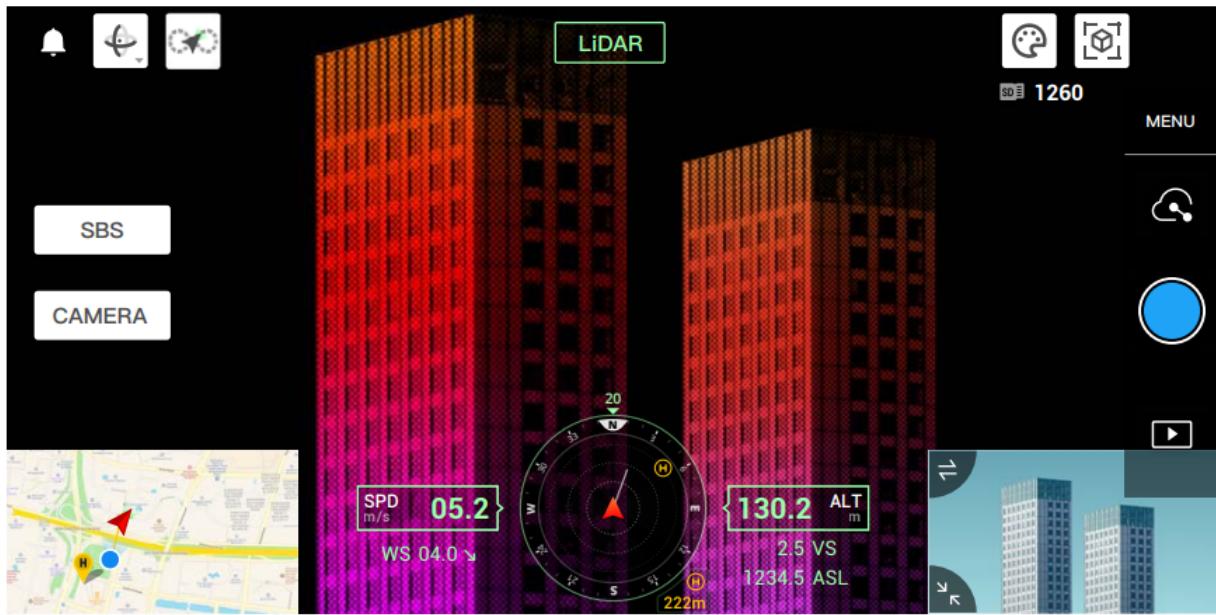


[https://dl.djicdn.com/downloads/Zenmuse\\_L1/20210518/Zenmuse\\_L1\\_User\\_Manual\\_EN\\_1.pdf](https://dl.djicdn.com/downloads/Zenmuse_L1/20210518/Zenmuse_L1_User_Manual_EN_1.pdf)

For now we did not know if this procedure is essential or just saying. We are trying to verify that

## Start Recording

We need to click the bottom above so the video can be record, and the point cloud can be create.



# Oblique Shooting

- Selecting



- Details:

1. Enter the mission flight screen in DJI Pilot, select Create a Route or import a KML file, and then select  to choose an Oblique mission. Tap and drag on the map to adjust the area that will be surveyed and tap + to add a waypoint.
2. Edit the parameters:
  - A. Select the camera type.
  - B. Set the gimbal pitch (oblique), altitude, takeoff speed, route speed, and action upon completion.
  - C. In Advanced Settings, set the side overlap ratio, forward overlap ratio, side overlap ratio (oblique), forward overlap ratio (oblique), course angle margin, and photo mode.

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#### ZENMUSE P1 User Manual

3. Select  to save the mission and select  to upload and execute the flight mission.
4. Power off the aircraft after the mission is complete and remove the SD card from the P1. Connect it to a computer and check photos and files.

# Lidar Data Collection Tip

## Altitude Check

- Before we start flying we need to make sure that there is no obstacle in the route we planed before. Although we can carefully plane the route so that we cannot hit the buildings, but it is really risky and time consuming, the easiest way is that we can increase the height of the drone until there is higher than any buildings. Remember that the lidar data usually will be preserve when the distance between lidar and target is lower than 250. Which means that the drone's flying height is around 150 at most (if u r using oblique shooting skills)
- To check the altitude, you need to first find the highest building by naked eyes and then start to use the drone to check
- In the fpv windows you will find where the horizontal line is and you can find the ALT and horizontal line as the following graph illustrate:

The ALT shows the altitude of height of the building if it aligns with the root top of that building



- Remember that the altitude is no the absolute altitude, it is the altitude relative to your take off altitude

## Data Collection Range

- Do not collect a large amount of data in one flight, this is because that the data processing software has its limit and we might could not load the data properly if the data is too large
- If one is using oblique shooting, the normal size of the point cloud is just use up your battery for one time(this could contains 5 routes for the area you design). Around 3/4 of the upper campus of CUHK SZ