

# **LxCameraViewer User Manual**

---

Windows & Linux



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2023.11.11

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## 1 Overview

LxCameraViewer is a Windows-based host software developed for MRDVS's self-developed camera products and camera SDK C or C++ development kit, referred to as this software.

This software provides camera users with simple and convenient features such as viewing, camera settings, and algorithm settings. Currently, the software supports the opening and viewing of multiple device devices, and supports the output of depth image, Amplitude image, TOF point, and RGB map. It also supports the reading and setting of basic camera functions and algorithm parameters.

Users can use this application to view and save high-precision image data obtained from the camera, as well as detailed data on camera configuration and algorithms.

## 2 Supported Products

Currently, this software supports the following products:

- LXPS-DS4423-M-79 940 3D Vision Camera
- LXPS-DS4423-M-79 850 3D Vision Camera
- LXPS-S2312-79E 940nm 3D Vision Camera
- Other products, please refer to: <https://en.vercel.mrdvs.cn/about>

## 3 Installation

### 3.1 Recommended System

Item	Configuration Recommended
Operating System	Windows 10 (64-bit) Windows 11 (64-bit)
Memory	4GB and above
Network Card/Wired	Gigabit and above

### 3.2 Camera Installation

- Align the V-shaped slots in Figure 1 with the V-shaped slots in Figure 2 and tighten the nut.
- The black wire is the negative pole of the 24V power supply, and the brown wire is the positive pole, as shown in Figure 3.
- Connect the camera to a 24V external power supply and use an Ethernet cable to connect it to the host computer, as shown in Figure 4.
- Try to keep the device perpendicular to the ground and wall, and position the camera at the edge of the plane, as shown in Figure 5.
- See Figure 6 for the sequence of other power lines.



Figure 1



Figure 2

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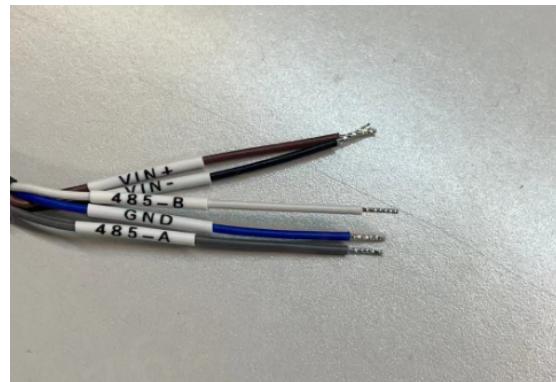


Figure 3

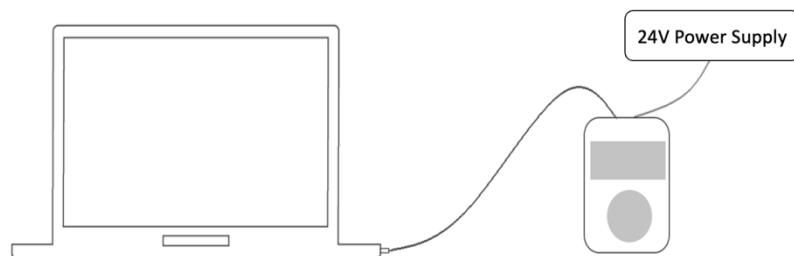


Figure 4



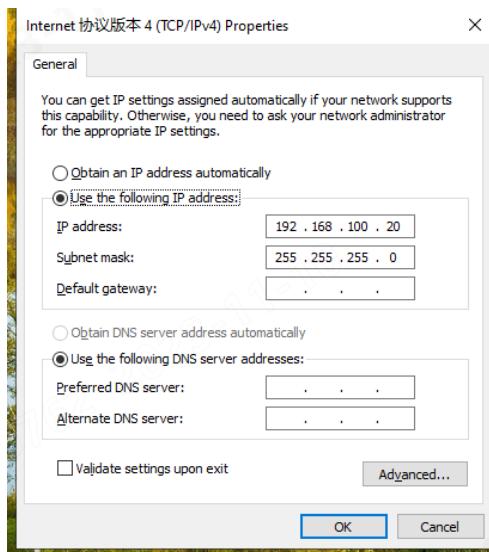
Figure 5

Port	Pin	Signal	Description	Remark
Socket Definition	1	GND	Signal Ground	Blue
	2	485_A	RS485_A	Grey
	3	485_B	RS485_B	White
	4	VIN +	24V Power Supply Positive	Brown
	5	VIN -	24V Power Supply Negative	Black

Figure 6

### 3.3 IP Address and Gateway Configuration

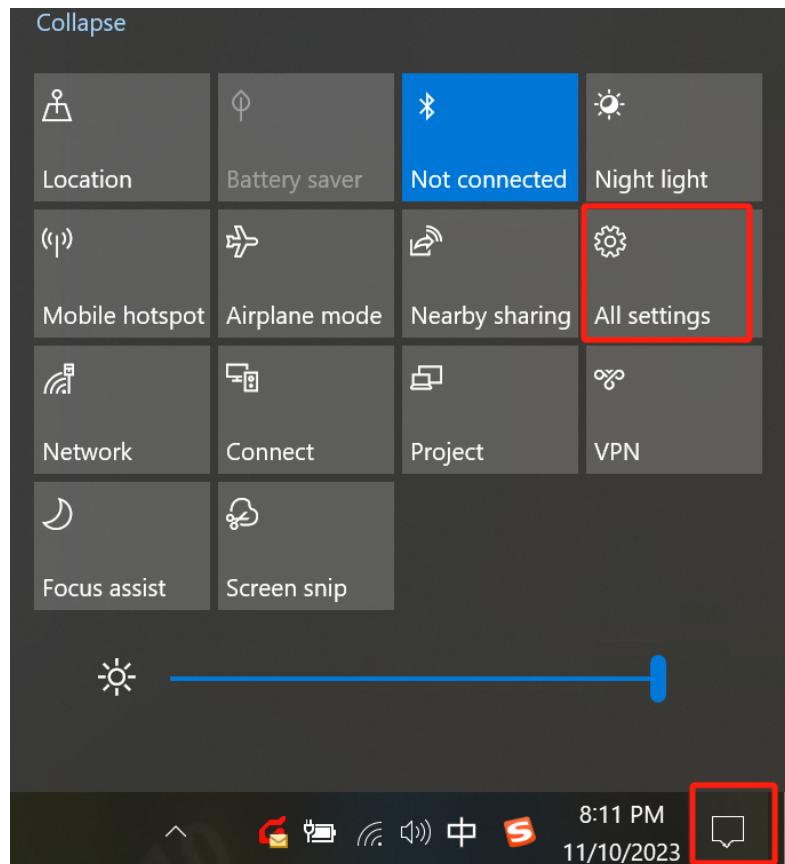
- The connection mode is fixed IP address connection, and it can be modified through this software when needed.
- The default IP address of the camera is 192.168.100.12.
- The default gateway can be left empty.
- The subnet mask is 255.255.0.0, on the Linux platform, it is 255.255.255.0.
- On the host computer, set the IP address of the Ethernet connected to the camera to 192.168.100.x, where x represents any number between 3 and 254. The host computer IP and camera IP cannot be the same.
- For example, when the camera IP is 192.168.100.12, set the host computer IP address to 192.168.100.89 with a subnet mask of 255.255.0.0, as shown in the diagram below:



### 3.4 Firewall Configuration

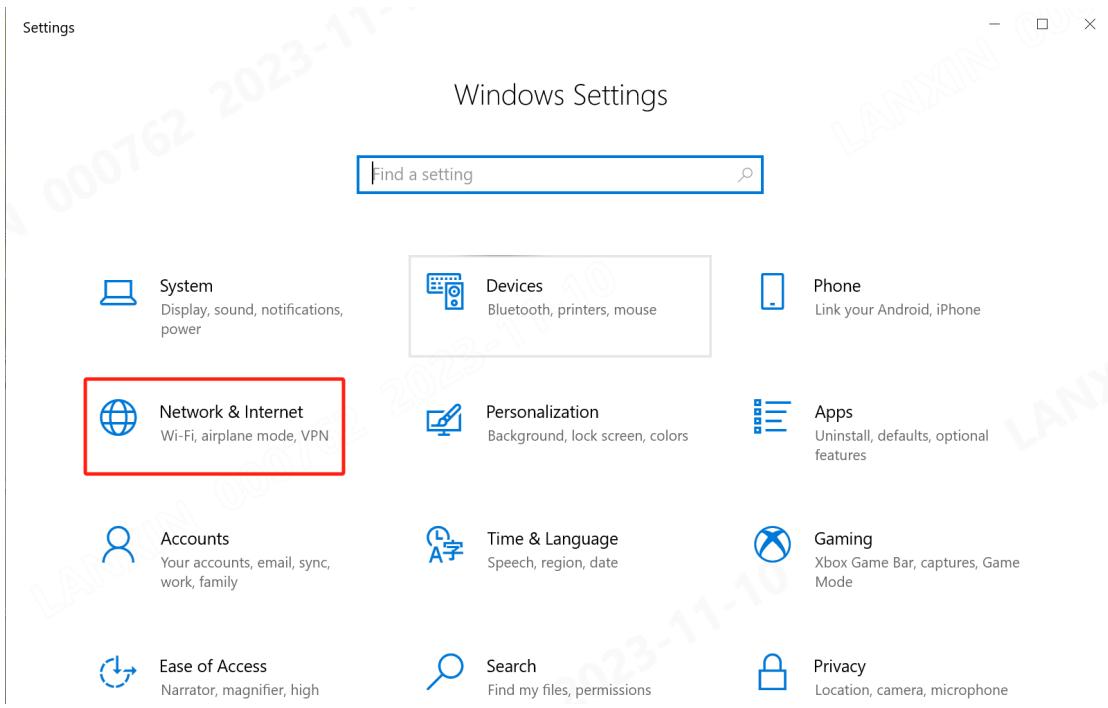
To open the camera, you need to disable the firewall. The settings process is as follows (using WIN10 as an example):

Click on the notification button in the lower right corner and then click on 'All settings.'

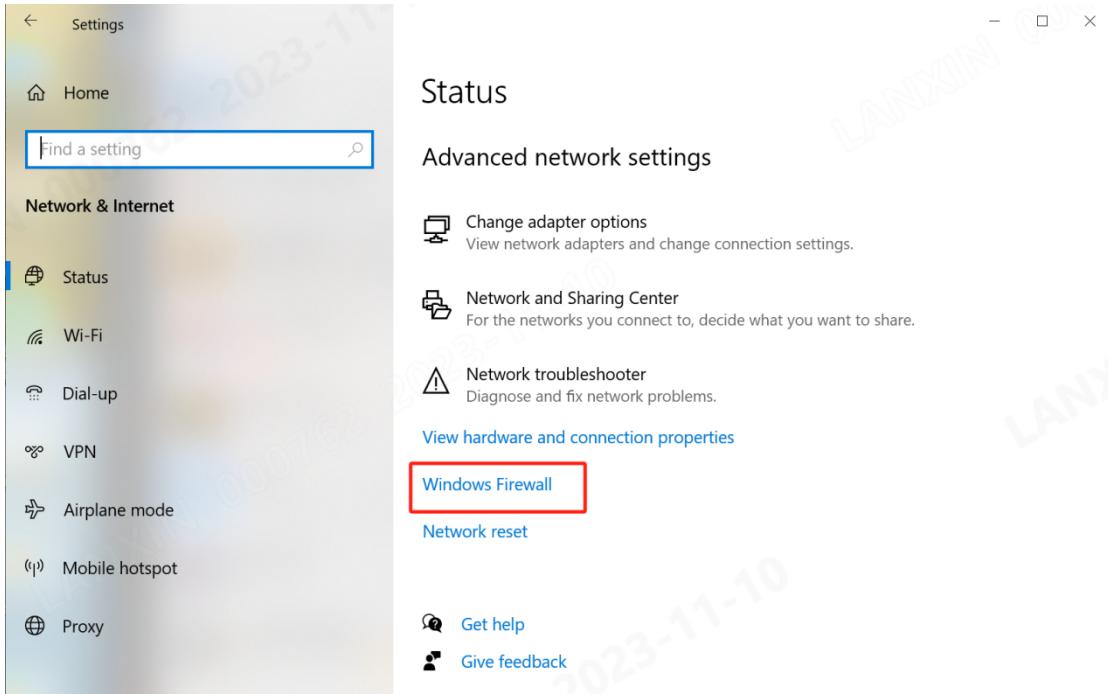


Click on 'Network & Internet.'

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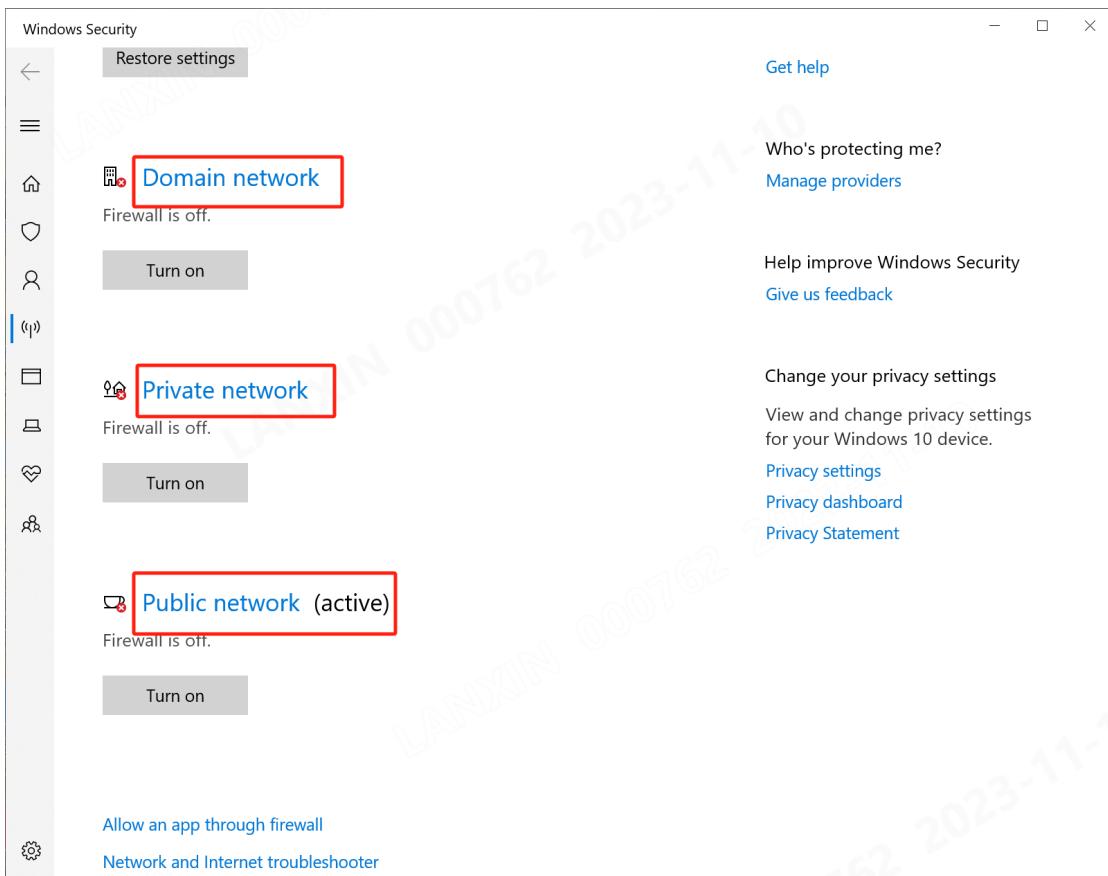


In 'Advanced network settings,' click on 'Windows Firewall'.



Within 'Firewall & Network Protection,' click on 'Domain Network,' 'Private Network,' and 'Public Network.'

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Turn off the firewall.

### Microsoft Defender Firewall

Helps protect your device while on a private network.

 Private firewall is off. Your device may be vulnerable.



### 3.5 Host Computer Installation

- Double-click to open the host computer installation package Lanxin-MRDVS-x.x.x.xxxx.exe.
- Click 'Allow the app to make changes to your device.'
- Choose the language for installation (see Figure 1).
- Select the installation path, and it's recommended to use the default path (see

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Figure 2).

- Check 'Create a desktop shortcut' (see Figure 3).
- After waiting for the installation to complete, uncheck 'Launch Lanxin-MRDVS' and click 'Finish' (see Figure 4).
- The first time you open the host computer software, you need to run it with administrator privileges. Right-click on the desktop software icon and click 'Run as administrator' (see Figure 5).

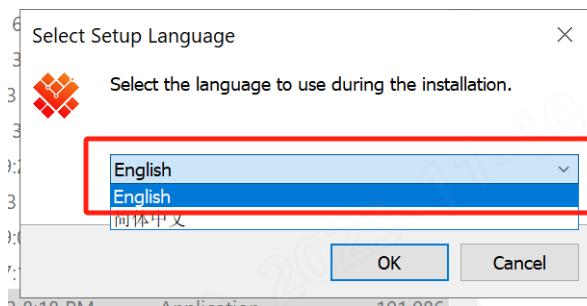


Figure 1

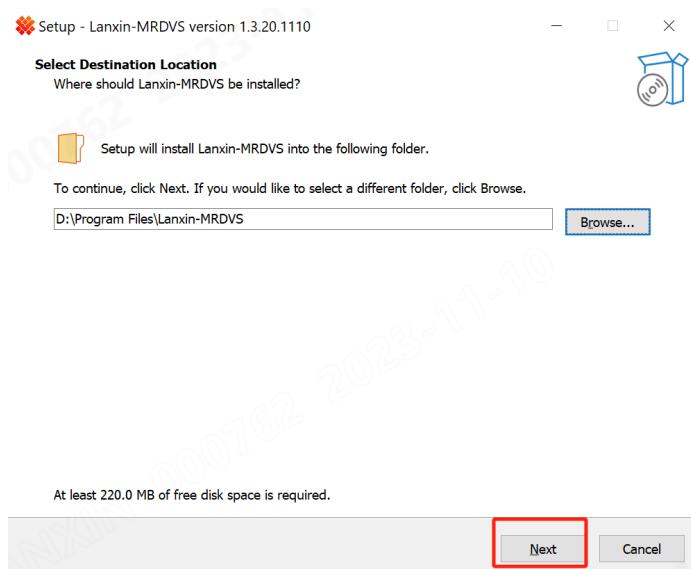


Figure 2

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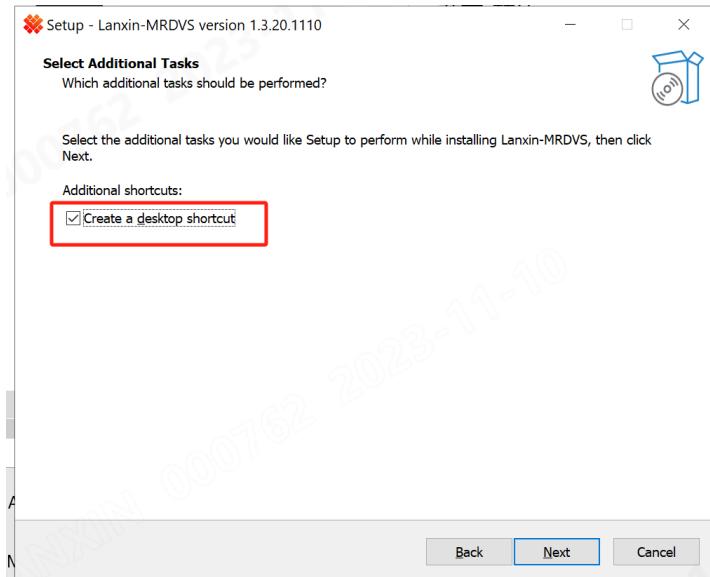


Figure 3

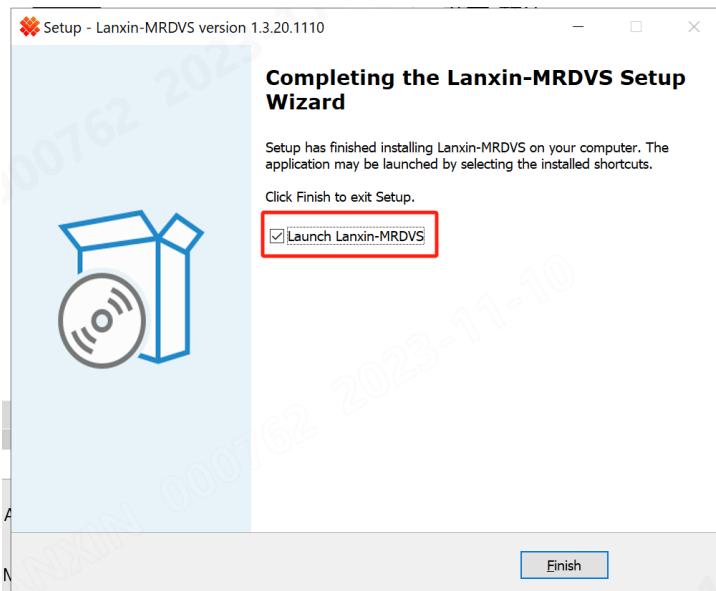


Figure 4

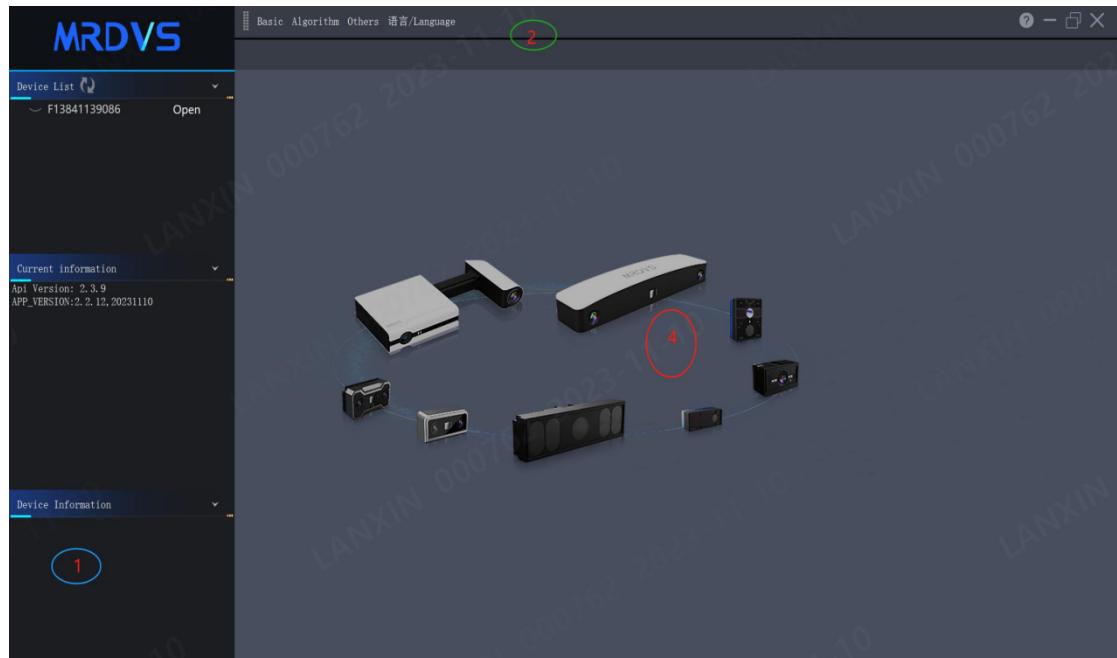
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Figure 5

## 4 LxCameraViewer User Guide

### 4.1 Software Interface Overview



#### 4.1.1 Software Interface Overview (Camera Not Opened)

The initial interface of this software is divided into three main sections:

- List Bar (Area 1 in blue):
  - Device list
  - Current information
  - Device information
- Menu Bar (Area 2 in green):
  - MRDVS icon
- Three right-side toolbar buttons
- Image Display Bar (Area 4 in red):
  - Tof point display
  - Depth image display
  - Amplitude image display
  - RGB image display
- Double-clicking in the menu bar area can maximize/minimize the window. Hold down the left mouse button and move the mouse to drag the interface.

#### 4.1.2 Software Interface Overview (Camera Opened)

After opening the camera, the interface includes an additional right-side toolbar (Area 3 in magenta):

- Basic tools, providing the following functions:
  - Image display settings
  - 2D settings
  - 3D settings
  - Filtering
  - Function settings

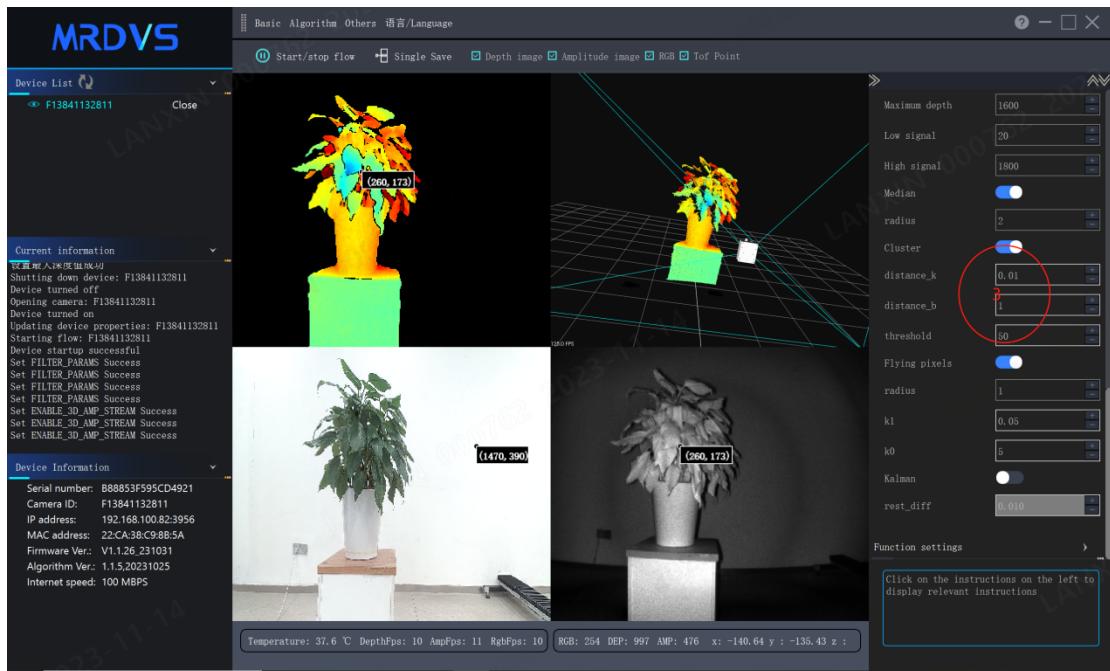
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➤ Apply algorithms, providing the following functions:

- Apply algorithm settings
- Working mode settings
- Obstacle avoidance algorithm settings
- Tray algorithm settings
- Algorithm version display
- Modbus bit settings

➤ Others, providing the following functions:

- NDC tray docking
- Open image save location



## 4.2 Open and Close Device

### 4.2.1 Device List

➤ The device list is located in the top-left corner of the interface (Area 1 in red in Figure 1).

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- The 'Refresh' button is next to the device list (Area 2 in red in Figure 2).
- The collapse/expand button for the device list is to the right of the Refresh button (Area 2 in green in Figure 2). When collapsed, it looks like Figure 3.
- The device list displays three properties for each camera:
  - Whether the camera is open (Area 2 in magenta in Figure 2, Device One is open, Device Two is closed).
  - Camera ID (Area 2 in yellow in Figure 2).
  - Camera IP (hovering the mouse over the Camera ID reveals the IP, as shown in the red box in Figure 4, indicating the IP of the second camera).
- Each camera in the device list has a button that can be clicked to open or close the camera ('Open' or 'Close' as shown in blue in Figure 2). The button also displays the current status of the camera (Figure 5).
- The font color of the selected camera in the device list is blue, while other cameras have white font color.
- Multiple devices can be opened simultaneously from the device list, but it's important to ensure that the network bandwidth is sufficient. Clicking on the camera ID allows you to switch and view different cameras."

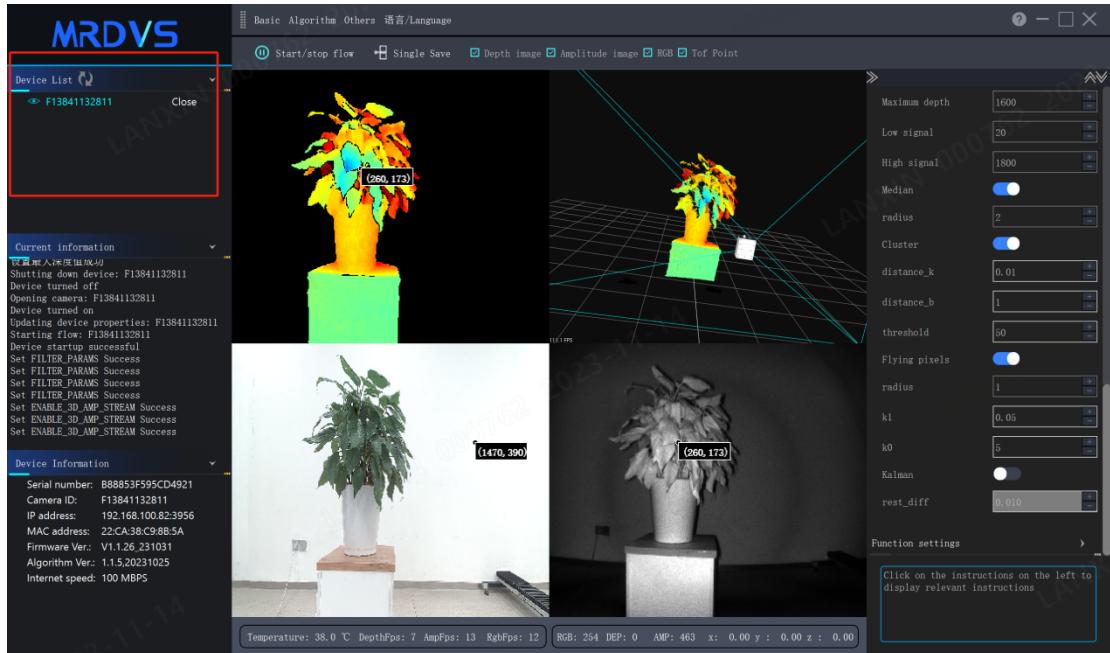


Figure 1

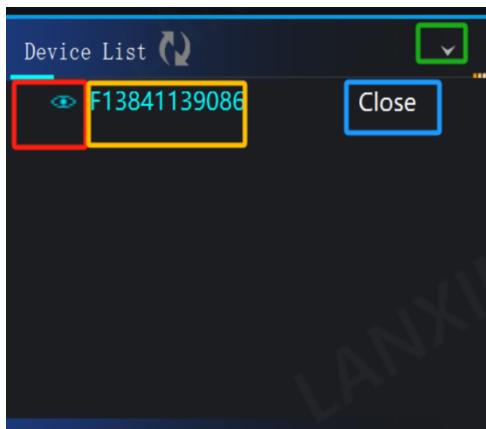


Figure 2

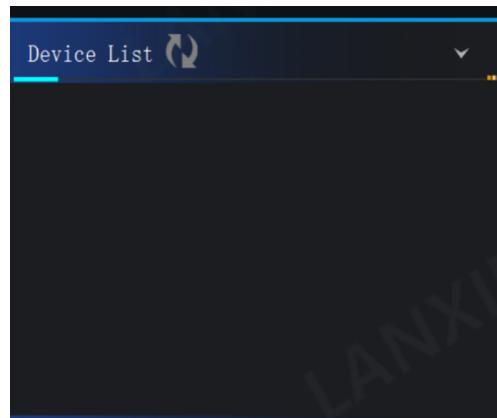


Figure 3

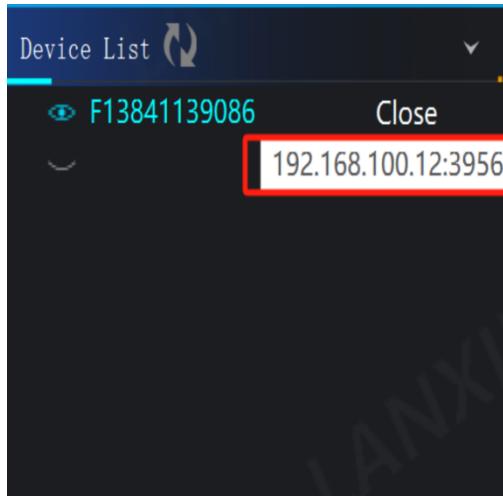


Figure 4

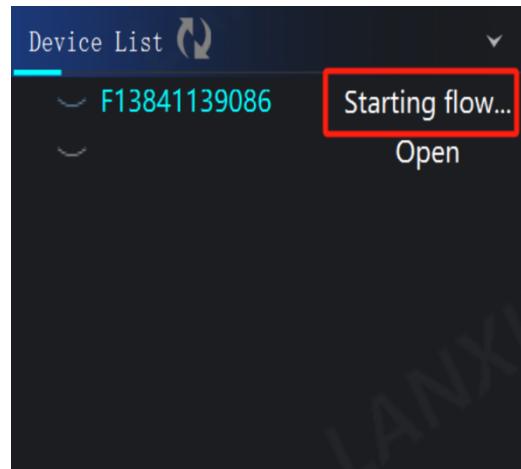


Figure 5

### 4.3 Current Information

- The current information is located in the middle-left position of the interface (Area 1 in red in Figure 1).
- The current information displays the following information:
  - All information about the camera (Area 2 in red).
  - Software operations (Area 2 in green).
  - Operation results (Area 2 in blue).
- When the text is too long, you can drag the blue scrollbar at the bottom to view

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the complete text (Figure 3, an additional blue scrollbar at the bottom).

- The current information displays a maximum of 25 relevant entries and can be scrolled using the mouse wheel. Older information will be overwritten.
- Clicking the collapse button will collapse the current information (Area 2 in yellow).

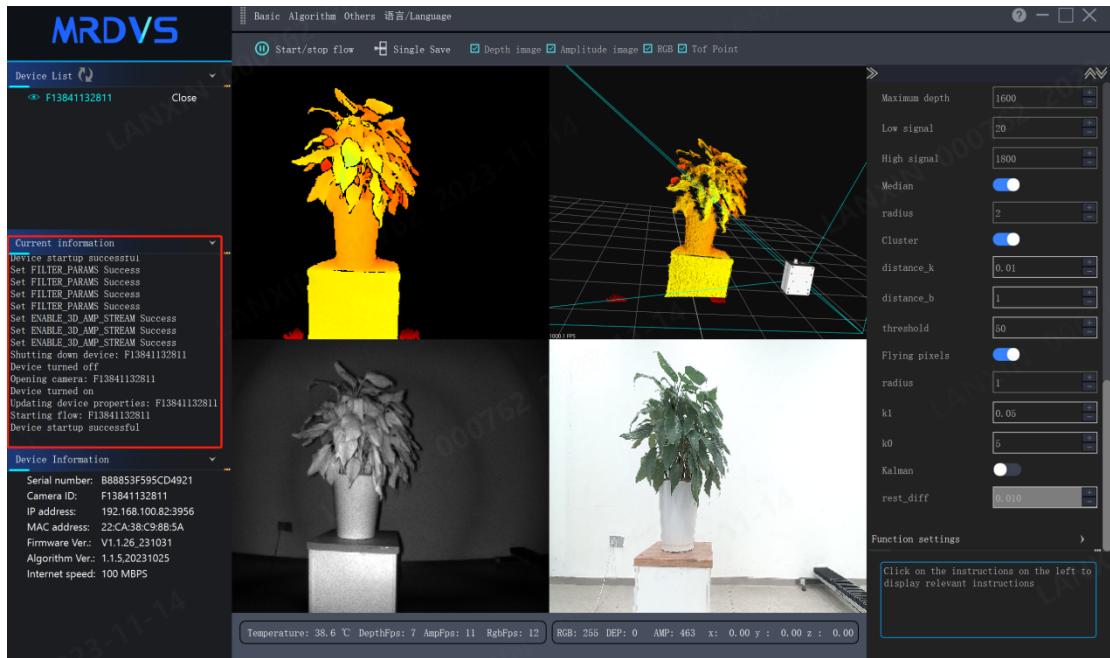


Figure 1

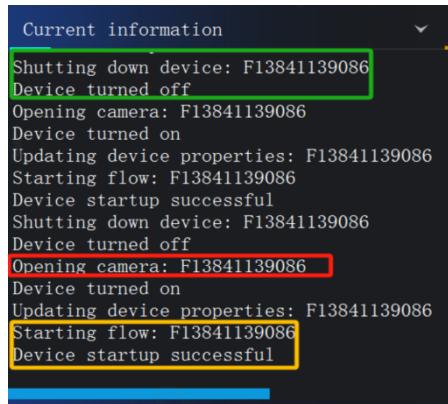


Figure 2

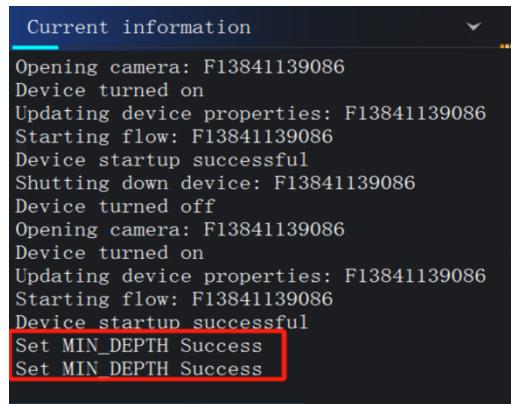


Figure 3

## 4.4 Device Information

- Device information is located in the bottom-left corner of the interface (Area 1 in red in Figure 1).
- Device information displays the relevant information of the device currently

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selected in the device list. The information includes:

- Serial number: Unique identifier for the device.
  - Camera ID: Unique identifier for the device; SDK can open the device based on the camera ID.
  - IP address: IP address of the device.
  - MAC address: MAC address of the device.
  - Firmware version: Built-in software version of the device.
  - Algorithm version: Built-in algorithm version of the device (visible after opening the camera).
  - Internet speed: The device is disconnected when not opened; after opening, it depends on the NIC speed.
- Clicking the collapse button will collapse the device information (Area 2 in yellow).
- Right-clicking on a specific item in device information allows copying that item's information (Figure 3, copying NIC speed information).

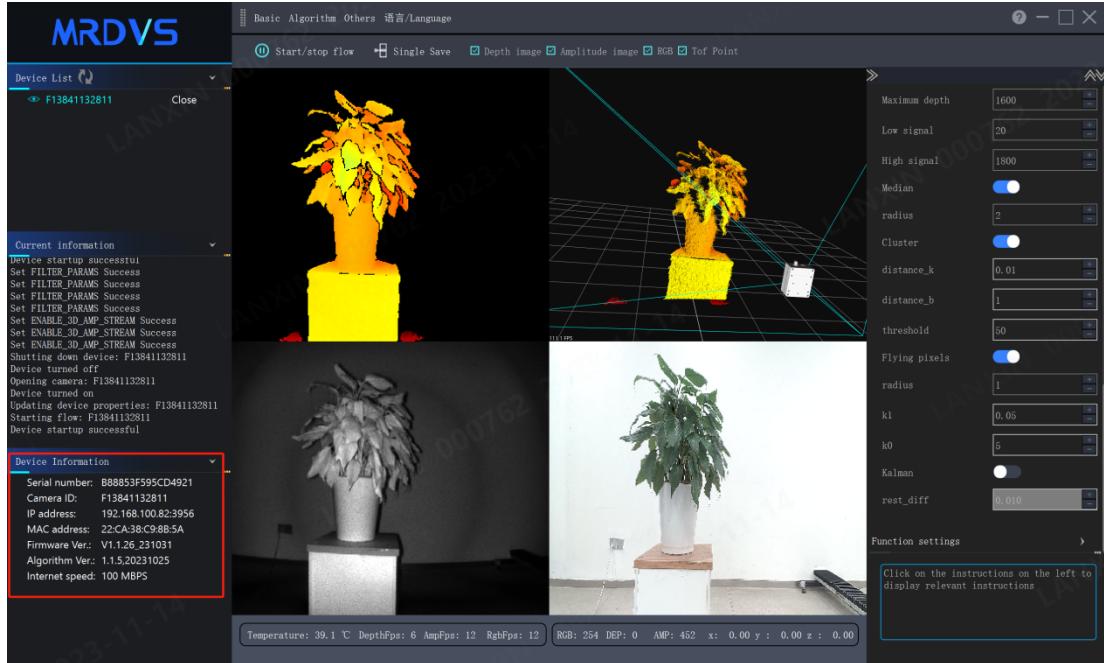


Figure 1

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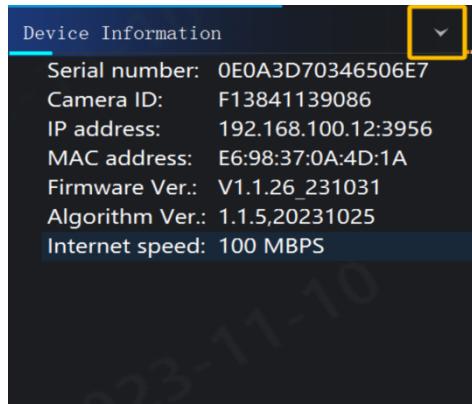


Figure 2

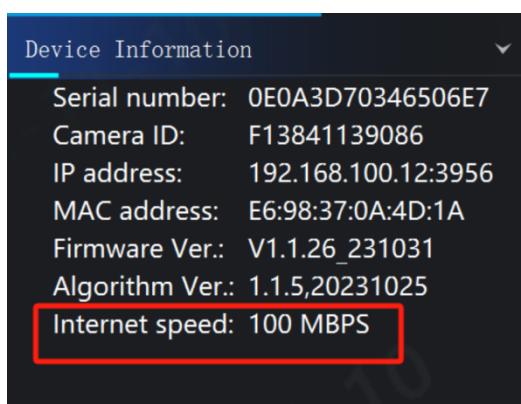


Figure 3

## 4.5 Image and Data Preview and Saving

### 4.5.1 Preview

- Image and image data, along with related image operations, are in the central area of the software interface (Area 1 in red in Figure 1).
- Controls for image operations include [Start/stop flow], [Save Single Image (single save) ], [Depth Image], [Amplitude Image], [RGB], and [TOF Point].
- The three images in the middle are the depth image, amplitude image, TOF point, and RGB map obtained from the device.
- The white text at the bottom displays camera and image data.

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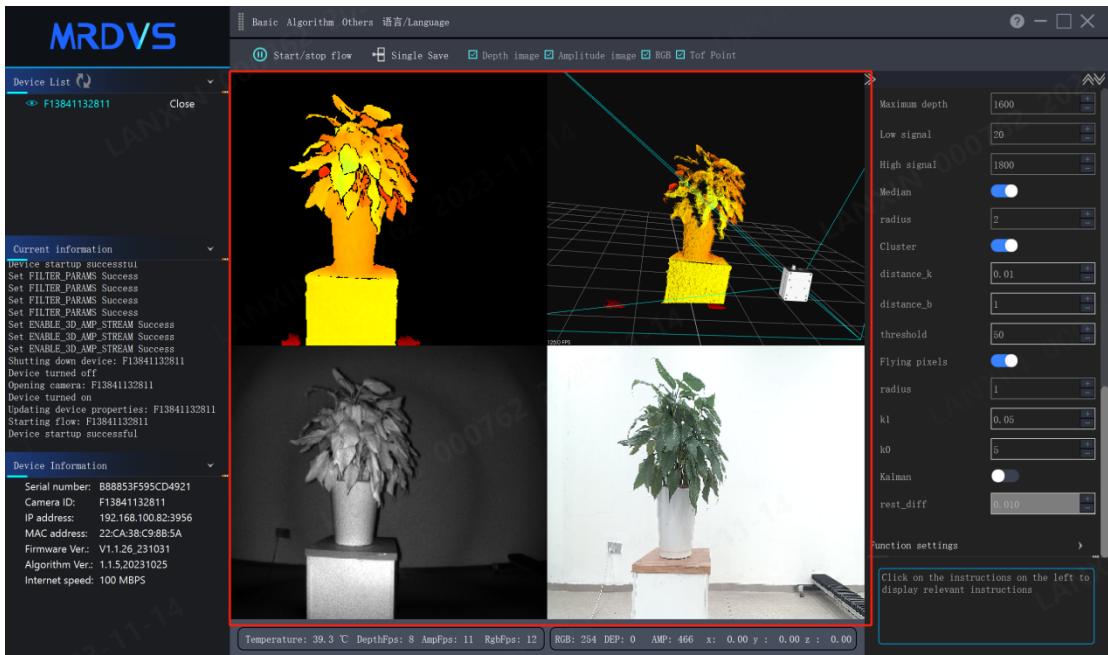


Figure 1

### 4.5.2 Image (Stream) Controls

- [Start/stop flow] button: Clicking can start or stop capturing images from the device. The button becomes unavailable until the current operation is completed.
- [Single save] button: Saves the image of the opened stream data.
  - For example, in Figure 2, only the depth image and TOF point are saved, while the RGB and Amplitude image are not enabled, so they are not saved.
  - The file extension for depth image and Amplitude image is .pgm, for RGB map is .png, and for TOF point is .pcd.
  - The saved depth image, Amplitude image, and TOF point are the original images without pseudo-coloring.
  - You can click multiple times to save continuously, but only up to three consecutive saves are allowed.
- [Depth image] checkbox: Whether to display (enable) the depth image.
- [Amplitude image] checkbox: Whether to display (enable) the Amplitude image.
- [Tof point] checkbox: Whether to display (enable) the TOF point.

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- [RGB] checkbox: Whether to enable the RGB map.
- Unchecking RGB/Amplitude image will stop the device from capturing RGB/Amplitude image images. However, the device will only stop capturing depth data when both the depth image and TOF point are turned off.
- In Figure 2, the device is capturing, with the depth image and TOF point enabled, and RGB map and Amplitude image disabled.
- In Figure 3, the device has stopped capturing, with the depth image and TOF point disabled, and RGB map and Amplitude image enabled.

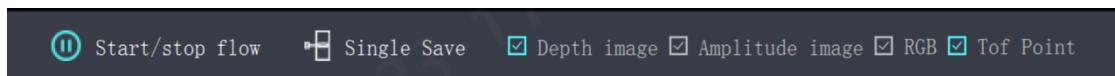


Figure 2

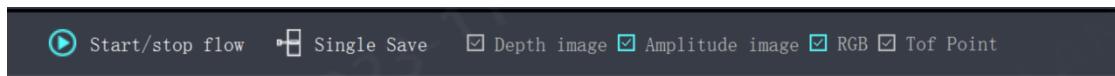


Figure 3

### 4.5.3 Image Data

- Displays the camera temperature (Figure 4, red box).
- When the depth image is selected, it shows the frame rate of the depth image (Figure 4, green box).
- When the Amplitude image is selected, it shows the frame rate of the Amplitude image (Figure 4, blue box).
- When the RGB map is selected, it shows the frame rate of the RGB map (Figure 4, rose box).
- When the RGB map is selected, it shows the pixel values of the selected pixels in the RGB map (Figure 4, black box).
- When the depth image is selected, it shows the pixel values of the selected pixels in the depth image (Figure 4, yellow box).
- When the Amplitude image is selected, it shows the pixel values of the selected pixels in the Amplitude image (Figure 4, orange box).

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- When the TOF point is selected, it shows the Tof point values corresponding to the selected pixels in the depth image (Figure 4, purple box).
- When no pixels are selected, the default selection is the (0,0) pixel.



Figure 4

### 4.5.4 Image Display

- You can choose different display modes (minimum one frame must be selected):
  - Single Frame: Displays a single frame when one of the four images is selected (Figure 5).
  - Dual Frame: Displays two frames when two of the four images are selected (Figure 6).
  - Triple Frame: Displays three frames when three of the four images are selected (Figure 7).
  - Quadruple Frame: Displays all four frames when all four images are selected (Figure 8).
- When the mouse is moved over an image, you can use the mouse wheel to zoom in or out with the mouse as the center, and dragging with the left mouse button pressed (compare the Amplitude images in Figures 7 and 8).
- Right-clicking on the depth image, amplitude image, or RGB map allows you to save that image.
- Left-clicking on an image allows you to select a pixel, and arrow keys can be used to move the selected pixel (as shown in Figure 8).

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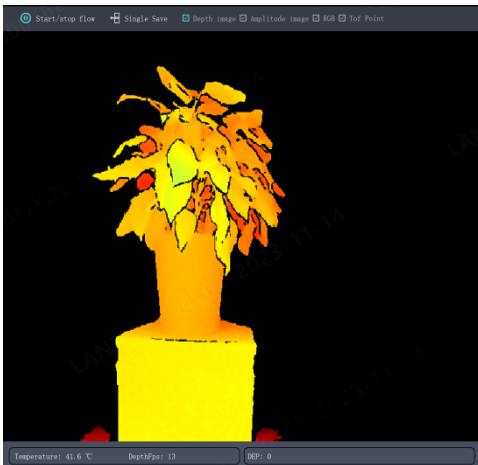


Figure 5

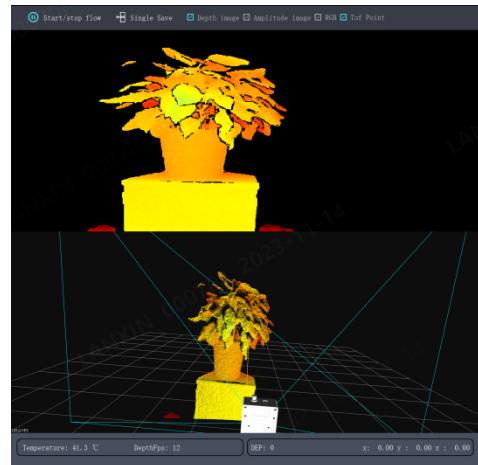


Figure 6

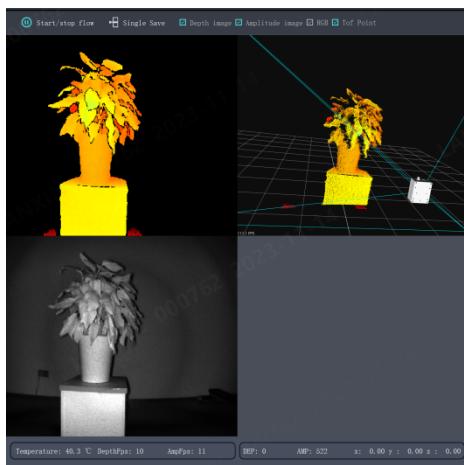


Figure 7

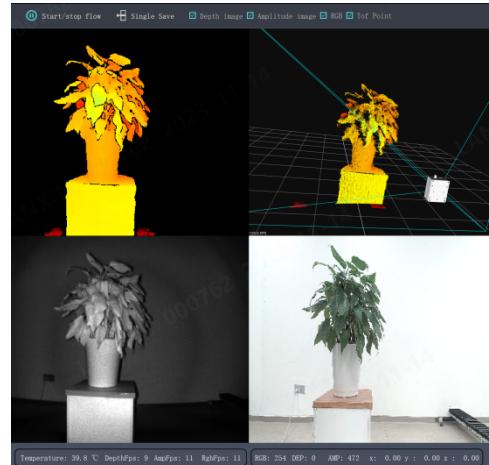


Figure 8

### 4.5.5 Tof Point Cloud Operations

- Holding down the left mouse button and dragging on the TOF point allows you to rotate the Tof point.
- Holding down the middle mouse button and dragging allows you to move the rotation center.
- Holding down the right mouse button and dragging up or down, or using the mouse wheel, allows you to zoom in or out of the Tof point.
- Right-clicking on the Tof point allows you to save the current Tof point.
- Tof point keyboard shortcuts are as follows:

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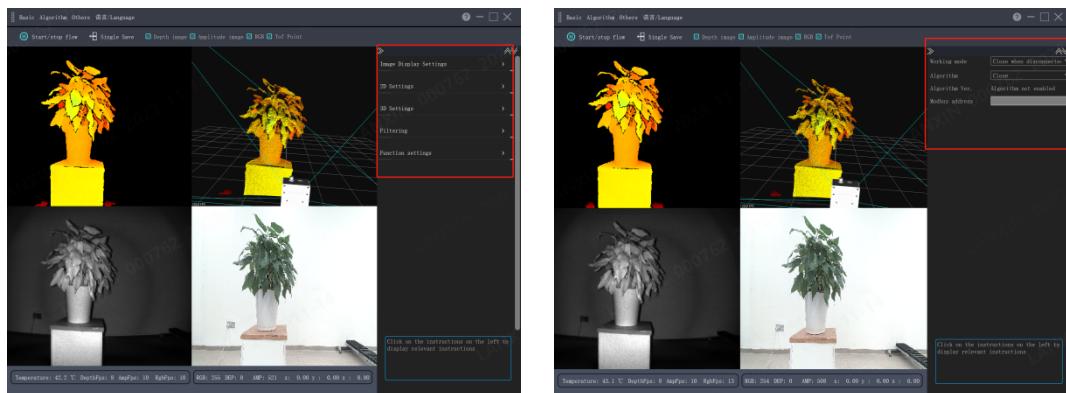
Shortcut	Function
W	Display the grid model, press S to switch
R	Reset the camera view
S	Display the surface model, press W to switch
P	Hide all lines, surfaces, and grids; press W or S to restore
U	Call user-defined function (invalid)
O	Eliminate fisheye effect, press again to restore
F	Zoom in to the location of the mouse and set the location of the mouse as the rotation center
G	Display the scale and ratio, press again to hide
X	Disable mouse operation of the Tof point, press again to restore
M	Display the Tof point bounding box, press again to show the Tof point

## 4.6 Menu Bar

- The menu bar includes [Basic], [Algorithms], and [Others] (as shown in Figure 1).
- Clicking [Basic] displays as shown in Figure 2.
- Clicking [Algorithms] displays as shown in Figure 3.
- Clicking [Others] displays as shown in Figure 4.



Figure 1



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Figure 2

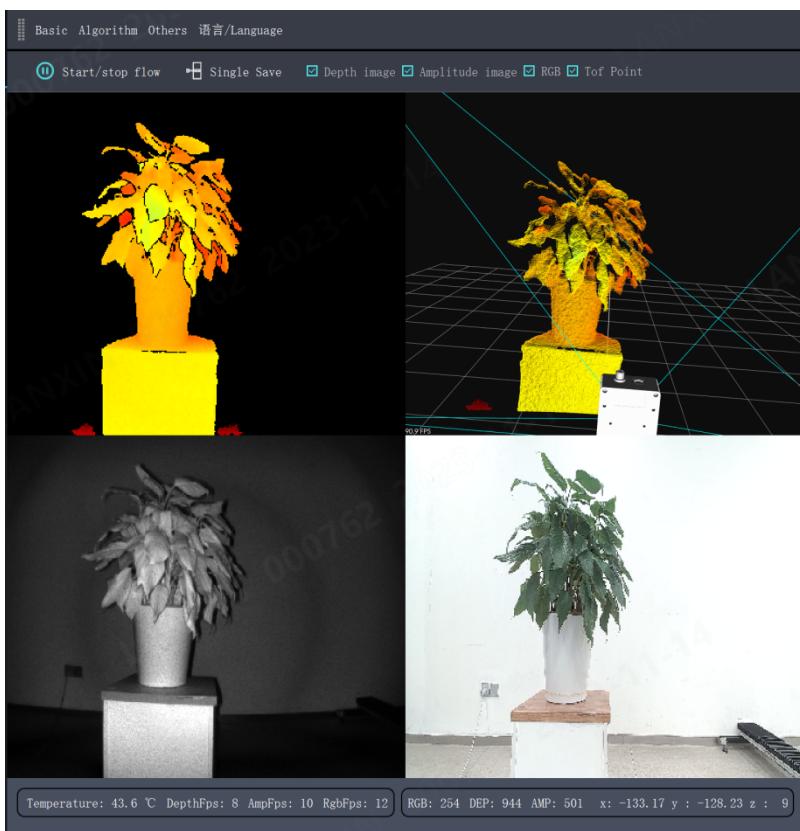


Figure 3

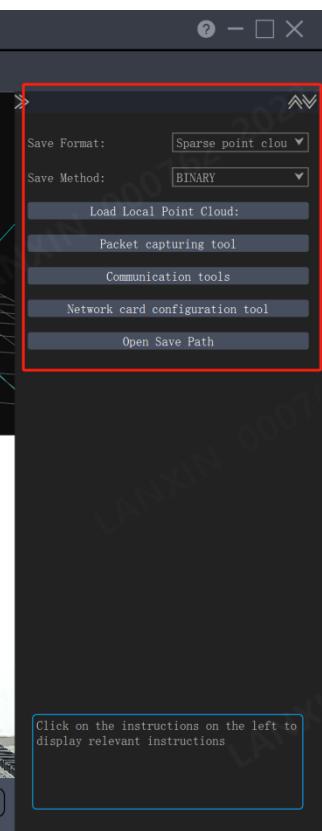
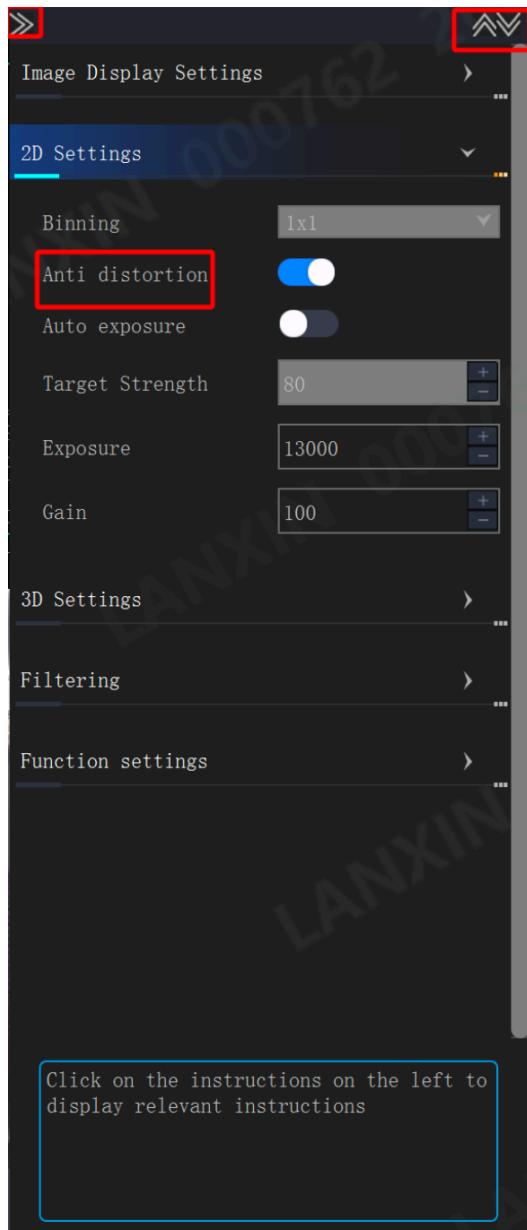


Figure 4

## 4.7 Function Bar

### 4.7.1 Display Functions

- Collapse the right sidebar (highlighted in red in Figure 1).
- Expand or collapse all (highlighted in blue in Figure 1, with the upper label indicating collapse all and the lower label indicating expand all).
- Click on the function name to display the corresponding setting information in the SDK (highlighted in blue at the bottom in Figure 1).
  - For example, if the 2D setting's Anti distortion is clicked (highlighted in green text), the blue box displays the API interface and enumeration values when calling this function.
- Display state (in Figure 1, 2D setting is in the expanded state, while others are in the collapsed state).



### 4.7.2 Basic Tools

- Clicking on the menu bar's "Basic" allows you to see the related settings for basic tools on the right side of the interface (as shown in Figure 1).
- Basic tools include "Image Display Settings," "2D Settings," "3D Settings,"



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"Filtering," and "Function Settings" (as shown in Figure 2).

Figure 1

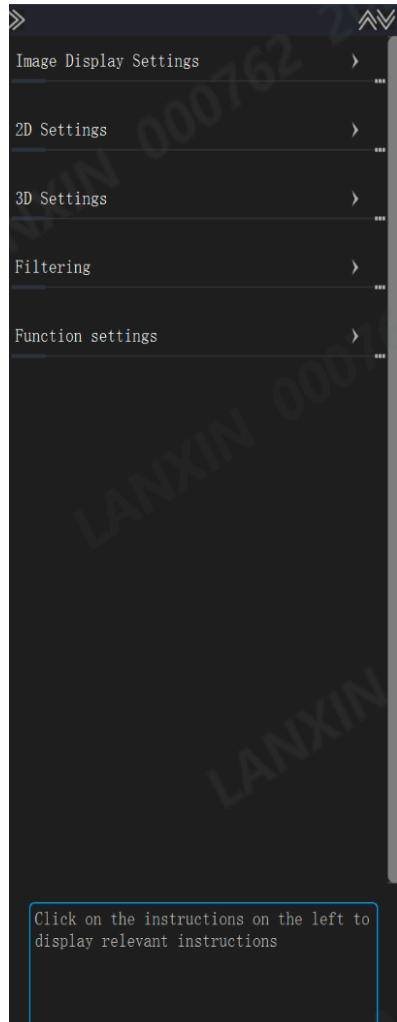


Figure 2

### 4.7.2.1 Image Display Settings

- **「Display Camera Model」** Show (Figure 4) or hide (Figure 5) the camera model on the Tof point image.
- **「Minimum Depth」** Modify the minimum depth displayed on the interface for depth and Tof point images; the camera output remains unchanged.
- **「Maximum Depth」** Modify the maximum depth displayed on the interface for

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depth and ToF point images; the camera output remains unchanged.

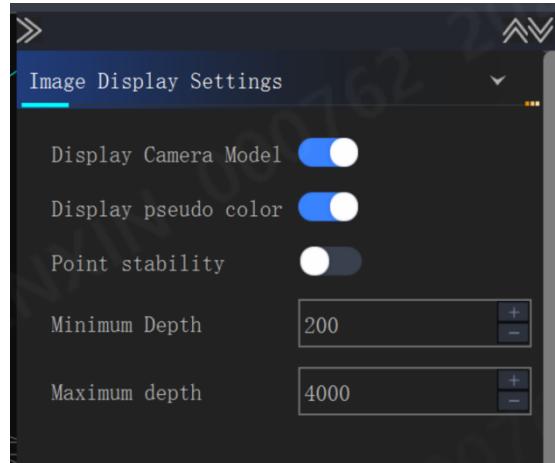


Figure 3

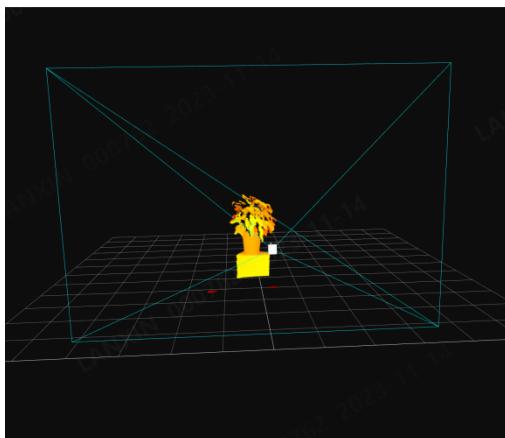


Figure 4

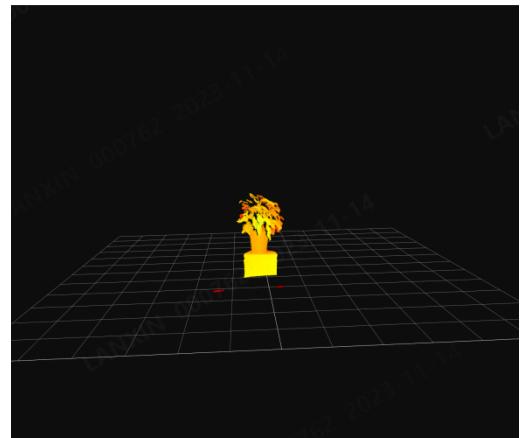


Figure 5

### 4.7.2.2 2D Settings

- **「Binning」** Combine pixel values in a 1\*1, 2\*2, or N\*N matrix, then divide by 2\*2 or N\*N to obtain the binned image (the image size becomes the original size divided by the pixel size of the binning in both width and height).
- **「Anti distortion」** Retrieve distortion parameters from the intrinsic parameters to remove distortion from the displayed image.
- **「Auto Exposure」** Enable or disable automatic setting of RGB exposure values by the camera.

- **「Target Strength」** Set when auto exposure is enabled; values can be set from 0 to 100, with higher values resulting in brighter images.
- **「Exposure」** Manual exposure; can be set when auto exposure is disabled.
- **「Gain」** Manual gain; can be set when auto exposure is disabled.

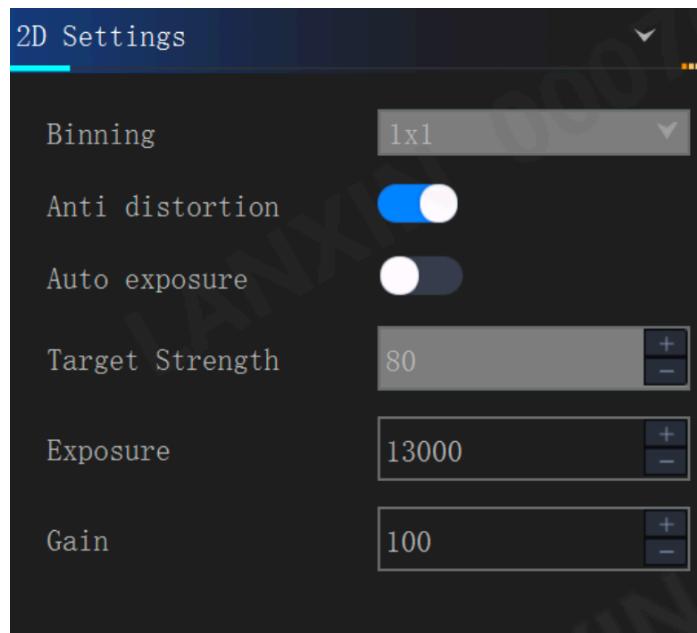


Figure 6

#### 4.7.2.3 3D Settings

- **「Binning」** Combine pixel values in a 1\*1, 2\*2, or N\*N matrix, then divide by 2\*2 or N\*N to obtain the binned image (the image size becomes the original size divided by the pixel size of the binning in both width and height).
- **「RGBD Alignment」** Aligns the depth image, Amplitude image, and Tof point with the RGB image. After alignment, the width and height of the depth image and Amplitude image will match the RGB image, and Tof point data will increase.
- **「Anti distortion」** Retrieve distortion parameters from the intrinsic parameters to remove distortion from the displayed image.
- **「High integral」** High integral time (increasing it allows the camera to measure

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distances farther away).

- **『Low integral』** Low integral time (mainly controls distance measurement for nearby objects and is generally not changed).
- **『Gain』** Increases intensity values by a factor (do not change).
- **『ROI Settings』** Set the data of the four ROI areas below to the camera. If you only modify the values below without clicking the button, it will not be set to the camera.
  - **『ROI x Offset』** Left-top x-coordinate of the ROI area set.
  - **『ROI y Offset』** Left-top y-coordinate of the ROI area set.
  - **『ROI Width』** Width of the ROI area set.
  - **『ROI Height』** Height of the ROI area set.

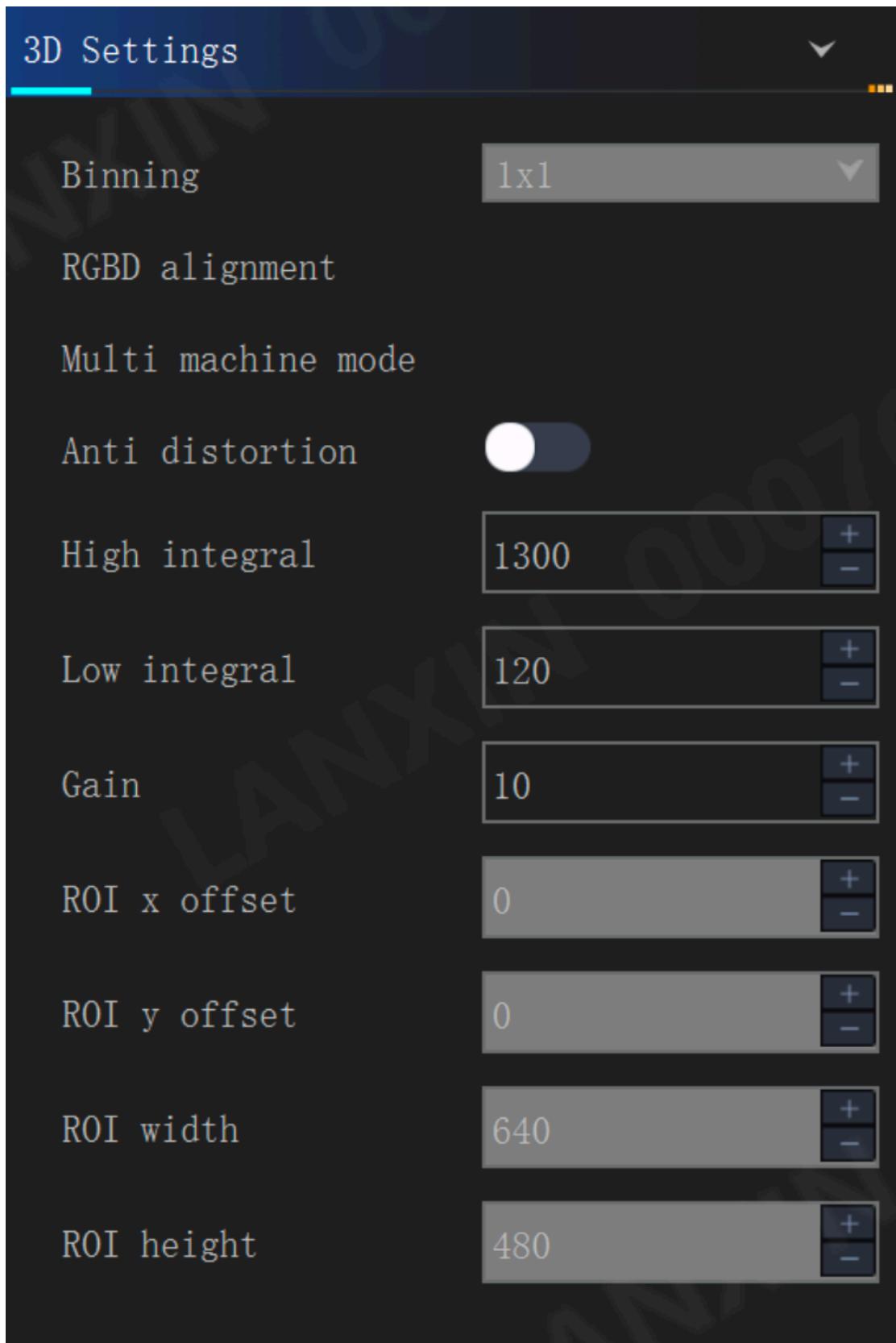


Figure 7

#### 4.7.2.4 Filtering Settings

- 「Minimum Depth」 The lower limit value for pseudo-color or distance in the depth image. Below this value, the pseudo-color is displayed as black, and the value is forcefully set to zero.
- 「Maximum Depth」 The upper limit value for pseudo-color or distance in the depth image. Above this value, the pseudo-color is displayed as black, and the value is forcefully set to zero.
- 「Low Signal」 The lower limit of intensity values. Below this value, the corresponding pixel in the depth image is forcefully set to zero (does not affect the Amplitude image).
- 「High Signal」 The upper limit of intensity values. Above this value, the corresponding pixel in the depth image is forcefully set to zero (does not affect the Amplitude image).
- 「Median」 Median filter with an open window (can be set to 1 or 2, too high affects frame rate significantly).
- 「Clusteri」 Clustering filter with an open window (has three parameters that can be adjusted according to requirements).
- 「Flying Pixels」 Flying pixel filter with an open window (has three parameters that can be adjusted according to requirements).
- 「Kalman」 Kalman filter with an open window (has three parameters that can be adjusted according to requirements).

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Figure 8

#### 4.7.2.5 Filtering Settings

- Modify IP: Sets the camera to the IP address entered in the input box. If the setting is successful, the camera will automatically shut down and needs to be manually reopened.
- Reset Settings: Restores the camera to its factory state. This operation will forget all configured settings, including but not limited to the camera IP. The camera will automatically shut down, and manual reopening is required.
- Upgrade: Upgrades the camera's firmware. If the upgrade is successful, the camera will automatically shut down and needs to be manually reopened.
- Camera Restart: Restarts the camera. The camera will not shut down automatically but will enter a reconnecting state. Please avoid performing other operations during the reconnection.

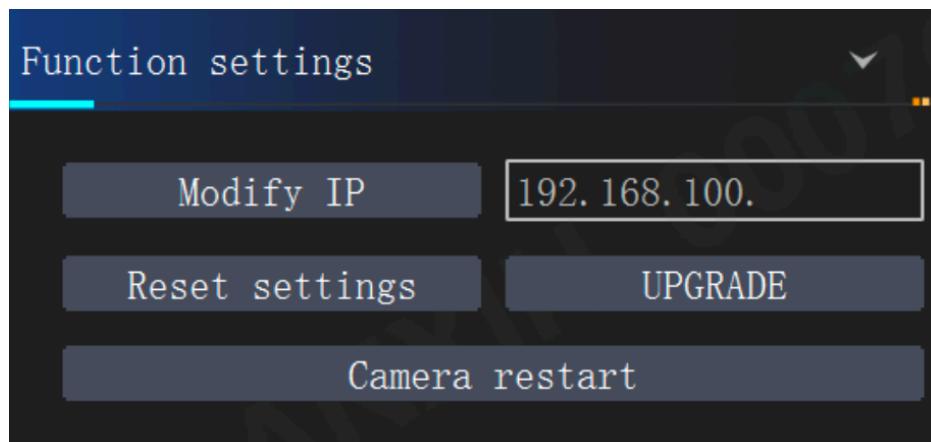


Figure 9

#### 4.7.3 Apply Algorithm

- Clicking on the menu bar 「Algorithm」 reveals the relevant settings on the right side of the interface (as shown in Figure 1).



Figure 1

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Figure2

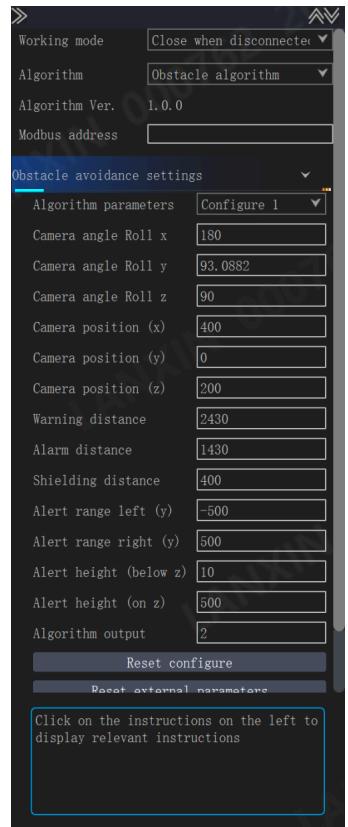


Figure 3



Figure 4

- 「Working Mode」 Allows you to set the camera to continue outputting algorithm results even when disconnected from the host computer.
- 「Algorithm」 Select the desired application algorithm:
  - 「Close」 (Figure 2)
  - 「Obstacle Avoidance settings」 (Figure 3)
  - 「Tray Identification settings」 (Figure 4)
- 「Algorithm Version」 Displays the version number of the currently selected algorithm.
- 「Modbus Address」 Sets the Modbus address. This Modbus address is used to retrieve obstacle avoidance algorithm results.

### 4.7.3.1 Obstacle Avoidance Settings

- Setting the application algorithm to obstacle avoidance will display obstacle avoidance-related configurations.
- 「Algorithm Parameters」 Obstacle avoidance can have multiple configurations, set through this option.
- 「Camera Angle Roll x」 Camera extrinsic parameter, roll angle. Default camera orientation is 180 degrees.
- 「Camera Angle Roll y」 Camera extrinsic parameter, pitch angle. Default is vertical installation, set to 90 degrees.
- 「Camera Angle Roll z」 Camera extrinsic parameter, yaw angle. Default is 90 degrees.
- 「Camera Position (x)」 Camera extrinsic parameter, distance in the x-direction

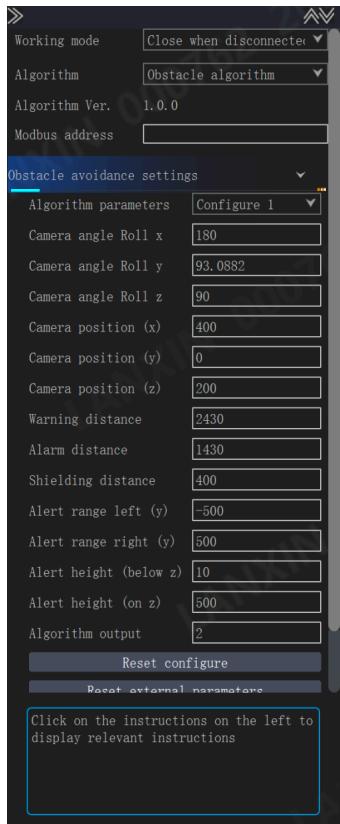
from the origin, in meters.

- 「Camera Position (y)」 Camera extrinsic parameter, distance in the y-direction from the origin. If installed in the middle, set to 0. Unit: meters.
- 「Camera Position (z)」 Camera extrinsic parameter, distance in the z-direction from the origin, interpreted as the height of the camera from the ground. Unit: meters.
- 「Warning Distance」 Obstacle range in the x-direction from the center of the vehicle. Obstacles beyond this distance are considered safe. The area between the warning distance and alarm distance is considered a warning deceleration zone, displayed in yellow. Unit: meters.
- 「Alarm Distance」 Obstacle range in the x-direction from the center of the vehicle. Obstacles below this distance are considered alarm stop. The area between the warning distance and alarm distance is considered a warning deceleration zone, displayed in yellow. Unit: meters.
- 「Shielding Distance」 Obstacle range in the x-direction from the center of the vehicle. Obstacles within this distance will be ignored. Unit: meters.
- 「Alert Range Left (y)」 Obstacle range, distance to the left of the vehicle center in the y-direction. Unit: meters.
- 「Alert Range Right (y)」 Obstacle range, distance to the right of the vehicle center in the y-direction. Unit: meters.
- 「Alert Height (below z)」 Obstacle range, height from the ground. Below this height, obstacles are not processed. Unit: meters.
- 「Alert Height (on z)」 Obstacle range, height from the ground. Above this height, obstacles are not processed. Unit: meters.
- 「Algorithm output」 Output obstacle avoidance results.
- 「Reset configure」 Restore all parameters not written to the camera.

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- 「Reset external paraments」 Write all parameters to the camera.

For detailed obstacle avoidance settings, please refer to the obstacle avoidance documentation.



### 4.7.4 Others

- Clicking on the "Others" option in the menu bar will display relevant settings on the right side of the interface (as shown in Figure 1).
- Tof point Save Method: Sets the method for saving Tof points.
  - Normal (Sparse point cloud): The number of points in the Tof point remains the same, width = width \* height, height = 1 (as shown in Figure 3).
  - Dense point cloud: The number of points in the Tof point remains the same, width = TOF width, height = TOF height (as shown in Figure 4).
- Save Format: Sets the data format for saving Tof points.
  - BINARY: Saves in binary format (as shown in Figure 5).

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- ASCII: Saves in ASCII format, meaning text-based format (as shown in Figure 6).
- The default settings are "Normal" for the Tof point save method and "BINARY" for the save format.

Note: For a 640\*480 image, the saving time is approximately 6.6 seconds for ASCII and approximately 32 milliseconds for BINARY. The saving speed of BINARY format is 206 times faster than ASCII, making BINARY the recommended format for saving.

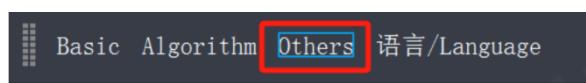


Figure 1

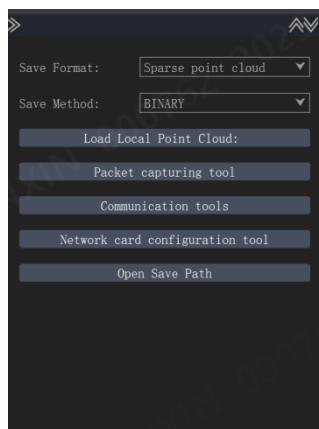


Figure 2

```
# .PCD v0.7 - Point Cloud Data file format
VERSION 0.7
FIELDS x y z rgb
SIZE 4 4 4 4
TYPE F F F U
COUNT 1 1 1 1
WIDTH 76800
HEIGHT 1
VIEWPOINT 0 0 0 1 0 0 0
POINTS 76800
DATA binary
:續絃\xDD>\x8E =g>○NUL NUL\xFF 始絃( ;\x8E .ACKc>○NUL NUL\xFF 壓○絆+A鶴愁>○NUL NUL
+絆\xB5: 繰彈>○NUL NUL\xFF 桂*絆\x88; \x8E, Jp>○NUL NUL\xFF EOT-&絆\x808\xBE EOT 發>○\n\x84\xFF\xFF NUL\xFF NUL NUL\xFF NUL
```

Figure 3 (Unordered Point Cloud Binary Format Saving)

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```
# .PCD v0.7 - Point Cloud Data file format
VERSION 0.7
FIELDS x y z rgb
SIZE 4 4 4 4
TYPE F F F U
COUNT 1 1 1 1
WIDTH 320
HEIGHT 240
VIEWPOINT 0 0 0 1 0 0 0
POINTS 76800
DATA ascii
```

Figure 4 (Ordered Point Cloud ASCII Format Saving)

```
# .PCD v0.7 - Point Cloud Data file format
VERSION 0.7
FIELDS x y z rgb
SIZE 4 4 4 4
TYPE F F F U
COUNT 1 1 1 1
WIDTH 320
HEIGHT 240
VIEWPOINT 0 0 0 1 0 0 0
POINTS 76800
DATA binary
```

Figure 5 (Ordered Point Cloud Binary Format Saving)

```
# .PCD v0.7 - Point Cloud Data file format
VERSION 0.7
FIELDS x y z rgb
SIZE 4 4 4 4
TYPE F F F U
COUNT 1 1 1 1
WIDTH 76800
HEIGHT 1
VIEWPOINT 0 0 0 1 0 0 0
POINTS 76800
DATA ascii
-0.24865375 -0.19782291 0.23966935 4278190191
-0.22209992 -0.17779312 0.21566229 4278190183
-0.22487123 -0.18113486 0.21998207 4278190183
-0.22513637 -0.18248717 0.22189422 4278190183
-0.22661205 -0.18484397 0.22503482 4278190191
-0.2219449 -0.18218827 0.22207406 4278190183
```

Figure 6 (Unordered Point Cloud ASCII Format Saving)

## 5 Accessing the Camera System

- Connect to the camera's IP address via SSH, using port 22.
  - Taking MobaXterm as an example, assuming the camera's IP is 192.168.100.15 (as shown in Figures 1 and 2).
- Username: user, Password: user, upon successful login, you will see the interface as shown in Figure 3.
- The system comes with the following configurations:

Built-in Configurations	Version
Opencv	4.5.0
Openmpi	4.0.5
Pcl	1.12.1
Vtk	8.1.2

**Note: Please do not modify the built-in system configurations as it may lead to system crashes.**

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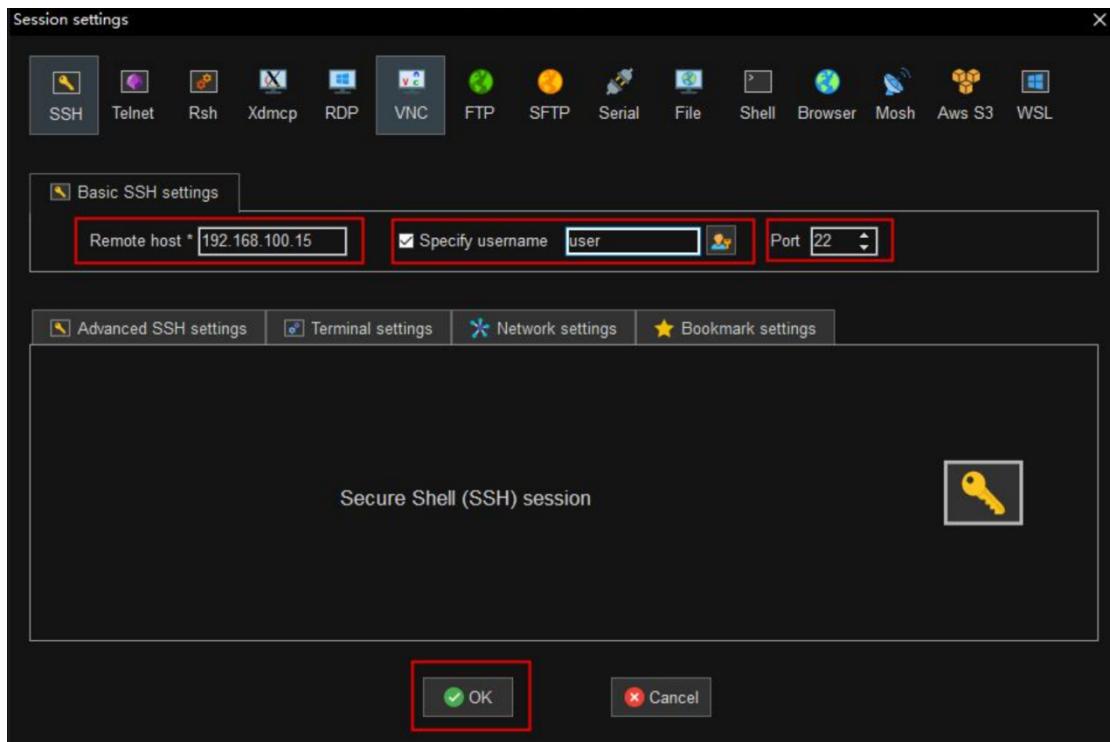


Figure 1

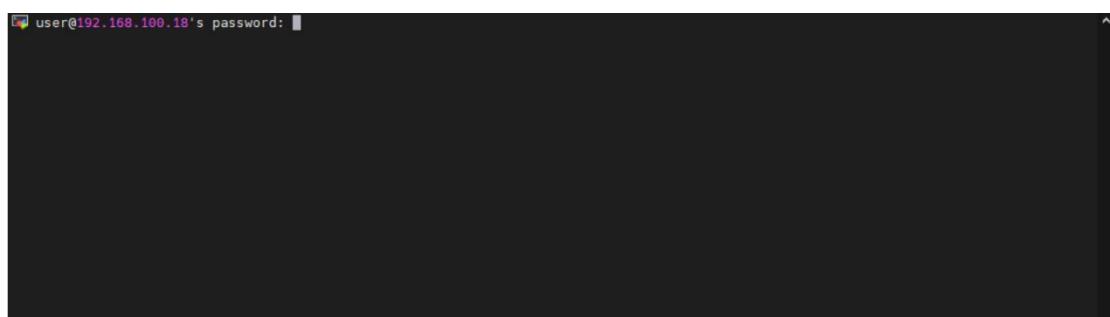
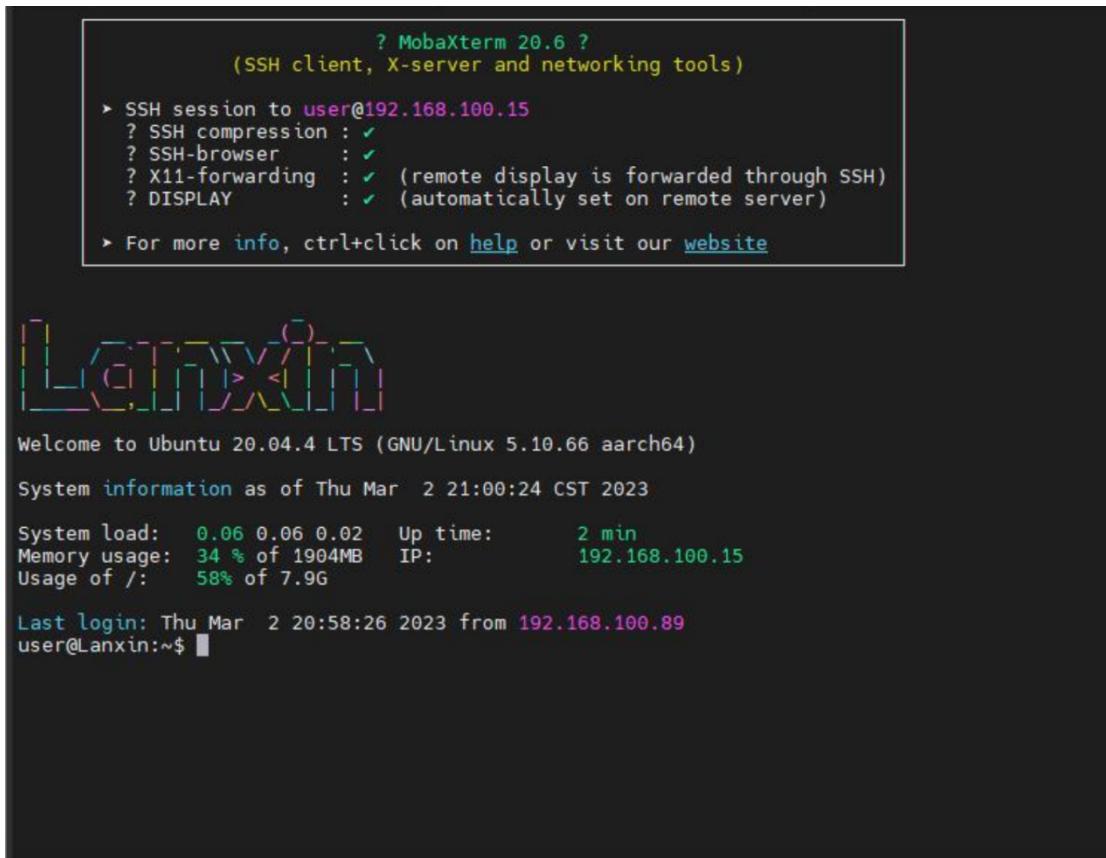


Figure 2

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The screenshot shows a terminal window with the following content:

```
? MobaXterm 20.6 ?
(SSH client, X-server and networking tools)

> SSH session to user@192.168.100.15
? SSH compression : ✓
? SSH-browser : ✓
? X11-forwarding : ✓ (remote display is forwarded through SSH)
? DISPLAY : ✓ (automatically set on remote server)

> For more info, ctrl+click on help or visit our website
```

Below this, there is a colorful ASCII art logo of a person sitting at a keyboard.

```
Welcome to Ubuntu 20.04.4 LTS (GNU/Linux 5.10.66 aarch64)

System information as of Thu Mar  2 21:00:24 CST 2023

System load:  0.06 0.06 0.02   Up time:      2 min
Memory usage: 34 % of 1904MB  IP:          192.168.100.15
Usage of /:   58% of 7.9G

Last login: Thu Mar  2 20:58:26 2023 from 192.168.100.89
user@Lanxin:~$
```

Figure 3

## 6 Frequently Asked Questions and Solutions

Problem Description	Solution
Camera not found	<ul style="list-style-type: none"><li>- Check if the camera power is connected; when the power is on, the blue light on the front of the camera should be on.</li><li>- Check if the IP address and subnet mask are correct.</li><li>- Check if there is any restriction on the upper computer accessing the network.</li></ul>
Can open the camera but streaming fails	Please check if you have opened the upper computer with administrator privileges.

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Image is lagging	<ul style="list-style-type: none"> <li>- Check if the network card, cable, and switch are all gigabit; after enabling RGB alignment, there may be some lag with a hundred-megabit network.&lt;br&gt;- Verify that RGB alignment is not causing the issue.</li> </ul>
Camera frequently reconnects	After restoring factory settings or firmware upgrade, or when opening the camera for the first time in a hundred-megabit network, the camera will perform self-adjustment/restart, lasting about 30 seconds. During this time, the upper computer will keep trying to connect to the camera until the camera stabilizes.
No depth data, no Tof point data	<ul style="list-style-type: none"> <li>- Check if the camera is obstructed</li> <li>- Ensure the subject is within the camera's shooting range.</li> <li>- Verify that the maximum/minimum depth values are correct.</li> <li>- Check if the filtering parameters are correct.</li> </ul>
Tof point disappears, only a white frame is visible	Click on the Tof point image with the mouse and then press the 'm' key.
Tof point display is abnormal	Check if any Tof point shortcut keys have been used.
Camera opens on Linux, but the Tof point is not displayed	Use the mouse to click and drag on the Tof point image to display it.
Application display: VTK loading failed, the Tof point will not be displayed, please check the graphics card configuration and graphics driver	<ul style="list-style-type: none"> <li>- Check if the graphics card configuration is too low.</li> <li>- Verify if the graphics card driver is functioning correctly.</li> <li>- Tof point display requires a graphics card with independent video memory and its driver.</li> </ul>

## 7 Help

### 7.1 About

Click on the top right corner [About], or in the initial software startup information, to view relevant information such as software version, SDK version, etc., as shown in the following figure:



Right-click on the shortcut of this software → Open file location → Go back to the parent directory → You can find all relevant documents in the Document folder, as shown in the following figure:

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