PandarView 1

Point Cloud Visualization Software User Manual

HESAI Wechat

Contents

About This Manual

■ **Using This Manual**

- Make sure to read through this user manual before your first use and follow the instructions herein when you operate the product. Failure to comply with the instructions may result in product damage, property loss, personal injuries, and/or a breach of warranty.
- This user manual does not contain information on product certifications. Please check the certification marks on the product's bottom plate and read through the corresponding certification warnings.
- If you incorporate this LiDAR product into your product(s), you are required to provide this user manual (or the means to access this user manual) to the intended users of your product(s).

■ **Access to This Manual**

To obtain the latest version:

- Visit the Download page of Hesai's official website: https://www.hesaitech.com/en/download
- Or contact your sales representative at Hesai
- Or contact Hesai's technical support team: service@hesaitech.com

■ **Technical Support**

If your question is not addressed in this user manual, please contact us at:

service@hesaitech.com

www.hesaitech.com/zh/support

https://github.com/HesaiTechnology   (Please leave your questions under the corresponding GitHub projects.)

■ **Legends**

⚠ Warnings: instructions that must be followed to ensure safe and proper use of the product.

💡 Notes: additional information that may be helpful.

1 Introduction

PandarView is a software that records and displays point cloud data from Hesai LiDARs, available in:

- 64-bit Windows 10
- Ubuntu 16.04/18.04

This manual describes PandarView 1.7.37 (no cybersecurity) and 1.7.42 (cybersecurity available).

Supported product models:

Pandar40	Pandar128E3X	PandarQT	PandarXT
Pandar40P			PandarXT-16
Pandar64			

2 Installation

Download the installation files from Hesai's official website, or contact technical support: www.hesaitech.com/en/download

System	Installation Files	Installation Steps
Windows	PandarViewX64_Release_V1.x.xx.msi	Before upgrading to a newer version, uninstall the current version
		Double click and install PandarView_Windows using the default settings
Ubuntu-16.04	PandarViewX64_Release_V1.x.xx.tar.gz	Unzip the file and run PandarView_Installer.bin
Ubuntu-18.04	PandarViewX64_18.04_Release_V1.x.xx.tar.gz	

The software interface of 1.7.42 is below. "About" in the menu bar shows the software version.
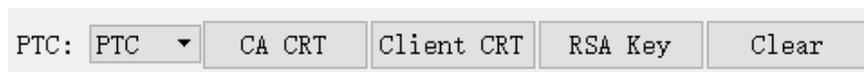
3 Check Live Data

Set the PC's IP address according to Section 2.4 (Get Ready to Use) in the LiDAR user manual.

3.1   Cybersecurity Configuration

For the product models supporting Cybersecurity, the following button group will appear in the toolbar.

Users may select one of the three modes:

■ **TLS Mode**

·   On the Security page of web control (see Section 4.9 - Security), turn ON the Cyber Security Master Switch and select **TLS** for PTC Connection.
·   In PandarView's PTC drop-down menu (see screenshot below), select **PTCS**. Thus PandarView automatically retrieves the LiDAR unit's correction files using PTCS commands.
·   Click the "CA CRT" button (see screenshot below) and specify the file path of Hesai's CA certificate chain (Hesai_Ca_Chain.crt).

■ **mTLS Mode**

· On the Security page of web control, turn ON the Cyber Security Master Switch and select **mTLS** for PTC Connection.

· In PandarView's PTC drop-down menu (see screenshot above), select **PTCS**.

· Click the "CA CRT" button (see screenshot above) and specify the file path of Hesai's CA certificate chain (Hesai_Ca_Chain.crt).

· Click the "Client CRT" button and specify the file path of the user certificate.

· Click the "RSA Key" button and specify the file path of the user's private key.

🔆 The "Clear" button removes the specified file paths for CA CRT, Client CRT, and RSA Key.

■ **Cybersecurity OFF**

· On the Security page of web control, turn OFF the Cyber Security Master Switch.

· In PandarView's PTC drop-down menu (see screenshot below), select **PTC**. Thus PandarView automatically retrieves the LiDAR unit's correction files using PTC commands.

3.2 Receive Live Data

Click ⚡ and select your LiDAR model to begin receiving data over Ethernet.

🔆 While receiving live data, users can export the angle correction file and the firing time correction file, see Section 4.2 (Point Cloud Correction).

3.3 Record Point Cloud Data

Click 🔴 (Record) and specify a file directory. Click "Save" to begin recording a .pcap file.

4 Play Point Cloud Data

4.1   Open a .PCAP File

Click and select a .pcap file to open.

💡   Only support the tcpdump pcap format.

4.2   Point Cloud Correction

PandarView1 supports two types of corrections:

Angle Correction	Correct the LiDAR's azimuth and elevation data. See Section 1.3 (Channel Distribution) in the LiDAR user manual.
Firetime Correction	Correct PandarView's point cloud display according to the firing time of each laser channel.

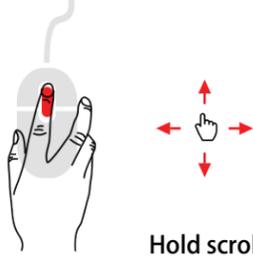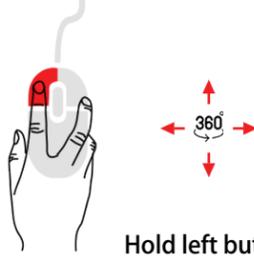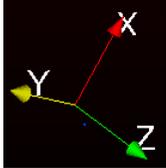|	For Best Performance	When the LiDAR Unit's Correction File Is Not Available Locally
Angle Correction	Menu bar: File --> Import Correction File Select the correction file of this LiDAR unit.	Menu bar: Model --> select your LiDAR model to load the general correction file of this model.
Firetime Correction	Menu bar: File --> Import FireTime File Select the correction file of this LiDAR unit, and click in the toolbar.	N/A

💡   While receiving live data, the correction files of this LiDAR unit can be downloaded: Menu bar: File --> Export Correction/FireTime File

4.3   Play Control

Button	Description					
⏮	Jump to the beginning of the file					
⏪	While paused, jump to the previous frame While playing, rewind. May click again to adjust the rewind speed (2x, 3x, 1/2x, 1/4x, and 1x)	⏪ 2X	⏪ 3X	⏪ 1/2X	⏪ 1/4X	⏪
▶ / ⏸	After loading a point cloud file, click to play the file While playing, click to pause					
⏩	While paused, jump to the next frame. While playing, forward. May click again to adjust the forward speed (2x, 3x, 1/2x, 1/4x, and 1x)	⏩ 2X	⏩ 3X	⏩ 1/2X	⏩ 1/4X	⏩
⏭	Jump to the end of the file					
CSV	Save a single frame to .CSV					
⬤	While playing, this Record button will be gray and unclickable					
🔁	While playing, click to loop playback. Otherwise the player will stop at the end of the file					
✂PCAP	Save multiple frames to .PCAP	Start Frame: 0 End Frame: 408				
✂CSV	Save multiple frames to .CSV	Specify the start and end frames				
[■——— 20]	Drag this progress bar or enter a frame number to jump to a specific frame					

5 Other Features

■ **Mouse Shortcuts**

|			
Scroll the wheel up/down to zoom in/out	Press the wheel and drag to pan the view	Left-Button drag to adjust the point of view	The bottom-left coordinate axes show the current point of view

■ **Standard Viewpoints**

Right   Front   Top

■ **3D Projection and Distance Measurement**

PandarView supports perspective projection (default) and orthographic projection.

The distance ruler is available only under orthographic projection:

· Click on to enter measurement mode. Hold the Ctrl key and drag the mouse to make a measurement in units of meters

· Click on again to quit
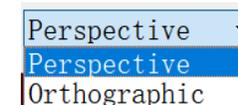
■ **Return Mode**

- Both blocks (default): to show the point cloud data from all blocks
- Even/Odd Block: to show the point cloud data from even/odd-number blocks
- ☼ See the definition of blocks in Section 3.1.2 (Point Cloud UDP Data)

■ **UDP Port**

Enter the UDP port number and click "Set".

■ **View Filter**

To set the polar/rectangular coordinate range for viewing live point cloud data or a .PCAP file.

- Click "Set Filter" to apply the settings.
- Click "Reset Filter" to return to default settings (shown in the screenshot).

- ☼ The filter does not apply to recording and saving .PCAP files.

Return Mode: Both Blocks ▾
Even Block
Odd Block
Both Blocks

UDP Port: 2368 Set

Filter Set
Min Polar Angle:
0.00
Max Polar Angle:
360.00
Min Polar Dist: (m)
0.01
Max Polar Dist: (m)
1000.00
Min X: (m)
−1000.00
Max X: (m)
1000.00
Min Y: (m)
−1000.00
Max Y: (m)
1000.00
Min Z: (m)
−1000.00
Max Z: (m)
1000.00
Set Filter
Reset Filter

■   **Distance Reference Circles**

Click on ◎ to show/hide the 12 distance reference circles. The actual distances are marked below.
To change the color and line width of these circles, click on "Tools" in the menu bar and open "Grid Properties".
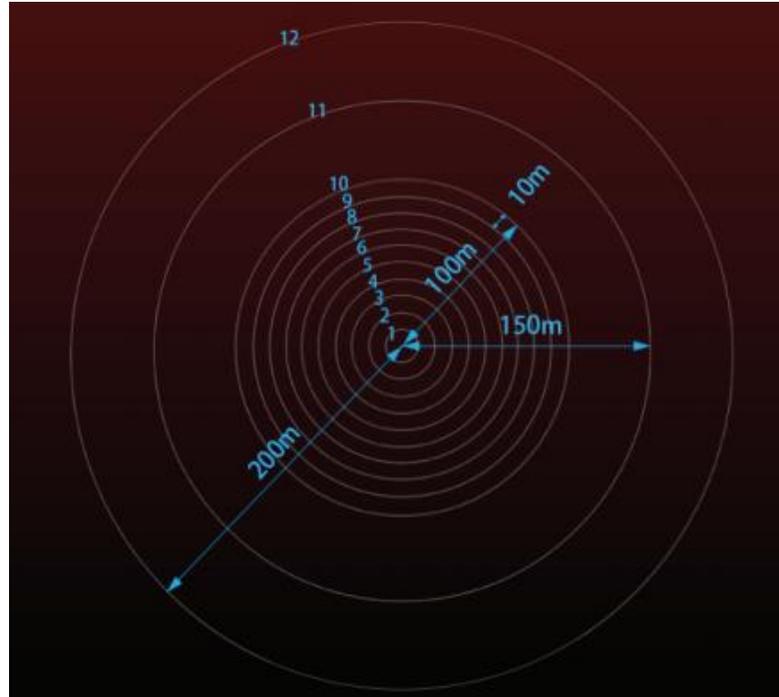
■ Channel Selection

Click on ▤ to open the Channel Selection box.

• Check/Uncheck the boxes on the left to show/hide each channel. By default, the point cloud data from all channels are shown.
• Check/Uncheck the "Enable/Disable all" option at the bottom of the table to show/hide all channels.
• When multiple channels are selected by holding the Shift or Ctrl key, check/uncheck the "Enable/Disable selected" option to show/hide multiple channels.

Click on ▤ again to close the Channel Selection box.

Pandar			✕
	Channel	Elevation	Azimuth
☑	1	14.708	-1.042
☑	2	10.858	-1.042
☑	3	7.885	-1.042
☑	4	4.883	-1.042
☑	5	2.866	-1.042
☑	6	1.854	-1.042
☑	7	1.686	1.042
☑	8	1.514	3.125
☑ Enable/Disable all	☑ Enable/Disable selected		

■ Point Selection and Data Table

Click on 🔲 and drag the mouse over the point cloud to highlight an area of points.

Click on 🔳 to view the data of the highlighted points, as shown below.

	Point ID	Points	azimuth	azimuth_calib	distance_m	elevation	intensity	laser_id	timestamp
	Showing Data ▼ Attribute: Point Data ▼ Precision: 3 ⬍ F 🔲 🔳 {..} 📂								
0	44575	55.724 -26.890 10.465	113.040	115.760	62.752	9.600	6	15	1685230948
1	44615	55.724 -26.890 10.465	113.040	115.760	62.752	9.600	6	15	1685230948
2	44655	55.549 -27.045 10.450	113.240	115.960	62.660	9.600	12	15	1685230948
3	44695	55.549 -27.045 10.450	113.240	115.960	62.660	9.600	12	15	1685230948

Some of the data fields are defined below:

Field	Description
points	The XYZ coordinates of each point
azimuth	Rotor's current reference angle
azimuth_calib	Azimuth + horizontal angle offset

To cancel the selection, click on 🔲 again and click on any place outside the selected point cloud area.
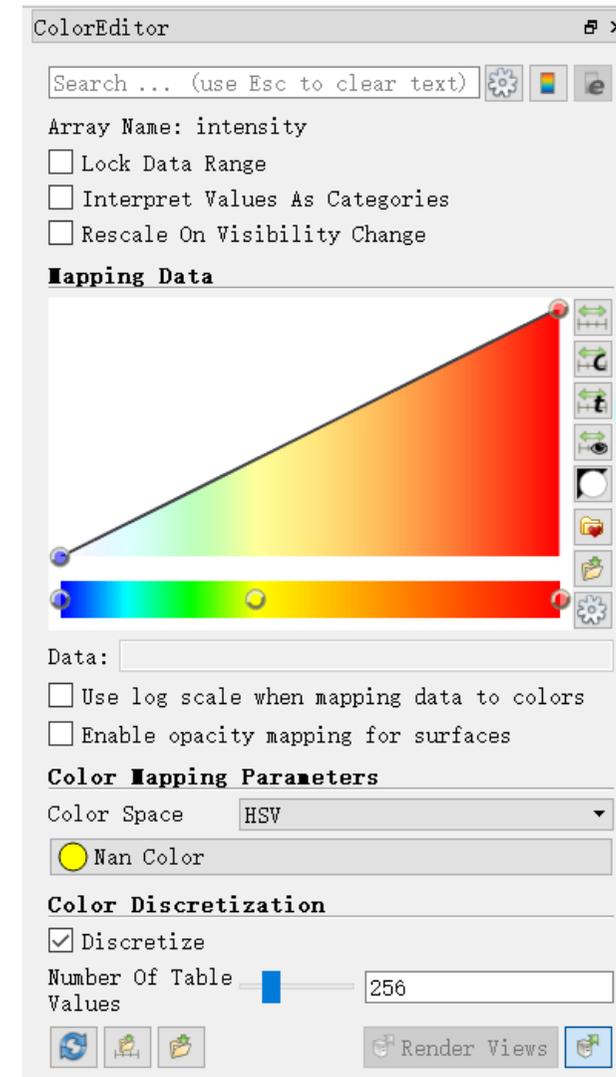
■ **Color Schemes**

Click on ▮ to show the color legend at the lower right corner.   Click on 🎨 to open or close the Color Editor.
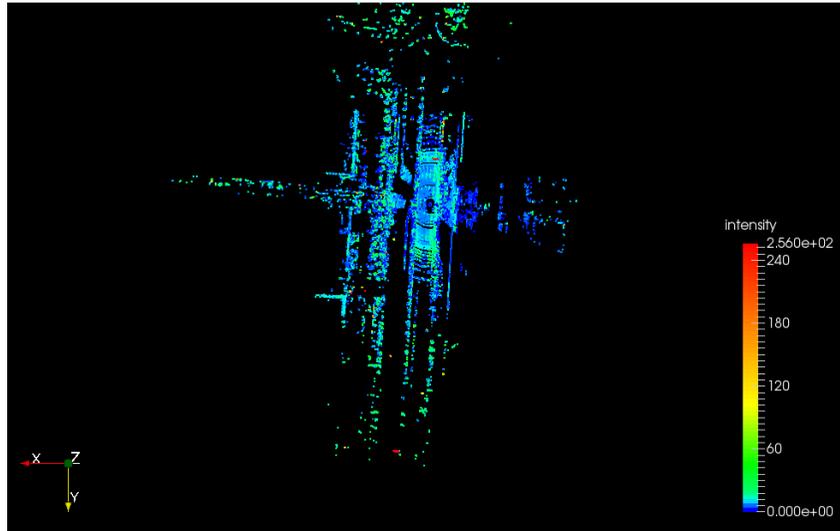
The default color scheme is intensity based. Users can choose from other colors schemes based on azimuth, azimuth_calib, distance, elevation, laser_id, or timestamp.

Appendix I   Legal Notice

Hesai Technology Co., Ltd.

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