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1 Background and Introduction

1.1 Background

Orbbec Viewer is an all-in-one preview and control platform developed by **Orbbec** based on the **Orbbec SDK**, designed to help developers quickly get started with Orbbec 3D cameras.

In software development, an **SDK (Software Development Kit)** is a critical toolkit that allows developers to interact with and control Orbbec cameras.Orbbec initially provided a closed-source SDK — **Orbbec SDK v1** (https://github.com/orbbec/OrbbecSDK) — enabling developers to communicate with and manage Orbbec's 3D vision hardware devices.However, as developer demand for **flexibility**, **customizability**, and **code transparency** increased, many began transitioning from closed-source to open-source SDK solutions.To address this need, Orbbec officially launched its open-source project — **Orbbec SDK v2** (https://github.com/orbbec/OrbbecSDK_v2) — offering a more open, extensible, and developer-friendly platform for Orbbec camera integration.

Since **Orbbec Viewer** is built upon the **Orbbec SDK**, the software is divided into two corresponding versions:

- **Orbbec Viewer v1** — based on **Orbbec SDK v1**
- **Orbbec Viewer v2** — based on **Orbbec SDK v2**

> **Important: All operations and descriptions in this document are based on Orbbec Viewer v2.**

1.2 Introduction

Orbbec Viewer v2 integrates both fundamental and advanced functionalities for Orbbec cameras.

- **Fundamental functions** include data stream toggling, control, and saving.
- **Advanced features** include device connection information, firmware upgrades, preset management, laser control, synchronization configuration, timestamp synchronization, recording and playback, depth post-processing, and point cloud control.

This document explores each feature of Orbbec cameras in **Orbbec Viewer v2** with detailed instructions and examples, helping users master Orbbec cameras efficiently.

2 Platform and Device Compatibility

Before using **Orbbec Viewer v2**, make sure to review the **Platform Support List** and **Device Support List** to verify that your system and camera model are supported.This step ensures normal functionality and optimal compatibility.

3 Overview of Orbbec Viewer v2

3.1 Main Interface

The **Orbbec Viewer v2** main interface is divided into **four sections**:

- Area 1: Device Management Area
- Area 2: Image Preview Area
- Area 3: Log Information Area
- Area 4: Control Panel Area

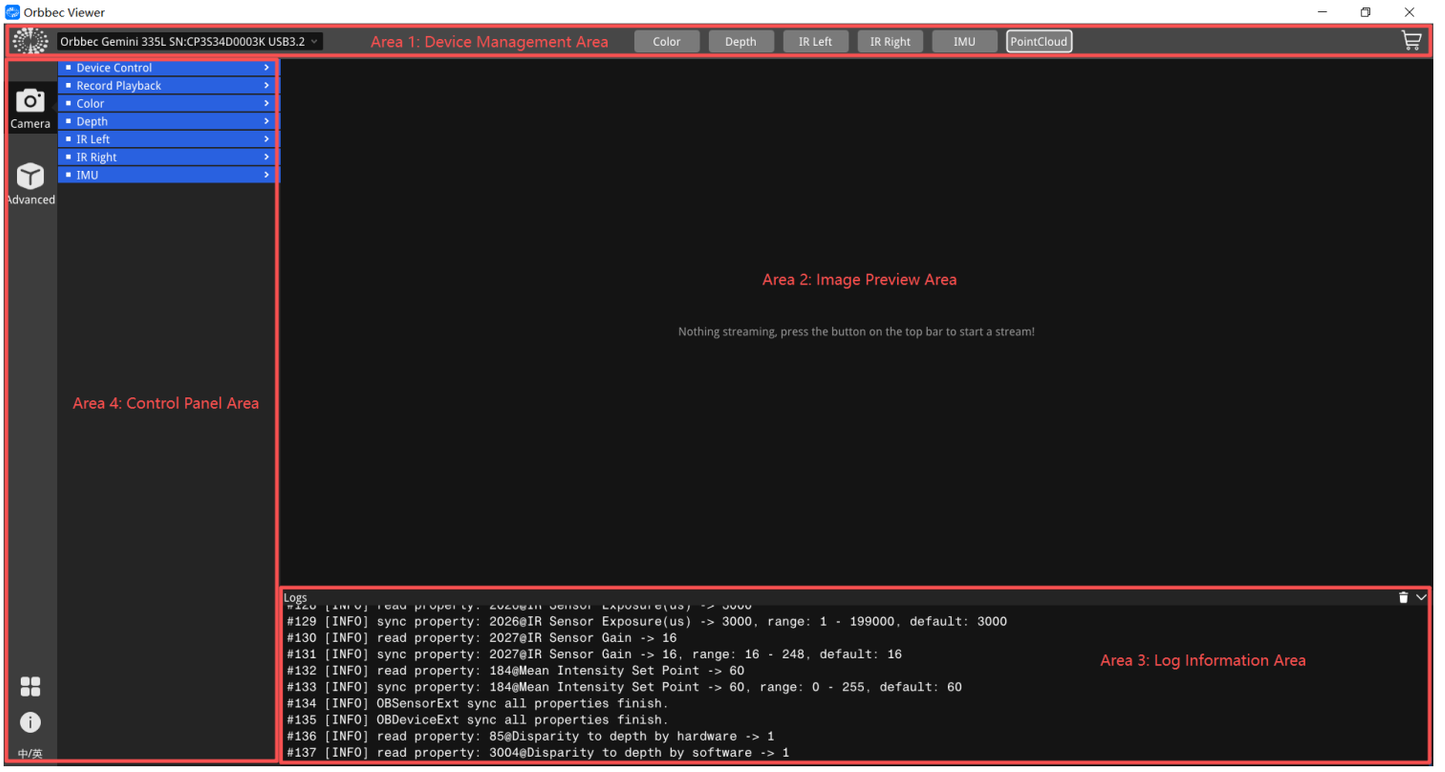


Figure 3-1 Main Interface Layout

Table 3-1 Description of Interface Sections

Area	Name	Description
Area 1	Device Management Area	Displays device connection info, enables/disables data streams, and toggles point cloud visualization.
Area 2	Image Preview Area	Displays real-time image streams, image controls, and metadata lists.
Area 3	Log Information Area	Shows real-time log outputs for monitoring system status.
Area 4	Control Panel Area	Provides access to device info, firmware upgrades, camera parameters, synchronization settings, and recording controls.

3.2 Device Management Area

Located at the top of the main interface, the **Device Management Area** includes several buttons arranged from left to right:Device Connection dropdown, Color Stream, Depth Stream, Infrared (IR Left/Right), IMU, Point Cloud and Store.

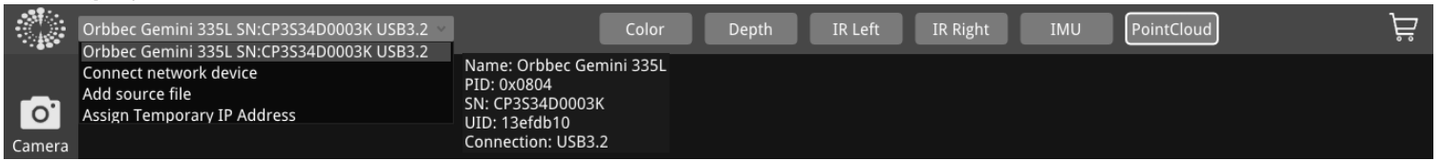
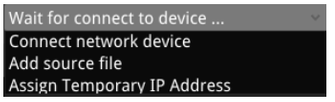


Figure 3-2 Device Management Area

Table 3-2 Functional Description of Device Management Area

Main interface	Icon	Function	Description
Device Connection dropdown		**Wait for connect to device**	Waits for the connection of an Orbbec camera.

			Once connected, it displays the device model, serial number, connection type, PID, and UID.
		Connect network device	Connects to network-based cameras via IP address.
		Add source file	Imports ROS bag files for playback when no device is connected.
		Assign Temporary IP Address	Assign Temporary IP Address
Color		**Color Stream**	Toggles the color data stream on/off.
Depth		**Depth Stream**	Toggles the depth data stream on/off.
Infrared (IR Left/Right)		**Infrared Stream**	Toggles the IR data stream (Left/Right) on/off.
IMU		**IMU Stream**	Toggles the IMU data stream on/off.
Point Cloud		**Point Cloud Stream**	Toggles point cloud visualization on/off.
Store		**Store**	Opens the official Orbbec online store page.

3.3 Image Preview Area

Located in the center of the main interface, the **Image Preview Area** displays real-time image streams once the camera is connected and the respective data streams are enabled.

Users can manipulate each stream window individually:

- Use **Ctrl + Mouse Wheel** to zoom.
- **Left Click** and **Right Click** to pan or rotate (Left = rotate, Right = pan for point cloud).

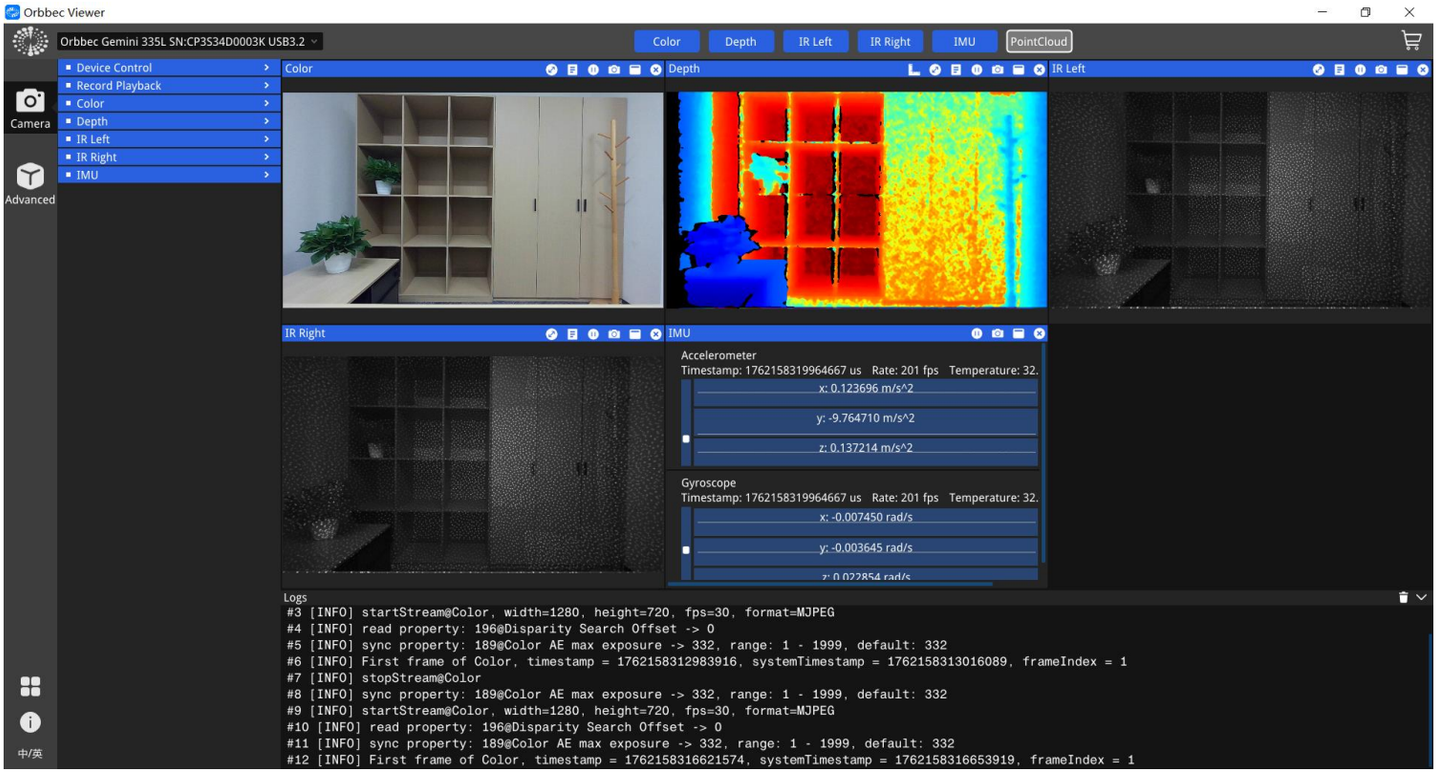


Figure 3-3 Image Preview Area

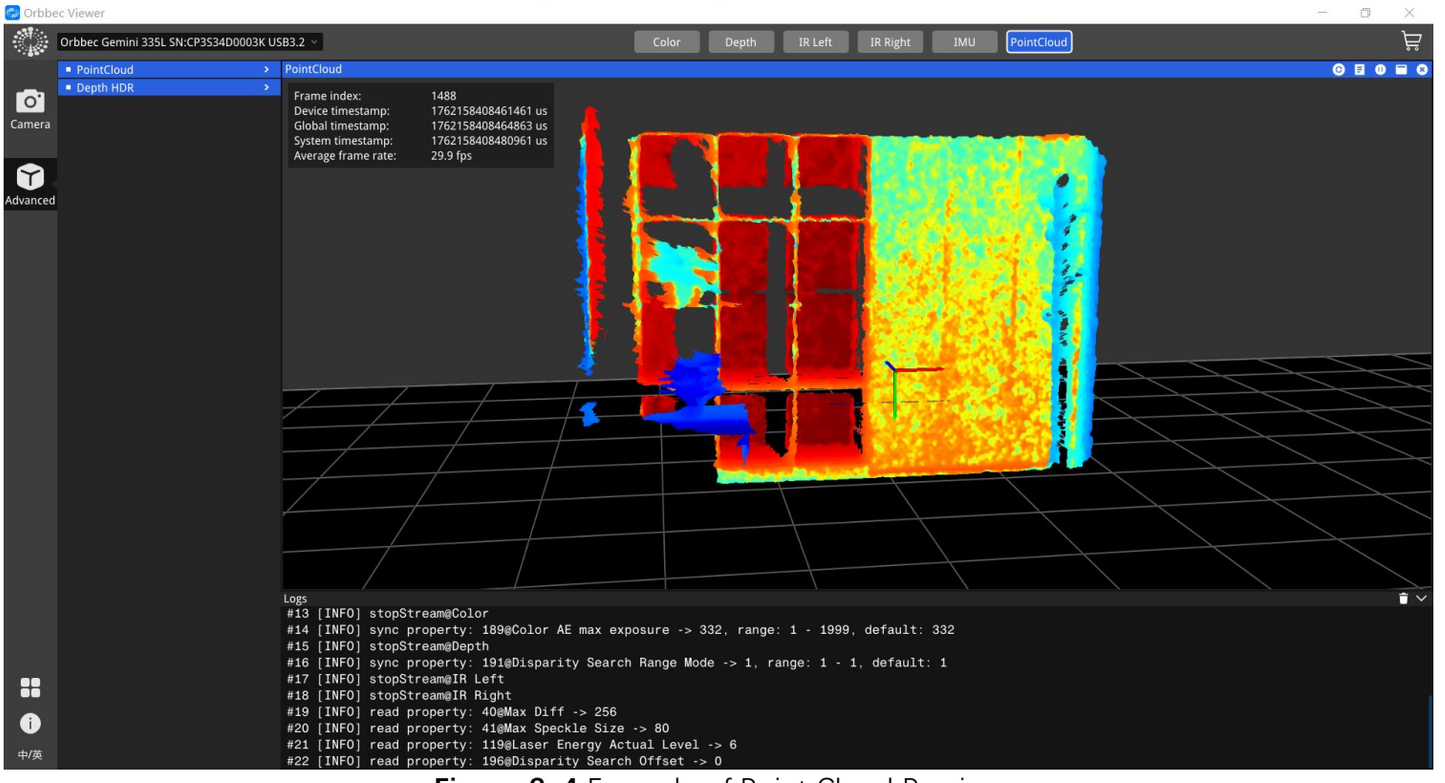


Figure 3-4 Example of Point Cloud Preview

3.3.1 Color Stream Preview Window

Displays the color stream and provides data stream controls. The top-right toolbar includes: **Reset render window**, **Metadata**, **Pause/Resume**, **Save Snapshot**, **Max/Restore Window**, and **Close Stream**.

When clicking on a pixel, the bottom-right corner displays the color values as:(X, Y) = (R1, G1, B1) | (R2, G2, B2) — representing the RGB values at click time and live update respectively.

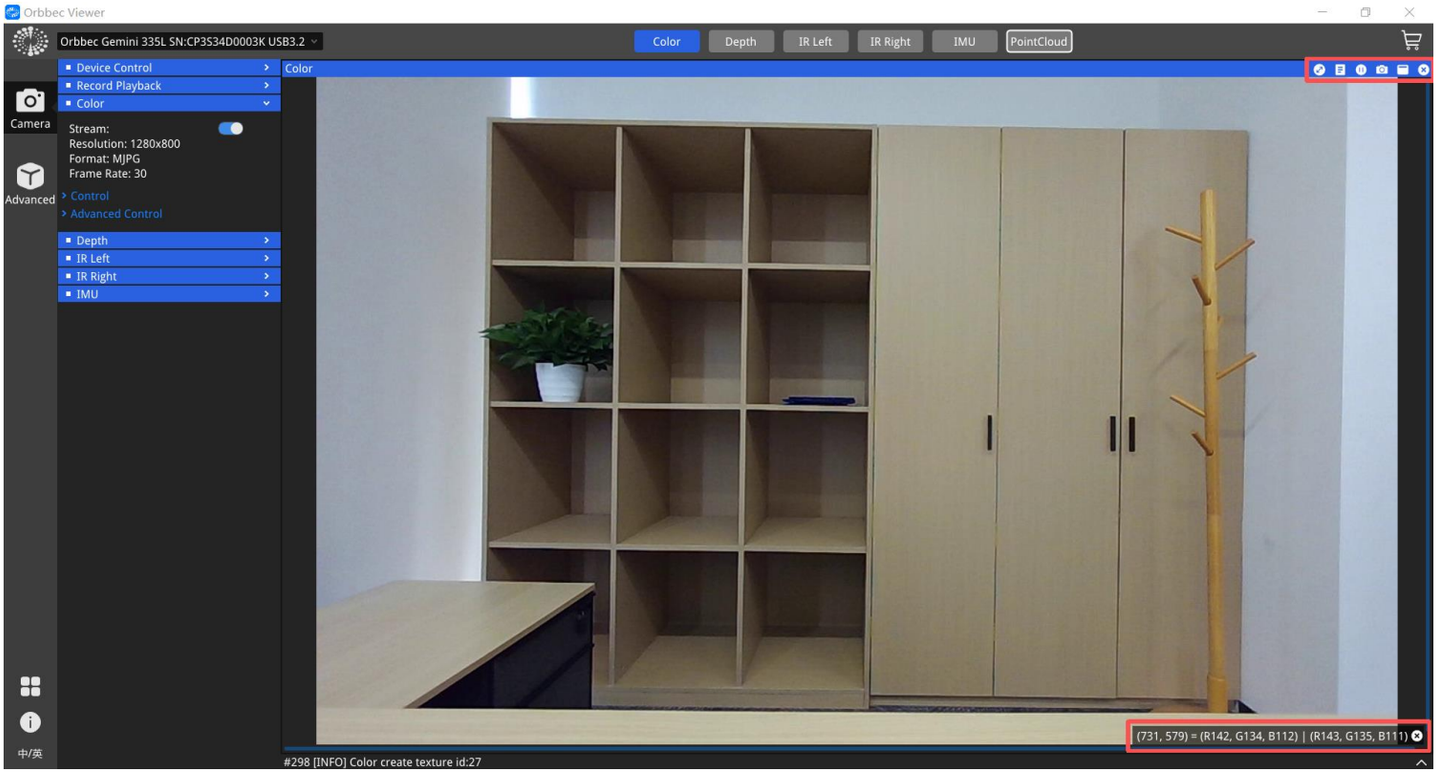


Figure 3-5 Color Stream Preview Window

Table 3-3 Color Stream Control Functions

Function	Icon	Description
Reset render window		Resets or resizes the rendering window.
Metadata		Displays or hides the metadata list (see *Metadata* section for details).
Pause/Resume		Pauses or resumes the data stream.
Save Snapshot		Saves the current frame as a PNG image.
Max/Restore		Maximizes or restores the preview window size.
Close Stream		Closes the current stream and preview window.

3.3.2 Depth Stream Preview Window

Displays the depth map with visual controls. The top-right toolbar includes:**Depth Colorbar**, **Reset render window**, **Metadata**, **Pause/Resume**, **Save Snapshot**, **Max/Restore**, and **Close Stream**.

When clicking on a pixel, the bottom-right displays depth as:(X, Y) = D1 mm, scale: 1.000 | D2 mm, scale: 1.000 — showing the instantaneous and live depth values.

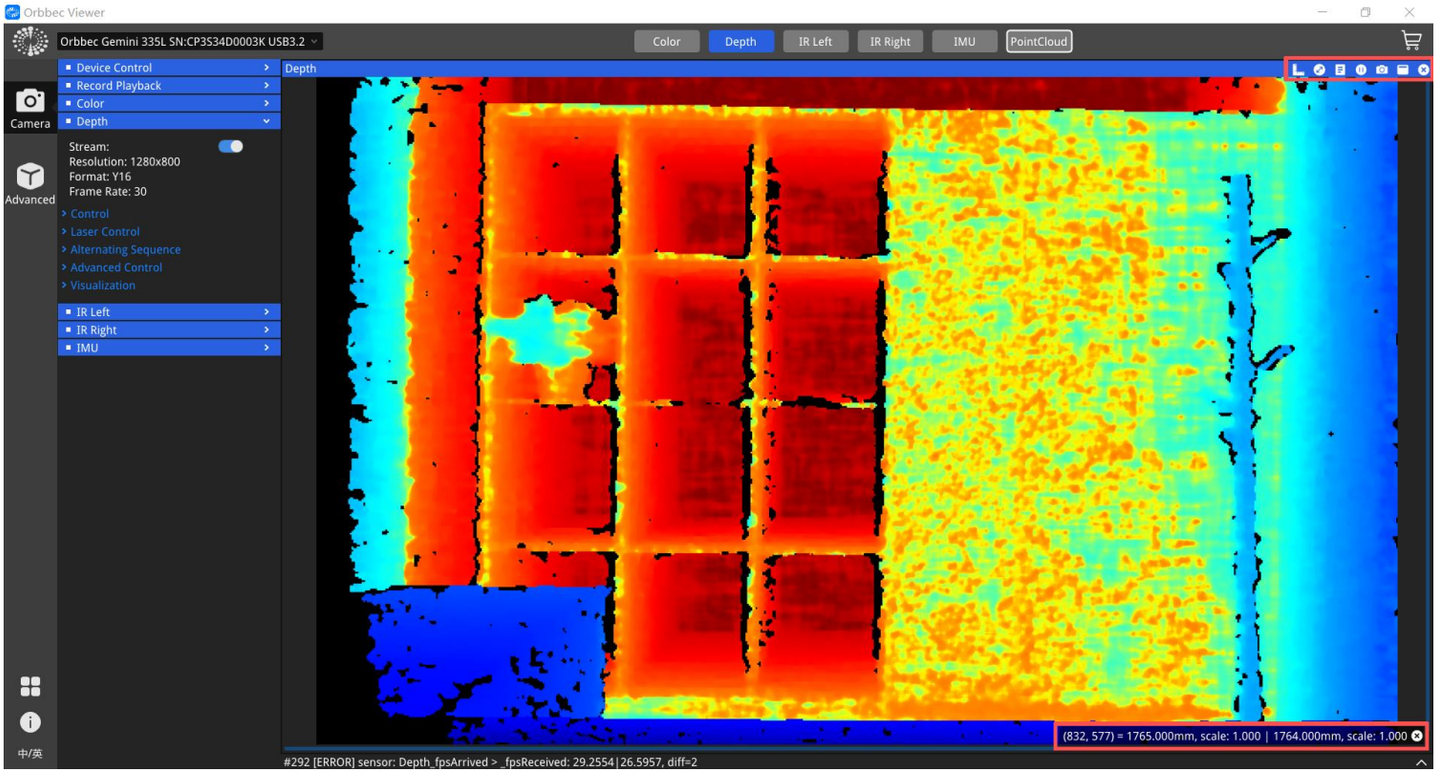


Figure 3-6 Depth Stream Preview Window

Table 3-4 Depth Stream Control Functions

Function	Icon	Description
Depth Colorbar		Displays color mapping for depth distances (shorter values = closer).
Reset render window		Resets or resizes the rendering window.
Metadata		Displays or hides the metadata list (see *Metadata* section for details).
Pause/Resume		Pauses or resumes the data stream.
Save Snapshot		Saves current frame as PNG, RAW, and CSV metadata.
Max/Restore		Maximizes or restores the preview window.
Close Stream		Closes the stream and window.

3.3.3 Infrared Stream Preview Window

The **Infrared Stream Preview Window** displays infrared (IR) data and provides full data stream control.The top-right toolbar includes:**Reset render window**, **Metadata**, **Pause/Resume**, **Save Snapshot**, **Max/Restore**, and **Close Stream**.

When clicking on a pixel, the bottom-right corner shows:(X, Y) = Z1 | Z2, representing the brightness value (0–255) at the clicked point (Z1) and the current real-time value (Z2).

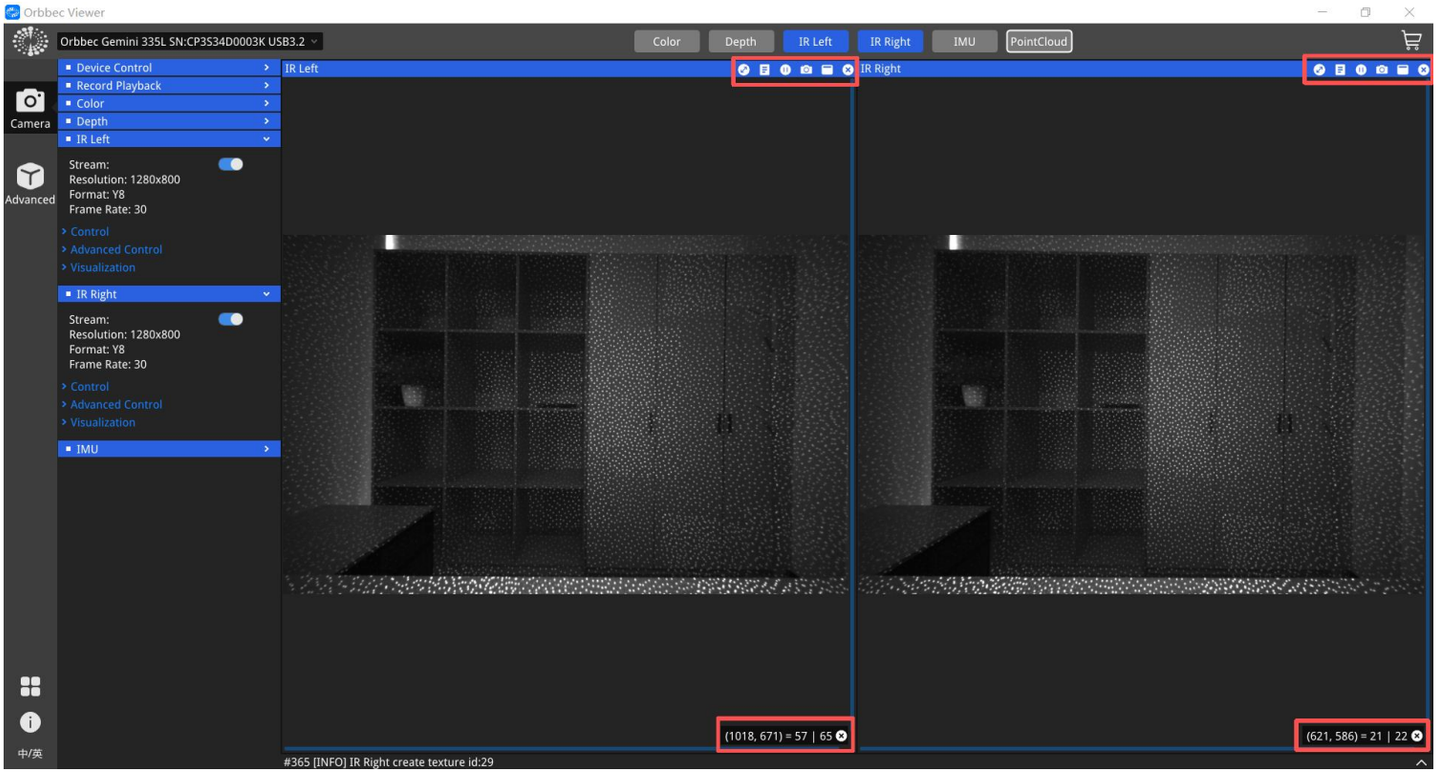


Figure 3-7 Infrared Stream Preview Window

Table 3-5 Infrared Stream Control Functions

Function	Icon	Description
Reset render window		Resets or resizes the rendering window.
Metadata		Displays or hides the metadata list (see *Metadata* section for details).
Pause/Resume		Pauses or resumes the IR data stream.
Save Snapshot		Saves the current frame as a PNG image.
Max/Restore		Maximizes or restores the preview window size.
Close Stream		Closes the current data stream and preview window.

3.3.4 IMU Stream Preview Window

The **IMU (Inertial Measurement Unit) Stream Preview Window** displays real-time waveform data from the accelerometer and gyroscope sensors.The top-right toolbar includes:**Pause/Resume**, **Save Snapshot**, **Max/Restore**, and **Close Stream**.

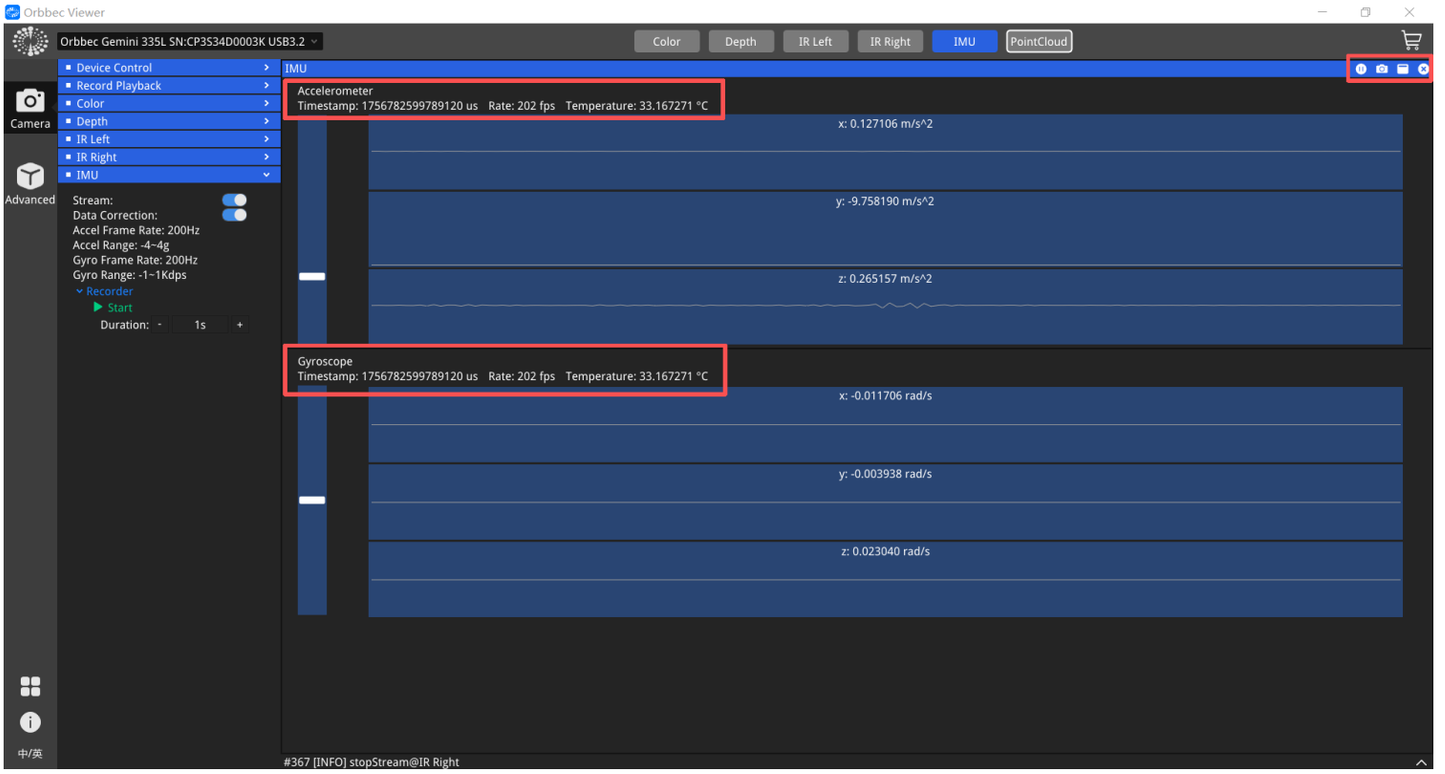


Figure 3-8 IMU Stream Preview Window

Table 3-6 IMU Stream Control Functions

Function	Icon	Description
Pause/Resume		Pauses or resumes the IMU data stream.
Save Snapshot		Saves the current frame's IMU metadata as a CSV file.
Max/Restore		Maximizes or restores the preview window.
Close Stream		Closes the current IMU preview window and stream.

3.3.5 Point Cloud Stream Preview Window

The **Point Cloud Stream Preview Window** provides visualization and control of real-time 3D point cloud data.The top-right toolbar includes:**Reset Point Cloud**, **Metadata**, **Pause/Resume**, **Max/Restore**, and **Close Window**.

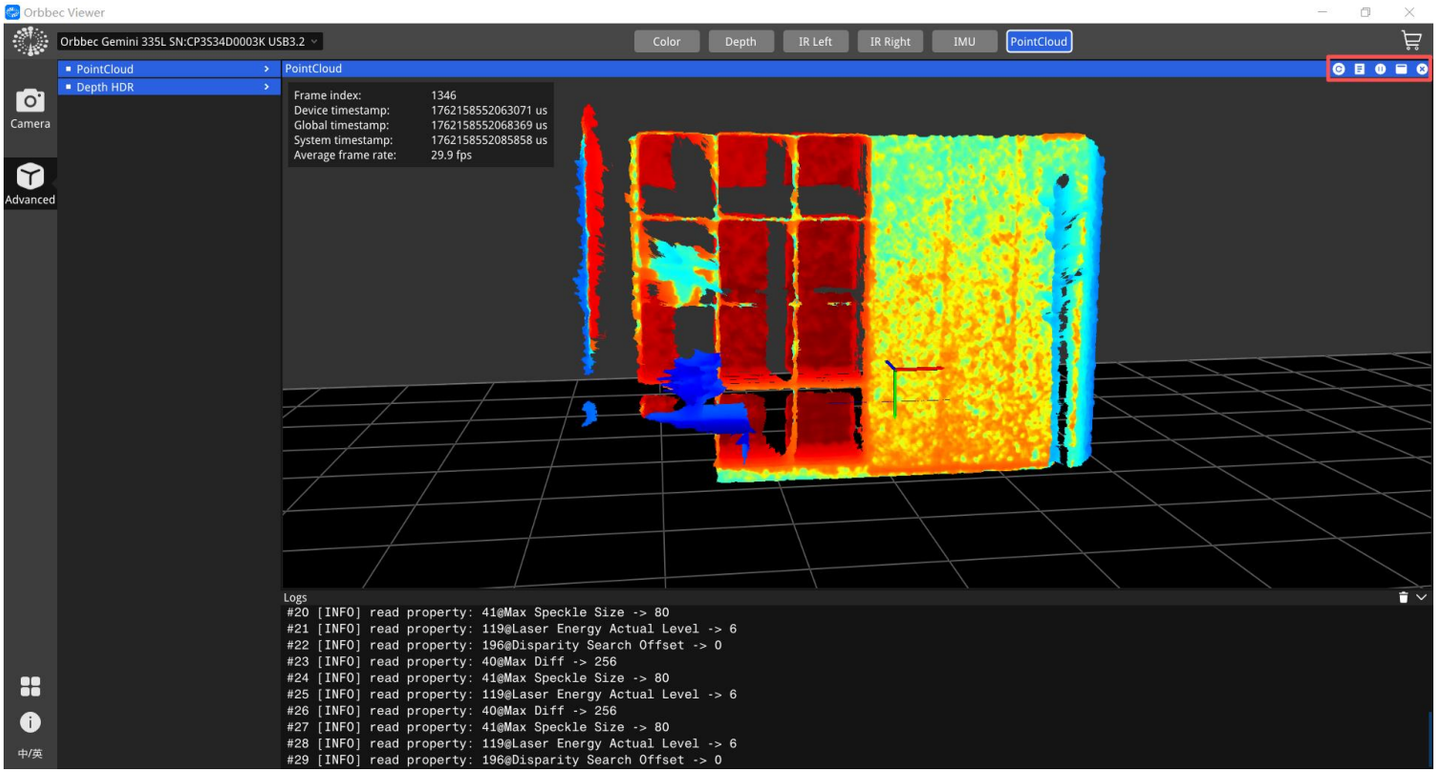


Figure 3-9 Point Cloud Stream Preview Window

Table 3-7 Point Cloud Stream Control Functions

Function	Icon	Description
Reset Point Cloud		Resets the point cloud's position and view.
Metadata		Displays or hides the metadata list (see *Metadata* section for details).
Pause/Resume		Pauses or resumes the point cloud data stream.
Max/Restore		Maximizes or restores the preview window.
Close Window		Closes the preview window (data stream remains active).

3.4 Log Information Area

The **Log Information Area** is located at the bottom of the main interface.It displays runtime log messages, useful for debugging and monitoring the system's status.The top-right corner includes **Clear Logs** and **Collapse/Expand** buttons.

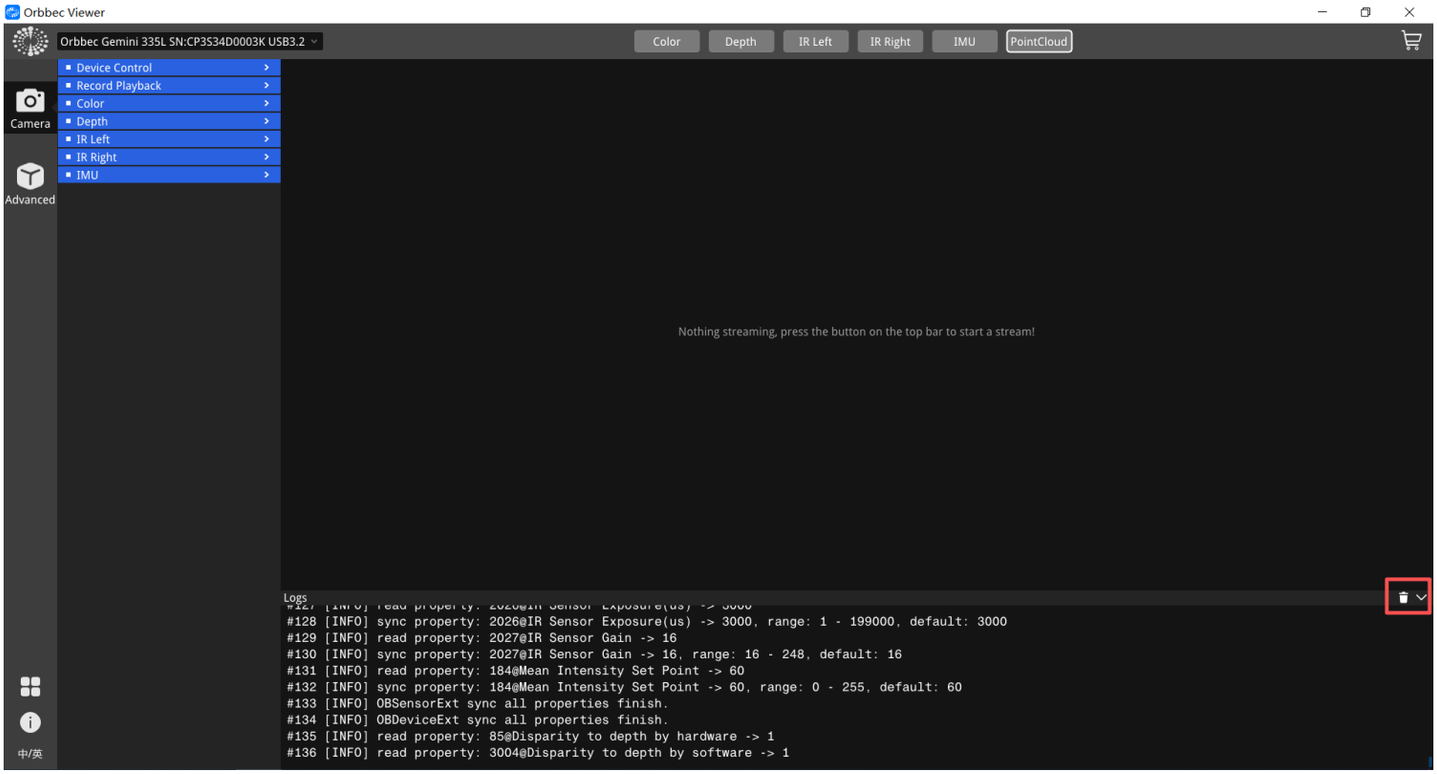


Figure 3-10 Log Information Area

Table 3-8 Log Control Functions

Function	Icon	Description
Clear Logs		Clears all displayed log entries.
Collapse/Expand		Collapses or expands the log display area.

3.5 Control Panel Area

The **Control Panel Area** is located on the left side of the main interface.From bottom to top, the buttons are: **Language Switch (CN/EN)**, **About**, **More**, **Advanced Mode**, and **Camera**.

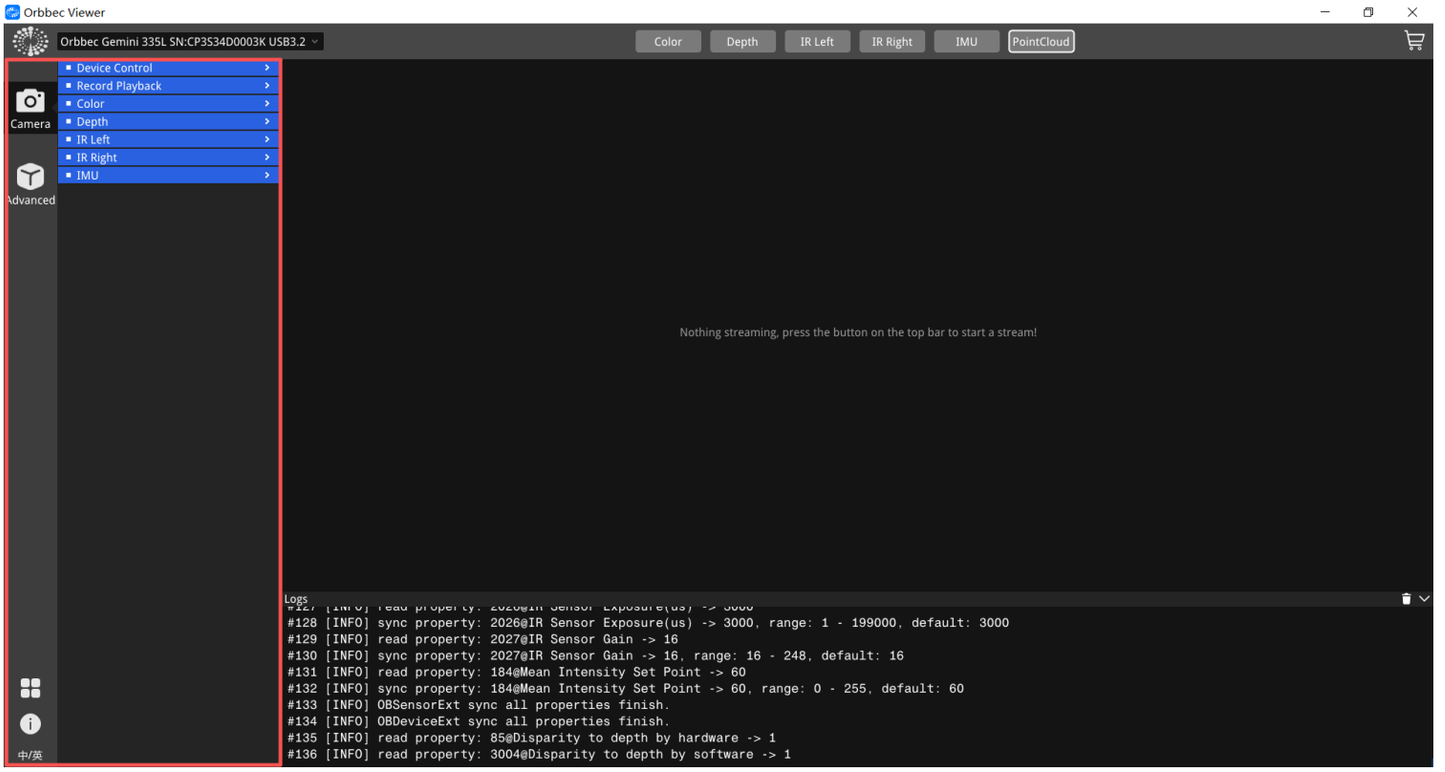


Figure 3-11 Control Panel Area

Table 3-9 Control Panel Control Functions

Main interface	Icon	Description
Language Switch (CN/EN)	中/英	Switches the software display language between Chinese and English.
About		Displays software version, supported platforms, feedback channels, and the official website link.
More		Opens detailed device information and firmware upgrade options.
Advanced Mode	Advanced	Enables access to advanced features such as point cloud control and combined image views.
Camera	Camera	Provides device control, recording and playback, and stream configuration tools.

3.5.1 More Functions Overview

The **More** section provides access to **Device Information** and **Firmware Upgrade** features.
Device information is divided into two sections:

- **Part 1:** Product ID, Firmware Version, Chip Model, SDK Version, Vendor ID, Serial Number, ASIC SN (Application-Specific Integrated Circuit Serial Number), Connection Type, and Log Level (DEBUG, INFO, WARN, ERROR, FATAL).

- **Part 2:** Module Temperature, Extended Information, Device Heartbeat, USB2 Retry Identification, and Device Restart.

The **Module Temperature** section displays temperature data for CPU, Laser (LDM), IR (Left/Right), RGB, and IMU modules.

The **Device Heartbeat** switch allows scheduled connection checks, and **Restart Device** enables manual device reboot.

Firmware Upgrade supports both **online** and **local** update methods.Before upgrading, all data streams must be closed.For details, refer to *Update Firmware*.

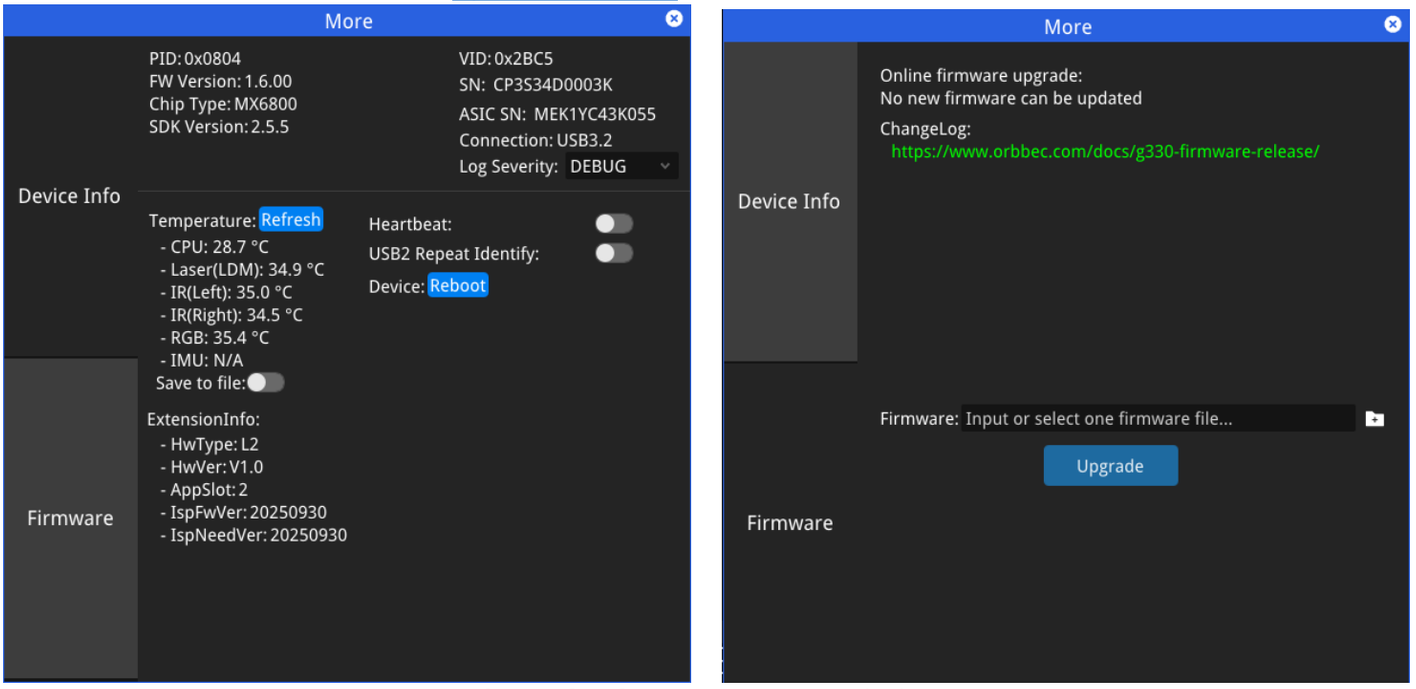


Figure 3-12 More Features Window

3.5.2 Camera

The **Camera** section provides access to core camera operations including device control, recording and playback, and data stream configuration.

Table 3-10 Camera Functions

Interface	Function Name	Description
Device Control	**Depth Preset Configuration**	Select a specific depth mode. For details, see *Use Depth Presets*.
	Depth Preset Update	Update optional depth presets. See *Update Optional Depth Preset*.
	Intra-Camera Sync Reference	In trigger mode, exposure alignment can be configured
	Synchronization Configuration	Configure frame synchronization (Color and Depth) or multi-camera synchronization. See *Set up cameras for external synchronization*.
	Software Trigger Control	Configure automatic or manual triggering.
	Timestamp Synchronization	Synchronize timestamps across all data streams.

	Timestamp Reset	Reset all Device timestamps.
Recording and Playback	**Recording**	Record data into a ROS bag (.bag) file.
	Playback	Replay recorded ROS bag files.
Color	**Color Stream Configuration**	Configure stream toggle, resolution, format, and frame rate.
	Control	Configure key parameters: exposure priority, auto-exposure, AE max exposure time, AE ROI coordinates, exposure, gain, brightness, auto white balance, white balance, sharpness, gamma, saturation, contrast, hue, backlight compensation, and power line frequency.
	Advanced Control	Enable post-processing options such as downsampling filters.
Depth	**Depth Stream Configuration**	Configure stream toggle, resolution, format, and frame rate.
	Control	Configure mirroring, flipping, rotation, exposure, AE control, target brightness, AE ROI, exposure gain, depth units, and baseline length.
	Laser Control	Control LDM and LRM laser modules.
	Alternating Sequence Mode	Configure HDR or laser alternating modes.
	Advanced Control	Configure depth engine and post-processing modules (see *Use Depth Post-Processing Blocks*).
	Rendering Configuration	Adjust color mapping mode, histogram equalization, minimum/maximum visual range, and preprocessing filters.
Infrared	**IR Stream Configuration**	Configure IR stream toggle, resolution, format, and frame rate.
	Control	Configure mirror, flip, rotation, auto-exposure, AE max exposure, brightness preset, exposure, and gain.
	Advanced Control	Enable frame sequence filtering.
	Rendering Configuration	Configure color mapping and range display.
IMU (Inertial Measurement Unit)	**IMU Configuration**	Configure stream toggle, calibration,

		accelerometer/gyroscope sampling rate and range.
	Recording	Configure IMU data recording toggle and duration.

3.5.3 Advanced Mode

The **Advanced Mode** provides extended functionalities such as **Point Cloud Stream Configuration**, **Image View**, and **Point Cloud View**.

Table 3-11 Advanced Mode Functions

Interface	Function Name	Description
Point Cloud Stream	**Point Cloud Configuration**	Configure the point cloud stream, alignment mode, enable color/depth streams, synchronize frames, and export camera parameters.
Image View	**Image View Configuration**	Display D2C preview, overlay depth and color alignment view, set transparency, and save combined data.
Point Cloud View	**Point Cloud View Configuration**	Configure 3D point cloud rendering, style, rendering type, point size, and data saving.
Depth HDR	**Depth HDR Configuration**	Perform HDR fusion in the Depth from HDR alternating frame mode.

4 Download and Installation

4.1 Download

You can download the latest version of **Orbbec Viewer v2** from the official Orbbec repositories:

- **GitHub:** OrbbecSDK_v2 Releases
- **Gitee:** OrbbecSDK_v2 Releases

Select the package that matches your platform.

For example, choose the `.exe` installer for **Windows 10 x64**, or the Linux zip package for Ubuntu.

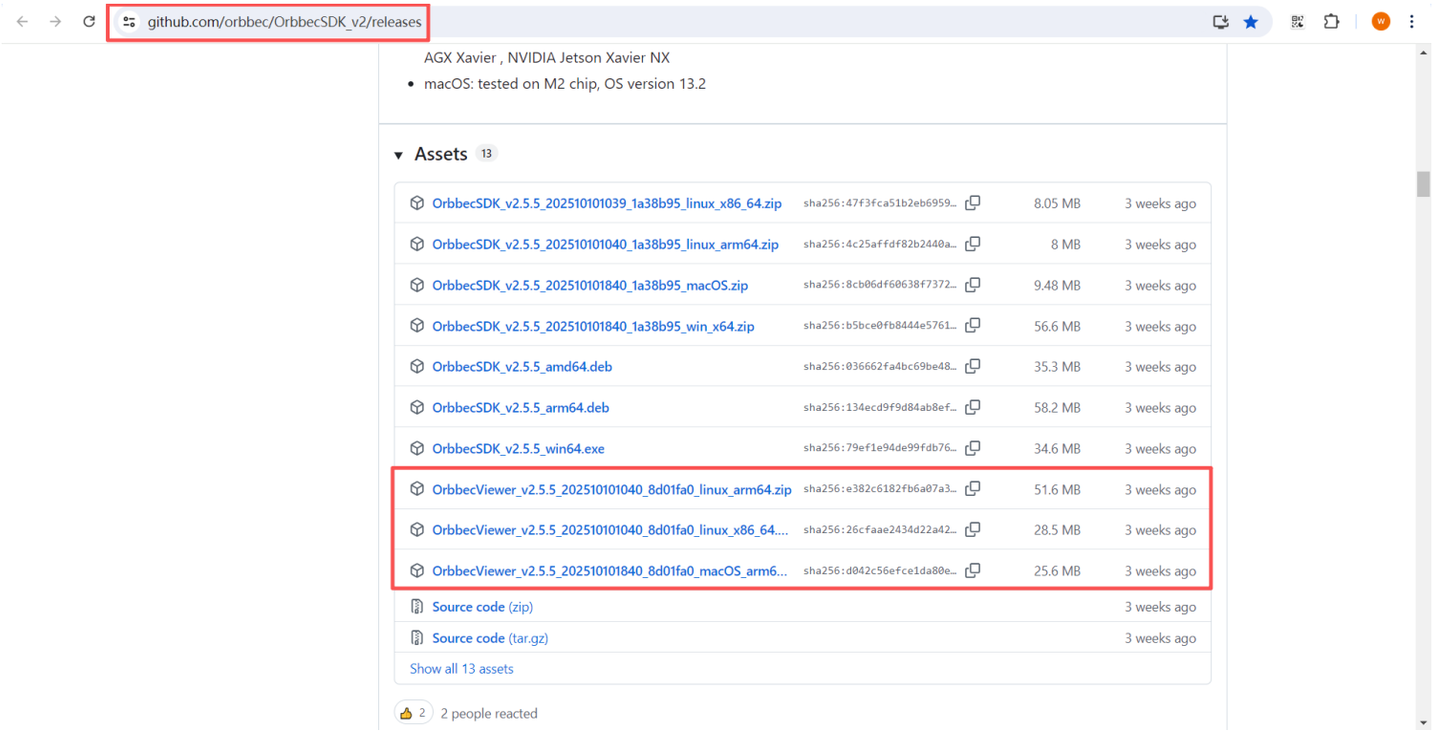


Figure 4-1 Example of downloading *OrbbecViewer_v2.5.5* from GitHub release page.

4.2 Installation

After downloading, simply extract the package to a desired directory — no additional installation is required.The folder contains the **Orbbec Viewer v2** executable file.

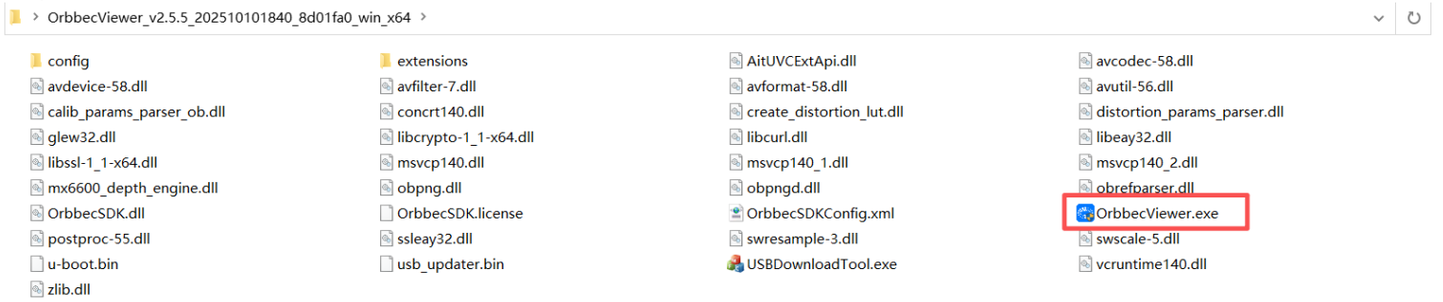


Figure 4-2 Windows Platform Extraction Example

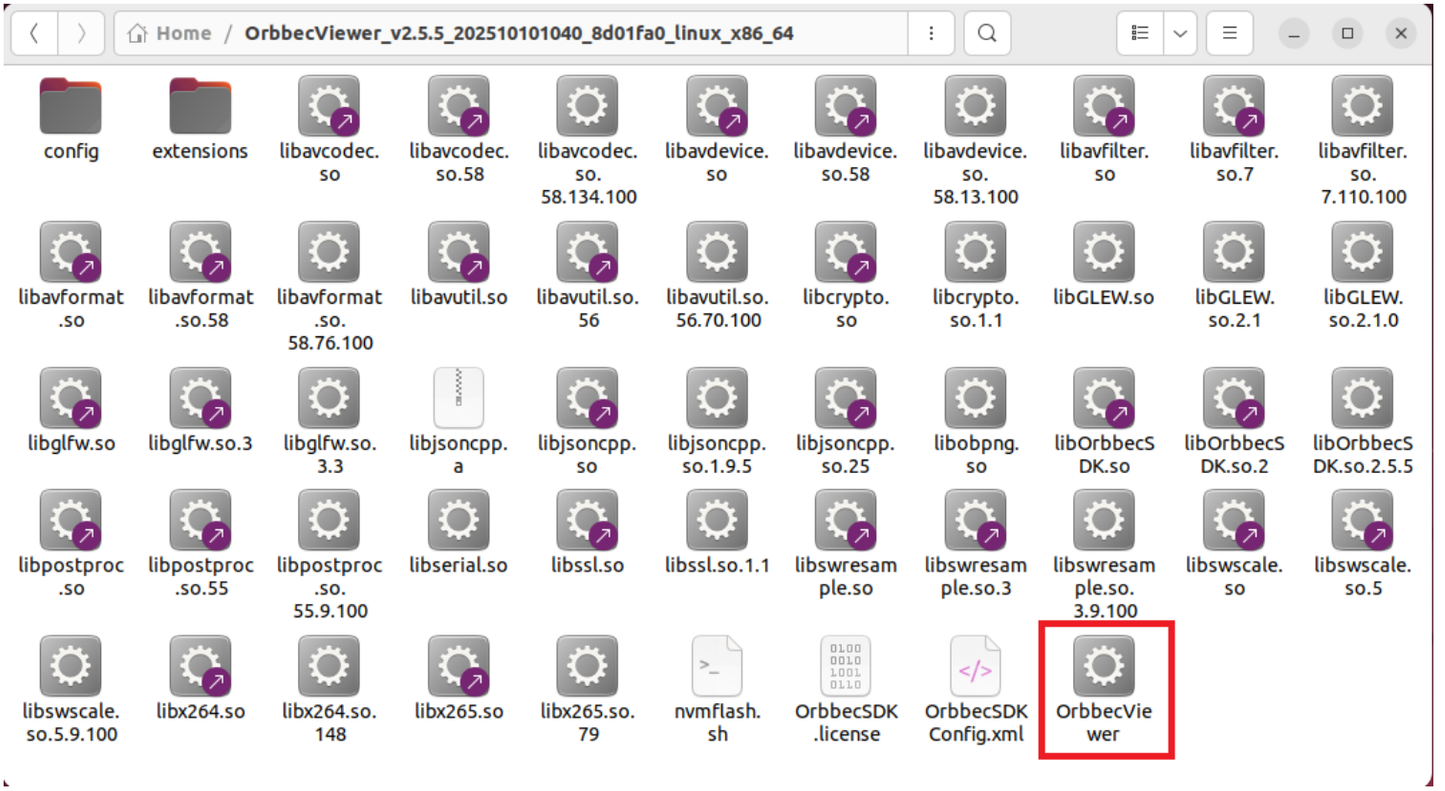


Figure 4-3 Linux Platform Extraction Example

5 Quick Start

Orbbec cameras primarily support **three interface types**: **USB**, **Ethernet**, and **GMSL**.

Table 5-1 Interface Types and Quick Start References

Interface Type	Camera Models	Reference Guide
USB	Gemini 335, 335L, 336, 336L, 335Lg, Femto Bolt, Femto Mega, Gemini 2 Series, Astra Series	Gemini 330 Series Quick Start Guide
Ethernet	Gemini 435Le, 335Le, Femto Mega, Femto Mega I	Gemini 335Le Quick Start Guide
GMSL	Gemini 335Lg	Gemini 335Lg Quick Start Guide

5.1 Quick Start on Windows (USB Interface)

5.1.1 Connect Device and Verify

Connect the Orbbec camera to your system using a USB cable.No driver installation is required.Press **Win + R**, type cmd, and run the command:

```
devmgmt.msc
```

to open **Device Manager**, then check under “Cameras” for the connected Orbbec device.

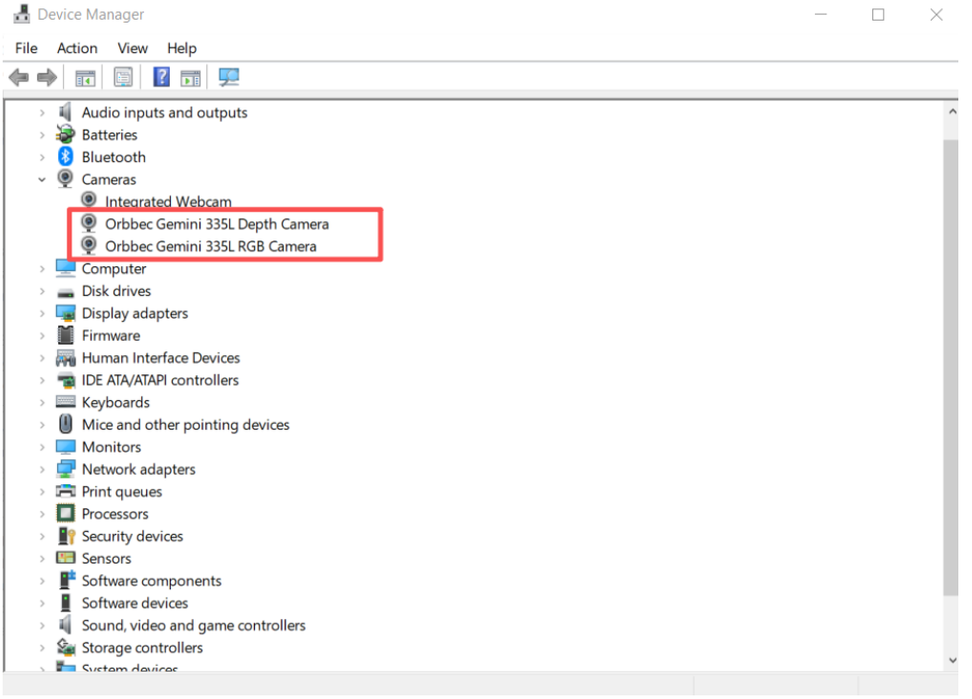


Figure 5-1 Orbbec Device in Windows Device Manager

5.1.2 Launch Software

Navigate to the extracted folder and double-click **OrbbecViewer.exe** to launch the software.

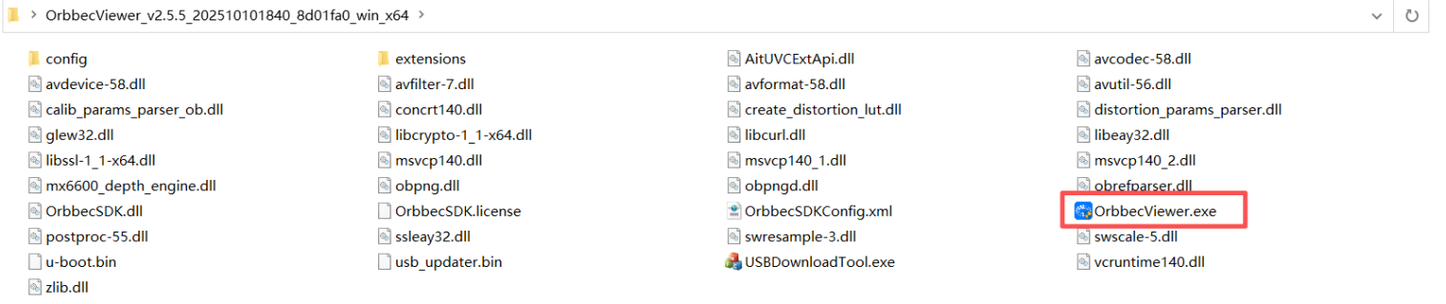


Figure 5-2 Software Folder

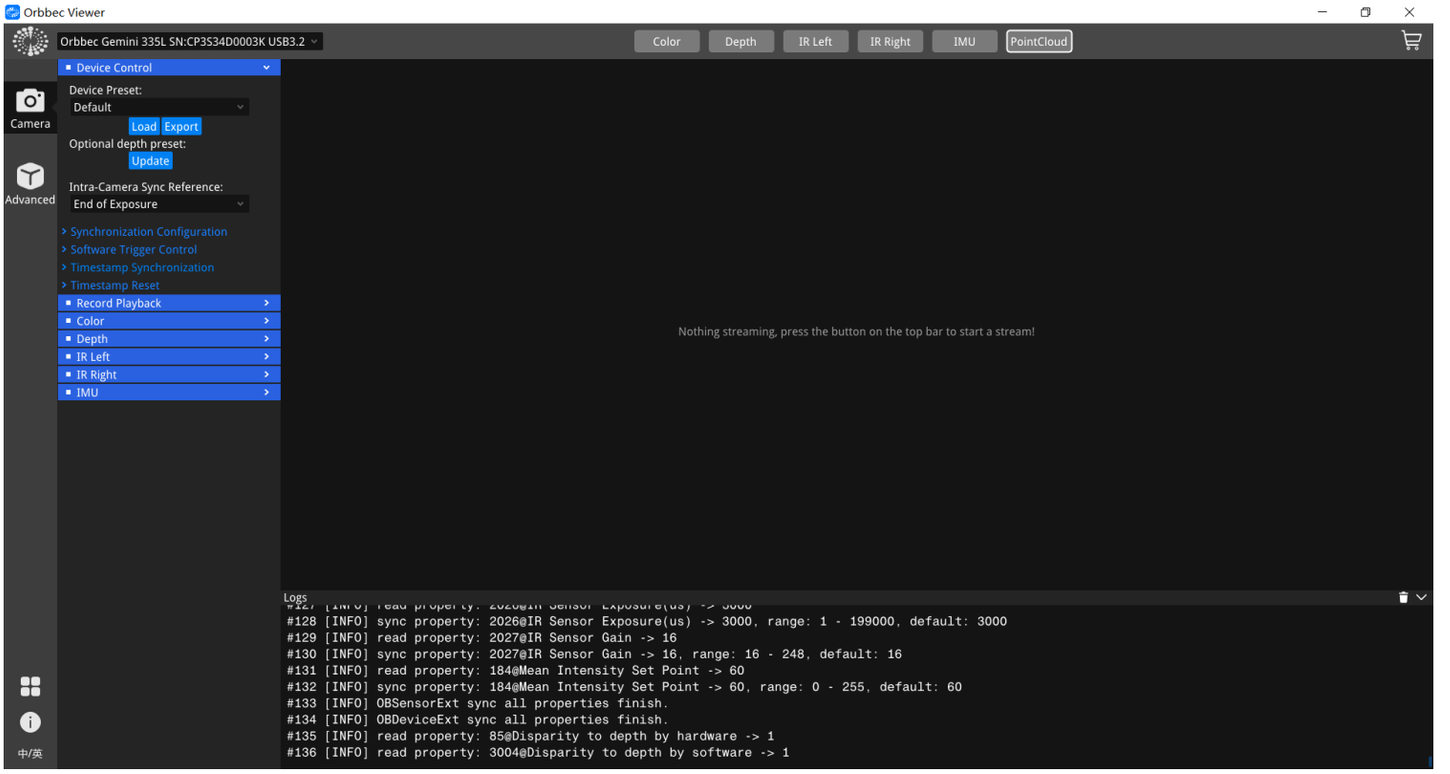


Figure 5-3 Launching Orbbec Viewer v2

5.1.3 Preview Streams

In the Device Management Area, enable desired data streams — **Color**, **Depth**, **IR Left/Right**, **IMU**, or **Point Cloud**.

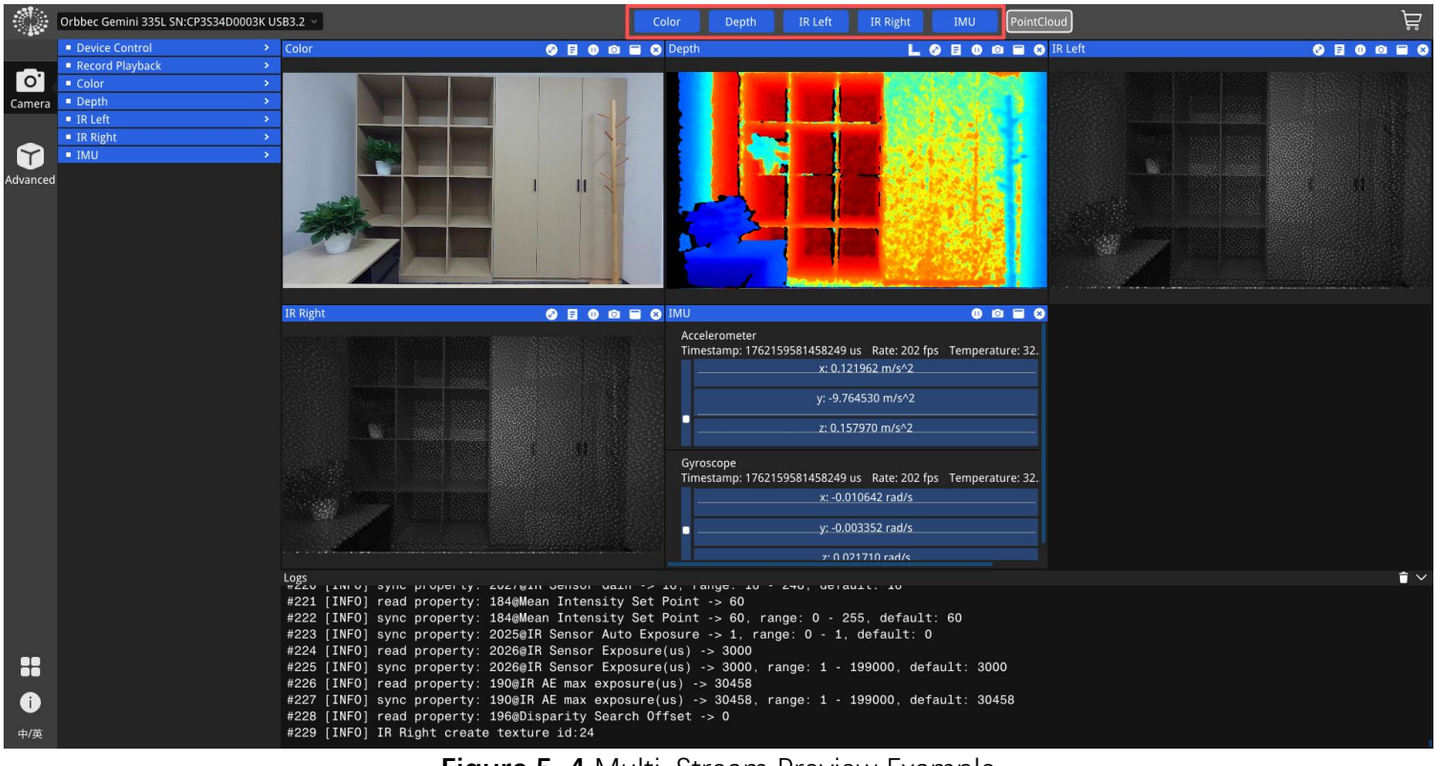


Figure 5-4 Multi-Stream Preview Example

5.2 Quick Start on Linux (USB Interface)

5.2.1 Connect Device and Verify

Connect the Orbbec camera via USB (no driver required).In terminal, list USB devices using:

```
lsusb
```

Figure 5-5 Viewing USB Devices in Terminal

5.2.2 Launch Software

Navigate to the extracted directory and run:

```
cd OrbbecViewer_v2.5.5_202510101040_8d01fa0_linux_x86_64/
sudo ./OrbbecViewer
```

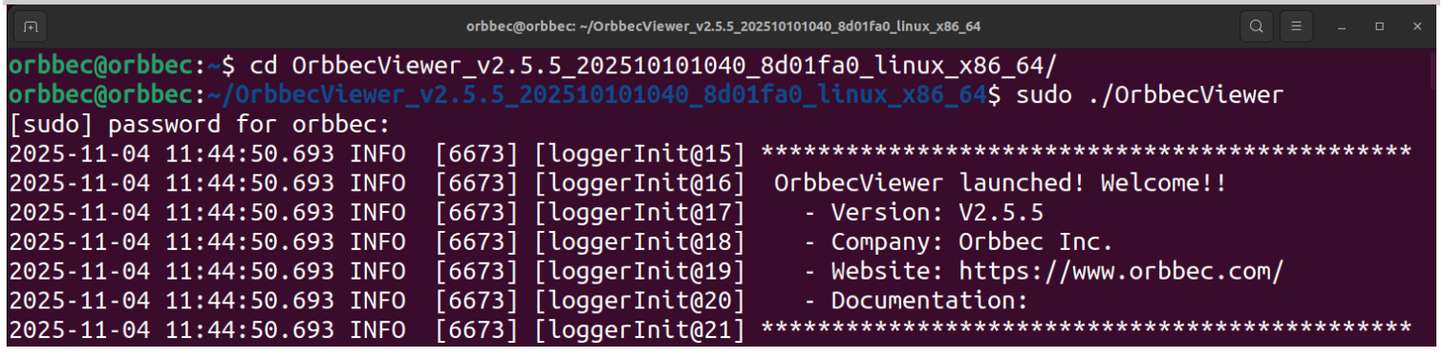


Figure 5-6 Launch Command

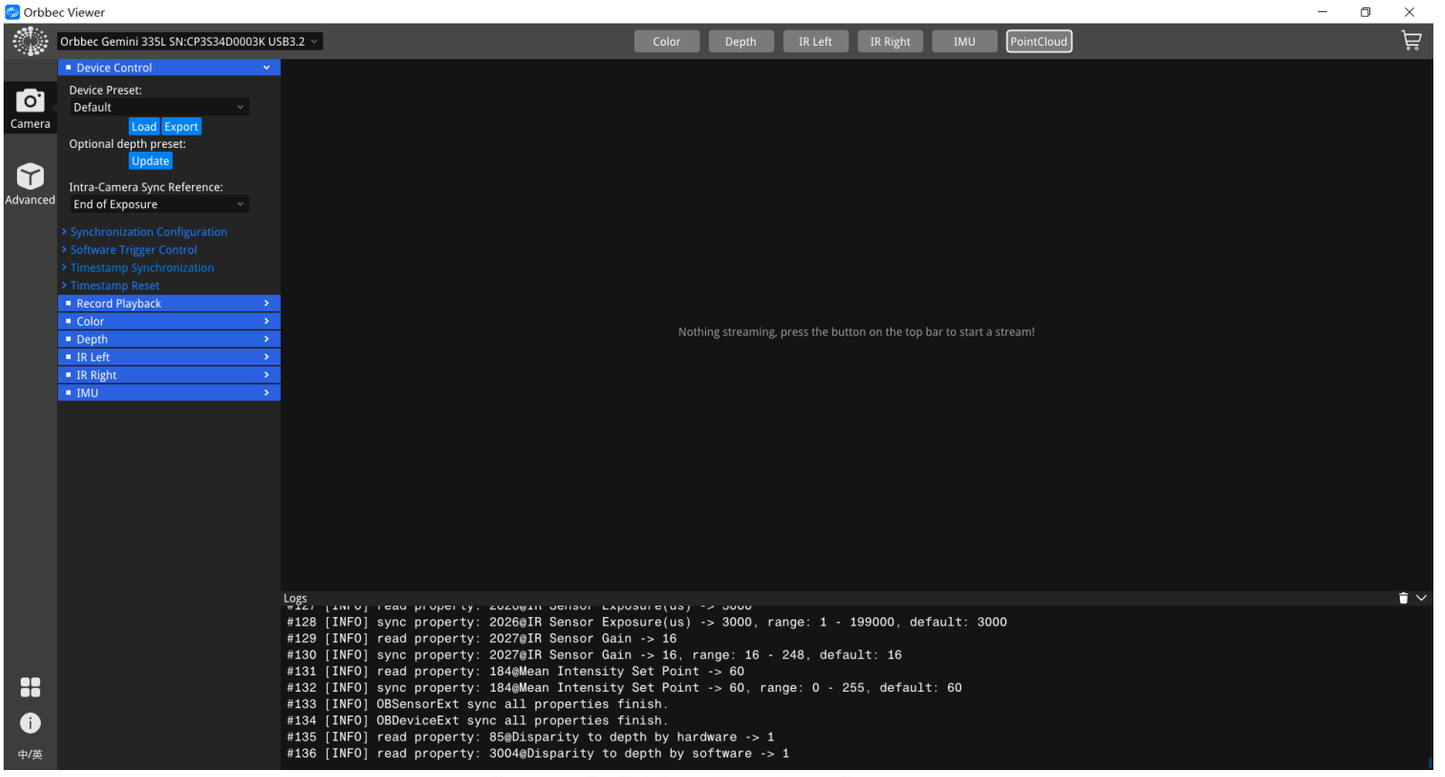


Figure 5-7 Main Interface Example

5.2.3 Preview Streams

In the Device Management Area, enable desired streams (Color, Depth, IR Left/Right, IMU, or Point Cloud).

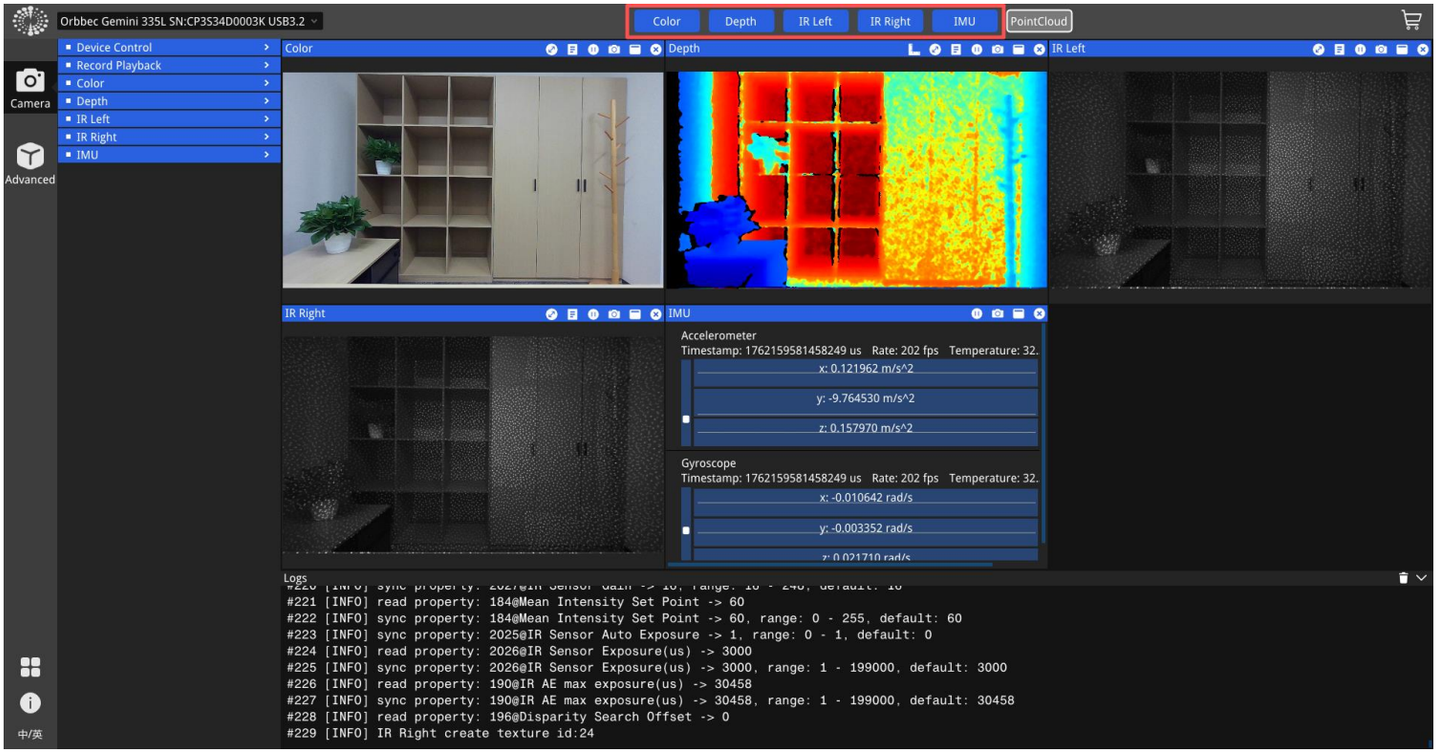


Figure 5-8 Multi-Stream Preview Example

6 Exploring Basic Camera Functions

6.1 Viewing Device Information

1) Follow the steps in Section 5 – Quick Start to connect your Orbbec camera and launch the software. No data stream needs to be enabled yet.
2) In the **Device Management** area, the “Device Connection” dropdown displays current connection information, including the device model, serial number (SN), and connection type.

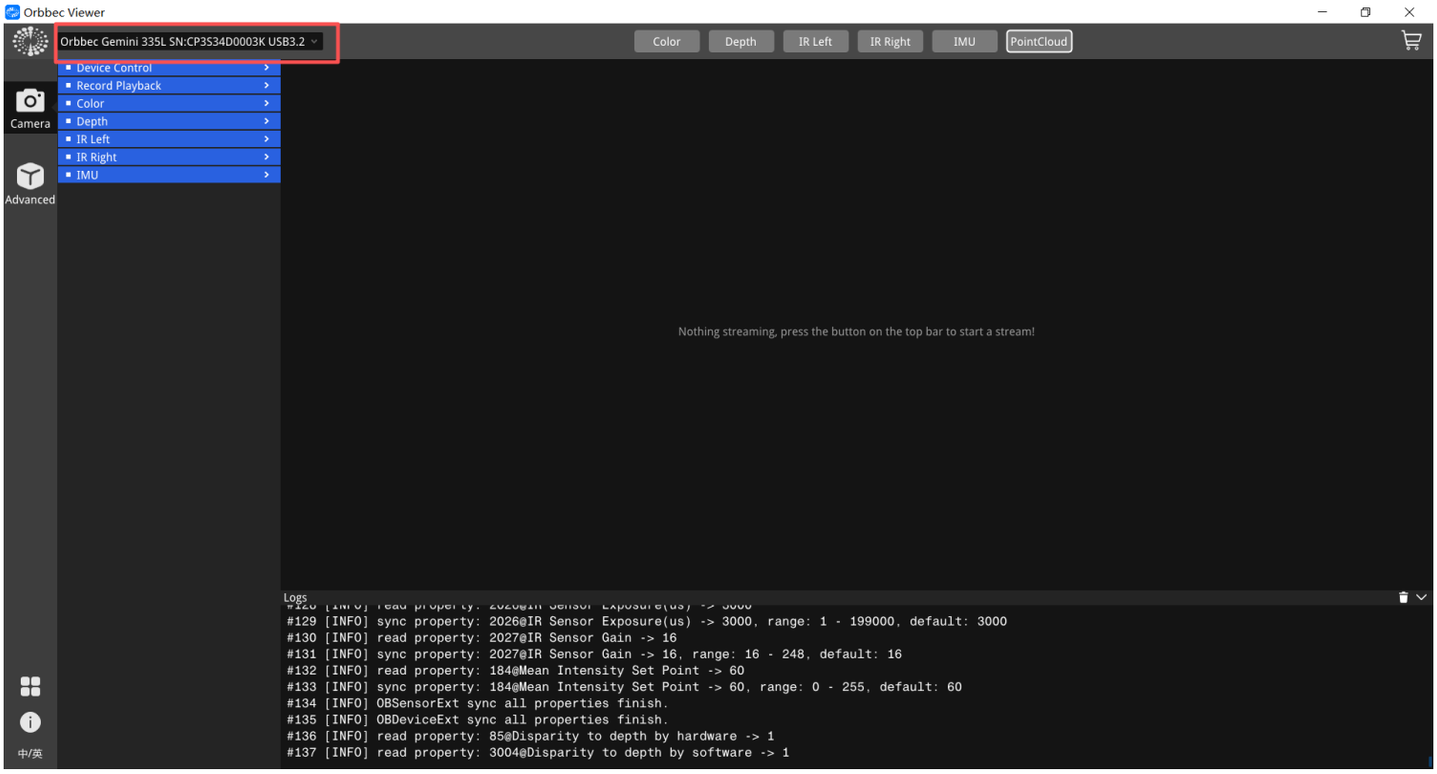


Figure 6-1 Device Connection Information

3) Expand the “Device Connection” dropdown menu to reveal additional options:
   a) **Select Device Connection**
   b) **Connect Network Device**
   c) **Add Resource File**

   When multiple Orbbec cameras are connected, the dropdown changes to “Select a Device Connection,” displaying all available device entries.

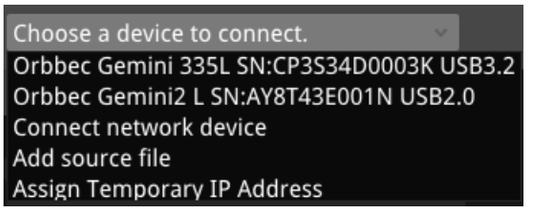


Figure 6-2 Multiple Device Selection

4) Hover the mouse over a device entry in the dropdown list to display more details such as **Device Name**, **PID**, **SN**, **UID**, and **Connection Type**.

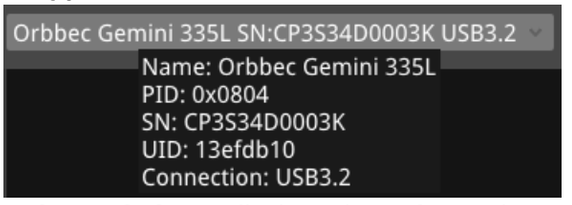


Figure 6-3 Detailed Device Information

6.2 Saving Images

The software provides two methods for saving image data:**Save Snapshot** and **Image Save**.

6.2.1 Save Snapshot

In each stream’s preview window, clicking the **Save Snapshot** button "  " captures the current frame.

- **Color Stream:** Saves as PNG image.

- **Depth & Infrared Streams:** Saves PNG (rendered), RAW (original), and CSV (metadata).
- **IMU Stream:** Saves CSV file containing accelerometer and gyroscope data.

Steps:

1) Follow the steps in Section 5 – Quick Start to connect and launch the software, then enable desired streams.
2) Locate the **Save Snapshot** button "  " in the preview window.
3) Click it, choose a directory, rename if needed, and click **Save**.

6.2.2 Image Save

The **Image Save** feature supports one-click saving of PNG images for color, depth, and infrared data streams.

Steps:

1) Follow the steps in Section 5 – Quick Start to connect and launch the software, then enable desired streams.
2) Open **Camera** → **Recording and Playback**, then locate **Image Save** settings.

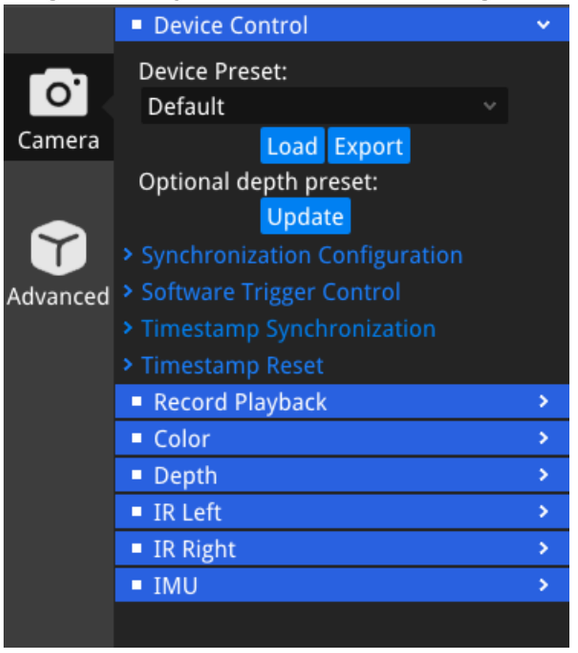


Figure 6-4 Image Save Configuration

3) Select the streams to save and set the number of frames.
4) Click **Save Count** "  " to capture images. The save path will appear in the **Log Information** area.

6.3 Color Stream

Found under **Camera** → **Color**, this section includes three modules:**Color Stream Configuration**, **Control**, and **Advanced Control**.

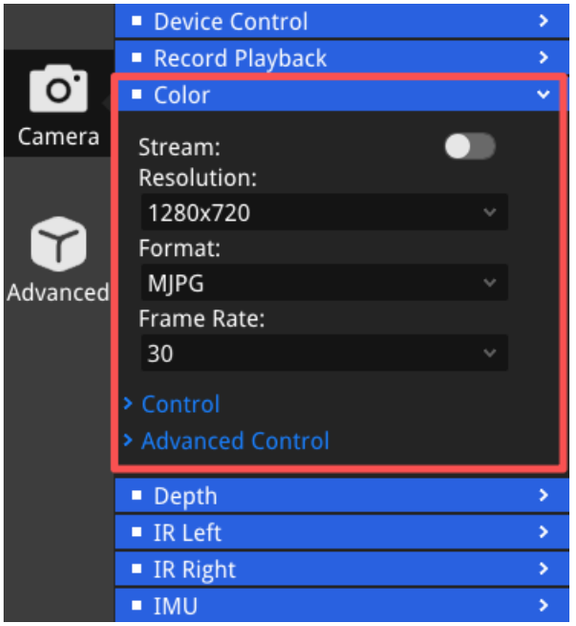


Figure 6-5 Color Stream Configuration Interface

6.3.1 Color Stream Configuration

You can toggle the stream on/off, and configure **resolution**, **format**, and **frame rate** according to your device's specifications.

6.3.2 Control

Adjusts parameters such as:

- Exposure Priority
- Auto Exposure
- AE Max Exposure Time
- AE ROI Coordinates
- Exposure / Gain / Brightness
- Auto White Balance and Manual White Balance
- Sharpness, Gamma, Saturation, Contrast, Hue, Backlight Compensation, and Power Line Frequency

Refer to the device product specifications for valid parameter ranges.

6.3.3 Advanced Control

Enables post-processing filters such as **Downsampling**.Refer to *Use Depth Post-Processing Blocks* for detailed parameter configuration.

6.3.4 Operation Steps:

1) Follow the steps in Section 5 – Quick Start to connect your Orbbec camera and launch the software. No data stream needs to be enabled yet.
2) Open **Camera → Color**.
3) Configure stream parameters (resolution, format, frame rate).
4) Enable the stream to preview output.
5) Expand **Control** to adjust camera parameters.
6) Expand **Advanced Control** to configure post-processing filters.

6.4 Infrared Stream (IR Left/Right)

Dual-structured light cameras include **Left IR** and **Right IR** channels.Taking “Left IR” as an example, its control panel includes **IR Stream Configuration**, **Control**, **Advanced Control**, and **Rendering Configuration** modules.

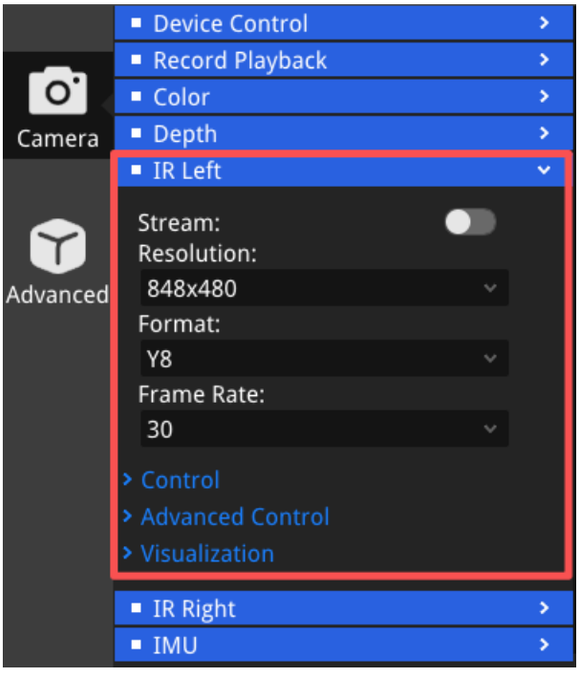


Figure 6-6 Left Infrared Configuration Interface

6.4.1 IR Stream Configuration

Toggle the IR data stream on/off and set **resolution**, **format**, and **frame rate**.

6.4.2 Control

Configure the following:

- Mirror / Flip / Rotation
- Auto Exposure
- AE Max Exposure Time
- Target Brightness
- Exposure
- Gain

Refer to product specifications for valid parameter ranges.

6.4.3 Advanced Control

Controls post-processing modules such as **Frame Sequence Filtering**.Refer to *Use Depth Post-Processing Blocks* for details.

6.5 Inertial Measurement Unit (IMU)

The IMU section supports configuring data stream and recording.

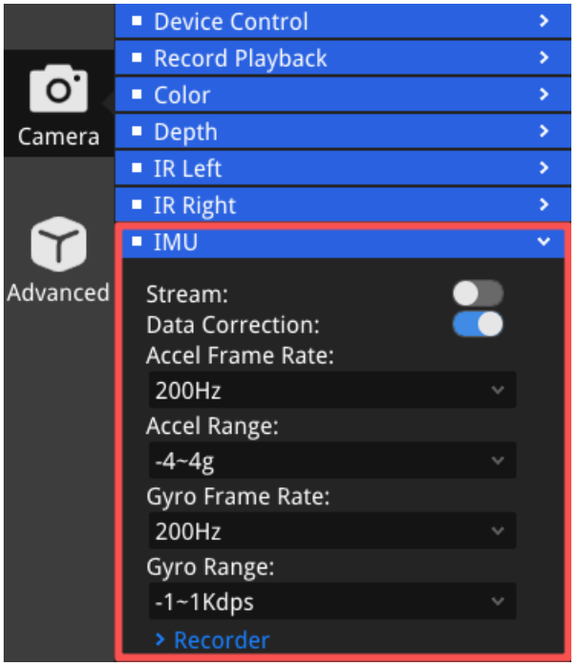


Figure 6-7 IMU Configuration Interface

6.5.1 IMU Stream Configuration

Allows users to toggle streaming and data calibration, set **sampling rates** and **measurement ranges** for both the **accelerometer** and **gyroscope**.Refer to device specifications for detailed IMU parameters.

Data Correction: The data calibration function aligns the three axes of the IMU's internal accelerometer and gyroscope with the reference coordinate system of the depth camera through dedicated calibration algorithms.This process eliminates axis misalignment and non-orthogonal errors, ensuring that the output orientation, acceleration, and angular velocity data are more accurate, stable, and reliable.

Accelerometer: Measures linear acceleration (i.e., the acceleration of an object along the X, Y, and Z axes, with units in g or m/s^2).

- Accel Frame Rate: The frequency at which the accelerometer outputs measured data, i.e., how often it updates its data.
- Accel Range: Indicates the maximum measurable acceleration.

Gyroscope: Measures angular velocity (i.e., the rate of rotation of an object around the X, Y, and Z axes, with units of °/s or rad/s).

- Gyros Frame Rrate: The number of times measurement data is output per second, which is the frequency at which the gyroscope updates its data.
- Gyros Range: Indicates the maximum measurable angular velocity range.

6.5.2 Recording

You can record IMU data within a defined duration.After recording, the data is saved as a `.csv` file in /output/IMU/, under the Orbbec Viewer directory.

Steps:

1) Follow the steps in Section 5 – Quick Start to connect your Orbbec camera and launch the software. No data stream needs to be enabled yet.
2) Open **Camera → IMU**.
3) Configure the sampling rate and range of accelerometers and gyroscopes.
4) Enable **Data Correction** and IMU Stream.
5) Expand **Recording**, and set recording duration.

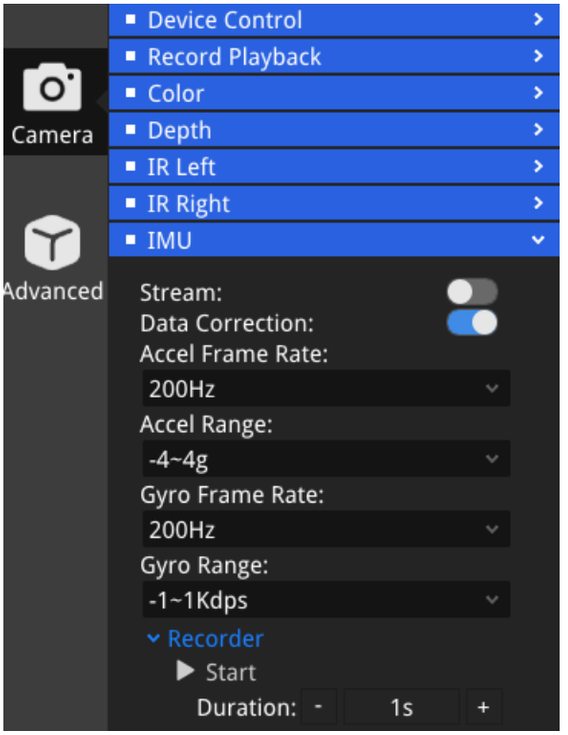


Figure 6-8 IMU Recording Configuration

6) Click **Start Recording**, and wait for completion.
7) After recording, a .csv file will appear in /output/IMU/.

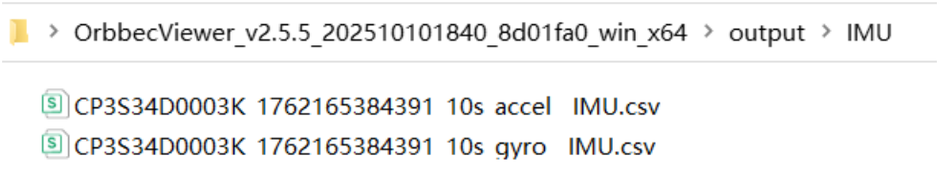


Figure 6-9 IMU Data Saving Example

7 Exploring the unique features of the camera

7.1 More Functions

7.1.1 Viewing Additional Device Information

1) Follow the steps in Section 5 – Quick Start to connect your device and launch Orbbec Viewer v2 (no need to enable data streams).
2) Click **More** "  " in the Control Panel Area (bottom-left corner of the main interface).
3) The pop-up window contains **Device Information** and **Firmware Upgrade** tabs.

Device Information is divided into two parts:

- **Part 1:** Product ID, Firmware Version, Chip Model, SDK Version, Vendor ID, Serial Number, ASIC SN (Application-Specific Integrated Circuit Serial Number), Connection Type, and Log Level.
- **Part 2:** Module Temperature, Device Heartbeat, USB2 Retry Identification, and Device Restart options.

The **Device Heartbeat** feature allows scheduled retrieval of connection information, while **Device Restart** provides a one-click device reboot function.

Figure 7-1 Device Information Window

7.1.2 Firmware Upgrade

Firmware upgrades can be performed **online** or **locally**.Before starting, ensure all data streams are closed.After the upgrade completes, click **Yes** to restart the device.Orbbec Viewer v2 will automatically recognize and reconnect to the device.

For details, refer to *Update Firmware*.

7.2 Device Control

7.2.1 Depth Preset Configuration (Supported by Gemini 330 Series)

Provides multiple depth modes tailored for different application scenarios, including: **Default**, **Hand**, **High Accuracy**, **High Density**, **Medium Density**, **Factory Calib**, and **Custom**.Choose the mode that best suits your application requirements.

For specific modes and applicable scopes, please refer to Use depth presets.

1) Follow the steps in Section 5 – Quick Start to connect your device and launch Orbbec Viewer v2 (no need to enable data streams).
2) Open **Camera → Device Control → Device Preset** .

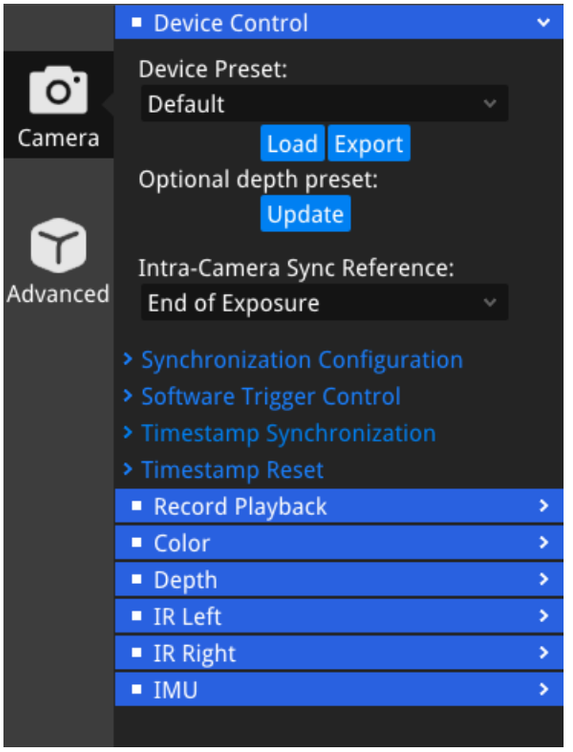


Figure 7-2 Device Preset

3) The dropdown defaults to "Default." Expand to view all depth modes.

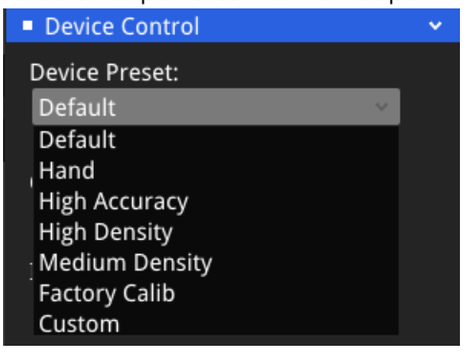


Figure 7-3 Depth Mode Selection

4) Click the desired **Depth Mode** to switch from the **Default** mode to the selected option, for example, **High Accuracy** mode.

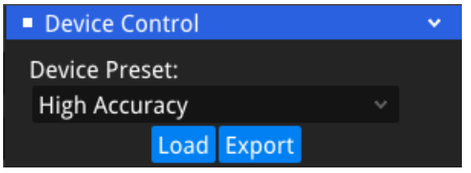


Figure 7-4 Switching Depth Modes

7.2.2 Depth Preset Update

Gemini 330 series cameras support **Depth Preset Updates**.

Since onboard preset storage is limited, users can update up to three presets for optimized depth performance in specific scenarios.

Presets can be downloaded from the **Depth Preset Release** page on Orbbec's official site. For details, refer to *Update Optional Depth Preset*.

7.2.3 Synchronization Configuration

Supports both **frame synchronization** (Color and Depth) and **multi-camera synchronization**.

For setup instructions, refer to *Set up cameras for external synchronization*.

7.2.4 Software Trigger Control

After completing synchronization configuration, the **Software Trigger Control** allows triggering verification for both master and slave devices.

Supports **Automatic** and **Manual** trigger modes.

- **Automatic Trigger:** Set the trigger interval time.
- **Manual Trigger:** Activate manually when needed.

For details, refer to *Set up cameras for external synchronization*.

7.2.5 Timestamp Synchronization

Aligns device timestamps with global or system timestamps for consistent frame timing.You can choose **Immediate Sync** or **Timed Sync** (repeated at set intervals).

Steps:

1) Follow the steps in Section 5 – Quick Start to connect your device and launch Orbbec Viewer v2, enable **Color Stream**.
2) In the Color Stream preview window, open the **Metadata** list and locate **Device**, **Global**, and **System Timestamps**.

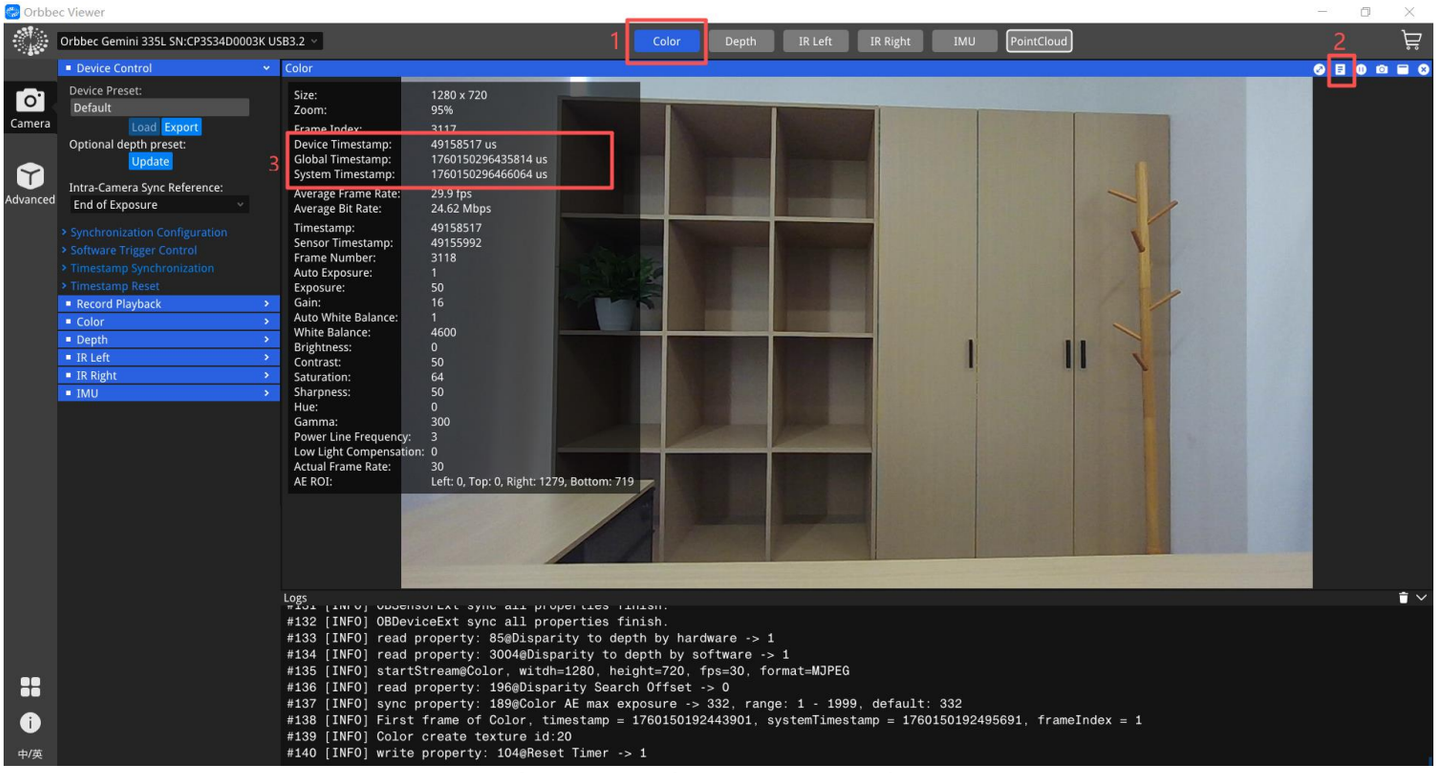


Figure 7-5 Timestamp Metadata

3) In **Device Control → Timestamp Synchronization**, click **Sync Immediately** to perform immediate alignment.
4) Alternatively, enable **Timed Synchronization** and set an interval to perform scheduled alignment.

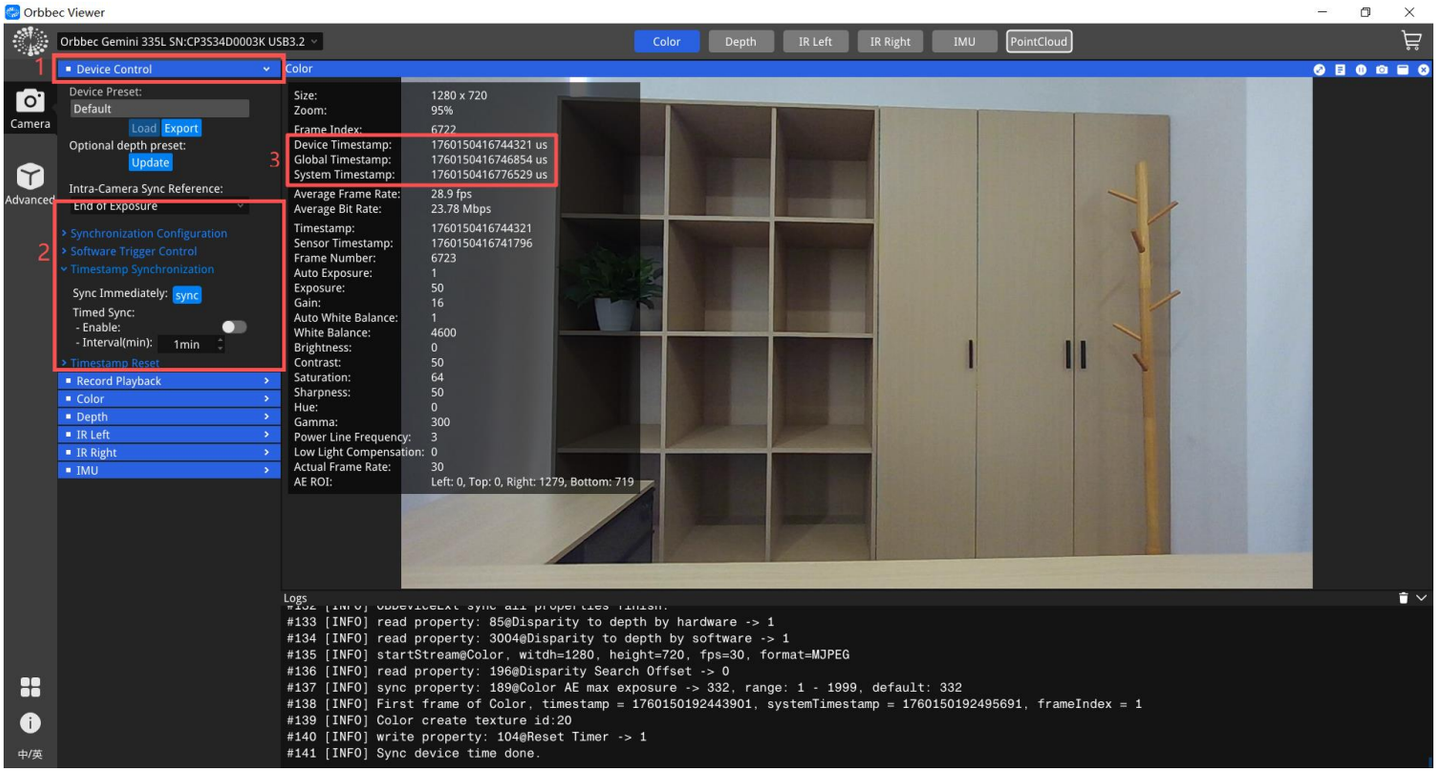


Figure 7-6 Timestamp Synchronization Setup

7.2.6 Timestamp Reset

Support resetting device timestamps.

Steps:

1) After synchronization, expand **Timestamp Reset** in the **Device Control** tab.

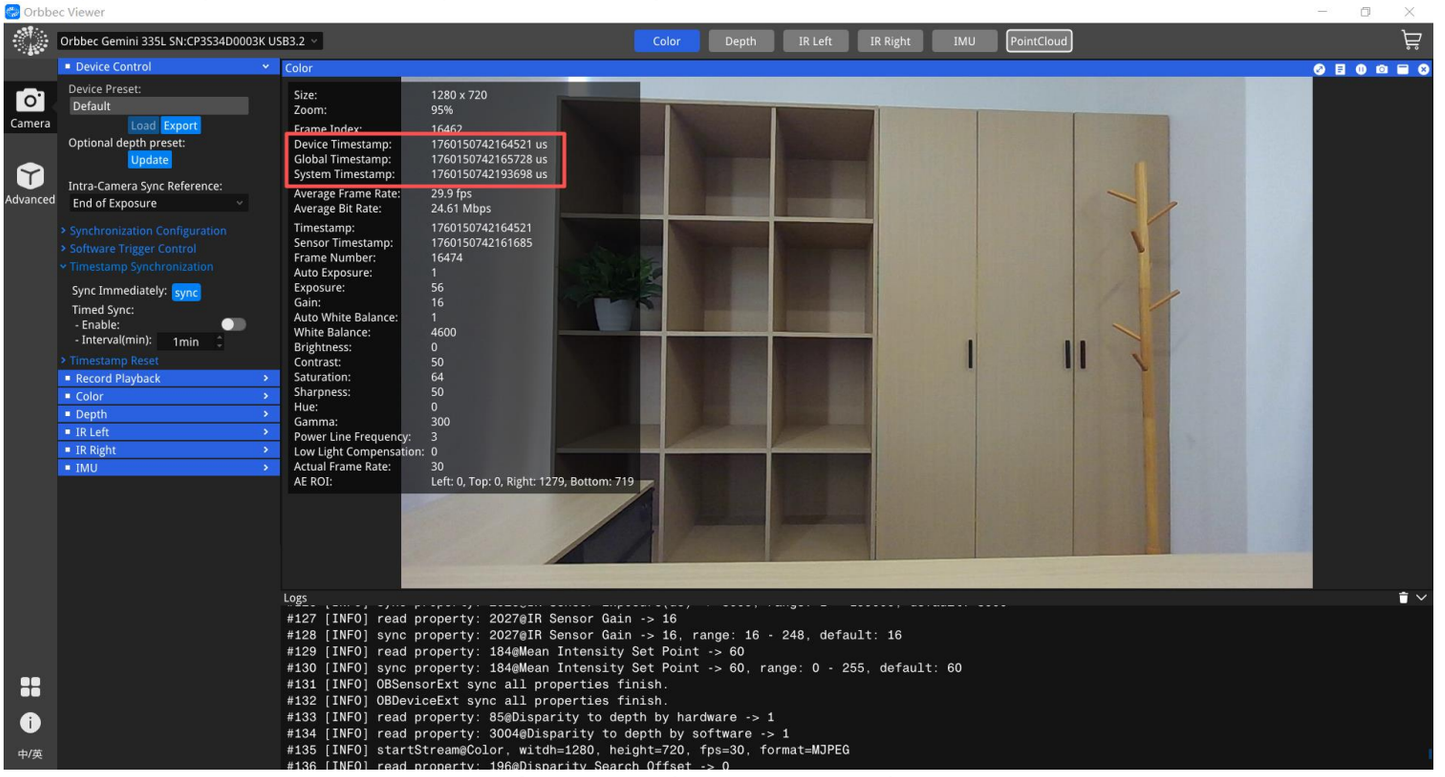


Figure 7-7 Timestamp Metadata

2) Set a reset delay and click **Reset Timer** to reinitialize timestamps.

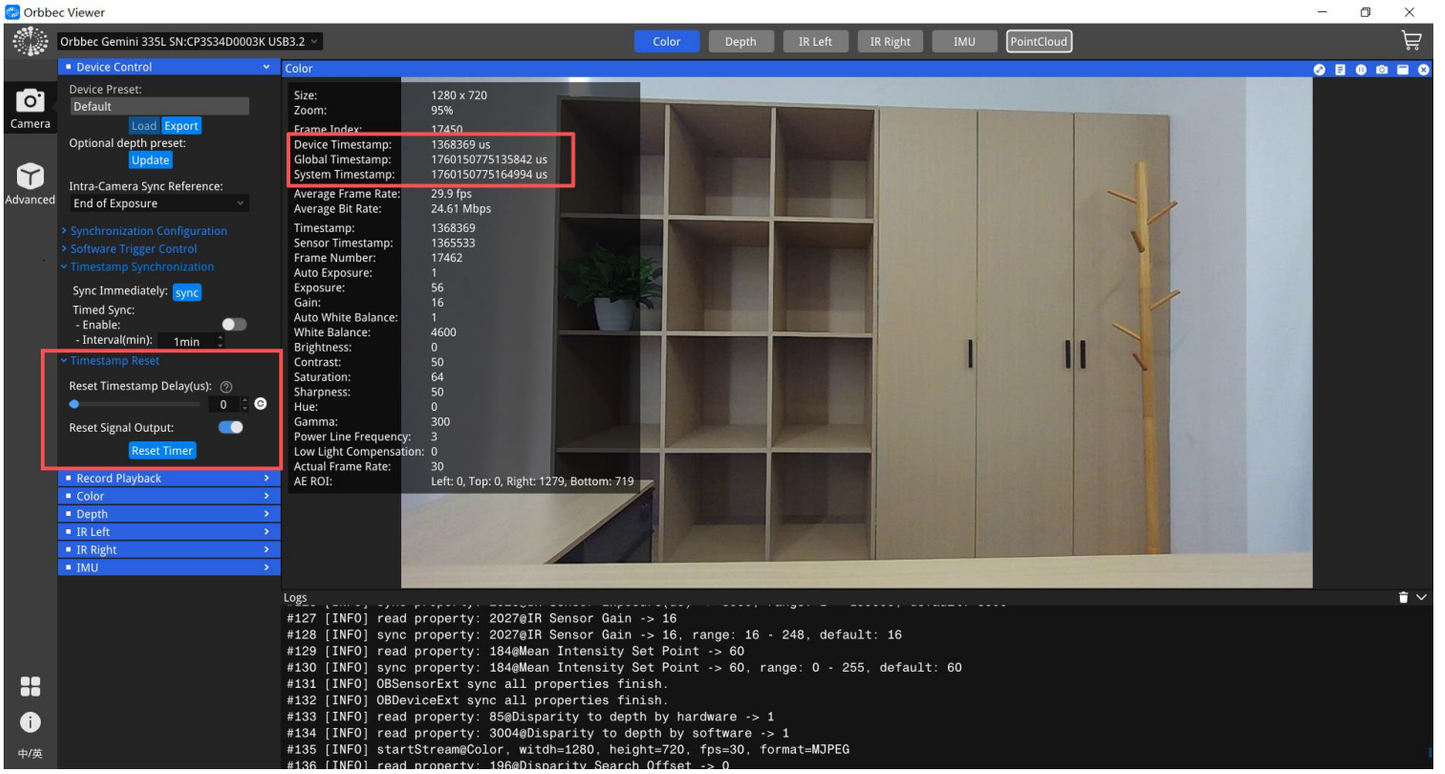


Figure 7-8 Timestamp Reset

7.3 Recording and Playback

Starting from **Orbbec SDK v2.4.x**, Orbbec cameras support **one-click recording and playback** of Color, Depth, IR, IMU, and Point Cloud streams in **ROS bag (.bag)** format.This feature improves efficiency for validation, debugging, and algorithm optimization.

7.3.1 Recording Function

Supports recording Color, Depth, IR, IMU, and Point Cloud streams into a .bag file.

Steps:

1) Follow the steps in Section 5 – Quick Start to connect your device and launch Orbbec Viewer v2, enable all required data streams.

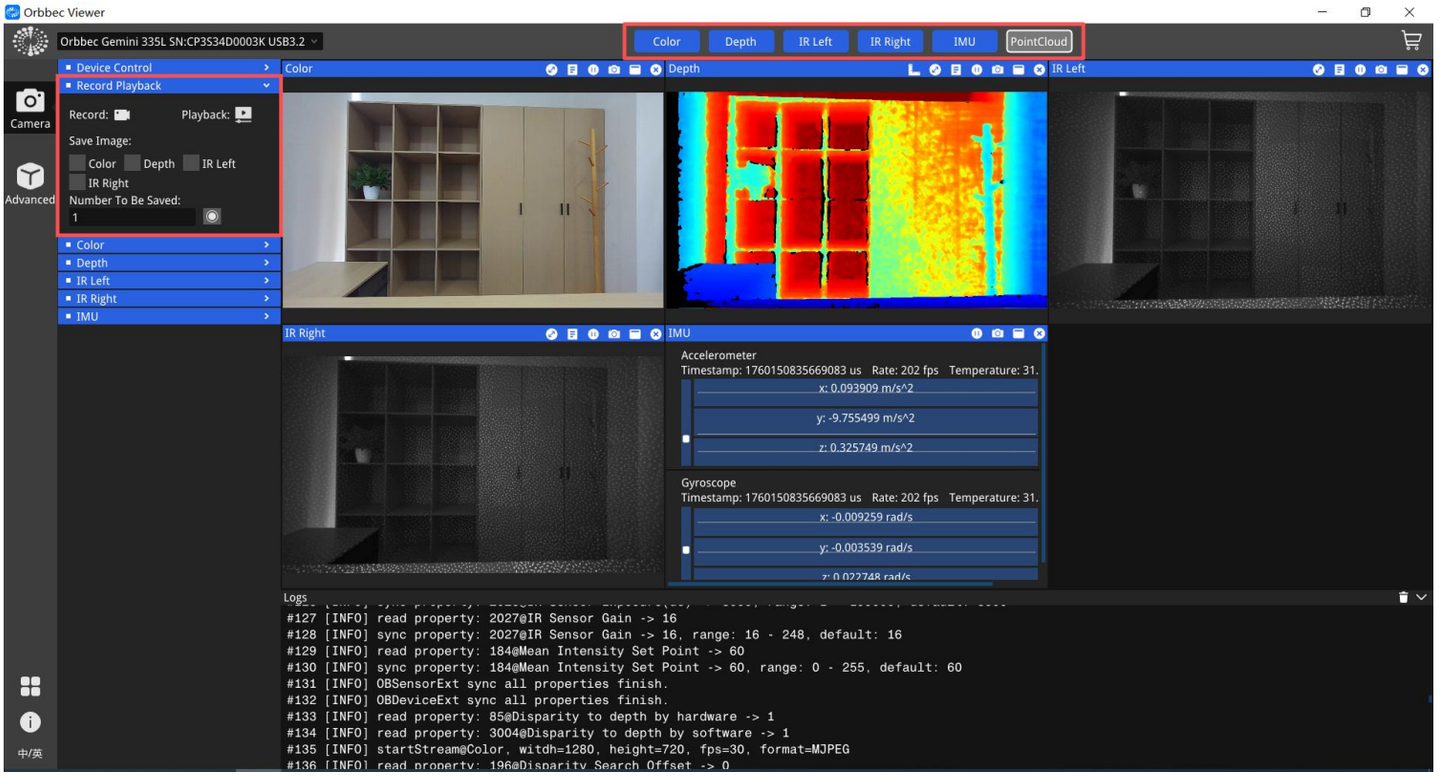


Figure 7-9 Recording Interface

2) Open **Camera → Record Playback**, then click the **Record** "" button.

3) During recording "", the icon changes from "" to "", and a red dot (●) flashes in preview windows.

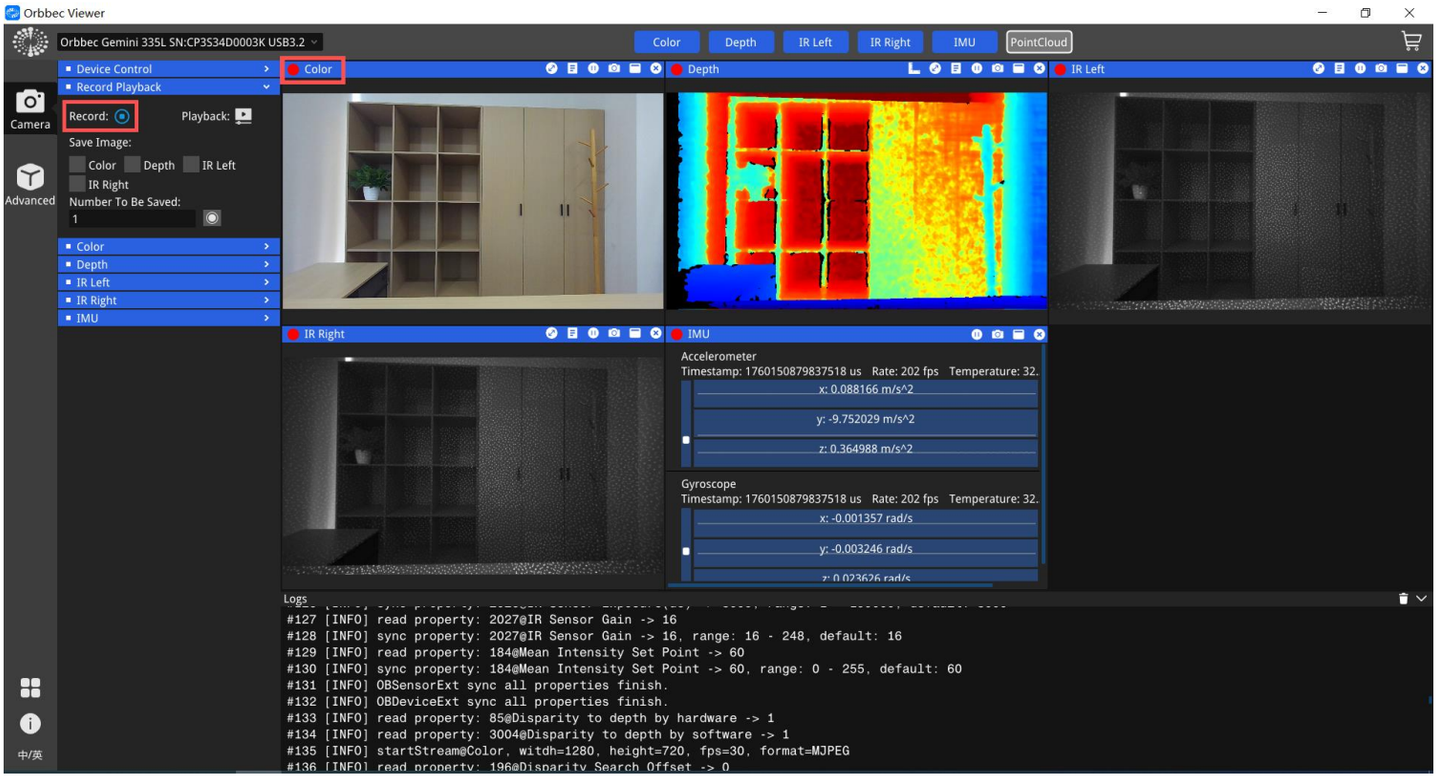


Figure 7-10 Recording in Progress

4) Click again to stop recording "". The log area will display the .bag file save path.

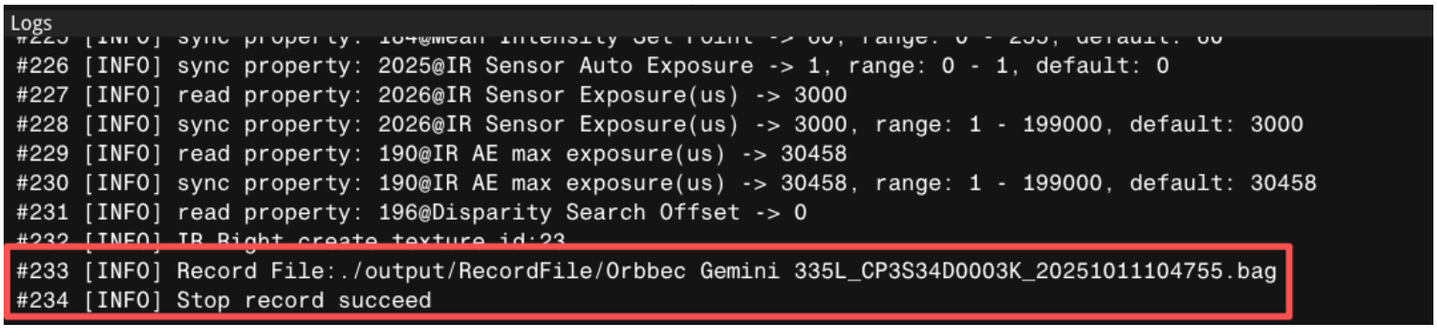


Figure 7-11 Recording Log Output

7.3.2 Playback Function (When Device is Connected)

You can load and replay ROS bag files for recorded sessions.

Steps:

1) Follow the steps in Section 5 – Quick Start to connect your device and launch Orbbec Viewer v2 (no need to enable streams).
2) Open **Record Playback**, click **Playback** "", and select a .bag file.
3) Use playback controls: **Rewind**, **Reset**, **Pause/Play**, **Forward**, and **Speed Control**.
4) You can also save replayed data.

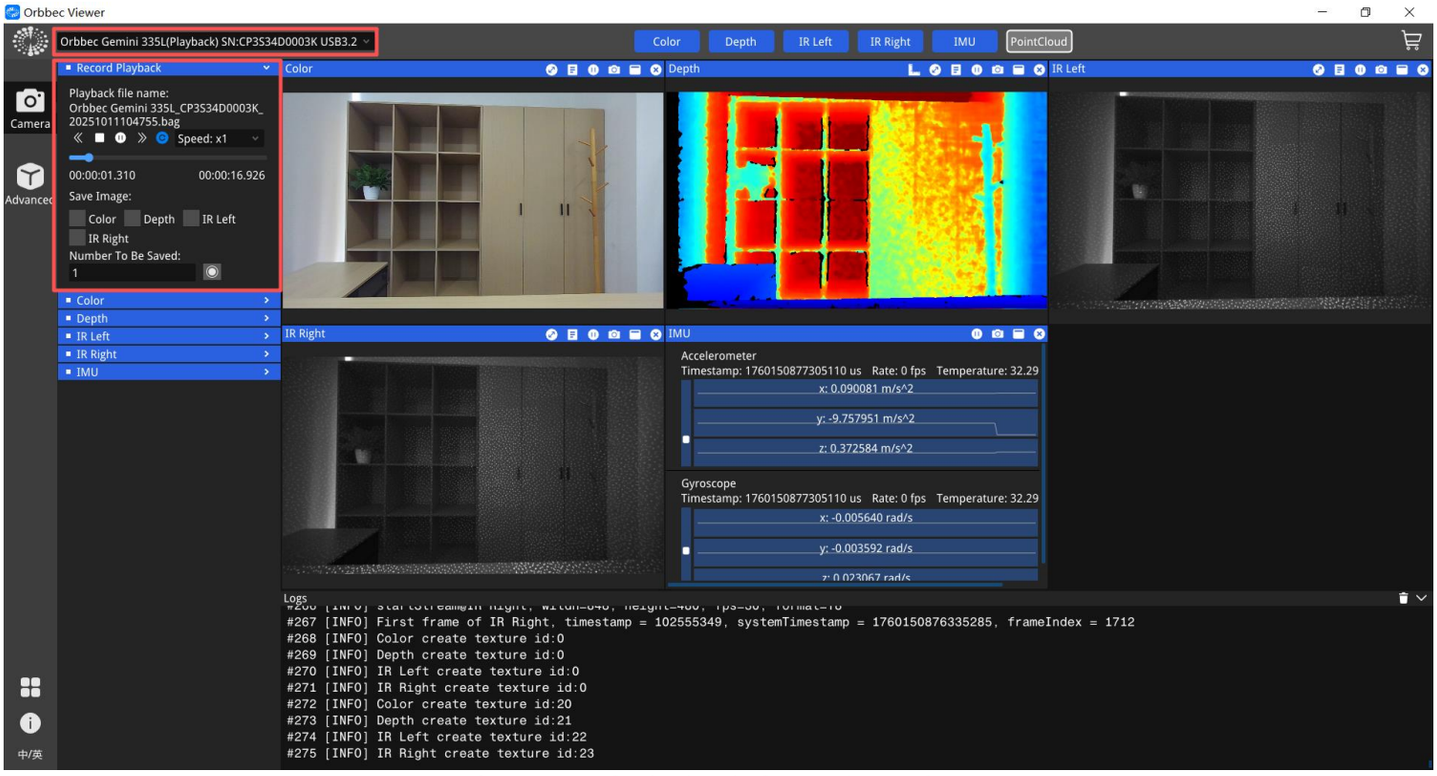


Figure 7-12 Playback Control Interface

7.3.3 Record playback operation demonstration

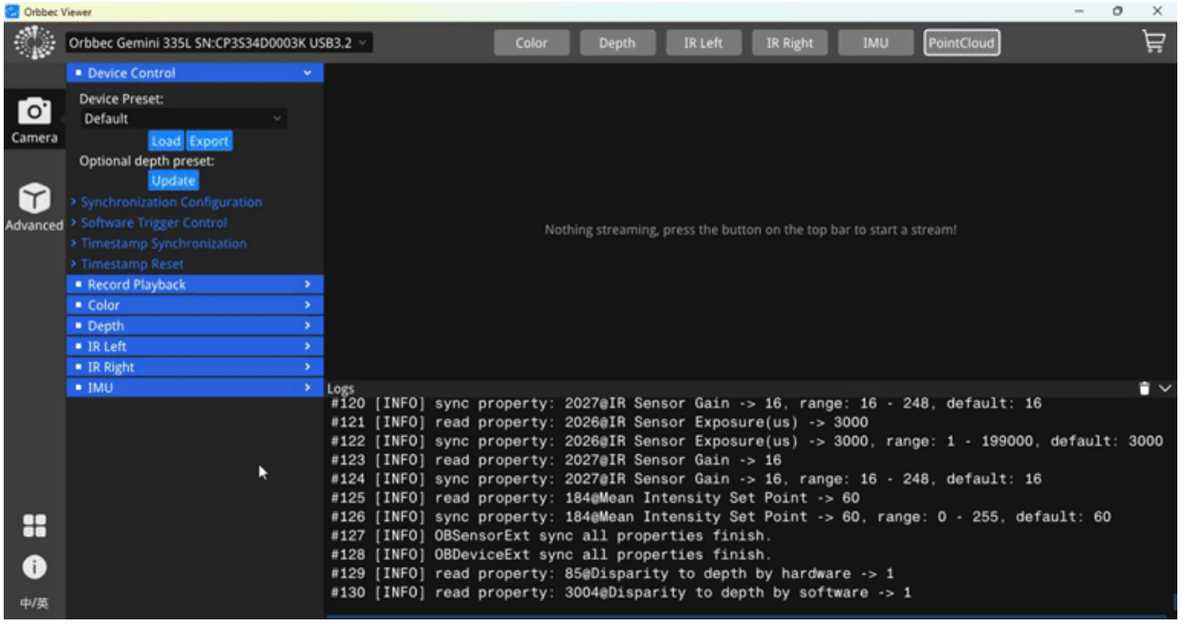


Figure 7-13 Playback Operation Demonstration

7.3.4 Adding Resource Files (No Device Connected)

When no device is connected, you can still replay .bag files using the **Add Resource File** option.

Steps:

1) Launch software without connecting any device.

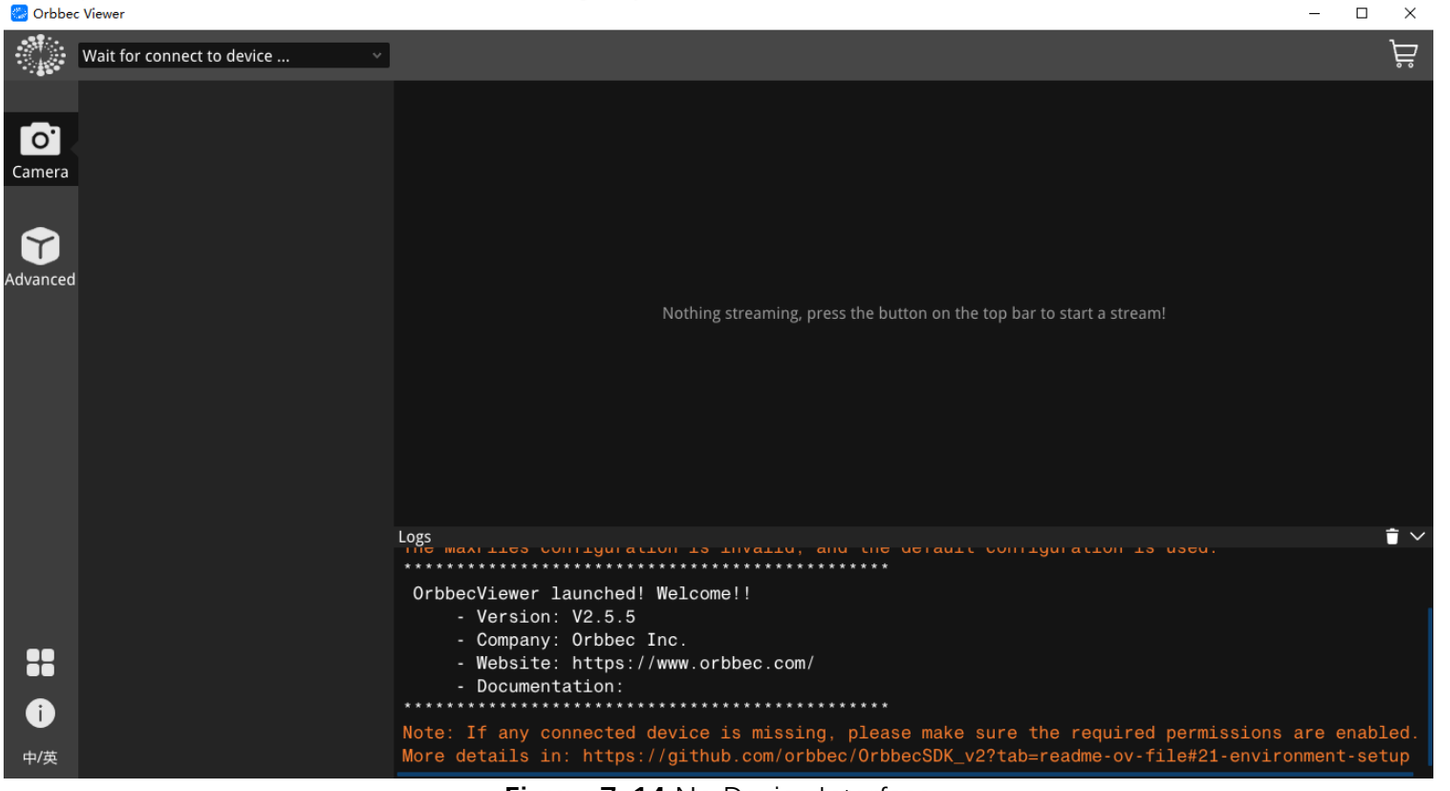


Figure 7-14 No Device Interface

2) Expand “Waiting for Device Connection…” dropdown and select **Add Resource File**.

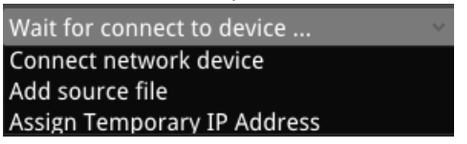


Figure 7-15 Add Resource File

3) Load a .bag file and replay it — Playback operation are consistent with the playback function of connected devices.

7.4 Depth

Located under the **"Depth"** tab in the **Camera** section of the Control Panel.

It consists of six modules: **Depth Stream Configuration**, **Control**, **Laser Control**, **Alternating Sequence**, **Advanced Control**, and **Rendering Configuration**.

7.4.1 Depth Stream Configuration

Supports enabling or disabling the depth data stream, as well as configuring **resolution**, **format**, and **frame rate**.

For detailed configuration parameters and supported image formats, refer to the *Image Stream Format* section in the device product specifications.

7.4.2 Control

Supports configuration of various parameters for the depth data stream, including: **Mirror switch**, **Flip switch**, **Rotation angle**, **Exposure priority**, **Auto exposure**, **AE maximum exposure time**, **Target brightness preset**, **AE ROI coordinate configuration**, **Exposure**, **Gain**, **Depth unit**, and **Baseline length**.

For key configuration parameters and adjustable ranges, refer to the *Camera* section in the device product specifications.

7.4.3 Depth Unit Configuration

The "Depth Unit" defines the measurement unit of output depth data.

When **Disparity-to-Depth** (D2D) conversion is enabled in Advanced Control, the MX6800 chip outputs 16-bit unsigned depth values (range: 0–65535).

With the default **1 mm** unit, the measurable depth range is **0–6.5535 m**.

Users can adjust the depth unit (0.001–10 mm) for different precision needs.

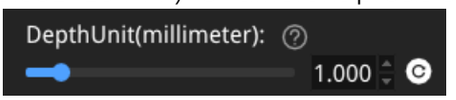


Figure 7-16 Depth Unit Settings

Steps:

1) Follow the steps in Section 5 – Quick Start to connect your device and launch Orbbec Viewer v2 (no stream enabled).
2) Under **Depth → Advanced Control**, locate **Disparity-to-Depth**, and ensure it's set to **Hardware** or **Software**, not **Disabled**.

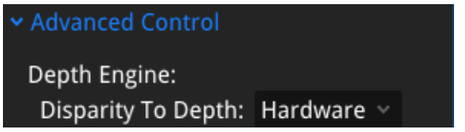


Figure 7-17 Disparity-to-Depth Configuration

3) Enable **Depth Stream** and check "Depth Unit (mm)" — default is **1.000 mm**.
4) Click on a pixel in the preview window to confirm the depth value.

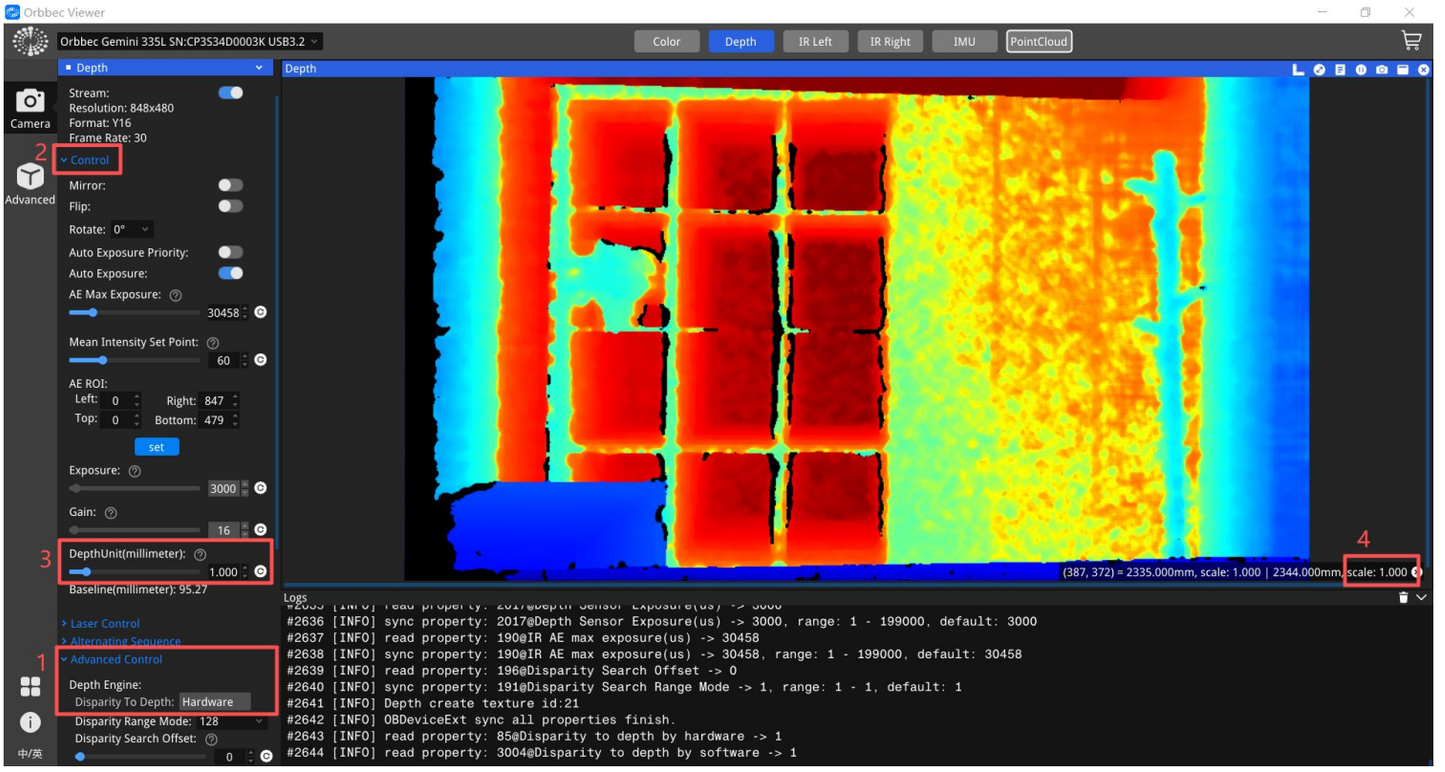


Figure 7-18 Default Depth Unit

5) Change “Depth Unit (mm)” to **2.000 mm** and observe updated display.

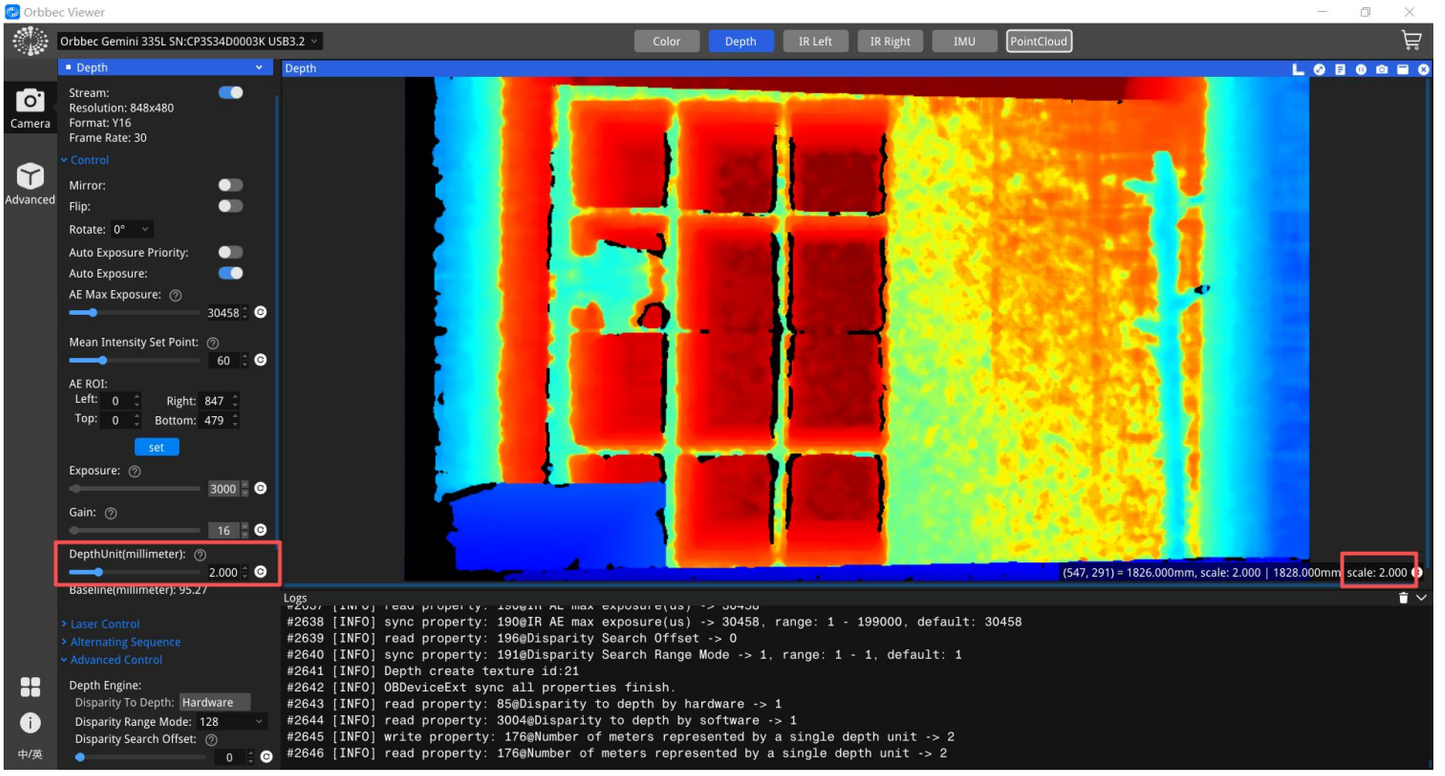


Figure 7-19 Adjusted Depth Unit

7.4.4 Laser Control

Controls **LDM (Laser Dot Matrix)** and **LRM (Laser Ranging Module)**.

- **Laser Power Level:** Adjustable from 0 to 6.
  - Level 0 = Laser Off
  - Levels 1–6 = Increasing brightness and power consumption
- **Actual Level:** Displays real-time power level.

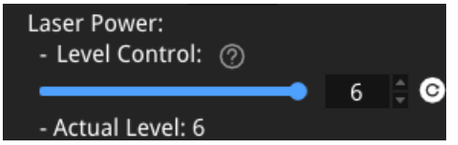


Figure 7-20 Laser Power Control

The **Laser Ranging Module (LRM)** measures obstacles in front of the camera, especially in stereo camera blind spots.

When enabled, choose between:

- **Automatic Update (1000 ms)** — refreshes every second.
- **Manual Update (Refresh)** — updates on demand.

Obstacle distances (0–400 mm) are displayed in **Obstacle Distance**.

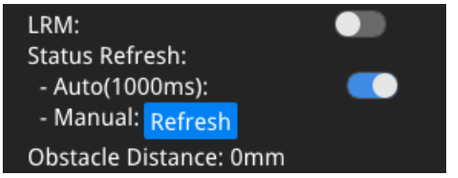


Figure 7-21 Laser Ranging Configuration

7.4.5 Alternating Sequence Mode

Supports **Depth from HDR** and **Laser On-Off** Alternating Sequence modes.

Each mode alternates between **Frame 0** and **Frame 1** configurations, allowing HDR exposure fusion or alternating laser control.

Table 7-1 Parameters of Alternating Sequence Mode

Parameter	Parameter Type	Sequence Index 0	Sequence Index 1	Description
Laser Control	Laser Control Switch	Laser control status at Frame 0	Laser control status at Frame 1	ON/OFF status of the laser control for the current frame
Exposure	Auto Exposure Disabled	Manual exposure value at Frame 0	Manual exposure value at Frame 1	Manual exposure value of the current frame
Gain		Manual gain value at Frame 0	Manual gain value at Frame 1	Manual gain value of the current frame
AE Max Exposure Time	Auto Exposure Enabled	Maximum auto exposure value at Frame 0	Maximum auto exposure value at Frame 1	Maximum auto exposure value of the current frame
Target Brightness Preset		Auto exposure target brightness at Frame 0	Auto exposure target brightness at Frame 1	Auto exposure target brightness of the current frame

For example, when the Alternating Sequence mode is configured as **Laser On-Off**, and the **Laser Control** of **Sequence Index 0** is set to **On** while that of **Sequence Index 1** is set to **Off**,the infrared stream running at **30 frames per second (fps)** will output Alternating Sequence data — i.e., **Frame 0, Frame 1, Frame 0, Frame 1,** and so on.

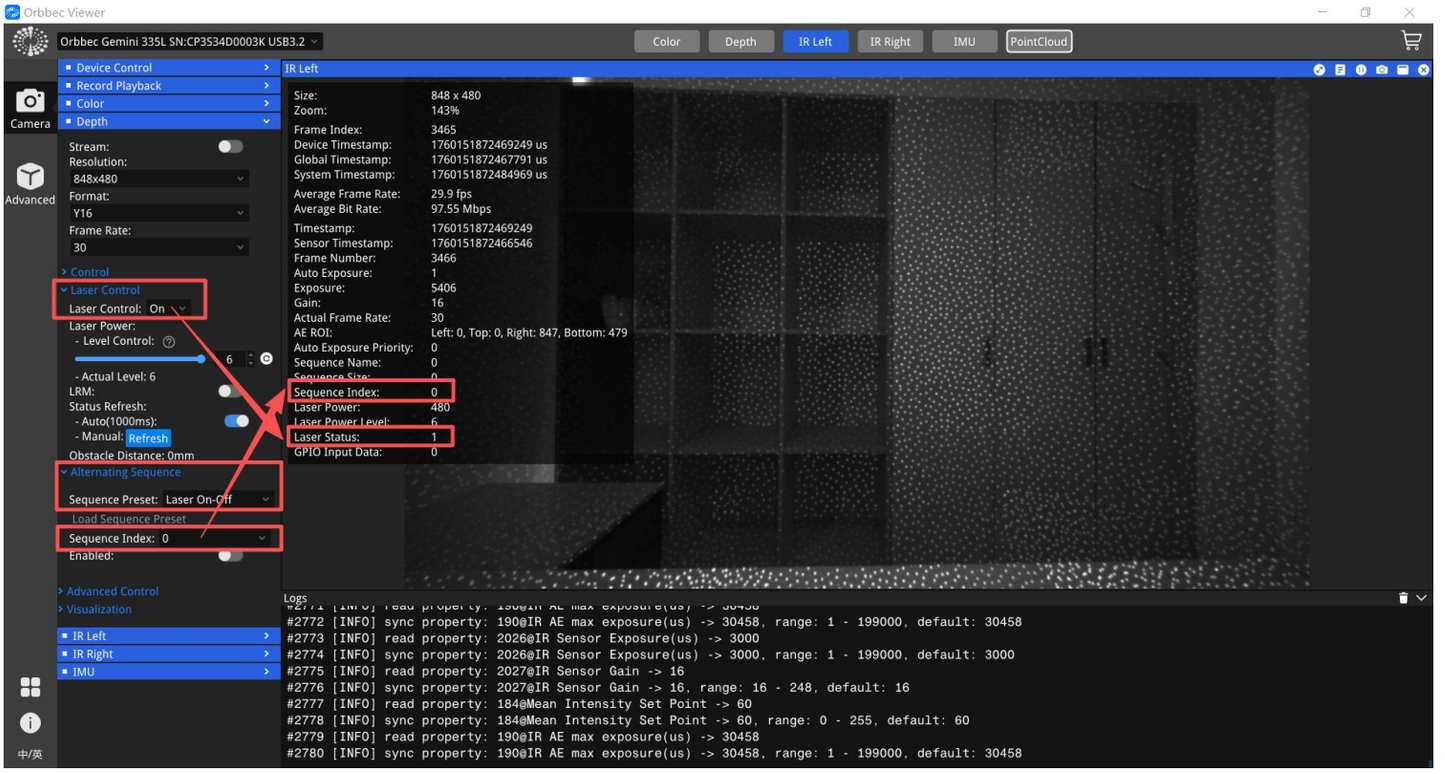


Figure 7-22 Configuration of Sequence Index 0

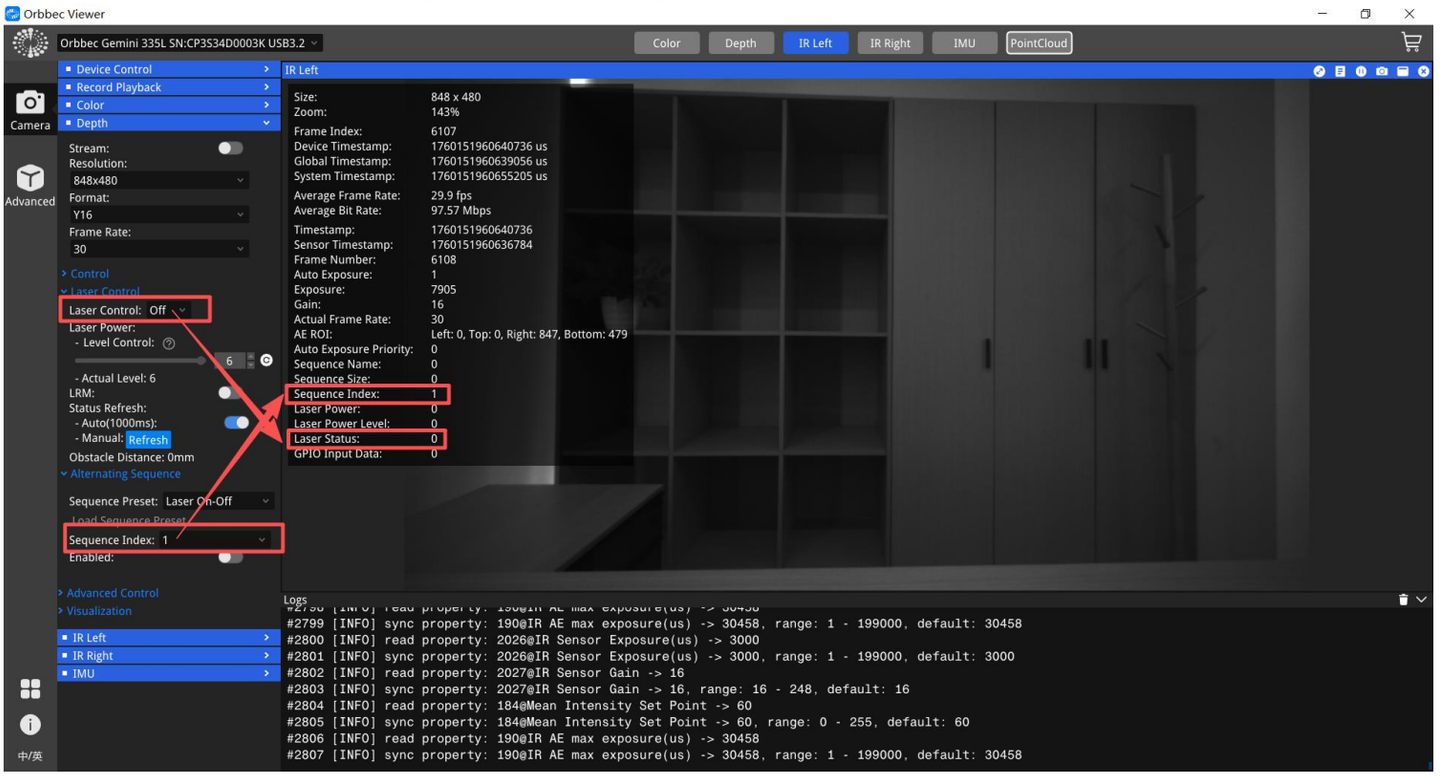


Figure 7-22 Configuration of Sequence Index 1

7.4.5.1 Depth from HDR Alternating Sequence Mode

In **Depth from HDR Mode**, two consecutive frames are captured alternately using different exposure and gain settings.

The system fuses these long- and short-exposure frames to generate a single **High Dynamic Range (HDR) depth image**,enhancing depth quality and minimizing data loss under both strong and low lighting conditions.

Depth from HDR Mode Example:

- Sequence Index 0: Exposure = 7500, Gain = 16
- Sequence Index 1: Exposure = 1, Gain = 20

Steps:

1) Follow the steps in **Section 5 – Quick Start** to complete device connection and launch the software (no stream enabled).
2) Expand the **"Depth"** tab and open the **"Alternating Sequence"** dropdown list.
   The default preset is **Depth from HDR** mode.
   Click **"Load Sequence Preset."**
3) Enable the **Left Infrared** data stream, and open the **Metadata List** "  " in the left IR preview window.
4) In the **"Alternating Sequence"** dropdown list, select **Sequence Index 0.**
5) In the **"Control"** dropdown list, disable **Auto Exposure**,
   then set **Exposure = 7500** and **Gain = 16.**

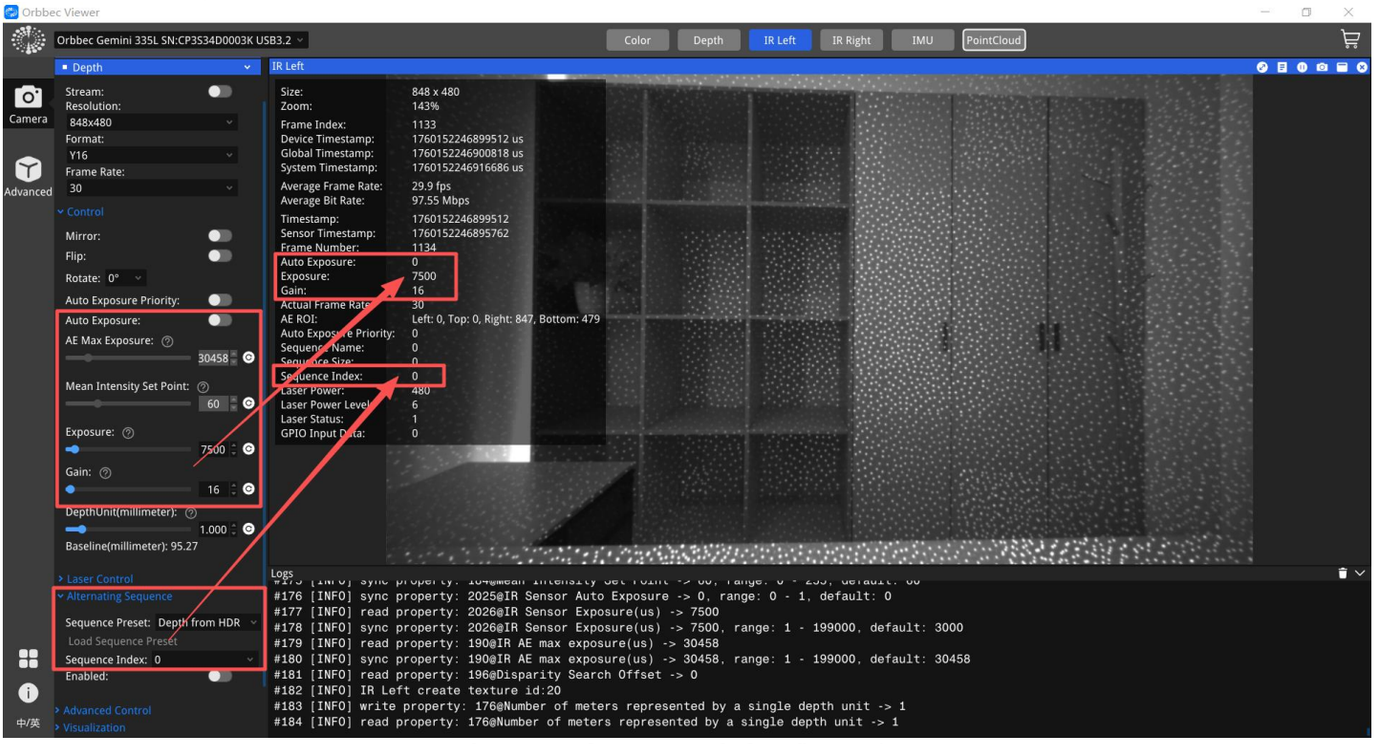


Figure 7-24 Frame 0 Configuration

6) Return to the **"Alternating Sequence"** dropdown list and select **Sequence Index 1.**
7) In the **"Control"** dropdown list, disable **Auto Exposure**,
   then set **Exposure = 1** and **Gain = 20.**

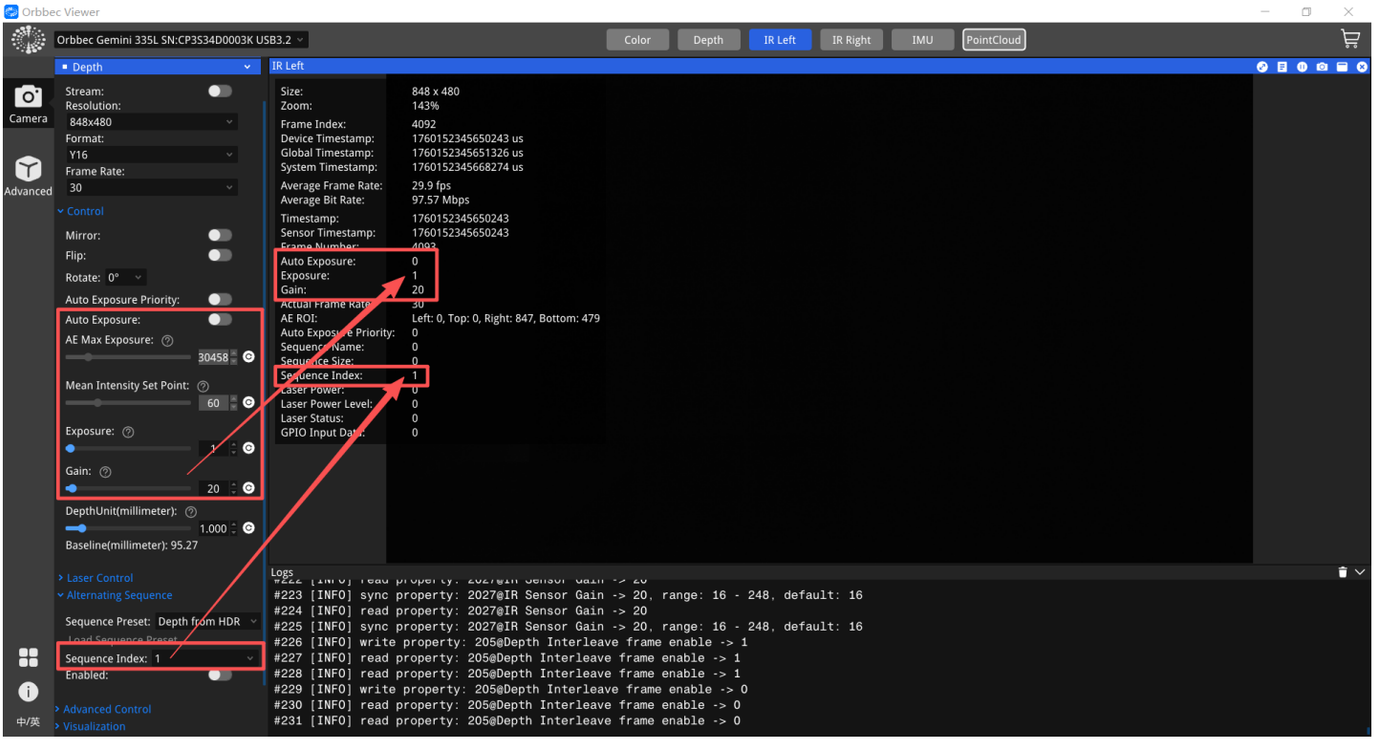


Figure 7-25 Frame 1 Configuration

8) Go back to the **"Alternating Sequence"** dropdown list and click **"Enabled."**
The **Depth from HDR Alternating Sequence Mode** will now be activated.
Observe the **Metadata List** to verify the **Sequence Index**, **Exposure**, and **Gain** values for each frame.

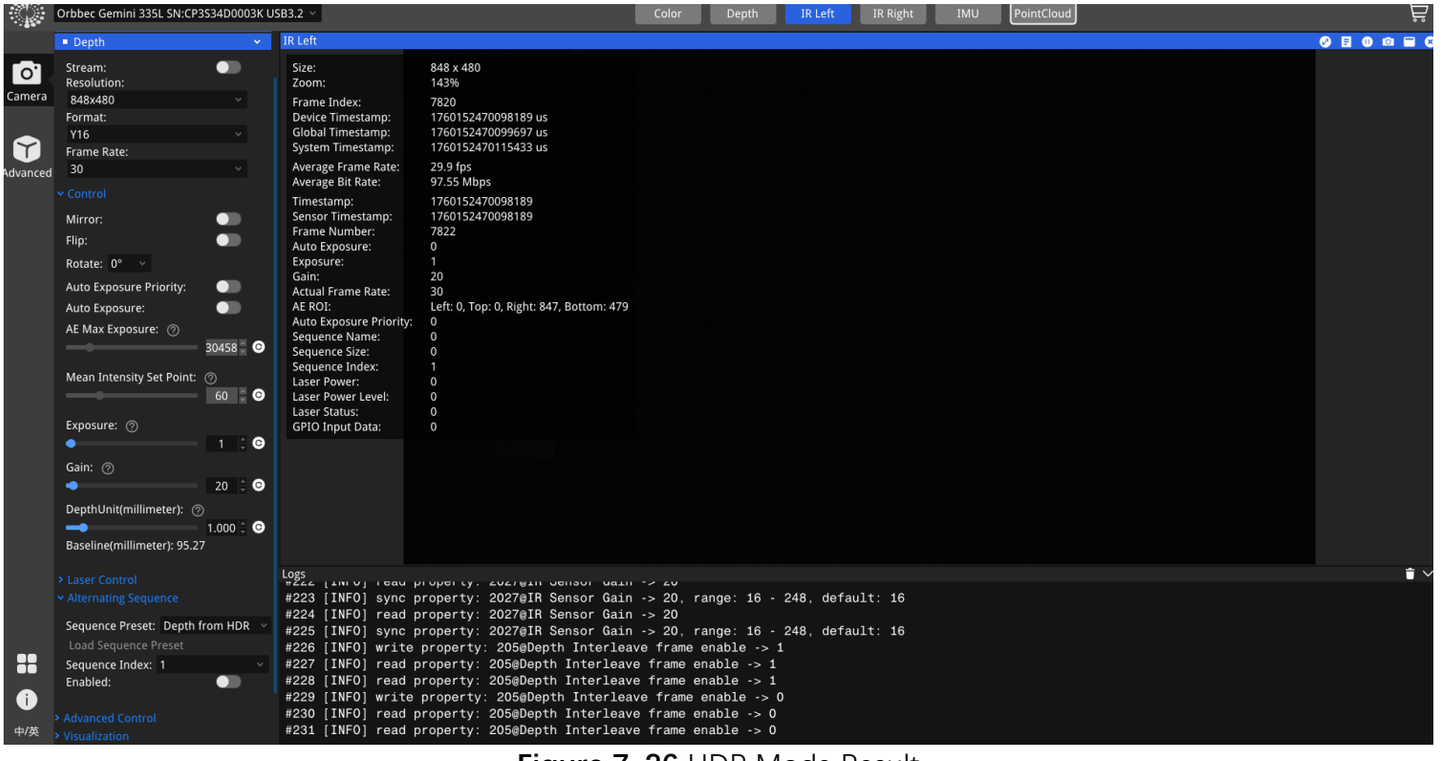


Figure 7-26 HDR Mode Result

7.4.5.2 Laser On-Off Alternating Sequence Mode

When **Alternating Sequence Mode** is set to **Laser On-Off**, the laser alternates between enabled and disabled states across frames.

This mode allows the system to distinguish between infrared patterns projected by the laser and ambient IR data, improving depth fusion in complex lighting environments.

Laser On-Off Mode Example:

- **Sequence Index 0:** Laser Control = **On**
- **Sequence Index 1:** Laser Control = **Off**

With a frame rate of **30 fps**, when the **Infrared** stream and **Alternating Sequence Mode** are both enabled,the two frame groups will output alternately as:

Frame 0 (On), Frame 1 (Off), Frame 0 (On), Frame 1 (Off)…

Steps:

1) Follow the steps in **Section 5 – Quick Start** to connect the device and launch the software (no stream enabled).
2) Expand the **"Depth"** tab, open the **"Alternating Sequence"** dropdown list, and select the preset **Laser On-Off Mode**, then click **"Load Sequence Preset."**
3) Enable the **Left Infrared** stream, and open the **Metadata List** "  " in the preview window.
4) In the **"Alternating Sequence"** dropdown list, select **Sequence Index 0.** In the **Laser Control = On.**

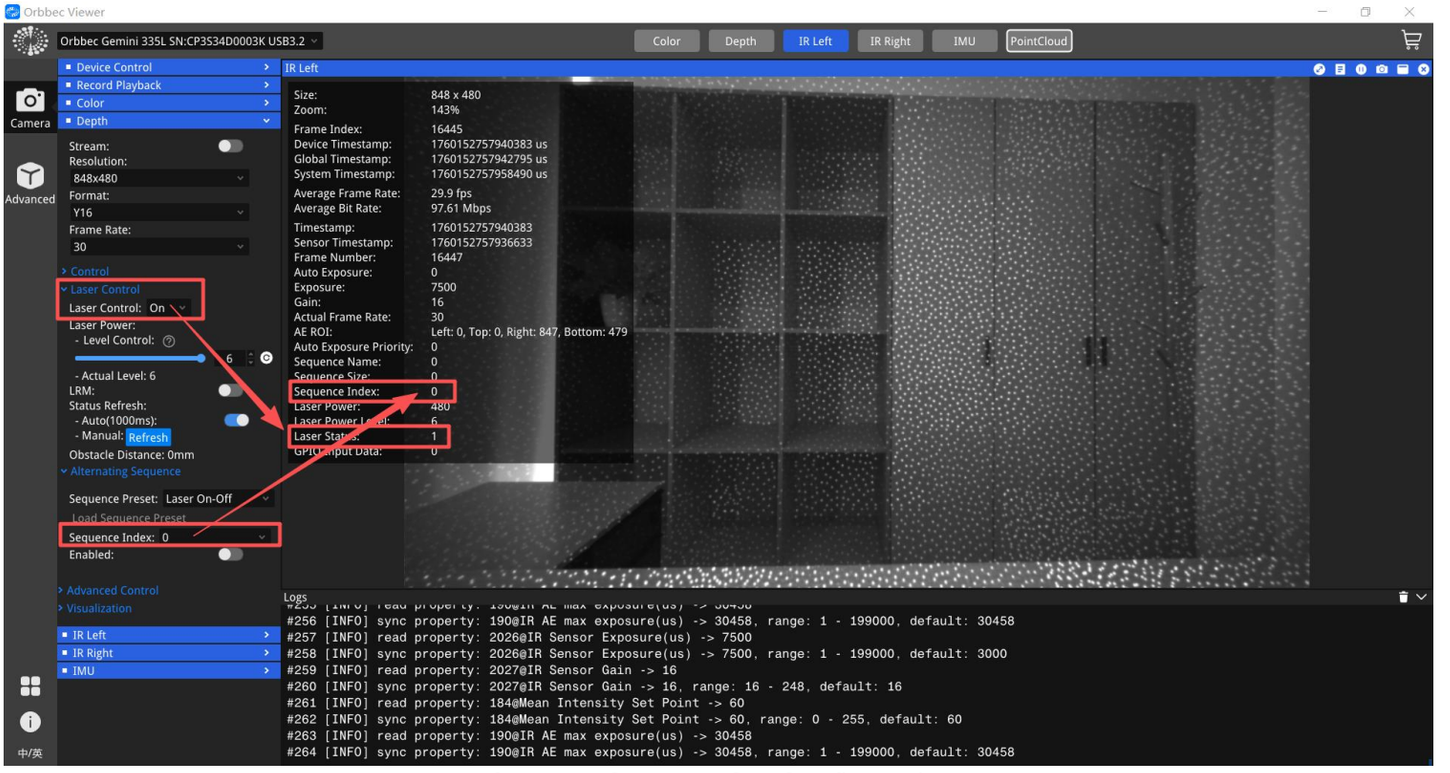


Figure 7-27 Laser ON Configuration

5) Return to the **"Alternating Sequence"** dropdown list, select **Sequence Index 1**, set **Laser Control = Off.**

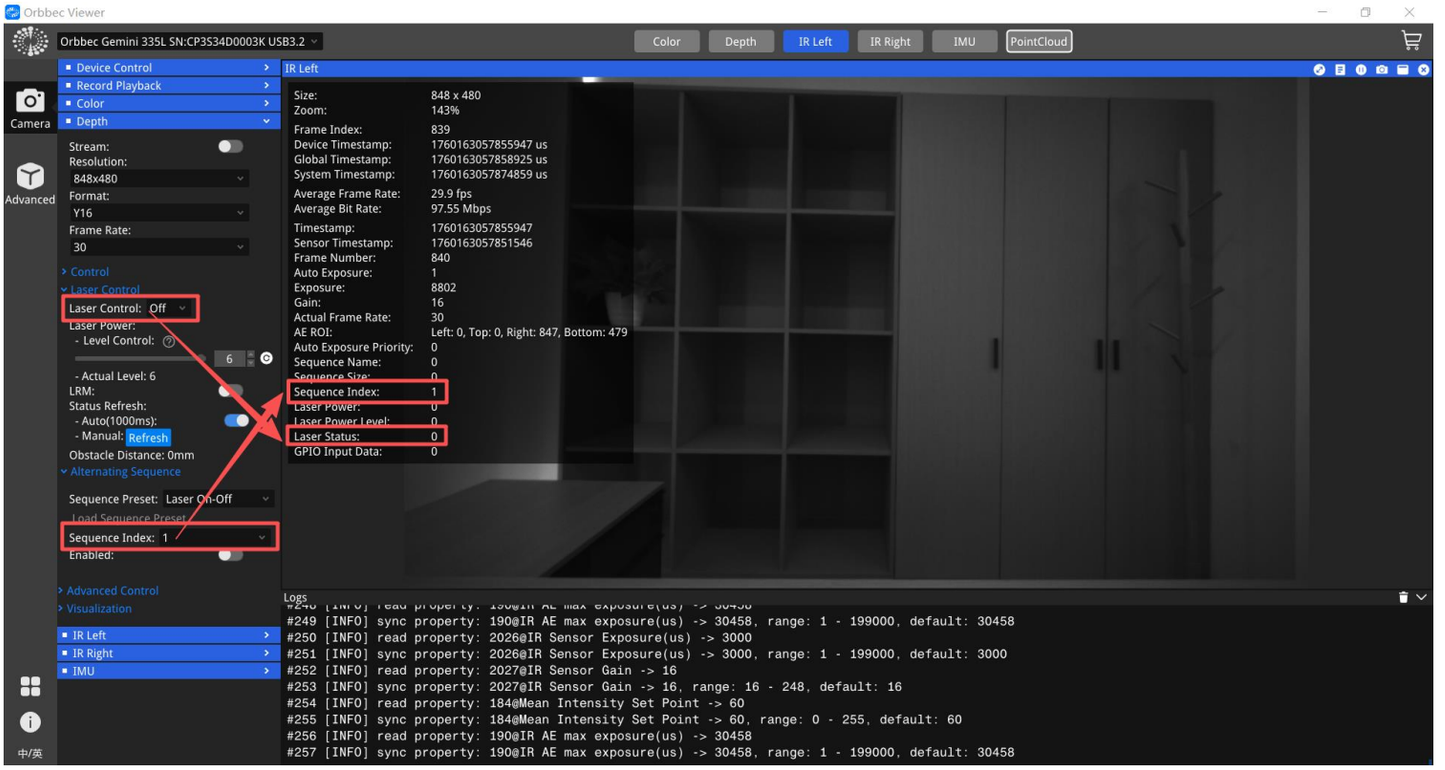


Figure 7-28 Laser OFF Configuration

6) Finally, return to the **"Alternating Sequence"** list and click **"Enable."**
The **Laser On-Off Alternating Sequence Mode** is now active.
Observe the **Metadata List** to confirm Alternating Sequence **Index**, **Exposure**, **Gain**, and **Laser State** values.

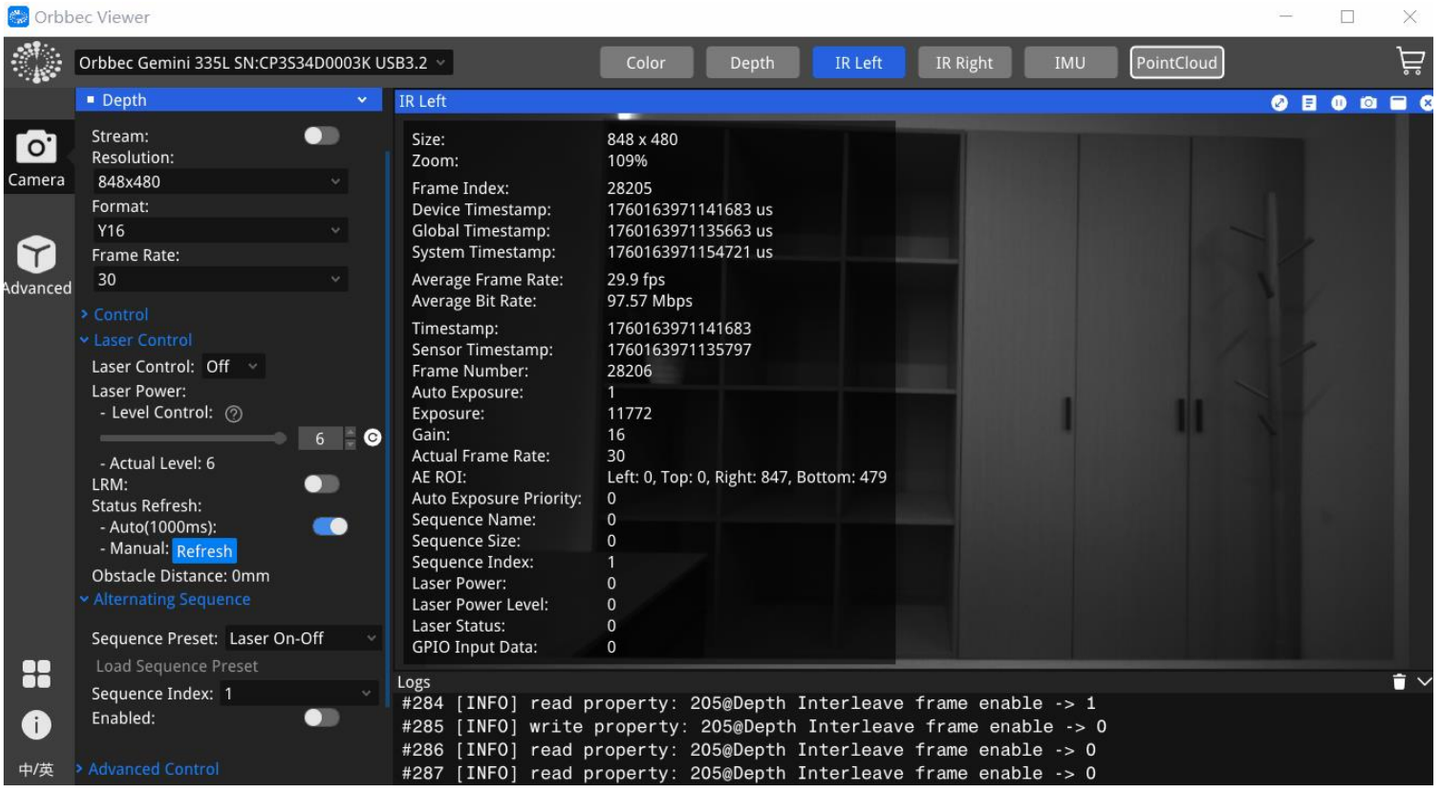


Figure 7-29 Laser On-Off Mode Result

7.4.6 Advanced Control

Supports switching between **Disparity-to-Depth** conversion modes, enabling or disabling **hardware denoising filters**, **software denoising filters**, and configuring **post-processing modules**.

The **Post-Processing Module** includes multiple configurable filters and processing options such as:

- **Downsampling Filter**
- **HDR Fusion**
- **Frame Sequence Filter**
- **Spatial Filter**
- **Temporal Filter**
- **Hole-Filling Filter**
- **Disparity-to-Depth Conversion**
- **Truncation Filter**

For detailed descriptions and parameter ranges of each module, refer to [Use depth post-processing blocks].

7.4.6.1 HDR Fusion

The **HDR Fusion** feature combines two consecutive frames with different exposure settings (long and short exposures) to create a single **High Dynamic Range (HDR) depth image**.

This improves the overall depth quality and enhances details in both high- and low-brightness environments, reducing overexposure and underexposure artifacts.

Steps:

1) Follow the steps in **Section 5 – Quick Start** to connect the device and launch the software, enable **Depth Stream**.
2) Open **Depth → Advanced Control**, enable **Post-Processing** and **HDR Fusion**.

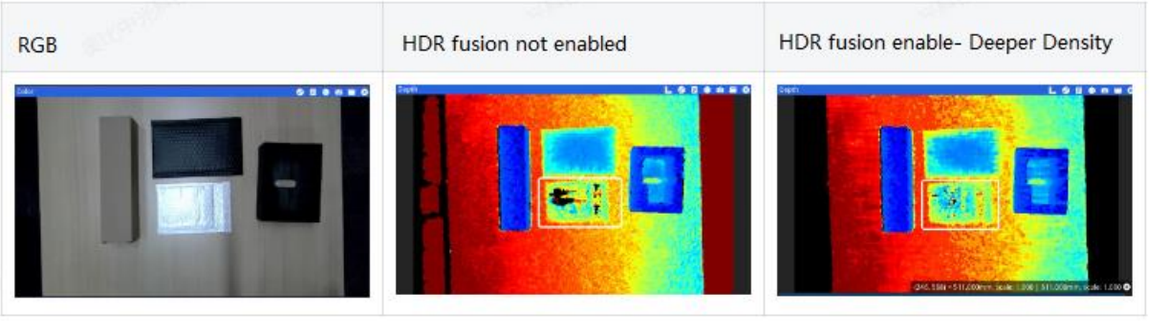


Figure 7-30 HDR Fusion Comparison

7.5 Advanced Mode Configuration

Advanced Mode supports configuration of **Point Cloud Streams**, **Image View**, and **Point Cloud View**.

7.5.1 Point Cloud Stream Configuration

Supports toggling point cloud streams, alignment mode, color-depth alignment (D2C/C2D), resolution matching, frame sync, and camera parameter export.

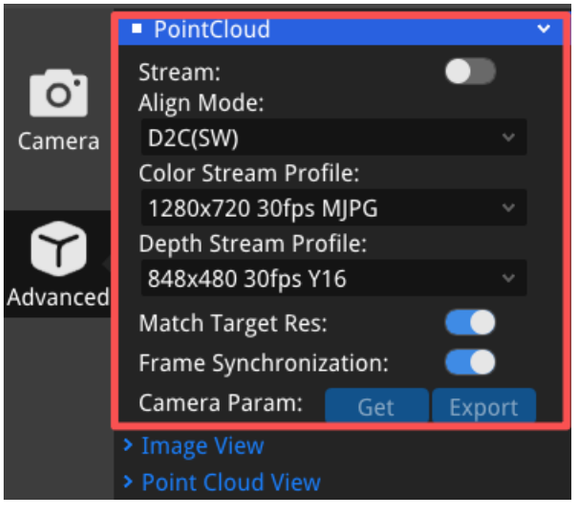


Figure 7-31 Point Cloud Configuration Interface

1) **Alignment Modes:**

- **Disable**
- **D2C (HW)** – Hardware alignment via ASIC (low CPU usage).
- **D2C (SW)** / **C2D (SW)** – Software alignment (higher flexibility).

2) **Match Target Res:**

The **Match Target Res** function ensures that, in **D2C (SW)** alignment mode, the resolution of the **Depth View** is aligned to match the resolution of the **Color View** in the 2D image display.

3) **Frame Synchronization:**

The **Frame Synchronization** function synchronizes the **color** and **depth** image streams, ensuring that their timestamps are aligned to achieve precise temporal consistency between both frames.

4) **Camera Parameters:**

The **Camera Parameters** module supports both **retrieval** and **export** of intrinsic and extrinsic parameters based on the current resolution of the point cloud data stream.

When the current state is **D2C (Depth-to-Color)**:

- The **color** and **depth intrinsic** parameters are identical.
- The **color distortion coefficients** correspond to the actual calibrated values.
- The **depth distortion coefficients** are all set to **zero**.
- The **rotation matrix (R)** is:R=[1,0,0;0,1,0;0,0,1].
- The **translation vector (T)** is:T=[0,0,0].

This means that after D2C alignment, the **depth** and **color** coordinate systems share the same origin.

```
#206 [INFO] Color Intrinsic: fx:610.816 fy:610.95 cx:636.816 cy:362.695 width:1280 height:720
#207 [INFO] Depth Intrinsic: fx:610.816 fy:610.95 cx:636.816 cy:362.695 width:1280 height:720
#208 [INFO] Color Distortion: k1:-0.0311526 k2:0.0361526 k3:-0.0123413 k4:0 k5:0 k6:0 p1:0.000118526 p2:-0.000129336
#209 [INFO] Depth Distortion: k1:0 k2:0 k3:0 k4:0 k5:0 k6:0 p1:0 p2:0
#210 [INFO] Depth to Color rotation:1.000000 0.000000 0.000000 0.000000 1.000000 0.000000 0.000000 0.000000 1.000000
#211 [INFO] Depth to Color translation:0.000000 0.000000 0.000000
```

Figure 7-32 Camera Parameter Retrieval

Steps:

1) Follow the steps in **Section 5 – Quick Start** to connect the device and launch the software (no stream enabled).
2) In **Advanced**, expand the **“Point Cloud”** tab.
3) Click the **“Align Mode”** dropdown list.
   The default setting is **“D2C (SW)”**, which can be changed to other modes as needed.

4) Click the **“Color Stream Configuration”** dropdown list — the default is **“1280×720 30fps MJPG”** , and the **“Depth Stream Configuration”** dropdown list — the default is **“848×480 30fps Y16.”**You may switch to other configurations if required.
5) Click the **“Match Target Res”** button.
   It is **enabled by default** and can be toggled **off** if necessary.
6) Click the **“Frame Synchronization”** button.
   It is also **enabled by default** and can be toggled **off** if needed.
7) Click the **“Stream”** button to start the point cloud stream and view the point cloud visualization.
8) In the **Point Cloud View**, use **Ctrl + Mouse Wheel** to **zoom**,
   Left Mouse Button to **rotate**, and **Right Mouse Button** to **pan** the point cloud.

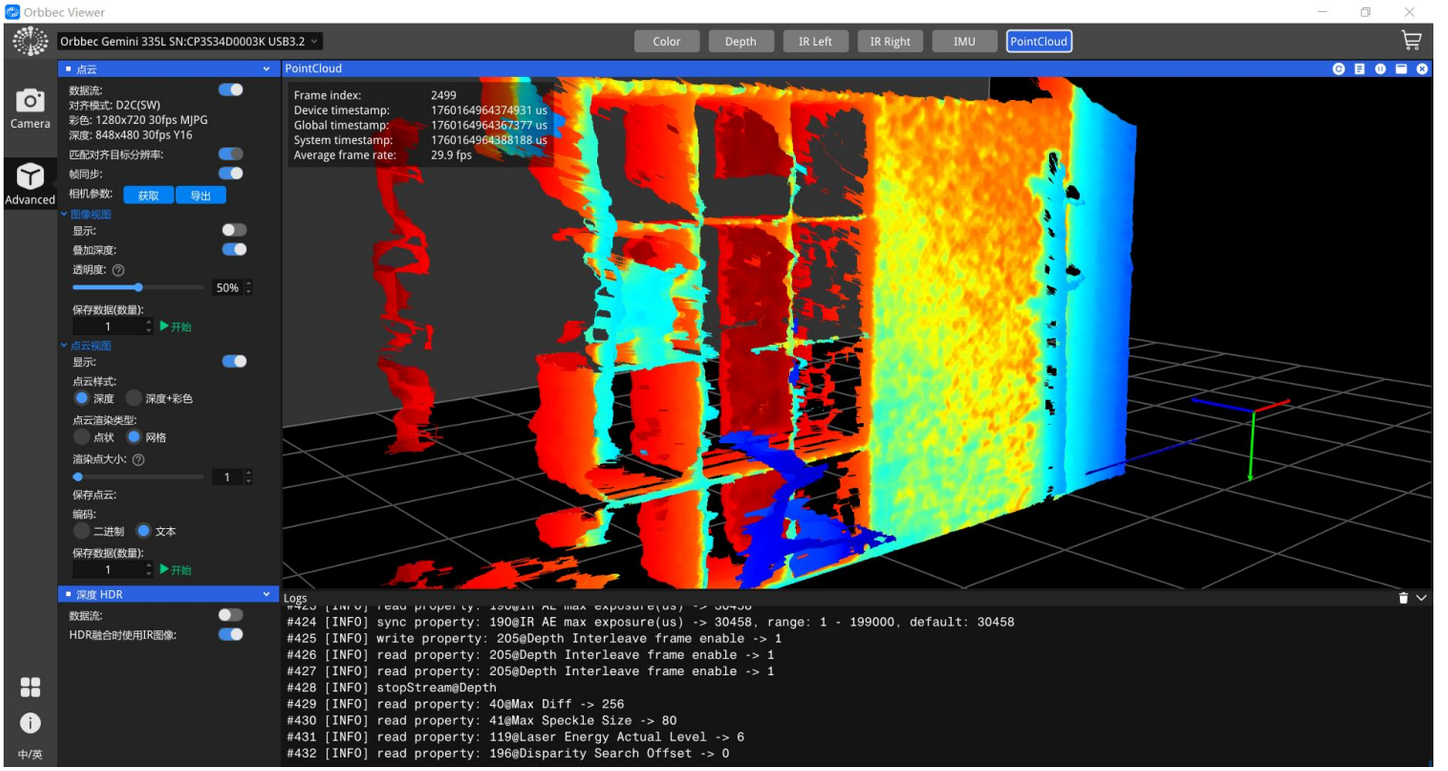


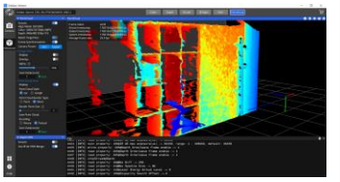
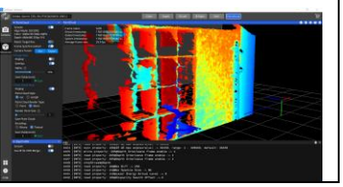
Figure 7-33 Point Cloud View Example

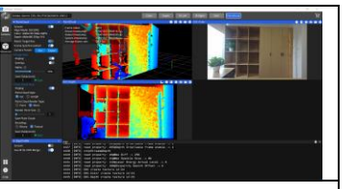
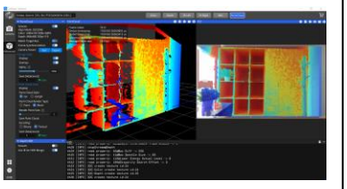
7.5.2 Image View

Displays combined **Depth-to-Color (D2C)** or **Color-to-Depth (C2D)** overlays, with adjustable transparency and saving options.

You can save image-depth pairs with timestamps to logs.

Table 7-2 Image View Display Modes

Display Status	Overlay Depth Status	Description	Example View
Off	Off / On	Displays only the point cloud view.	**Status 1:**  **Status 2:** 

On	Off	Displays the point cloud, D2C color view, and depth view.	
On	On	Displays the point cloud and overlaid color–depth aligned (D2C) composite view.	

7.5.3 Point Cloud View

Displays 3D point clouds with adjustable rendering options:

- **Point Cloud Style:** Depth-only or Depth+Color.
- **Rendering Type:** Points or Mesh.
- **Point Size:** Adjustable.
- **Save Data:** Save depth, color, and point cloud files in binary or text format.

7.6 Rendering Video Frames (Ensuring Every Frame is Rendered)

When rendering video frames in **Orbbec Viewer v2**, the default frame rate is typically **15 fps**. In certain testing scenarios, this default value may lead to misunderstandings.

For example, when the user configures **Software Triggering** with **100 frames per trigger**, due to timing limitations, the system may capture frames **0 to 97** (a total of 98 frames),and the last two frames might not be rendered.

This could make it appear as though the **manual trigger function** is malfunctioning.

You can ensure that every frame can be rendered by configuring the config. ini file.

Steps:

1) Follow the steps in **Section 5 – Quick Start** to connect the device and launch the software (no stream enabled).
2) Expand the **“Device Control”** tab and open **“Synchronization Configuration.”** Set the synchronization mode to **Software Triggering**,configure the **frame count per trigger** to **100**,and click **“Write”** to apply the settings.
3) Enable the **Color** and **Depth** streams,and open the **Metadata List** — at this point, no data stream will be shown yet.
4) Expand the **“Software Trigger Control”** section and click the **“Trigger Once”** button under **Manual Trigger**.
5) Observe that both the color and depth data streams are triggered.However, the **frame sequence number** may show only **97 frames**,indicating that the last two frames were not rendered.

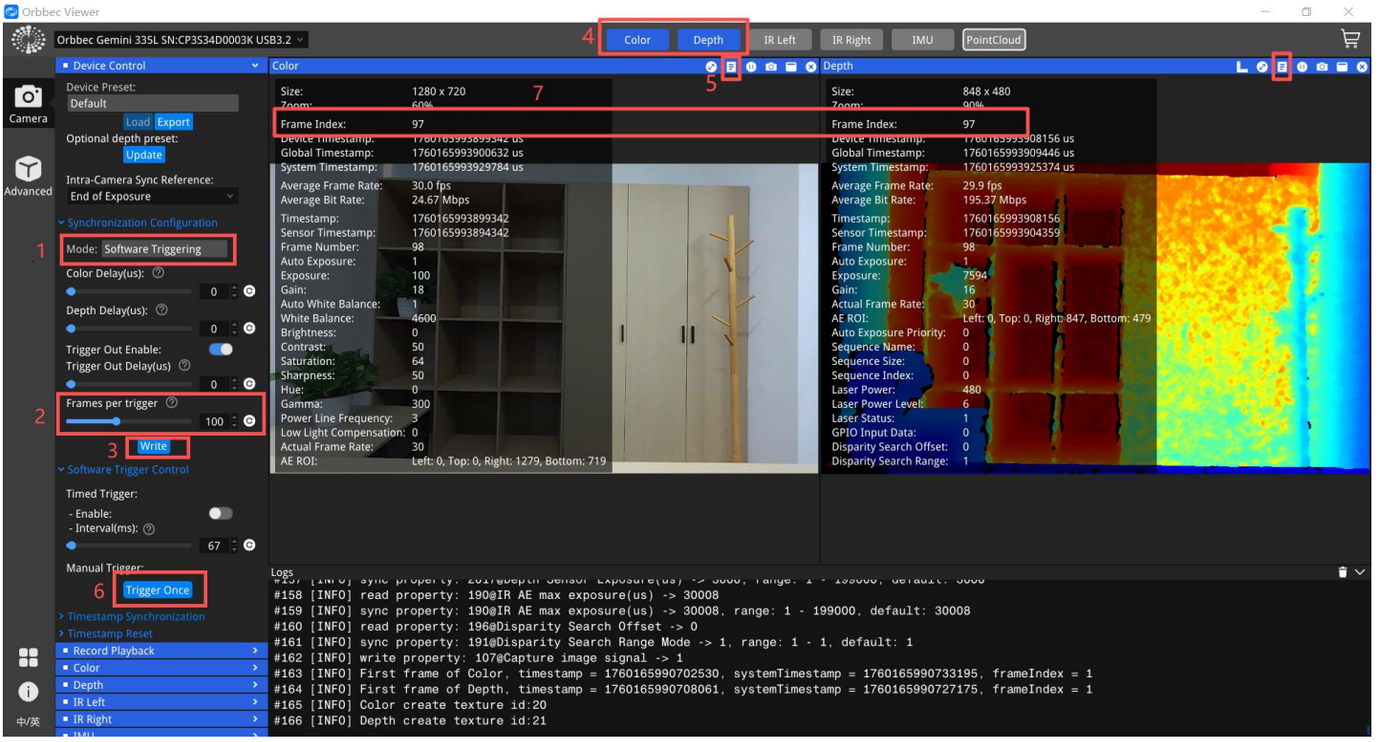


Figure 7-34 Rendering Video Frame Example

6) To ensure that all frames from 0 to 99 are rendered correctly, follow these steps:

7) Locate the Orbbec Viewer v2 installation directory,open the config folder, and find the config.ini file. The default path is:

```
OrbbecViewer_v2_XXX/config/config.ini
```

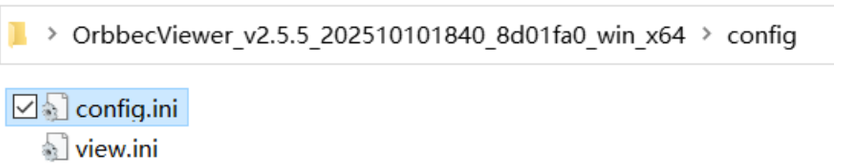


Figure 7-35 Configuration File Path

8) Open the config.ini file and find the [Config] section.

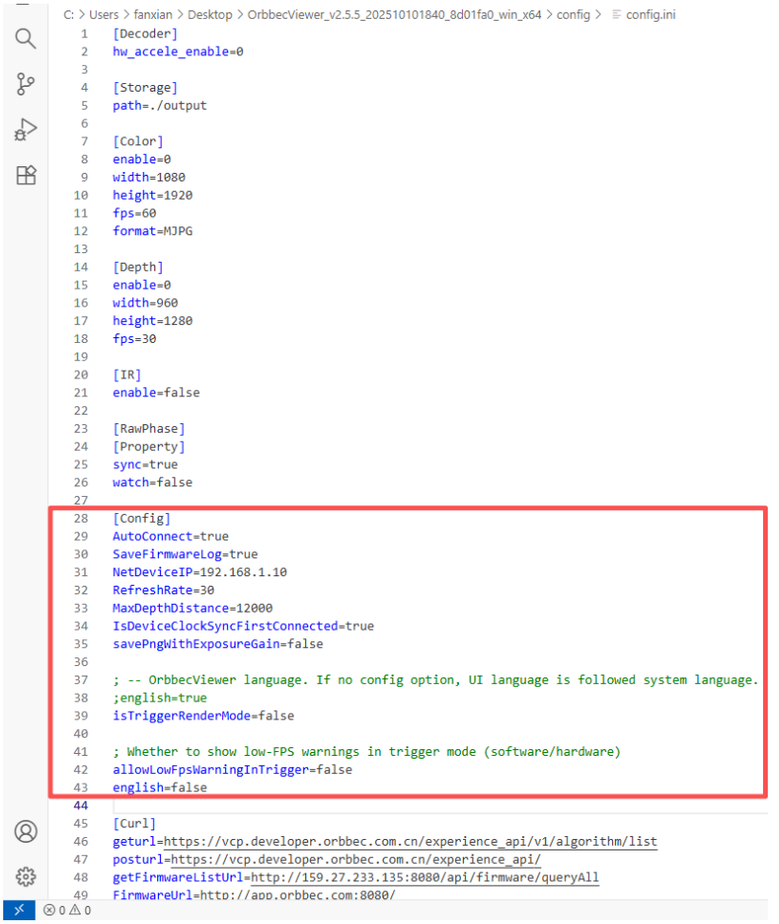


Figure 7-36 Configuration Node Contents

9) Locate the configuration item:

```
isTriggerRenderMode=false
```

Change it to:

```
isTriggerRenderMode=true
```

When the frame rate is **30 fps or below**, this setting ensures that nearly all frames are rendered.

10) If the frame rate is greater than 30 fps, an additional modification is required.

11) In the same [Config] section, find:

```
RefreshRate=30
```

Change this value to 60 or higher (recommended not to exceed 100).

A higher refresh rate increases performance requirements on the computer.

```
RefreshRate=60
```

12) Save the modified configuration file and restart Orbbec Viewer for the changes to take effect.

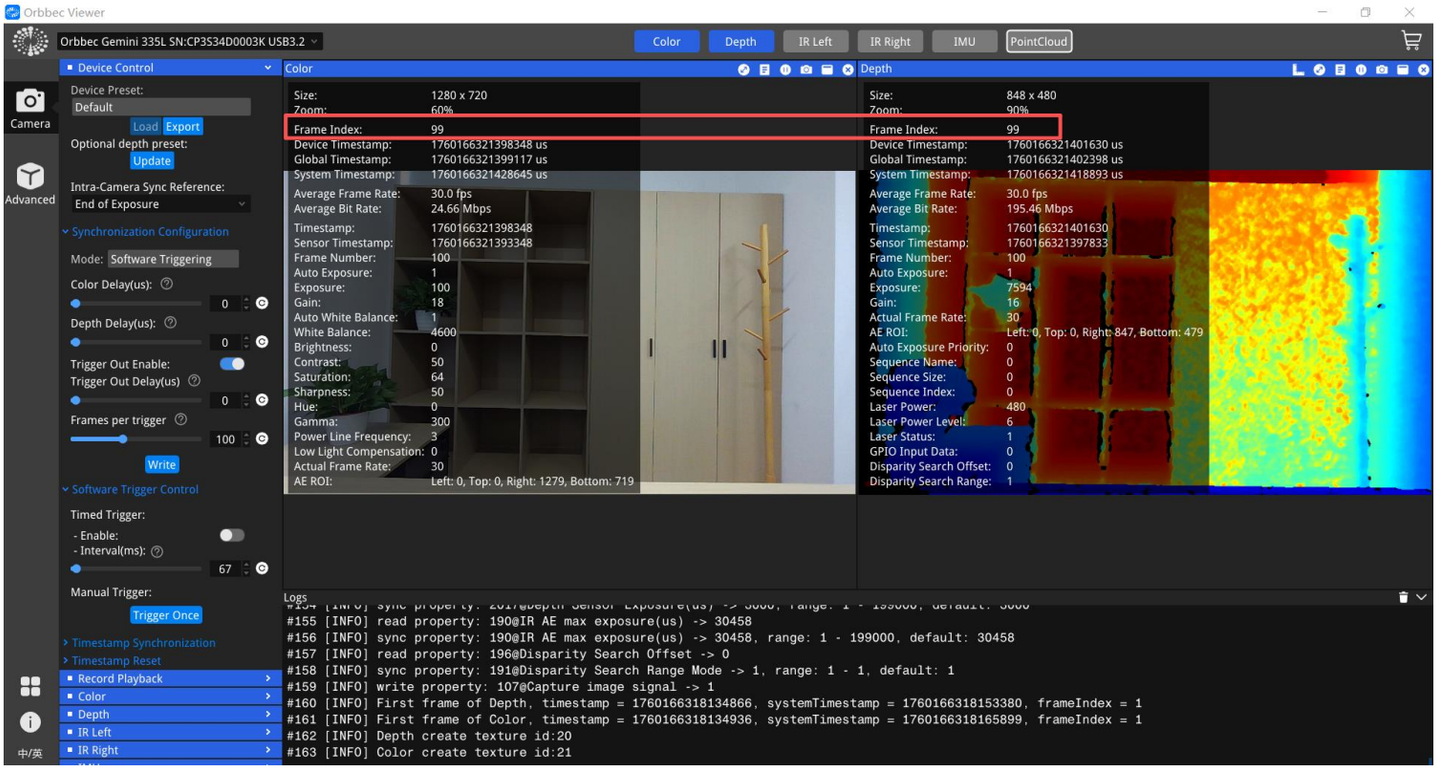


Figure 7-37 Render Adjustment Example

7.6.1 Rendering Operation Demonstration

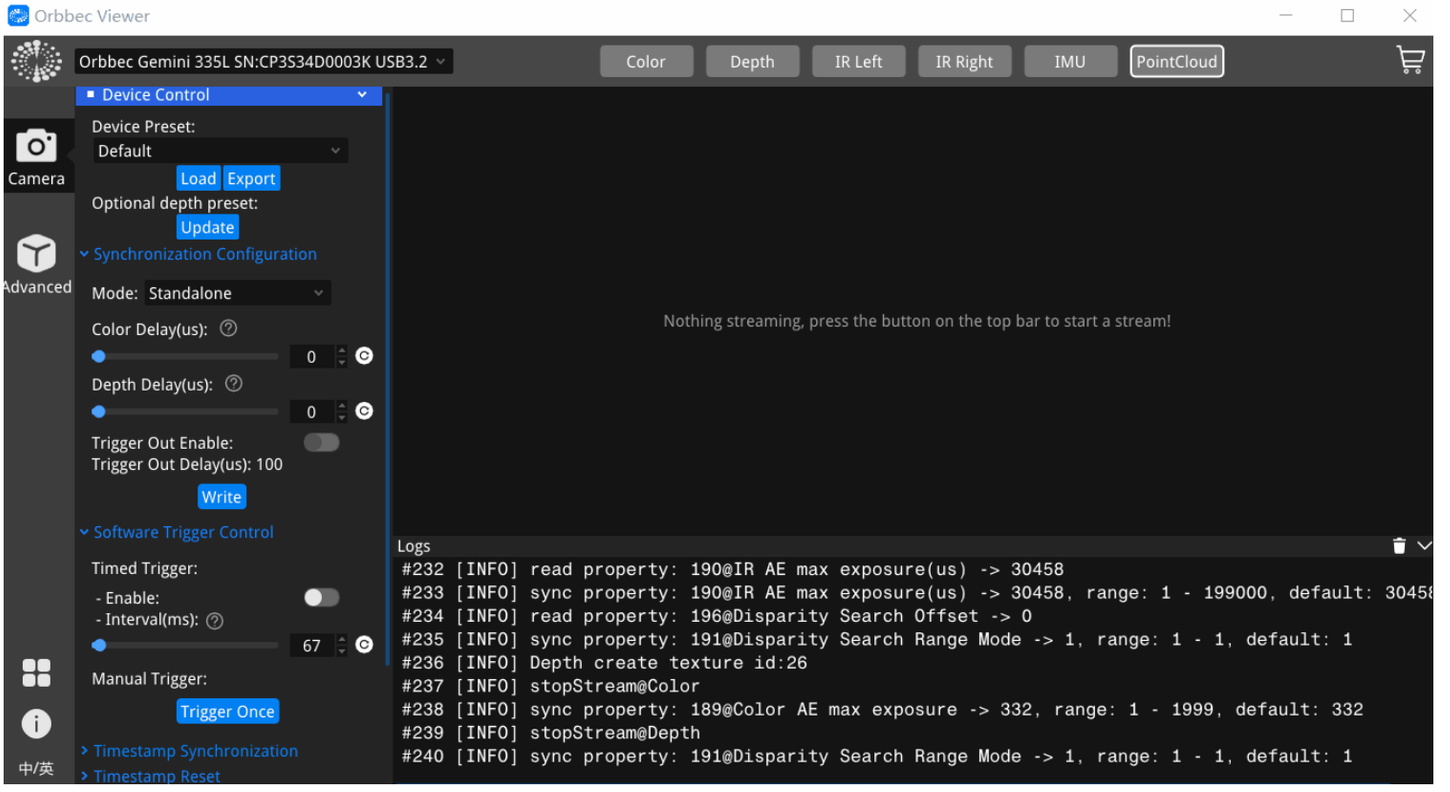


Figure 7-38 Rendering Operation Demonstration

8 Explore the unique features of cameras

8.1 Ethernet device connection to view IP address

1) Follow the steps in **Section 5 – Ethernet Quick Start** to connect the device and launch the software (no stream enabled).
2) In **Device Management**, view connection info — model, SN, and connection type.

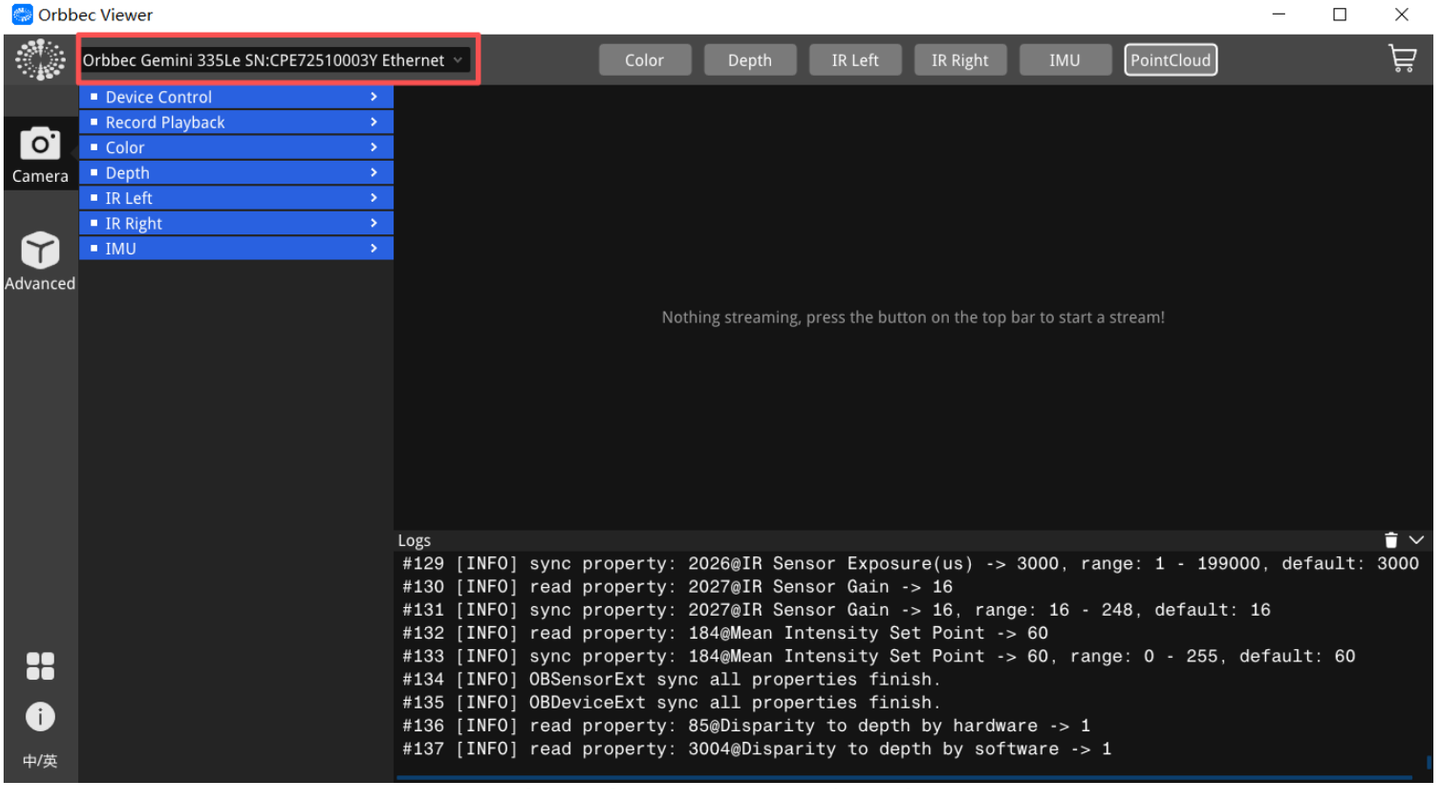


Figure 8-1 Ethernet Device Info

3) Expand the **Device Connection** dropdown to view multiple devices if connected.

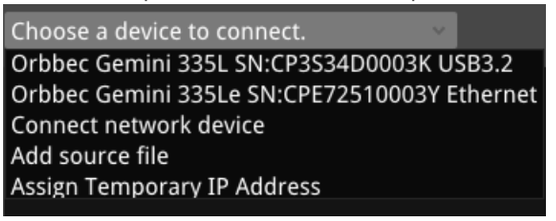


Figure 8-2 Multi-Device Selection

4) Hover over a device entry to see **Name**, **PID**, **SN**, **UID**, **Connection Type**, and **IP Address**.

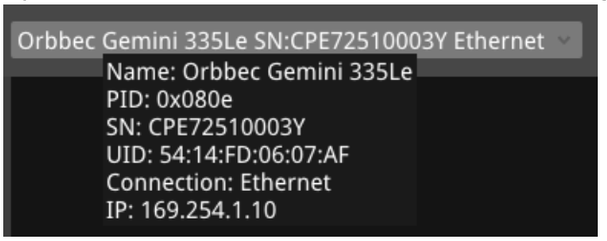


Figure 8-3 IP Address Display

8.2 Usage Limitations of GMSL Cameras

GMSL cameras interface with various deserializer chips such as MAX9296 and MAX92716. Orbbec GMSL cameras support multiple streams including depth, color, IR, and IMU data, but certain usage limitations apply:

- Two cameras connected on the same MAX9296, MAX96712 LinkA/B, or MAX96712 LinkC/D have the following limitations:
  - Before driver version v12.02, there was a restriction that the RGB of one camera and the right IR of another camera could not stream simultaneously. After driver version v12.02, the restriction was modified to that the RGB of one camera and the left IR of another camera cannot stream simultaneously.
  - Before driver version v12.02, there was a restriction that the DEPTH of one camera and the left IR of another camera could not stream simultaneously. After driver version v12.02, the restriction was modified to that the DEPTH of one camera and the right IR of another camera cannot stream simultaneously.
  - The combined maximum number of active streams from both cameras is limited to four (satisfying the above two conditions ensures compliance).

For further known limitations, please refer to Usage Limitations of Orbbec GMSL Cameras.