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## **Credimension Viewer instruction manual**

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<b>Revise the historical version</b>			
date	version	description	author
2021/12/03	V1.0.0	CS30 instructions for use	Daisy
2021/12/07	V1.0.1		Daisy
2022/3/18	V1.0.2	Added adjustment distance and integration time	Daisy
2022/7/26	V2.0.0	Credimension 3.0 (V3.0 SDK + RGBD function) version instructions	Daisy
2022/12/1	V3.0.0	The GUI supports enabling CS30 dual-band or CS30 single-band modules and optimizing and updating related functions	Daisy
2023/2/17	V3.1.0	Added filtering function and distortion removal function	Daisy
2023/5/15	V3.2.0	CS30+CS20GUI description	Daisy
2023/5/22	V4.0.0	GUI 4.0 instructions	Daisy
2023/7/10	V4.0.1	GUI4.0 adds CS20-P & CS40 devices	Daisy

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## 1. Introduction to the tool

Tool name: Credimension Viewer v4.0

Tool description: Credimension Viewer v4.0 is a CS20/CS30/CS20-P/CS40 multi-machine series of Windows demo GUI tools. This tool is mainly used to obtain, display, and save Depth, IR, Pointcloud, RGB(CS30), RGBD (CS30) information, and at the same time supports viewing device basic information, setting resolution, integration time and other functions, and supports 2 and more devices connected at the same time.

## 2. Installation instructions

### 2.1. System Requirements

Currently, Credimension Viewer 4.0 supports window10 and window11.

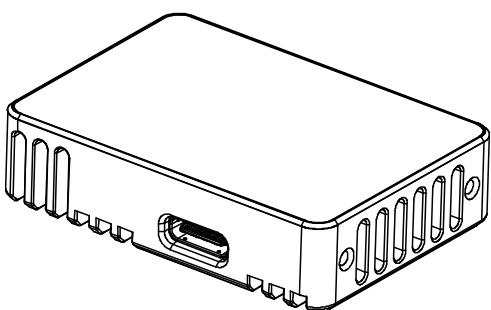
### 2.2. Credimension Viewer installation

Credimension Viewer is a green version and does not require a separate installation.

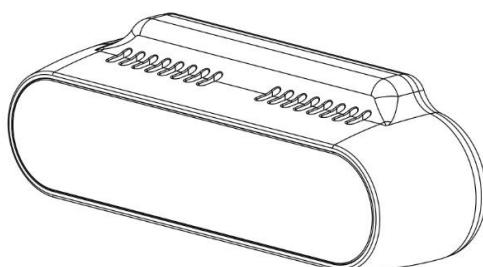
名称	修改日期	类型	大小
log	2023/5/15 13:36	文件夹	
parameters	2023/5/16 10:09	文件夹	
platforms	2023/4/26 11:42	文件夹	
styles	2023/4/26 11:42	文件夹	
translations	2023/4/26 11:42	文件夹	
ChangeLog.txt	2023/4/24 16:38	文本文档	1 KB
concr140d.dll	2023/3/21 11:11	应用程序扩展	714 KB
configuration.ini	2023/5/16 10:13	配置设置	1 KB
Credimension.exe	2023/4/26 11:41	应用程序	1,448 KB
csreconstruction2.0.dll	2023/4/24 14:56	应用程序扩展	15,118 KB
D3DCompiler_47.dll	2014/3/11 18:54	应用程序扩展	4,077 KB
libEGL.dll	2020/11/6 13:30	应用程序扩展	25 KB
libGLESv2.dll	2020/11/6 13:30	应用程序扩展	3,306 KB
msvcp_win.dll	2021/6/1 16:10	应用程序扩展	620 KB
msvcp110_win.dll	2021/4/23 13:21	应用程序扩展	548 KB
msvcp140.dll	2021/7/27 9:54	应用程序扩展	553 KB
msvcp140_1d.dll	2023/3/21 11:11	应用程序扩展	30 KB
msvcp140d.dll	2021/6/3 9:30	应用程序扩展	899 KB
msvcr100.dll	2011/6/11 1:15	应用程序扩展	810 KB
msvcr.dll	2021/4/23 13:21	应用程序扩展	623 KB
opencv core440.dll	2022/11/25 15:39	应用程序扩展	3,956 KB

### 2.3. Hardware Connections

Connect the CS20/CS30 to the USB interface on the PC side via the data cable:



Schematic diagram of the appearance of CS20



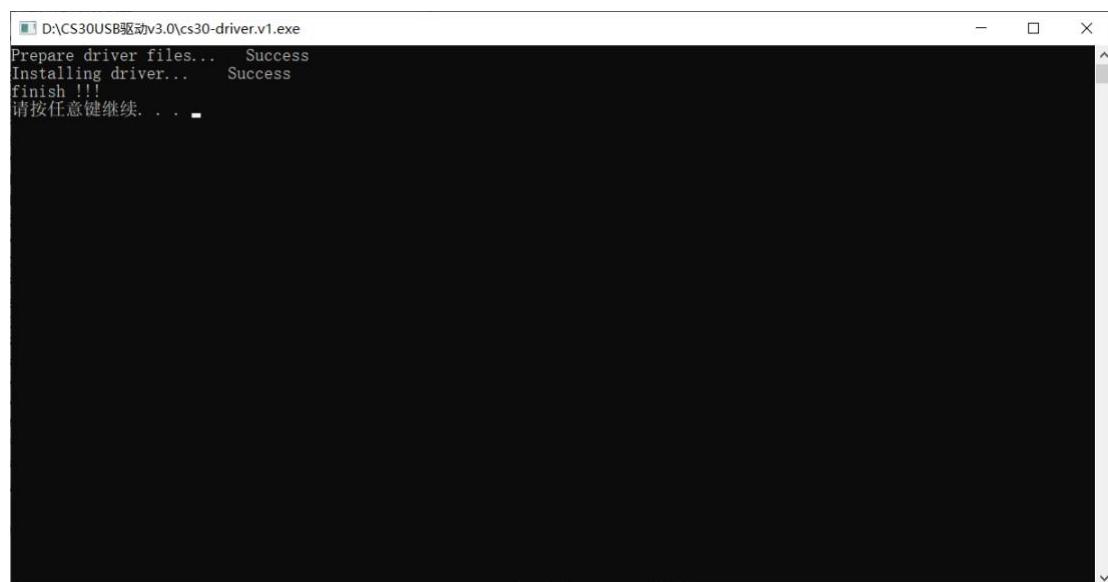
Schematic diagram of the CS30 appearance

Note: Before running the Credimension Viewer version 4.0 tool for the first time to open CS30 (if the computer has previously run Credimension Viewer v3.0 and installed the driver, you need to install the driver first, and the installation steps are as follows:

Download the driver locally:



Connect the CS30 module to the PC, double-click the cs30-driver.v1 file to install the driver, wait for about 1 minute to appear: Please press any key to continue... As shown in the following figure, the installation is complete



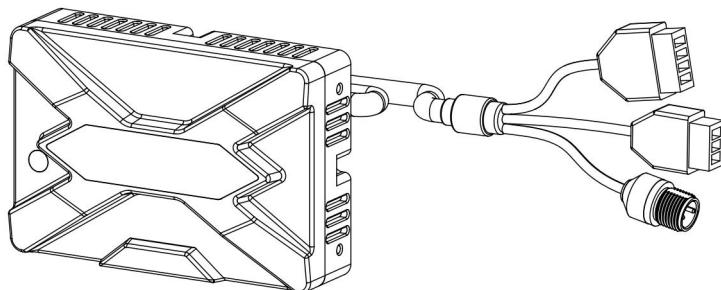
At this point, the current module can be recognized in the device manager, as shown in the figure below, and the device manager shows synexens CS30 as the driver installation is complete.



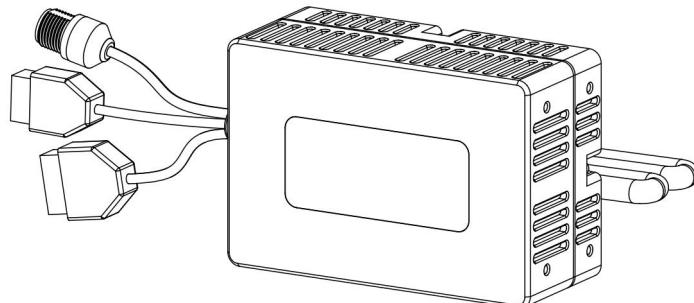
After the driver installation is complete, or the driver is directly connected to the device before it has been installed. CS30 device normal connection (after connecting the device, you need to have about 5S computer connection response time, when the device manager list appears as shown in the above figure is the connection is successful, CS20 does not need to install the driver, connect the device around 5S device manager list - > camera CS20 Camera appears to be successfully connected)



CS20-P&CS40 devices for TCP connections:



Schematic diagram of the appearance of CS20-P

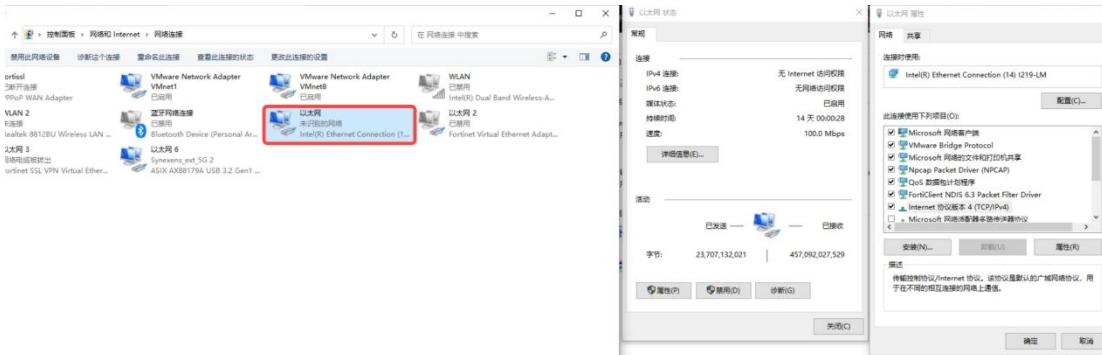
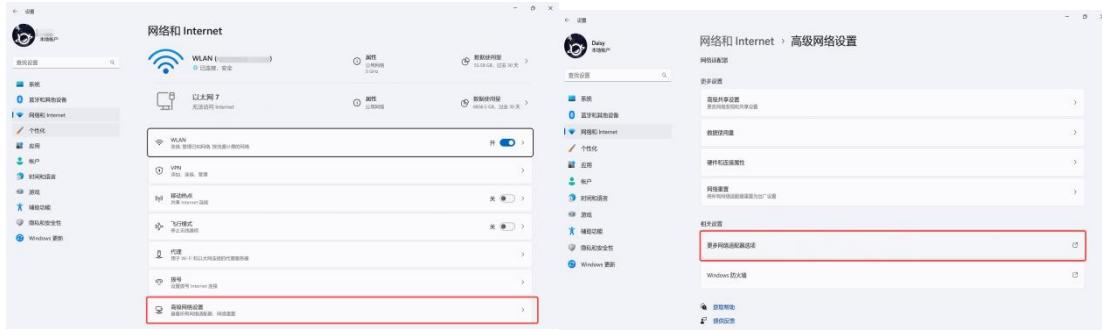


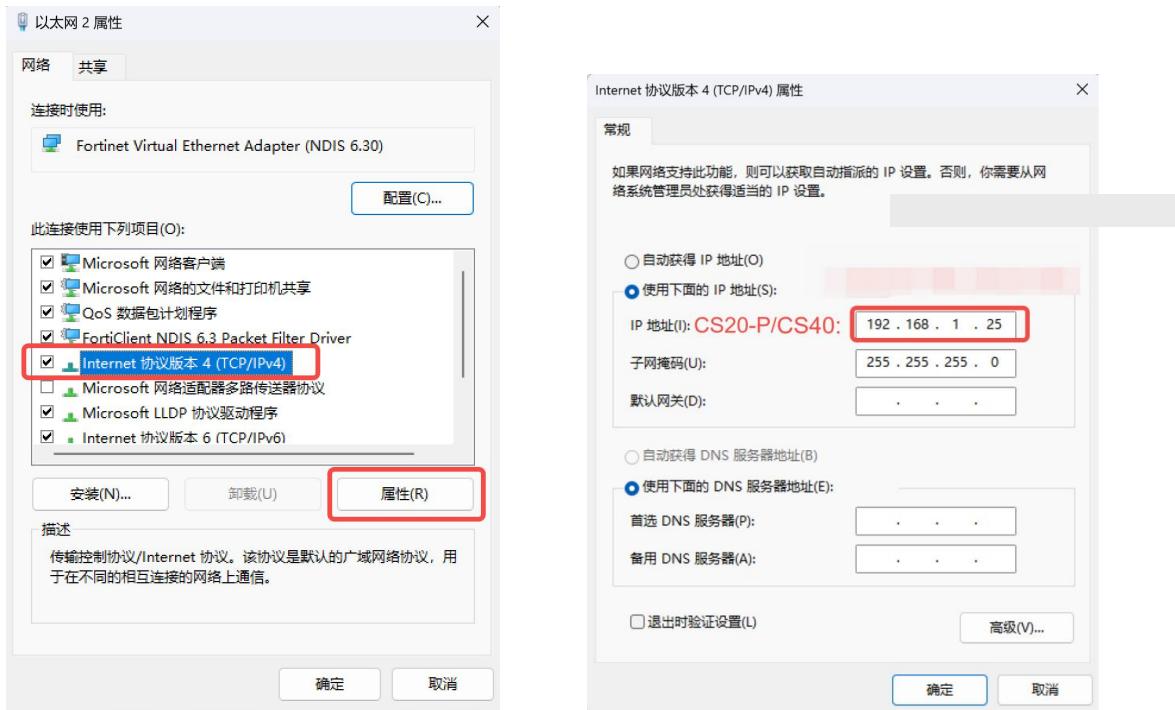
Schematic diagram of the appearance of CS40

CS20-P / CS40 Connect the power supply and connect to the network, connect to the computer, turn on the network and Internet in the computer, set more network adapter options, select the network added

after the current connected device Right-click Properties - > select IPv4 Click Properties Select Use the following IP address: CS20-P/CS40 configuration IP address is: 192.168.1.1~100, any number between 1 and 100, as shown in the figure below,

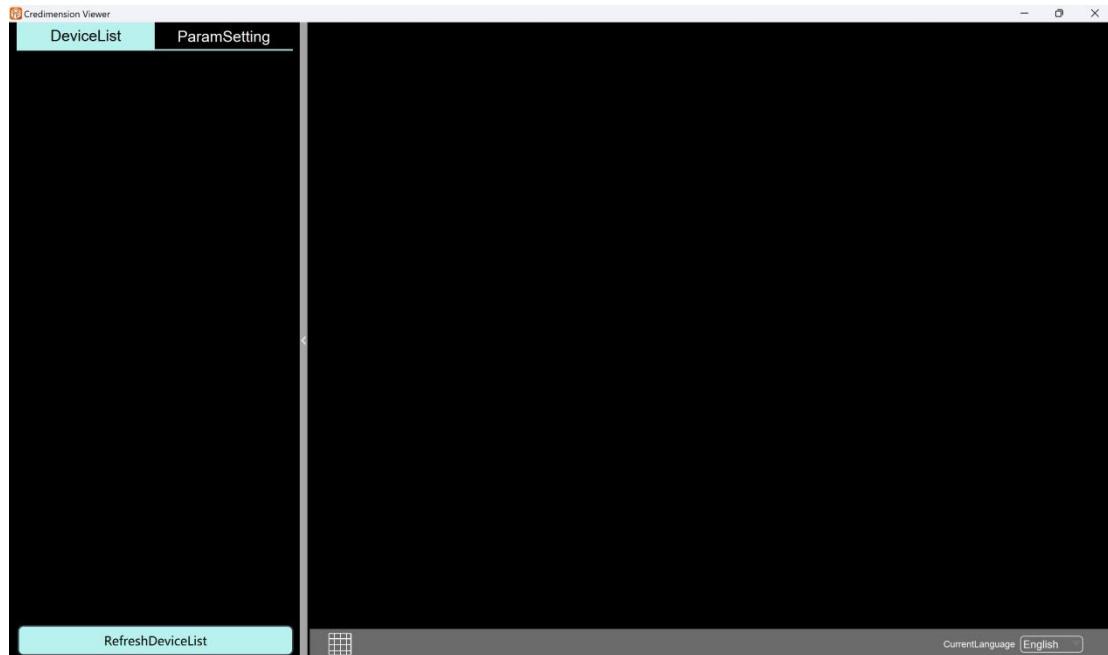
(Note: After the network port is connected to the computer, you need to wait for the response time of about 5S to appear in the following figure to frame the Ethernet information, and the configured IP is the IP corresponding to the current device)





The following example shows the example of connecting two modules at the same time

Run the Credimension Viewer tool (double-click the Credimension.exe executable file)



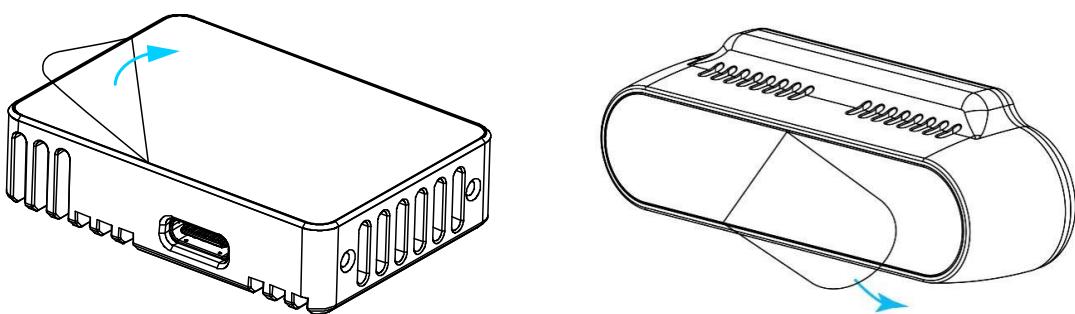
Note: Before opening, you need to turn off the camera turned on in the computer, otherwise it will occupy this device and cause no screen

display.

**Notes on connecting devices:**

1. Do not use USB under one bus when accessing, try to have a separate USB for each one. For information such as the number of devices that can be connected to the specific computer configuration, please refer to 4. Examples of connected devices
2. There may be insufficient power supply to the motherboard, in which case it is necessary to connect the hub external power supply to the module.
3. CS20 runtime will download the internal reference file (about 60S) first, it is best to wait for the internal reference file to be downloaded before turning on another device, whether the internal reference file is downloaded can check the parameters directory under the GUI (resolution + SN number named file)
4. When the CS20/CS30/CS20-P/CS40 device does not flash the SN number, the program protection mechanism restricts the device from turning on the device, so the connected device needs to burn the SN number before running, and the current can be opened.

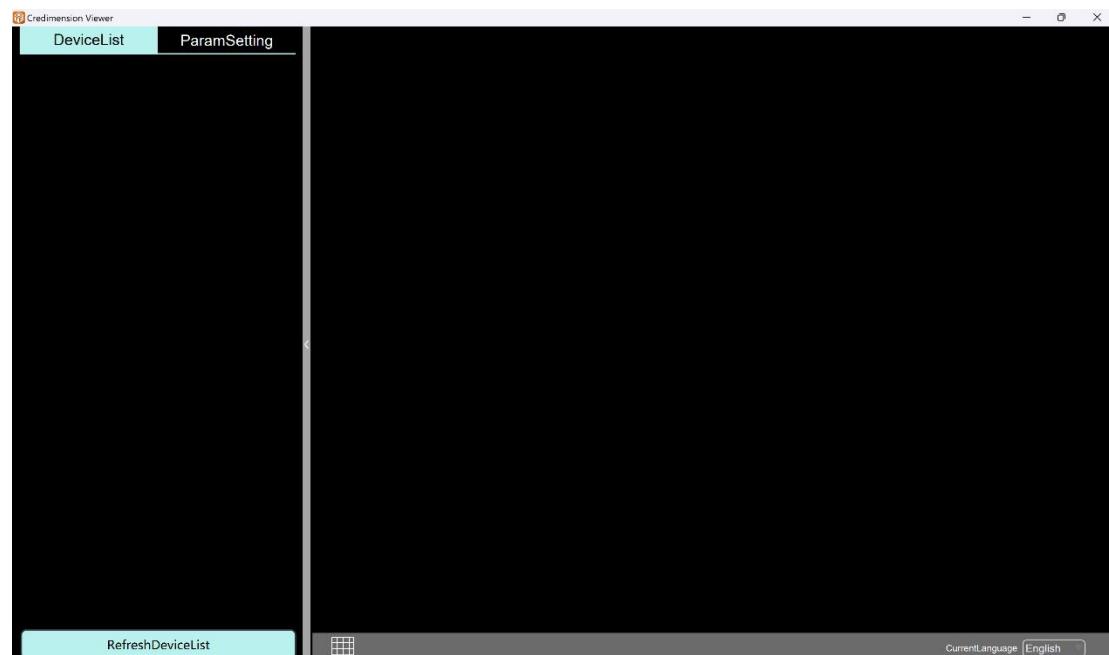
Tips: Please tear off the protective film on the CS20/CS30 module glass cover before use, and use it as shown in the figure below, if there is no protective film, this tip can be ignored



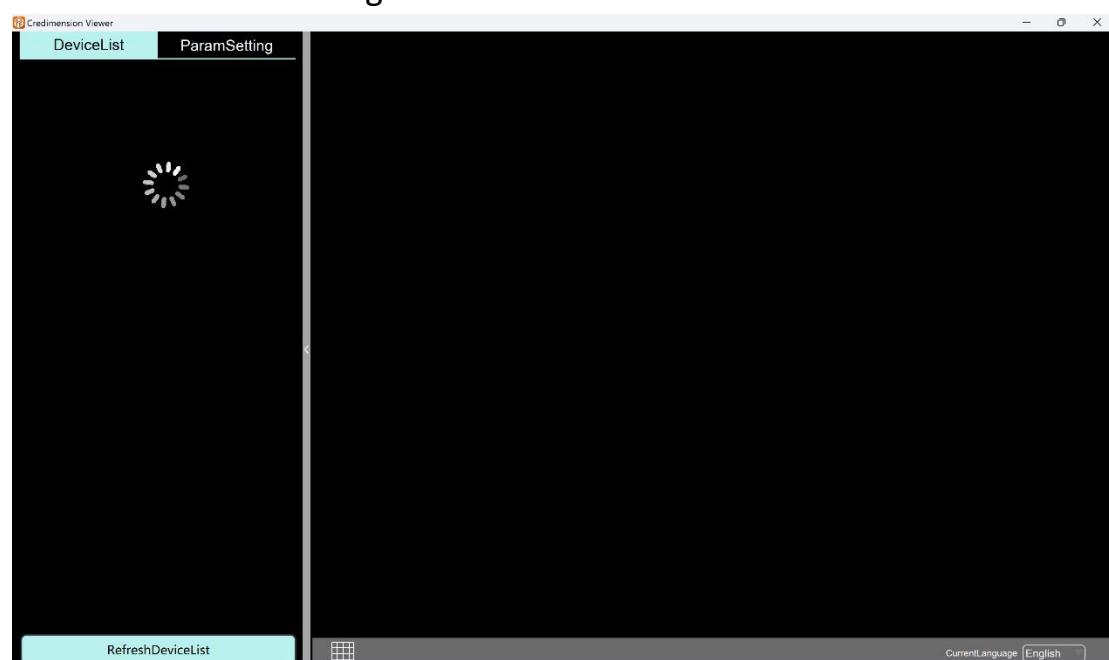
### 3. Instructions for use

#### 3.1. Turn on the device

Click the Refresh Device List button as shown in the figure below, and the refresh status appears on the left side to display the list of currently connected devices around 5S.



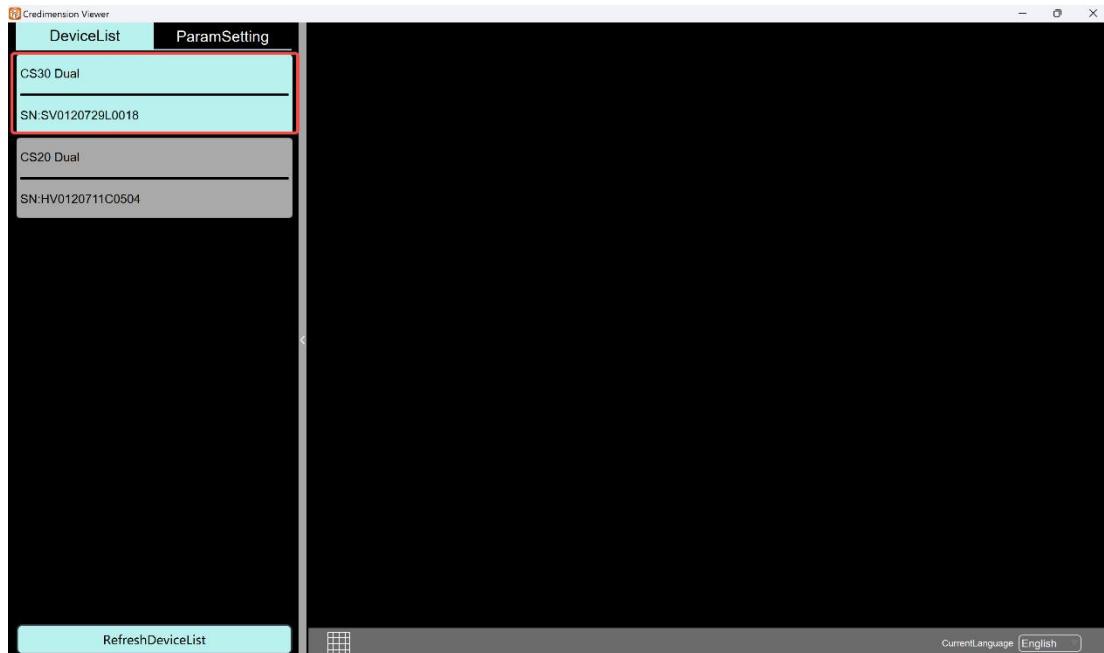
Device list refreshing:



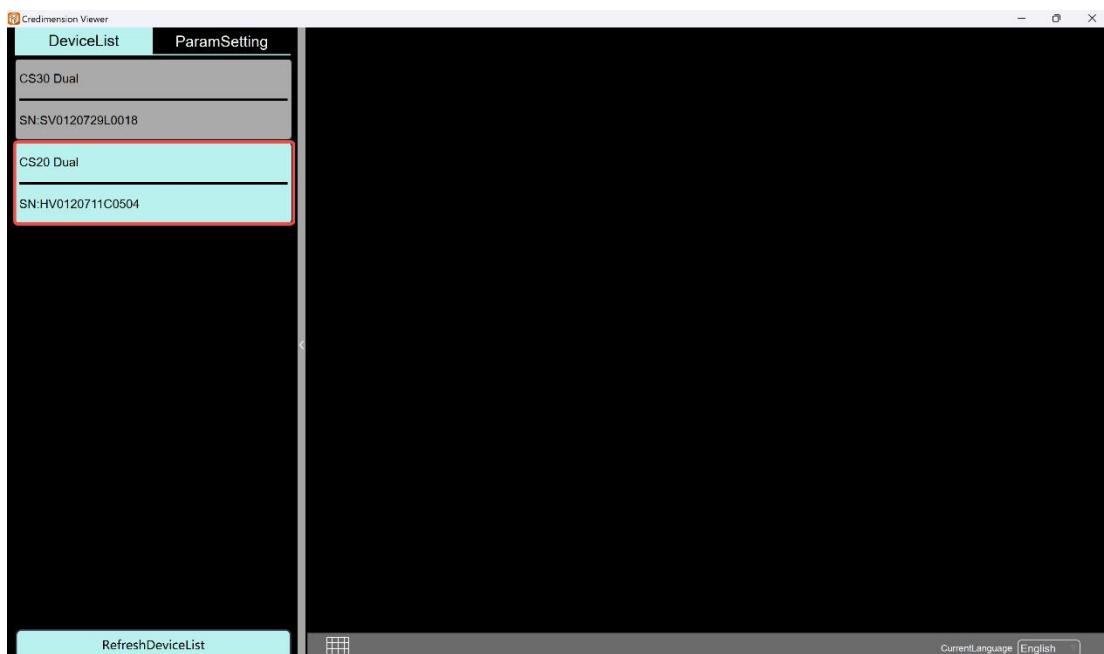
Display the device list (currently connect CS20 dual-band + CS30

dual-band module as an example):

When connecting one device, the current device is selected by default (blue background), when two devices are connected, the first device is selected by default, gray is unchecked, and the selected module is CS30 Dual (dual band), and the device SN number is: SV0120729L0018



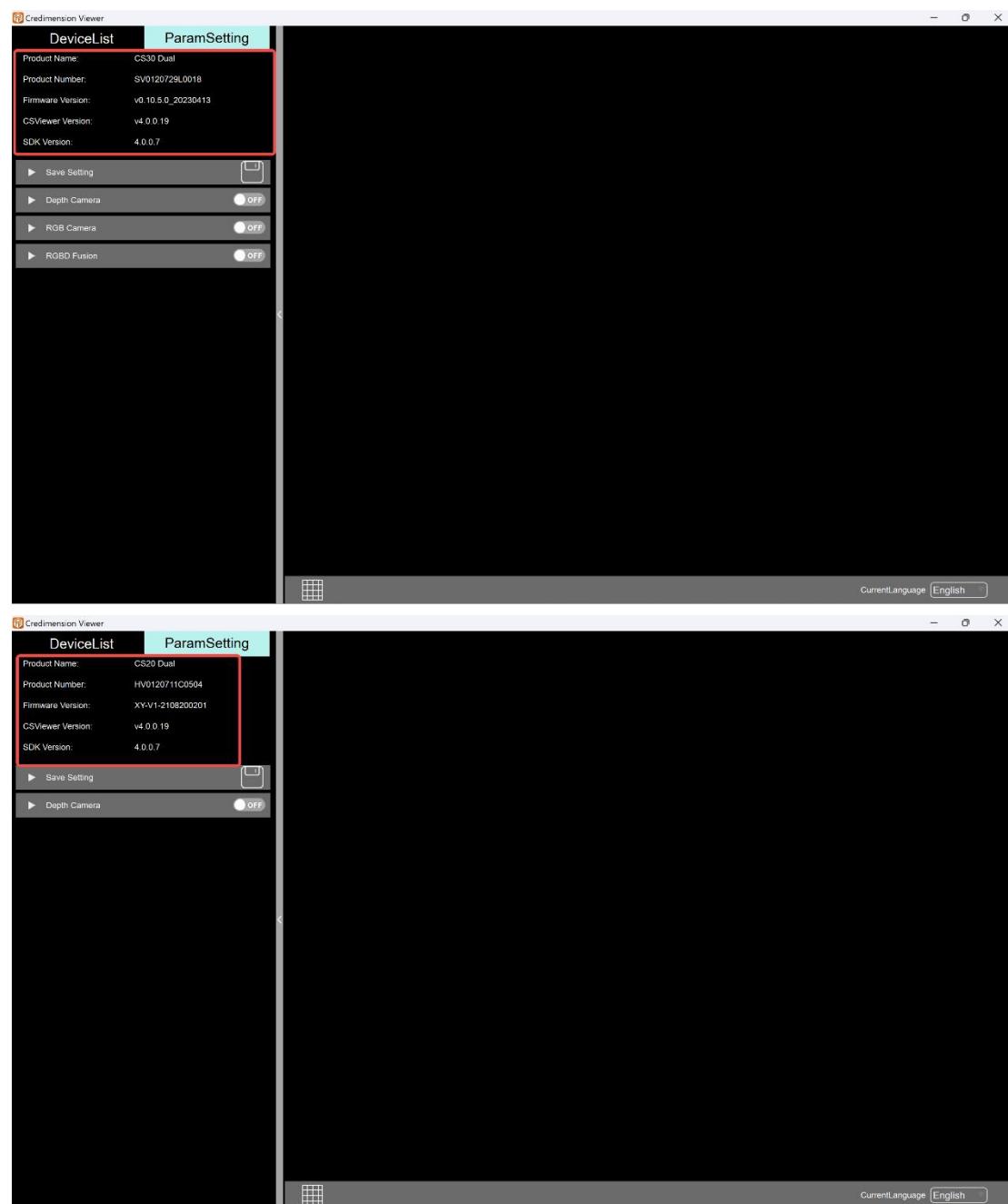
The selected device is CS20 Dual (dual band), and the device SN number is: HV0120711C0504



### 3.2. Obtain device information

After selecting a device, click ParamSetting to display the information of the currently selected device, and you can perform operations such as opening and closing the current device

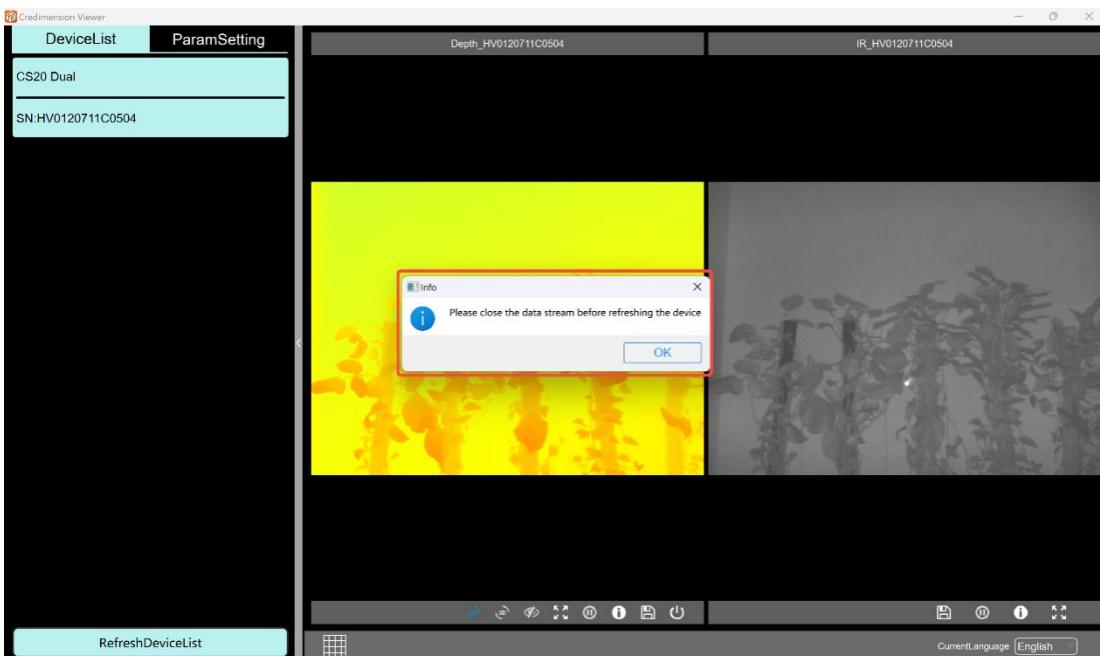
Includes: device name, device number (SN number), SDK version, firmware version, etc.



### 3.3. Introduction to Auxiliary Tools

#### 3.3.1. Refresh the device list

If no devices are in the stream, click Refresh Device List to display the currently connected devices in the left device list column. If there are currently devices that are in the open stream, please close the devices in the open stream and refresh them again.

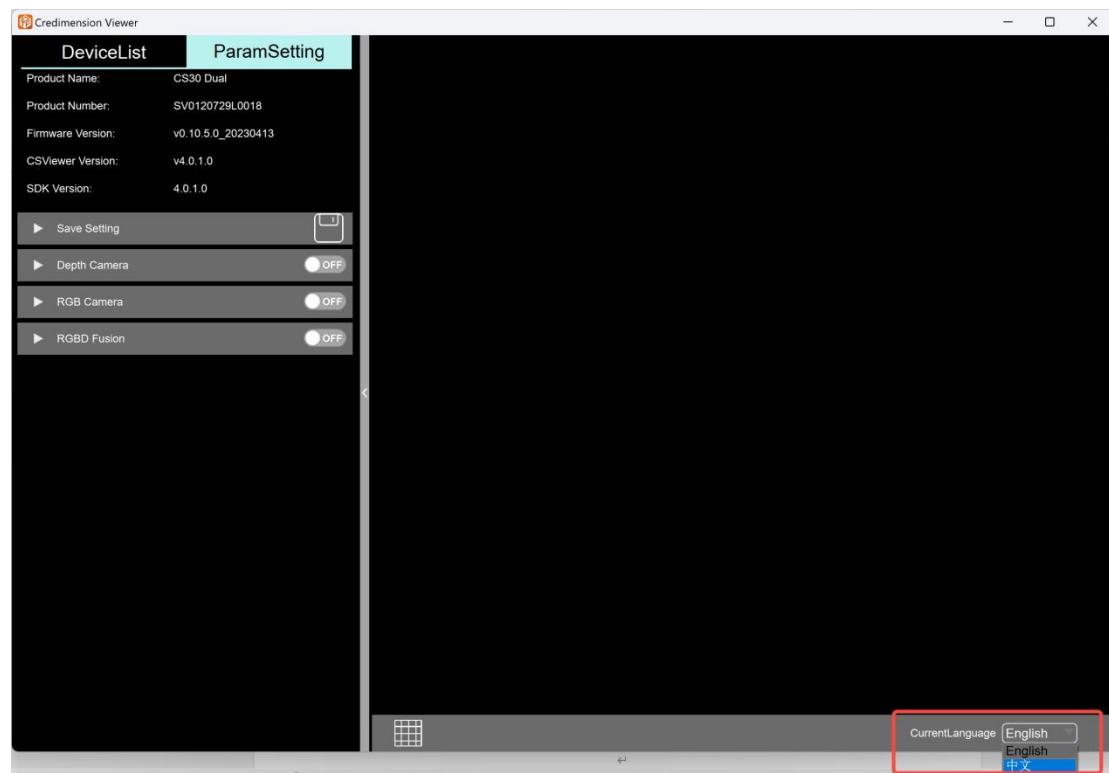


When the device connection process is interrupted and the device is already in the device list, a prompt box will prompt that the current device has been removed, click the OK button and the device that is interrupted from the connection will no longer be displayed in the list.



#### 3.3.2. Switch between Chinese and English

The lower right corner of the tool shows the current language, which can support switching Chinese/English; The default is English

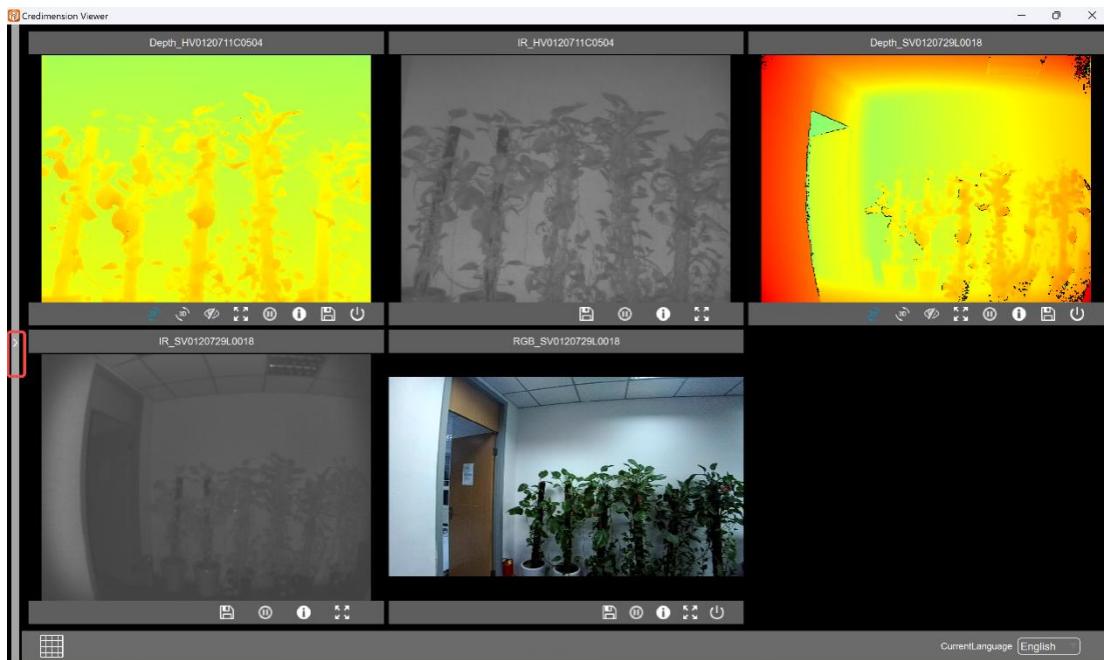


### 3.3.3. Window layout settings

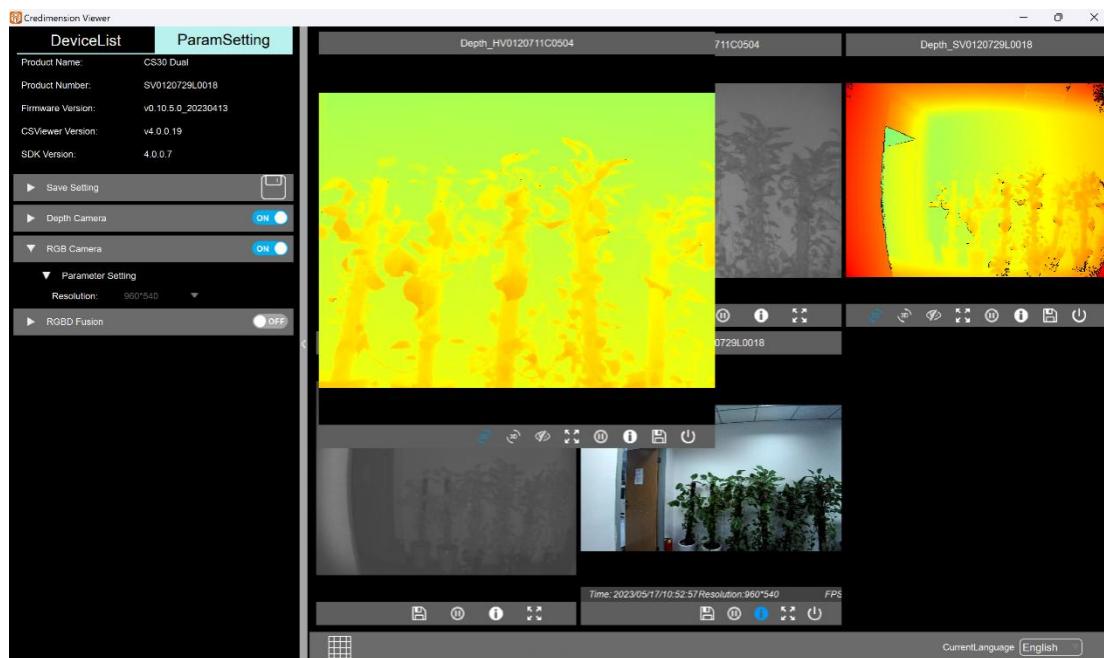
Click on the left to hide the device list and menu bar to make the screen space larger, click the arrow to restore; Drag each screen window with the mouse to move the window position, or zoom in and out of the current picture window, and display the nine-square button at the bottom left of the screen window frame, which can restore the screen window dragged by the mouse back to the normal layout state.

Hide the left device list/left settings bar:

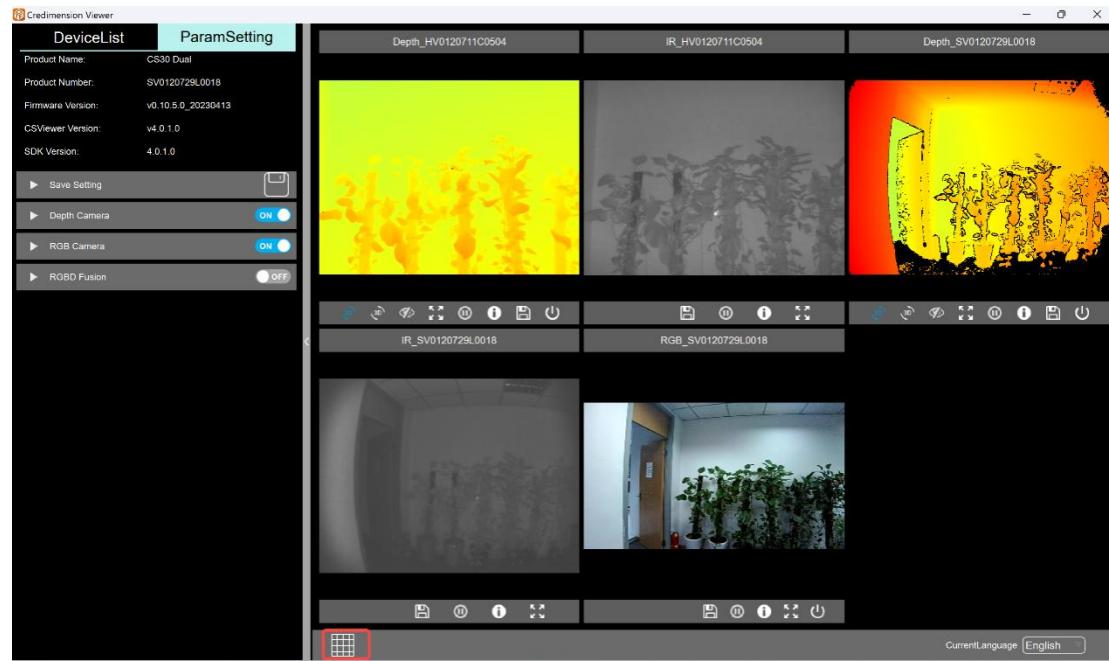
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To modify the window size and change the window position:



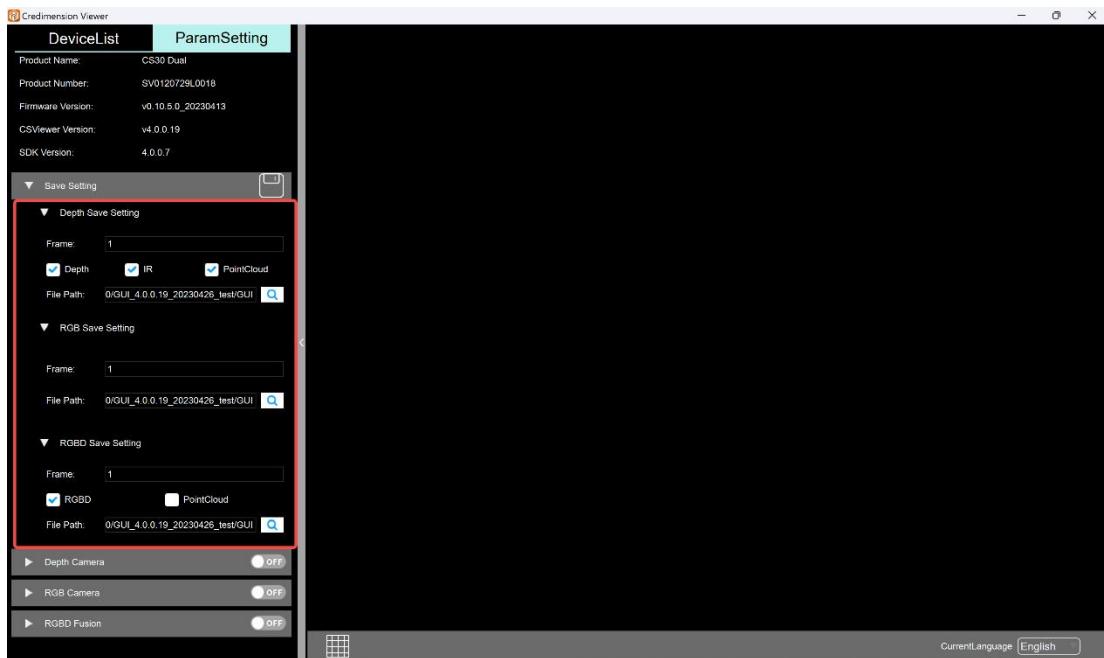
Nine-grid button relayout restoration:



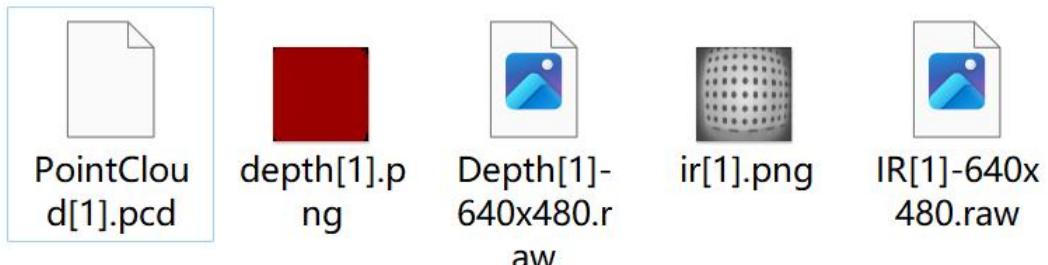
### 3.3.4. Save settings

Save settings are common to multiple devices, the save path defaults to the current directory folder (the placement path should not contain Chinese as much as possible), select the file path to save the data, after setting, the software will default to the latest set save path, number of save frames, etc. (Note: do not contain Chinese/Chinese characters in the save path).

CS30 device save settings include: Depth Save Setting, RGB Save Setting, RGBD Save Setting; CS20 device save settings include: Depth Save Setting;



Depth save settings can choose to save the data type, depth/IR/PointCloud, check the save data format corresponds to depth.png, ir.png, PointCloud.pcd, the default save data is Depth.raw, IR.raw



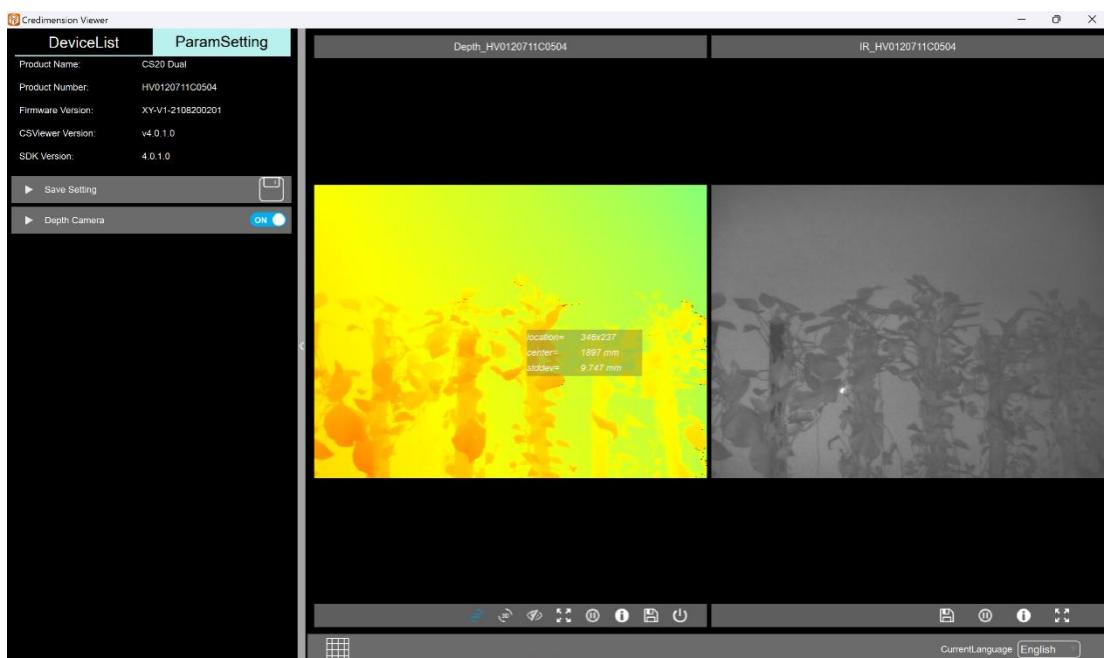
Note: After turning on multiple devices, click the Total Save button on the right side of Save Setting, save all data that the data content is the current SN number module, for example: the current enabled module is CS20+CS30, when you click the Total Save button, the device is selected in the device list as CS30, the corresponding number is SV0120729L0018, and the current type is depth+RGB, click Save. Save data for the current CS30 device: Select Depth under the corresponding SN number of the current CS30 device to save data + RGB data; If the stream is CS30depth+RGB CS20 depth, and CS20 is selected in the device list, click the Save button to save all the selected data under CS20 depth.

### 3.4. Turn on the device

CS20 open flow precautions:

CS20 runtime will first download the internal parameter file (about 60S), it is best to wait for the internal parameter file to be downloaded before turning on another device, whether the internal parameter file is downloaded can check the parameters directory under the GUI (resolution + SN number named file, a CS20 resolution corresponds to download an internal parameter file), be careful not to close the depth or program during the download of the internal parameters.

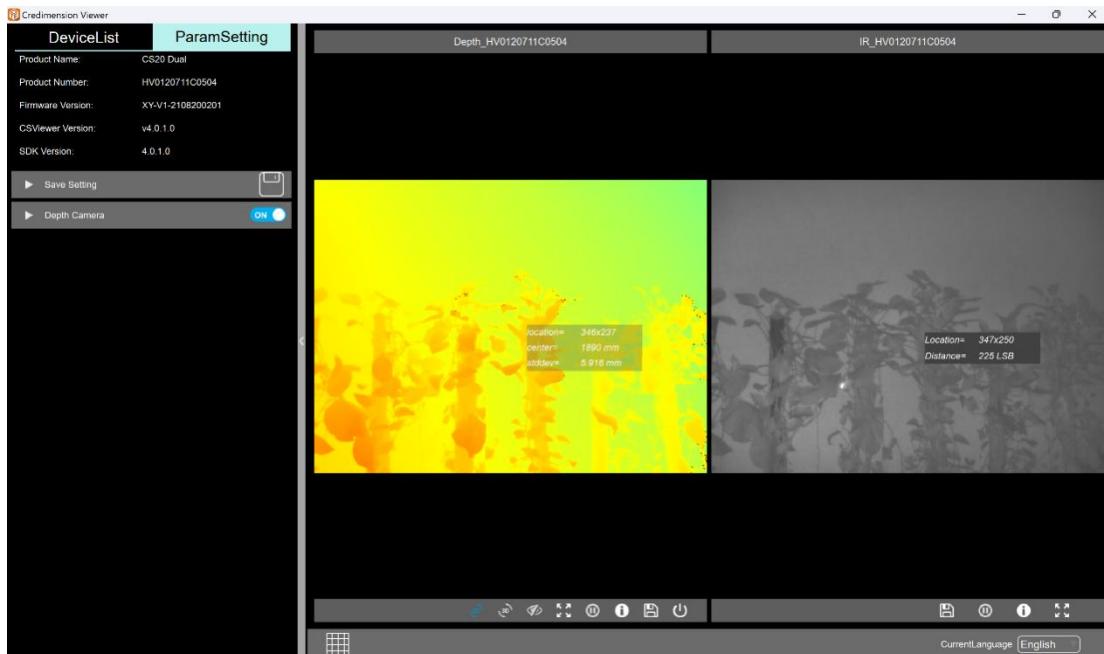
Select the device that currently needs to be turned on, click ParamSetting, and click the Depth Camera switch to display the depth image of the current device (left) and IR image (right). CS20 open current resolution default is 640\*480, CS30 open current default resolution is 320\*240 (dual-frequency frame rate 20fps, single-frequency frame rate 40fps), the current example is CS20 open-stream screen is 640\*480 resolution (frame rate 7~8fps), CS20 will be reduced when loading the internal parameter frame rate when it is first turned on, and the frame rate can return to normal after the participation in the load is completed within about 60S.



### 3.5. Display 2D Depth images

The naming format of the screen window is: Depth\_SN number, IR\_SN number, SN number is used for the corresponding window and device when multiple devices are connected at the same time, and Depth/IR is used to distinguish the type of open window;

Click the mouse on the depth screen to view the depth value of the currently clicked pixel. Click the IR screen to view the IR intensity value.



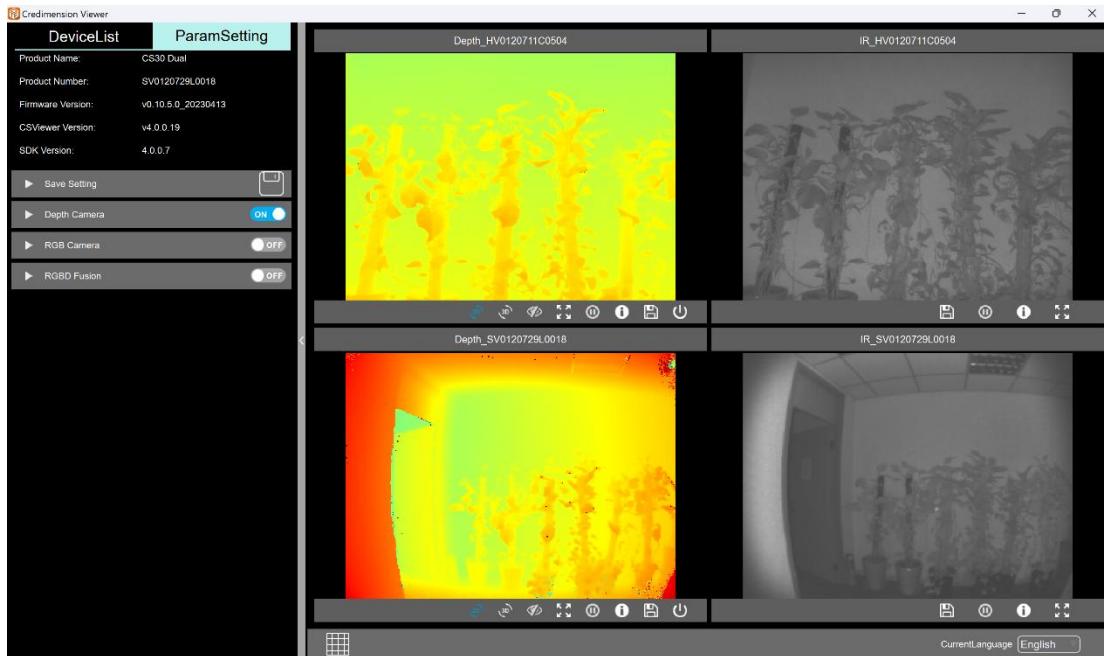
Note: The close button at the bottom right of the depth screen window, this button functions the same as the Depth Camera close button on the left, the ir figure is displayed or hidden with the depth screen window switch, and there is no separate control switch.

Click the Camera switch when connecting CS20, and the image can be displayed in about 5S;

When you open a CS20 device for the first time, the internal reference will be downloaded to the local (the same module is downloaded once), download time: about 60S, please do not close the module or close the GUI during the download process, the frame rate will be reduced during the loading process, and when the frame rate returns to normal (640 resolution 7~8fps) within the participation is completed).

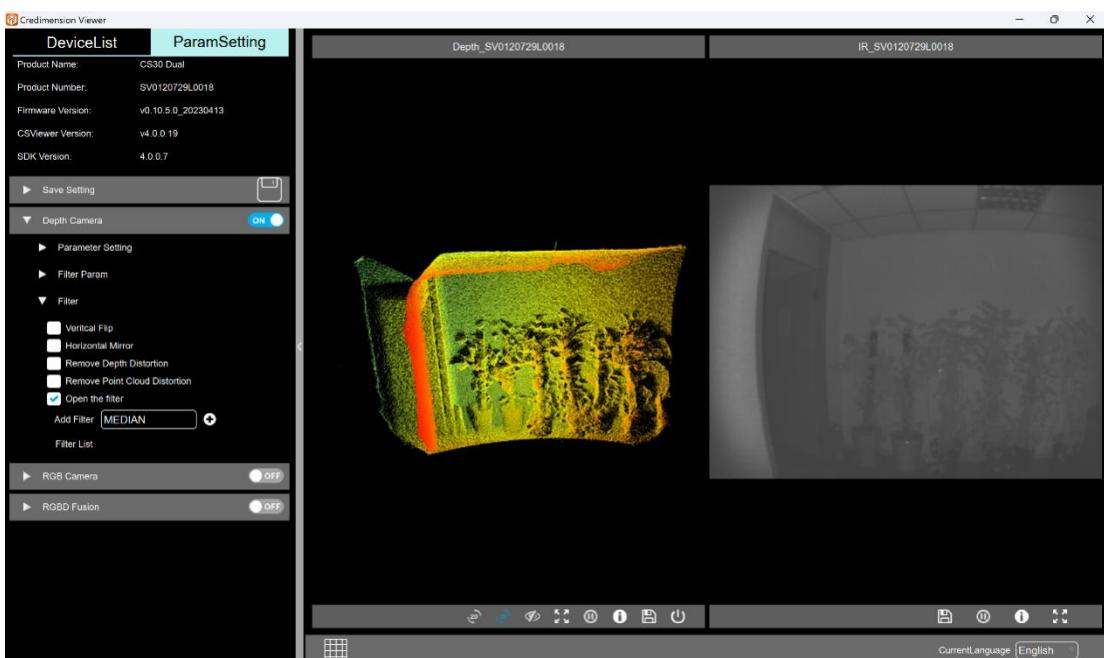
### 3.6. The second device is open

Click the device list in the upper left corner, select another device, click the ParamSetting button, and Depth Camera is open (CS30 dual-band as an example)

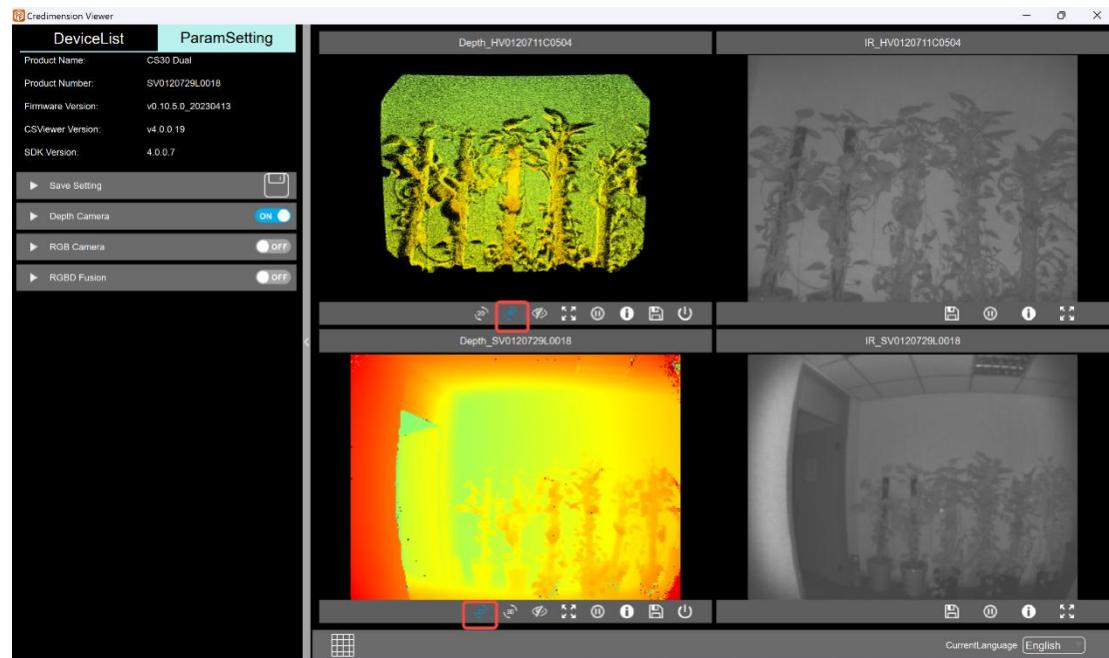


### 3.7. Display 3D pseudo-color point clouds

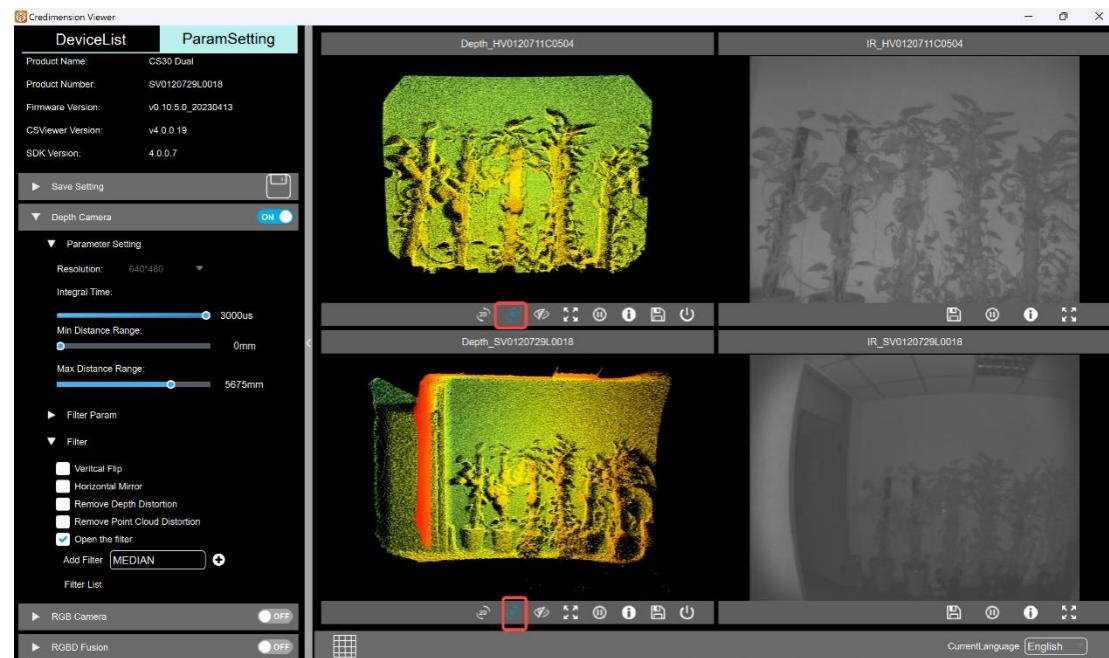
Click the 3D button under the depth window to view the real-time pseudo-color point cloud map corresponding to the current device, drag the mouse to control the viewing angle or slide the scroll wheel to zoom in and out, and you can view two device point clouds at the same time.



To view a device artifact point cloud:

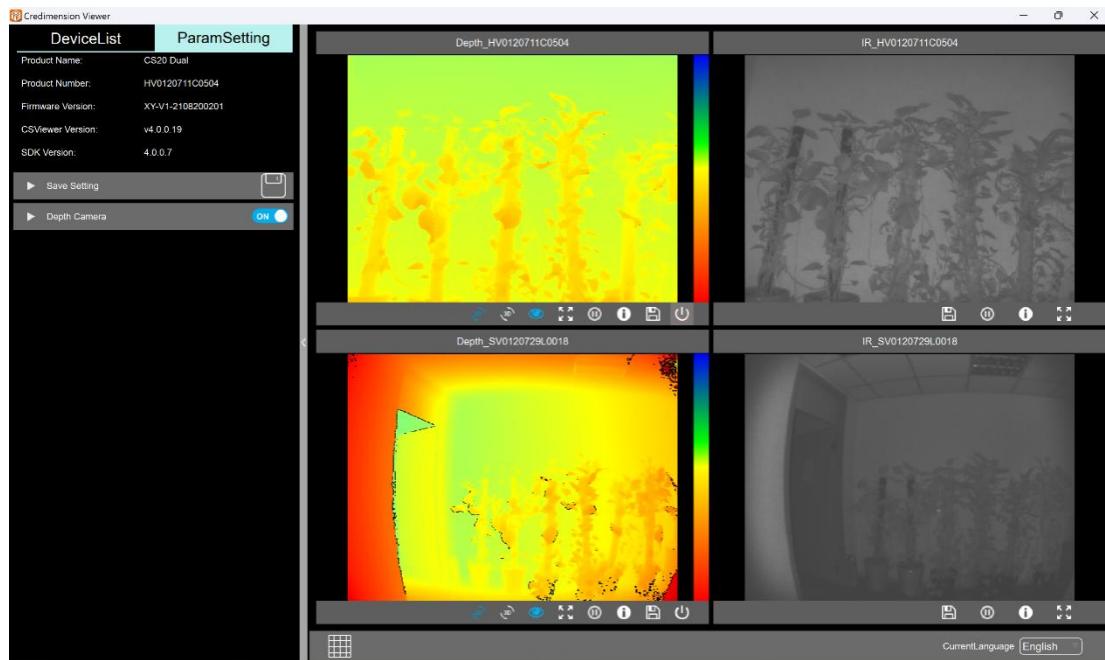


View two device false color point clouds:



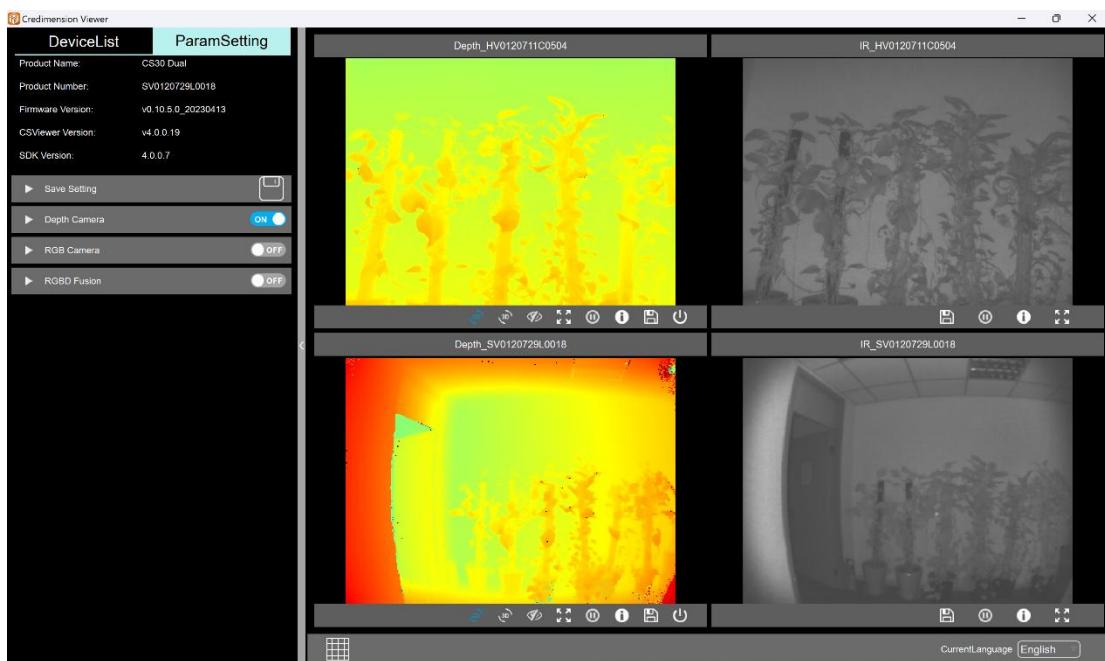
### 3.8. Check the color bar

Click the View color bar button at the bottom of the Depth screen to display the color bar.

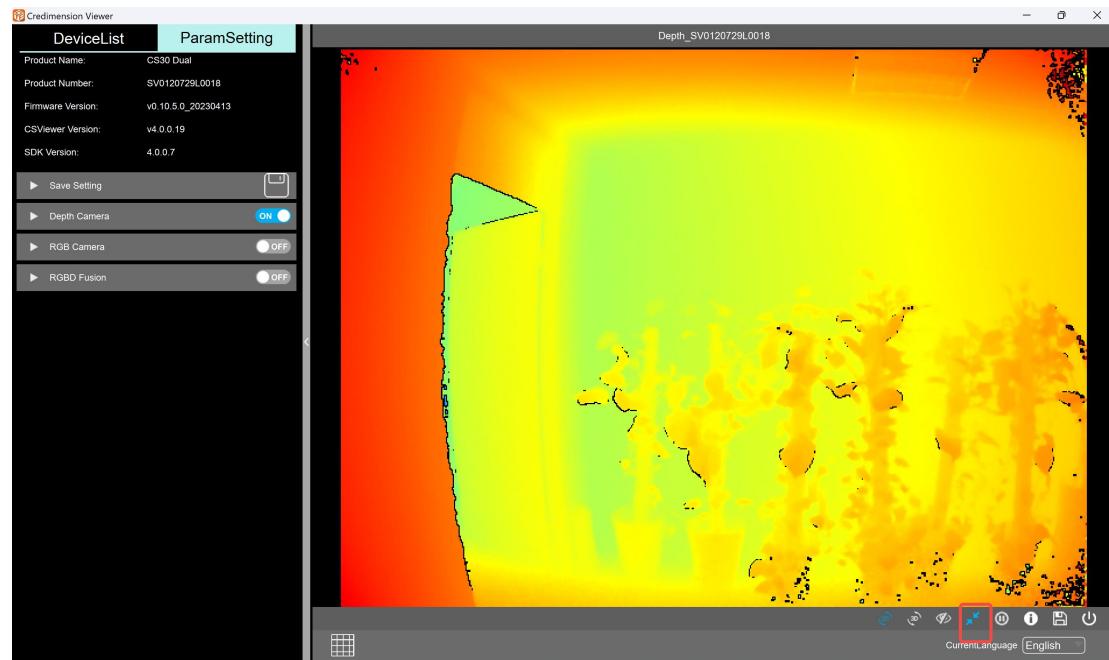


### 3.9. Window maximization

Click the picture maximization button at the bottom of the screen (valid when there are two screen windows displayed at the same time, and there is this button at the bottom of each screen), the currently selected screen can be displayed as maximized, not hidden by the clicked window, click the restore button again, and all the pictures currently opened are displayed normally.



Select one of the windows and click Window Maximize:

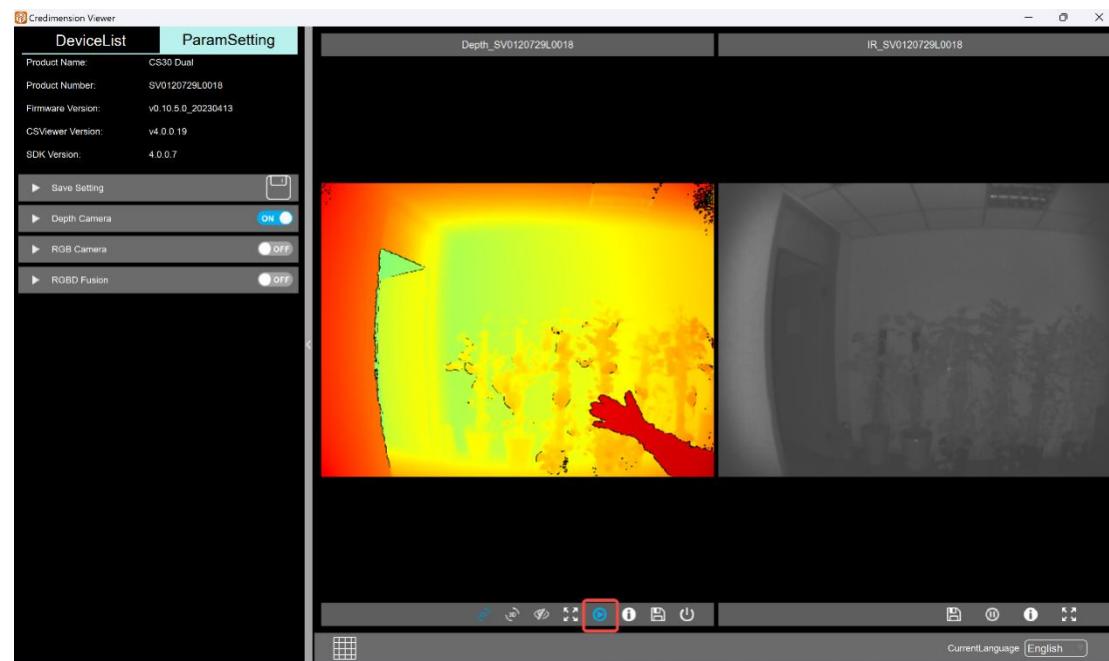


Click the blue arrow in the red frame to restore the original window size

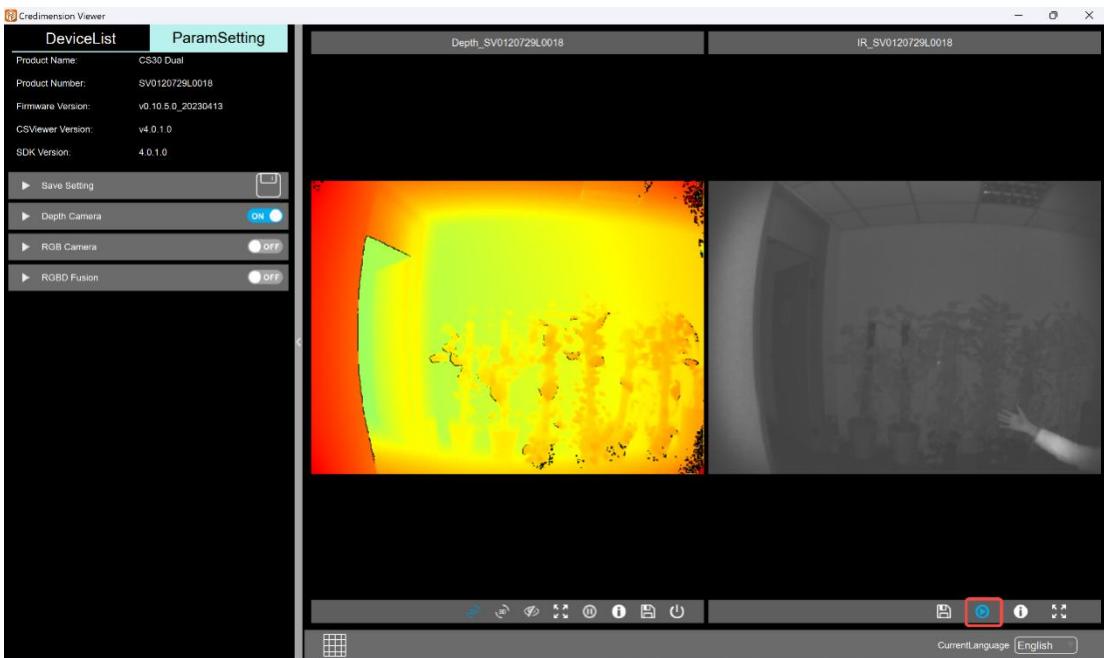
### 3.10. Pause the Depth screen

Click the pause button at the bottom of the screen to pause the Depth screen or pause the IR screen:

Pause the Depth screen:



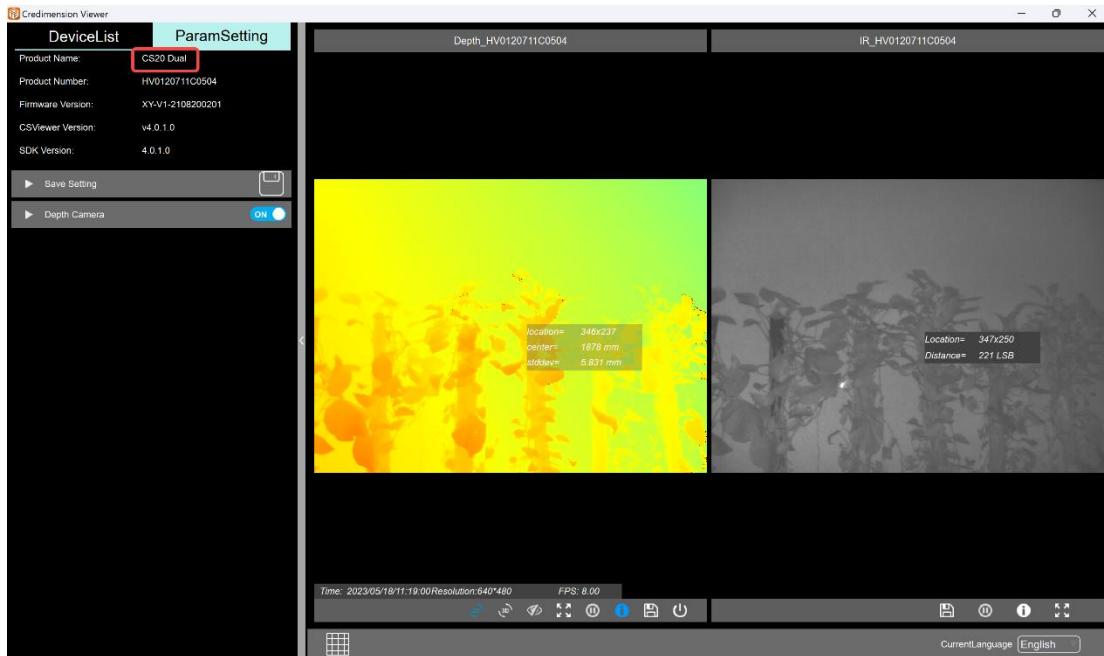
### Pause the IR screen:



### 3.11. Display screen information

Click the screen information button at the bottom of the screen to display the current timestamp, current resolution, current frame rate information in the lower left corner of the screen, CS30 depth default resolution (320\*240) dual-frequency frame rate is 20 frames, CS30 single-frequency module is 40 frames, the resolution is 640\*480 dual-frequency module frame rate can reach 15 frames (frame rate is 13fps after filtering is turned on), single-frequency module frame rate can reach 18 frames (frame rate is 15fps after filtering). The default resolution of CS20 dual-band depth is 640\*480, the frame rate is 7~8fps, the switchable resolution is 320\*240, and the frame rate is 21~22fps.

Note: There is this button under each open screen window, you can view the screen information of the current window, when two devices are turned on at the same time, the frame rate may be reduced due to the different computer performance.



### 3.12. Screen save button

Click the Save button under the open flow screen, click to save the current screen information data to the local level, and the save format and the number of saved frames are determined by checking the format content in the save settings.

Note: If you click the save window to depth/ir, check the content in the depth saving settings of the device corresponding to the SN number of the current window. If the saved window is RGB, the RGB data corresponding to the SN of the current window. If RGBD is enabled on the CS30 device, the window save button saves the RGBD data.

Folder naming format:

20230519172341_SV0120729L0018_rgb	2023/5/19 17:23	文件夹
20230519163332_SV0120729L0018_rgbd	2023/5/19 16:33	文件夹
20230519163041_SV0120729L0018_tof	2023/5/19 16:30	文件夹
20230519163020_SV0120729L0018_tof	2023/5/19 16:30	文件夹

After saving, create a folder in chronological order + SN number + tof/RGB, automatically save data, save depth png and raw data format, IR png and raw data format, point cloud save pcd data format.

Depth saves data content and format:



RGB save data format:

› 此电脑 > Data (D:) > 20230519172341\_SV0120729L0018\_rgb



RGBD saves data format content:

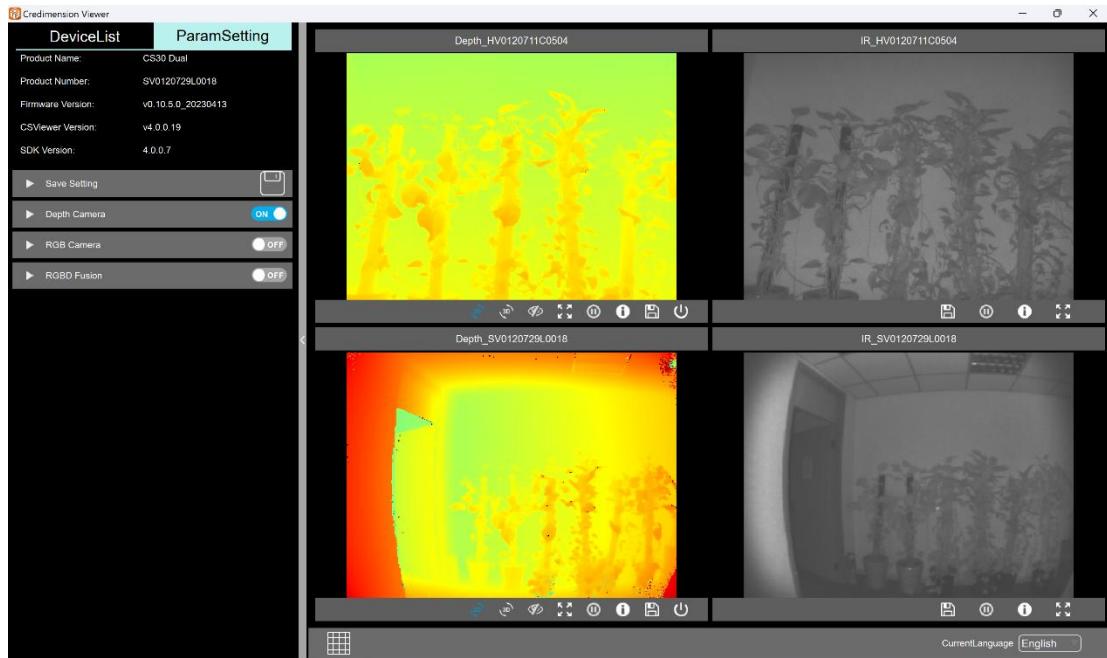
› 此电脑 > Data (D:) > 20230519163332\_SV0120729L0018\_rgbd



### 3.13. Turn on both devices at the same time

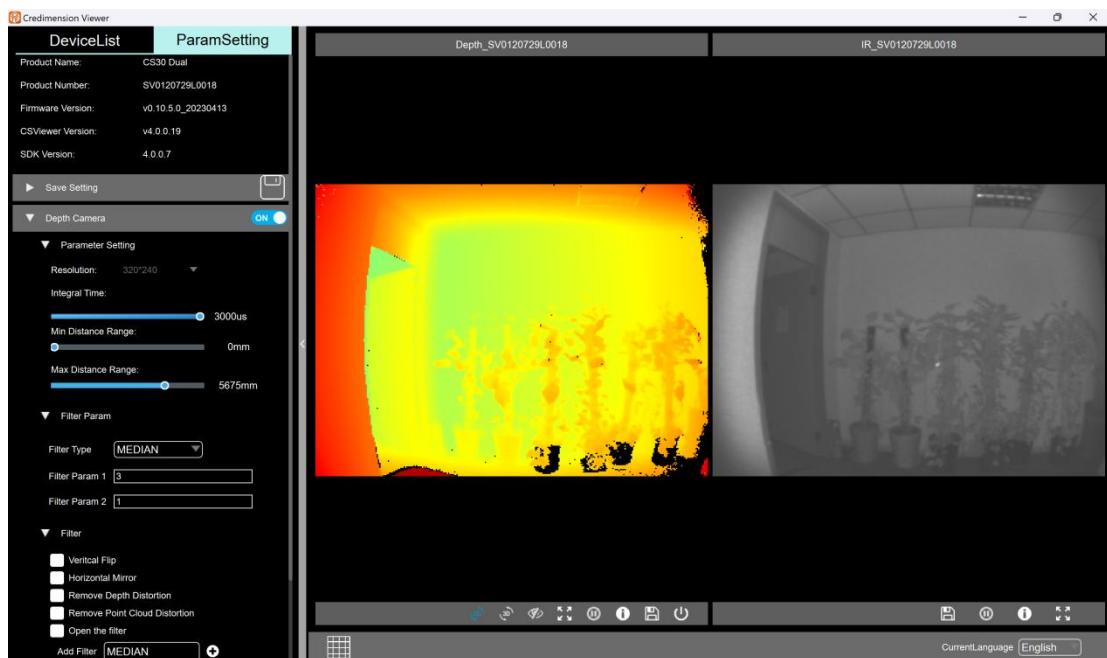
Click the device list, select another connected device, click ParamSetting, Depth Camera to open the stream,

When you open a CS20 device for the first time, the internal parameter will be downloaded to the local (the same device is only downloaded once in this computer), the download time is about 60S, please do not close the module or close the GUI during the download process, the frame rate will be reduced during the loading process, and when the frame rate returns to normal (640 resolution 7~8fps) within the participation is completed); If the open streaming device is CS30, the default resolution is 320\*240.



### 3.14. Adjust parameters

Click the drop-down arrow on the left side of Depth Camera to set adjustment parameter information, filter parameter settings, setting screens, etc. Click Parameter Setting to display the parameter adjustment box, you can choose to switch the resolution of 320\*240 (default) or 640\*480; adjust the exposure time; Minimum distance display range; Maximum distance display range.



Note: The detection distance is related to the integration time, and different distances need to adjust the corresponding integration time to achieve the accuracy of the test data, it is recommended to refer to the following:

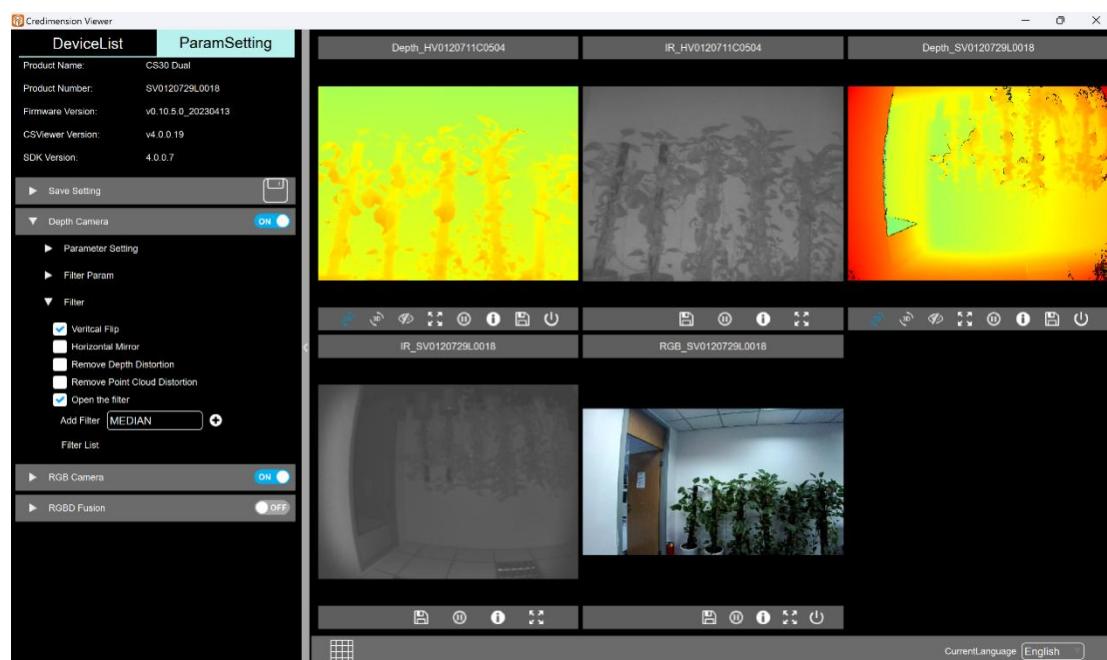
GUI测试数据不同距离相应调整不同对应的积分时间对应关系如下：

测试距离	积分时间
300mm-500mm	<500us
600mm-900mm	500us-1000us
1000mm-1700mm	1500us-2500us
>1700mm	3000us (远距离要求测试环境近距离无干扰)

CS30 integration time correspondence diagram

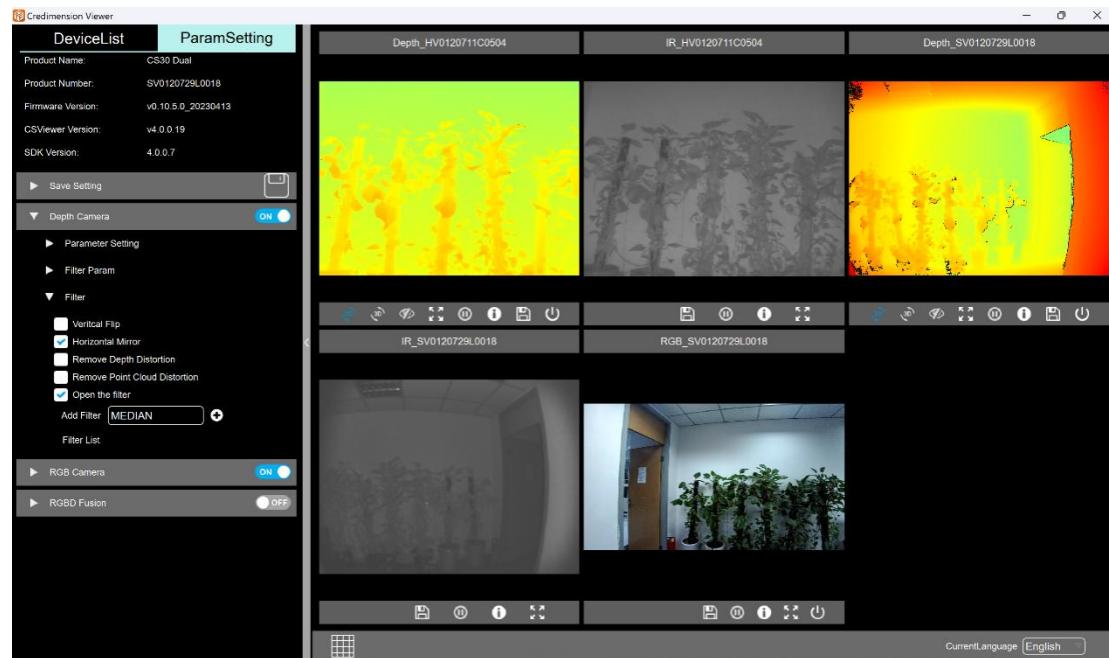
Note: The default CS20 integration time is up to 1800us, and the maximum CS20 integration time for 320\*240 resolution is 580us

Adjust the distance range:

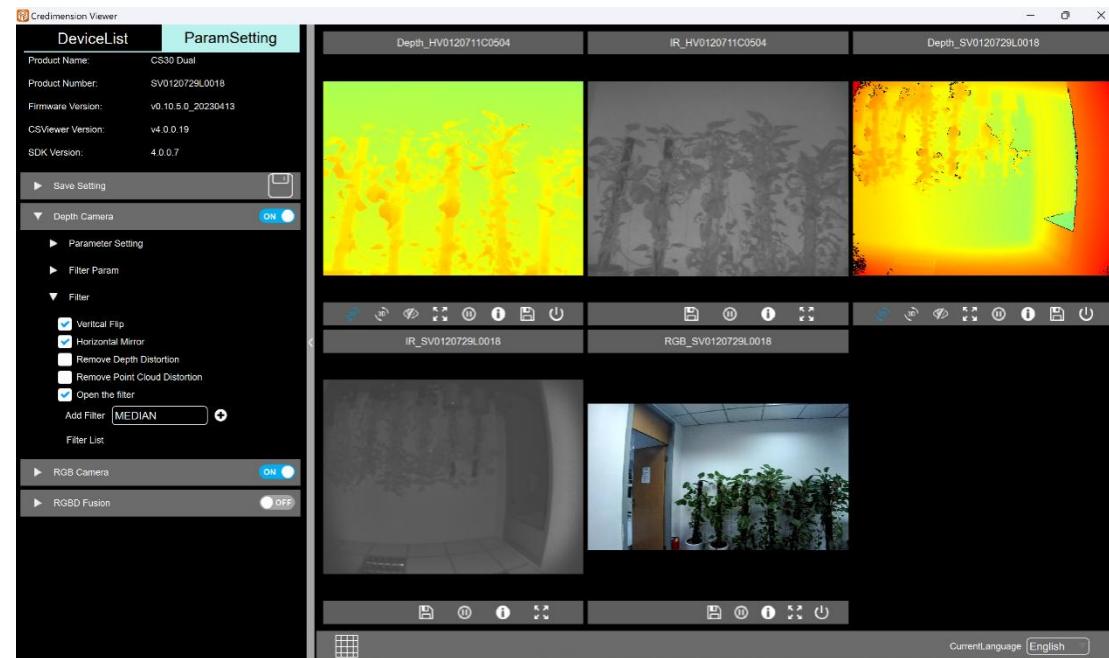


Horizontal flip effect:

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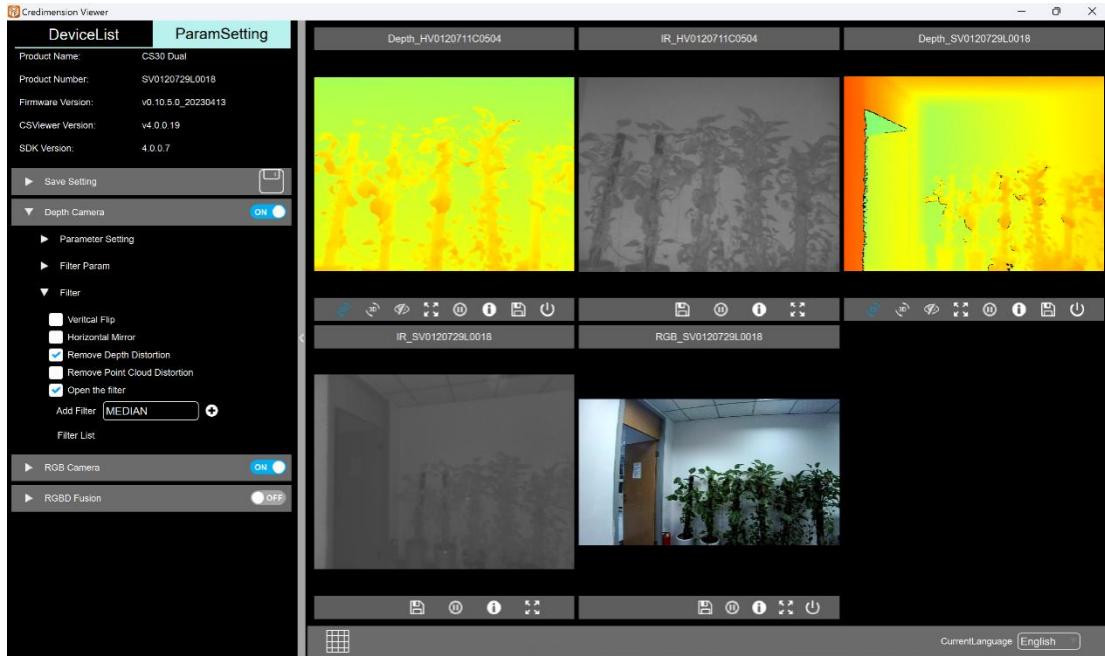


Horizontal + vertical flip effect (take adjusting CS30 SV0120729L0018 as an example to compare CS20 unflipped and other effects):

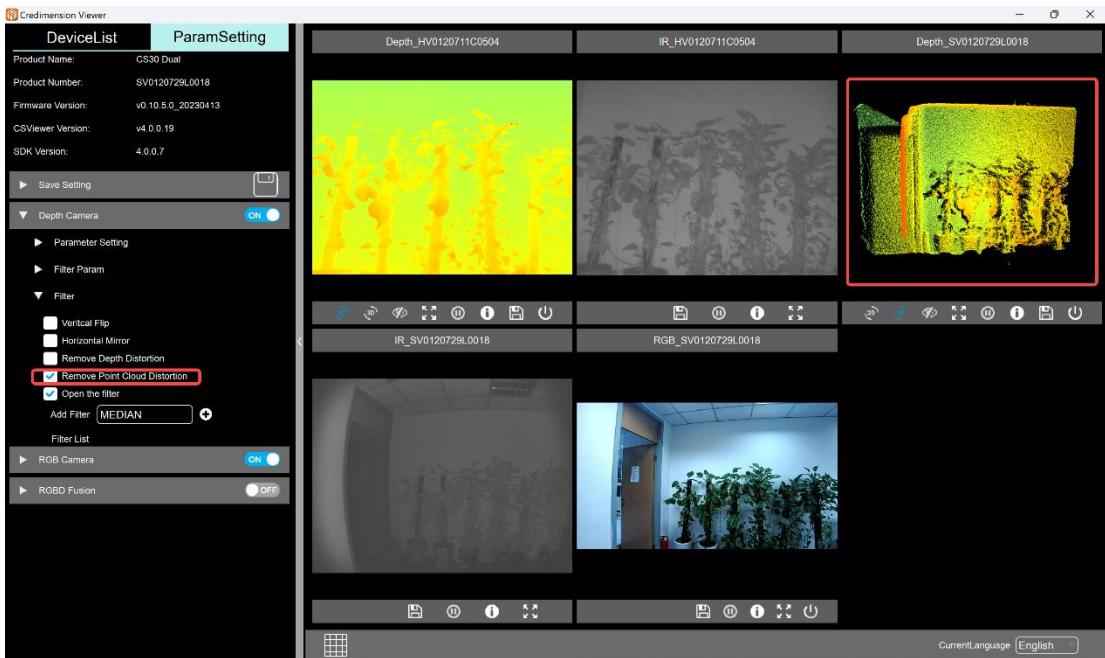


CS30 depth removes distortion effects:

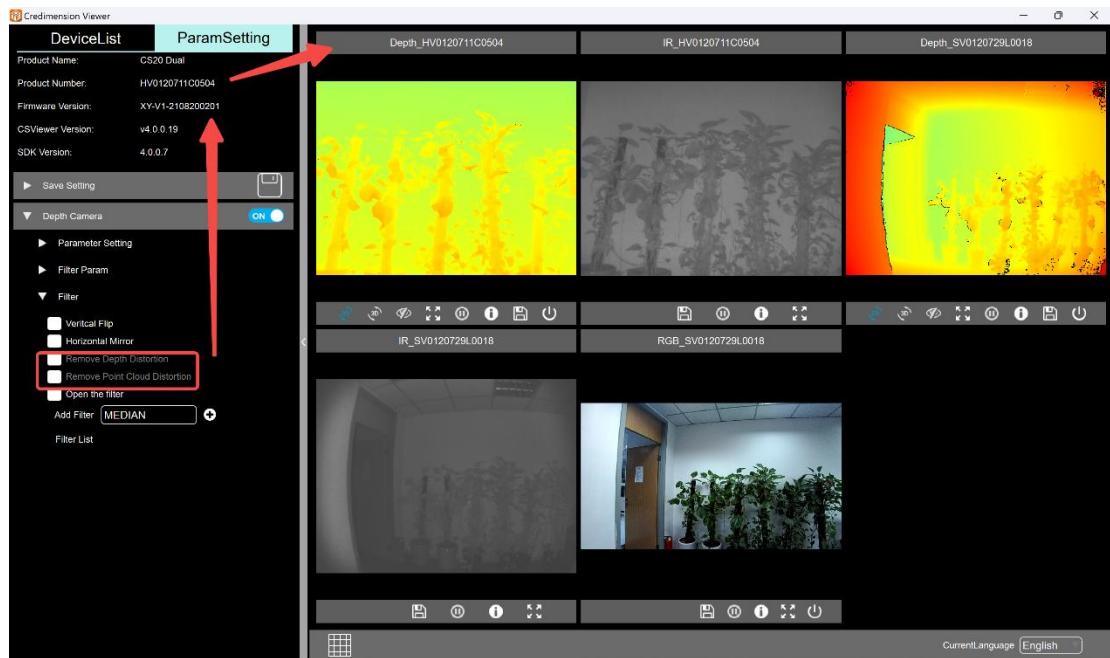
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### CS30 point cloud distortion removal effect:



CS20 device field of view is small, no need to remove distortion function, select CS20 device in the device list, click RemoveDepth Distortion and Remove Point Cloud Distortion in ParamSetting under Depth Camera to disable the state, as follows:

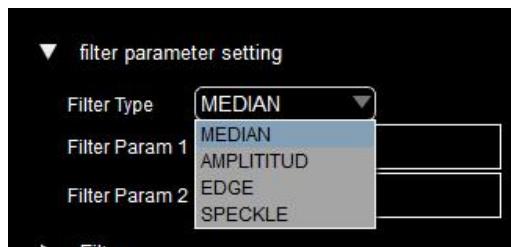


Check or uncheck Open the filter to enable the filter or cancel the filter function, check or cancel the effect is as follows, the specific filter parameter settings and each filter function are detailed in 3.16.

Note: When the filter frame rate CS30 dual-band module is turned on, it will be reduced to about 13fps

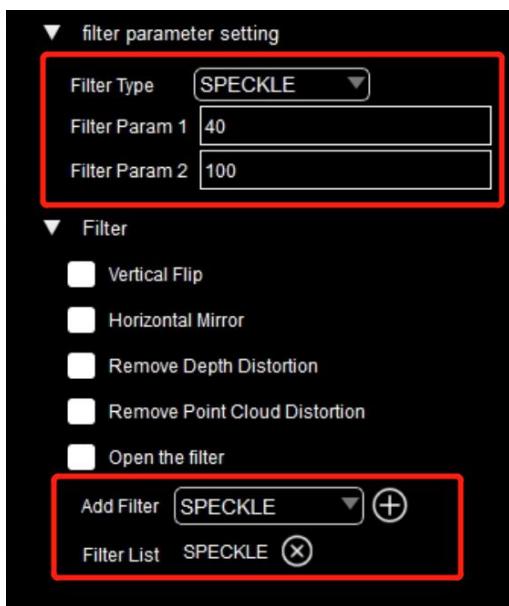
### 3.16. Filter parameter setting

The filter parameter settings can be set to moderate filtering (MEDIAN), amplititud filtering (AMPLITITUD), boundary filtering (EDGE), and speckle filtering (SPECKLE) as shown in the figure below.



After the filter parameter is set, check open the filter to view the setting filter effect, Note: Speckle filtering (SPECKLE) is shown in the figure below, when setting spot filtering, you need to select Filter.Type as the spot After setting the Add Filter blob under the Filter parameter, click the plus sign to add it in the filterList (as shown in the figure below), you

can successfully set the spot filter.



Parameter setting description:

Amplitude filtering: The default value is set to 6, the number of parameters is 1, and the range is 0-100

Median filtering: default value The first parameter scale size default value is 3, which can be set to 3 or 5, and the second parameter iteration number, default value 1, can be set from 0-5.

Boundary filtering: default value 50, range 20-200 can be set.

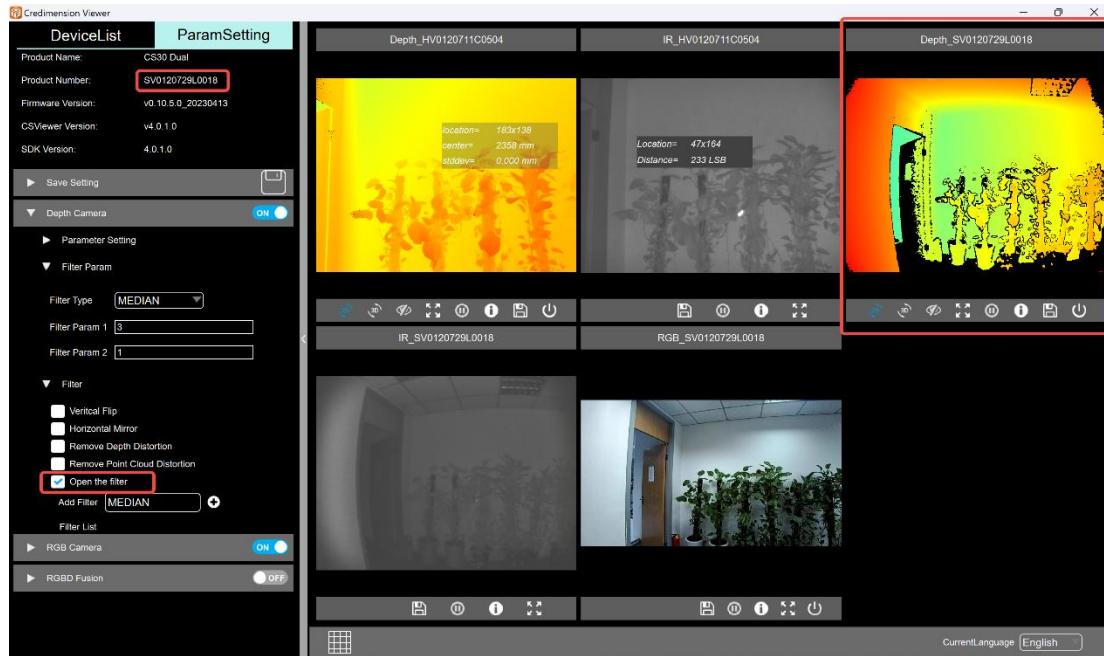
Spot filtering: default value of the first parameter 40, can set the range 24-200,

The default value of the second parameter is 100, and the range 40-200 can be set.

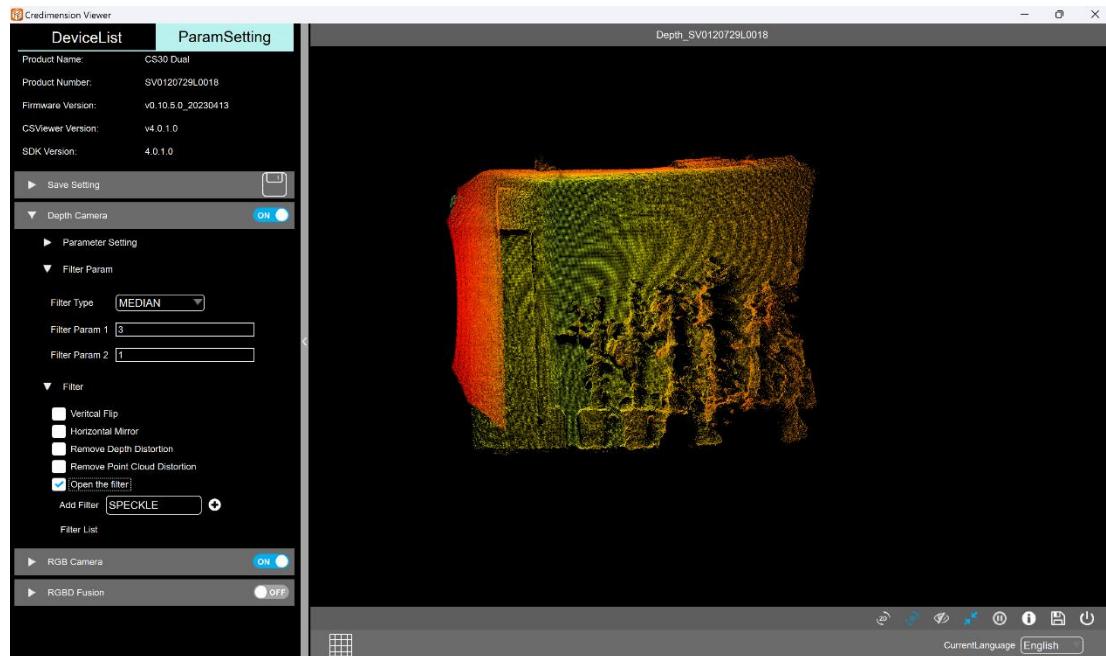
In the following example, the SN number of the CS30 device is SV0120729L0018 as an example:

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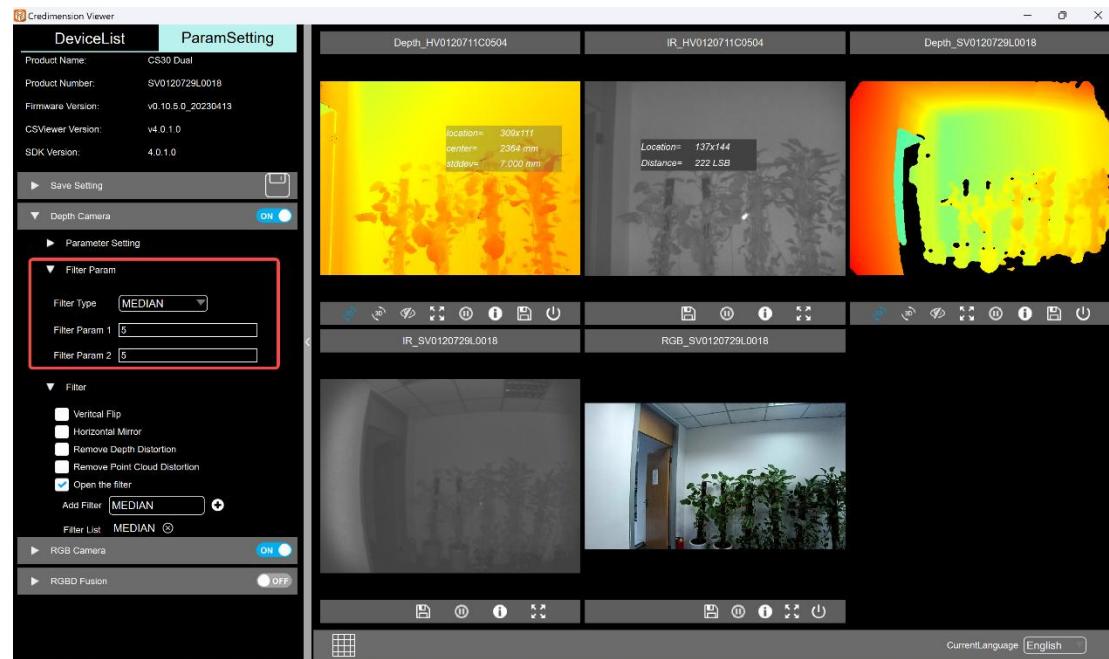
### Default value effect:



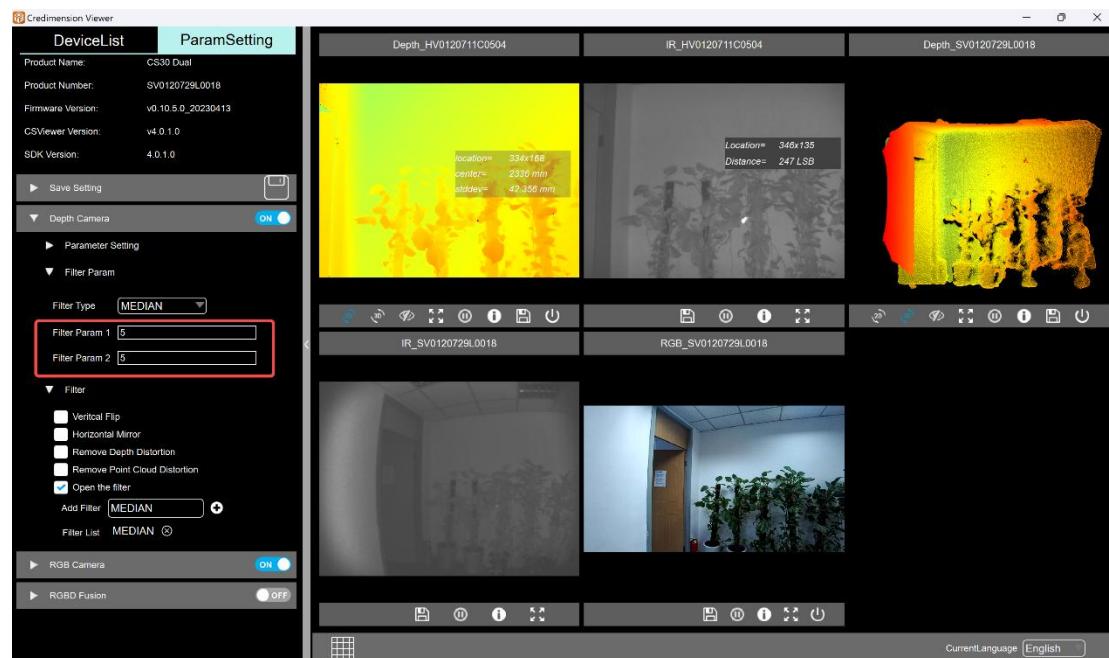
### Default point cloud effect:



The median filter setting parameter is Maximum Depth:

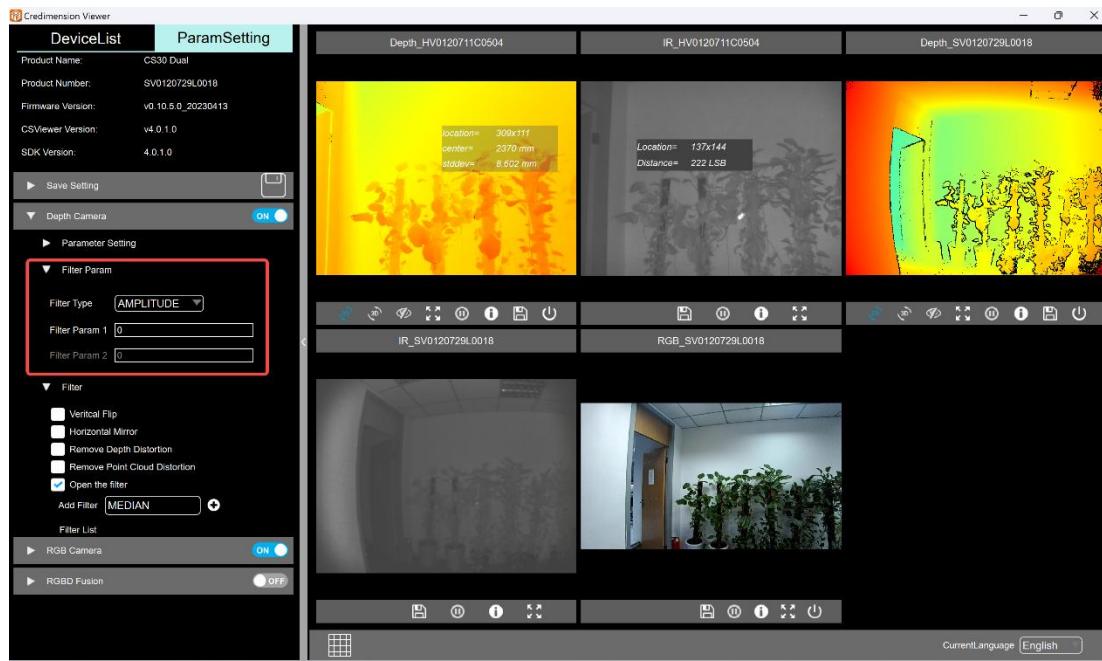


Point cloud effect after setting parameters for median filtering:

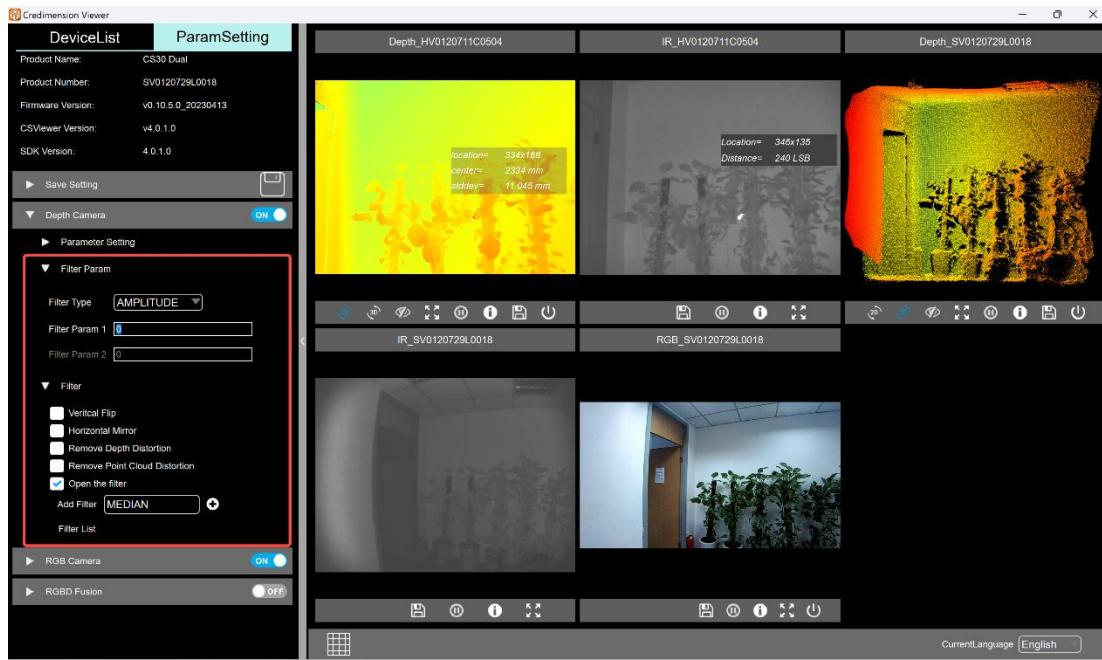


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Amplitude filtering is set to minimum depth effect:

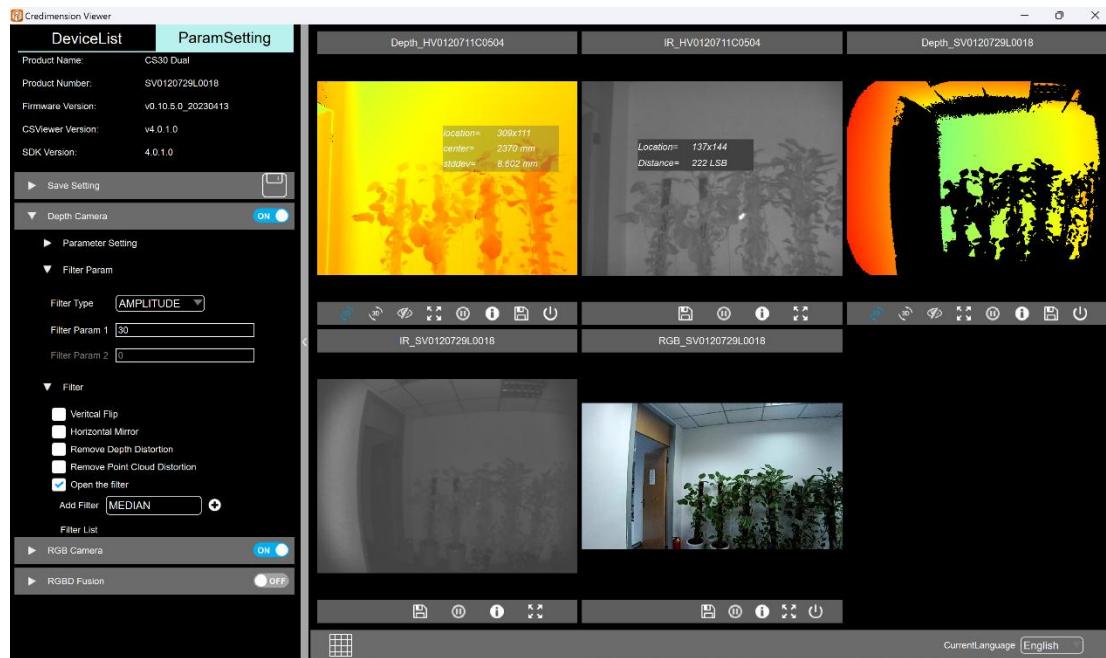


Amplitude filtering to set the minimum point cloud effect:

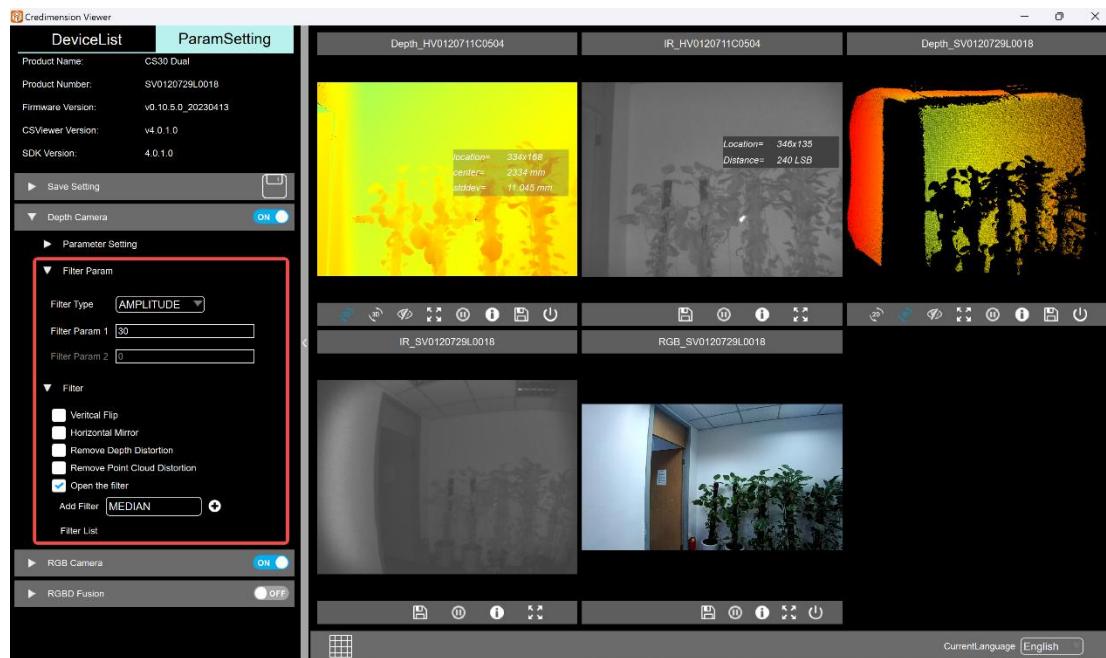


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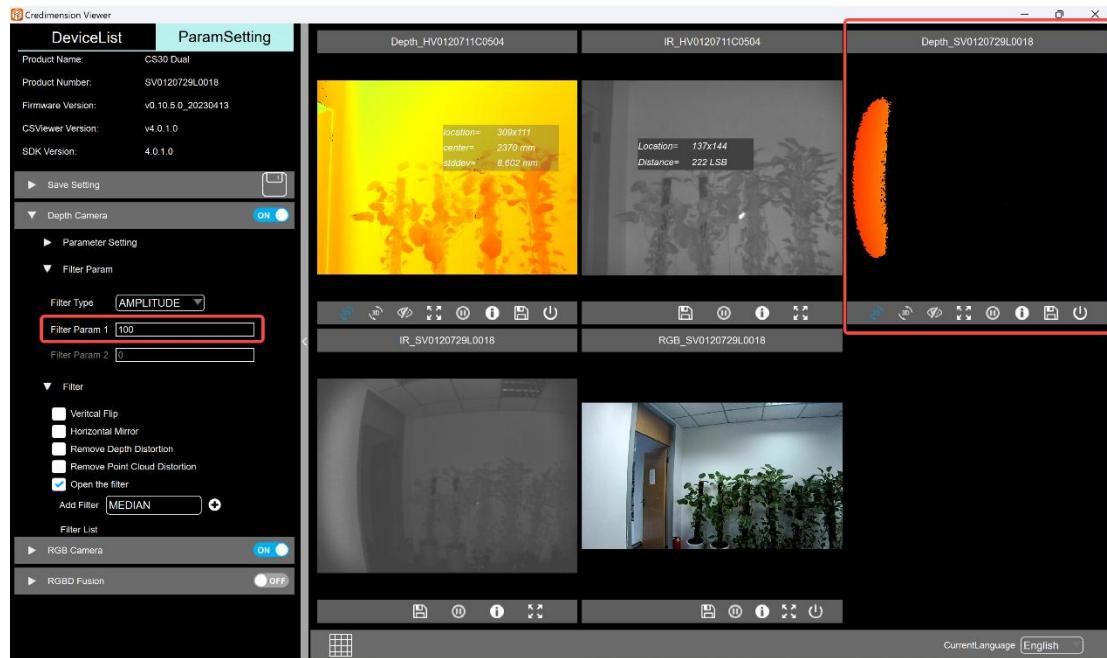
### Amplitude filtering parameter set to 30 depth effect:



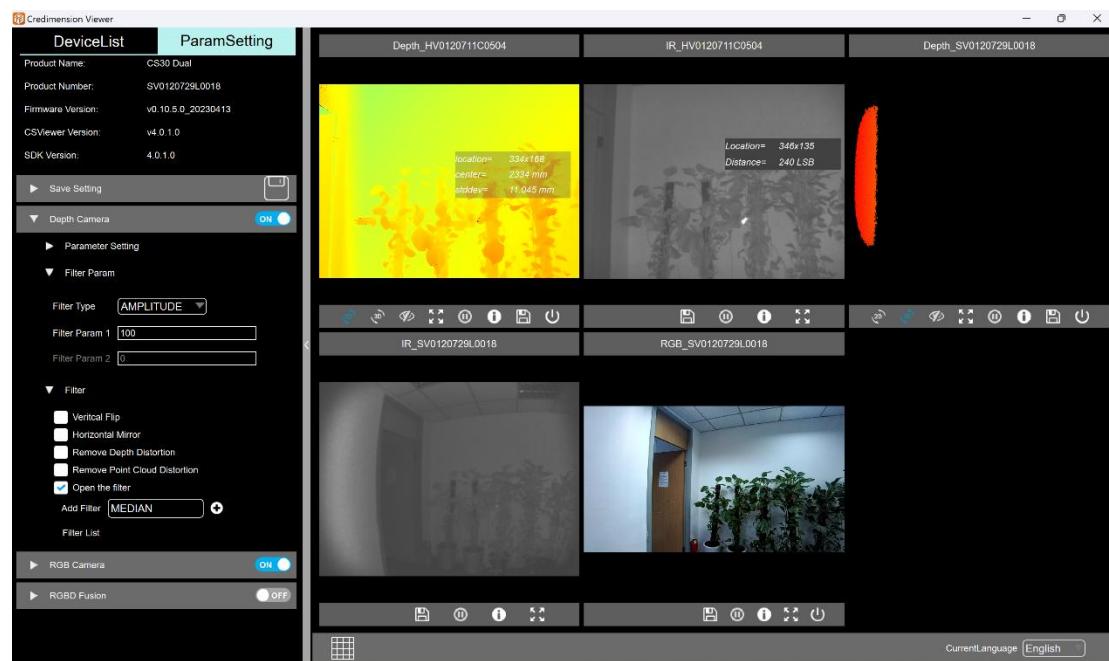
### Amplitude filtering parameter set to 30 point cloud effect:



The amplitude filtering parameter is set to maximum depth effect:

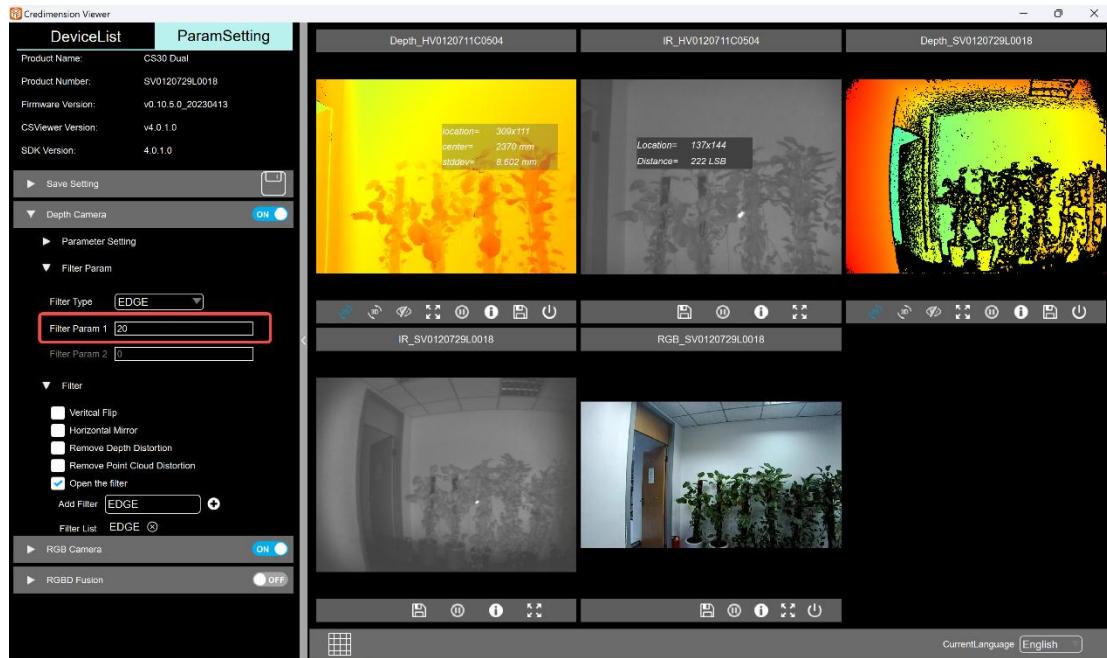


The Amplitude Filter parameter is set to the maximum point cloud effect:

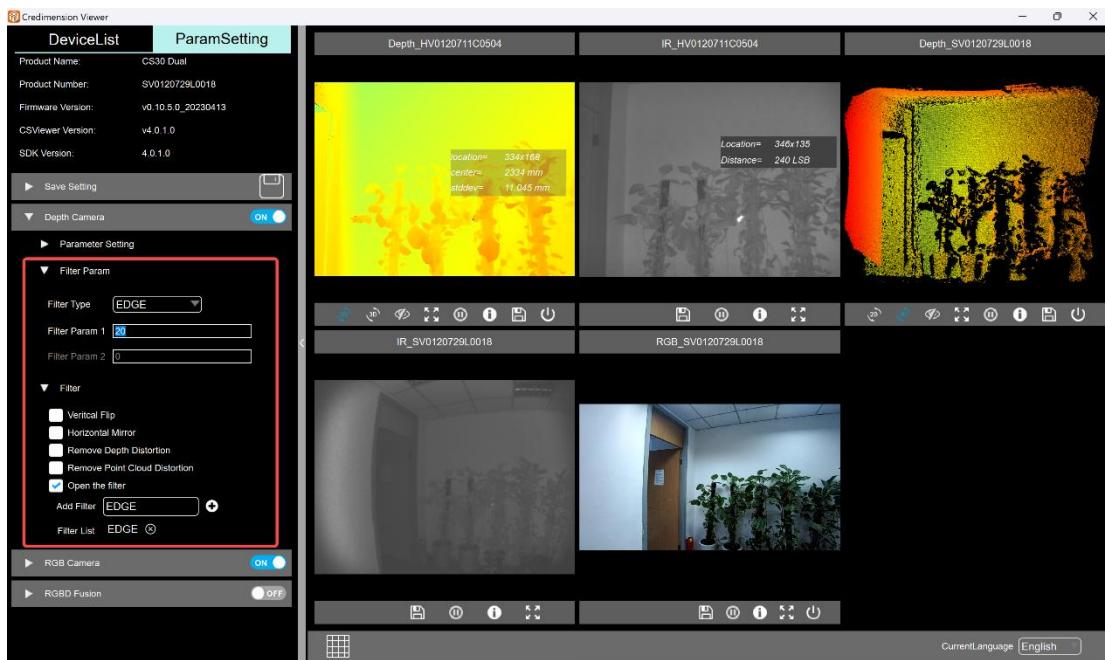


Set the amplitude filter, the larger the number, the more data will be filtered out

## Boundary filtering sets the minimum depth effect:

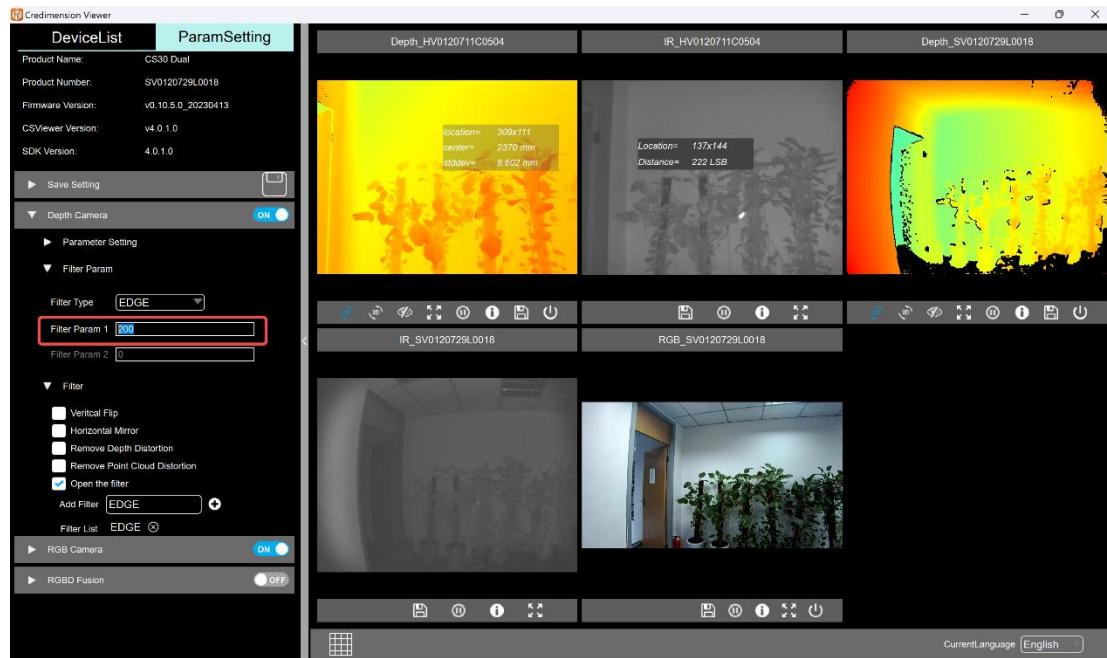


## Boundary filtering sets the minimum point cloud effect:

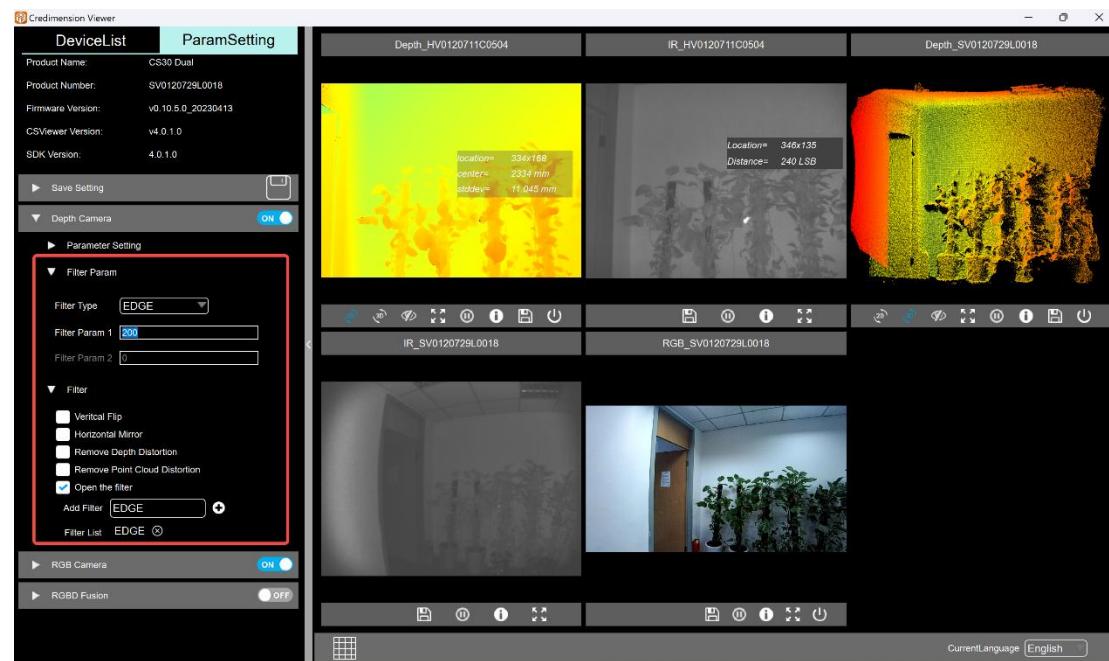


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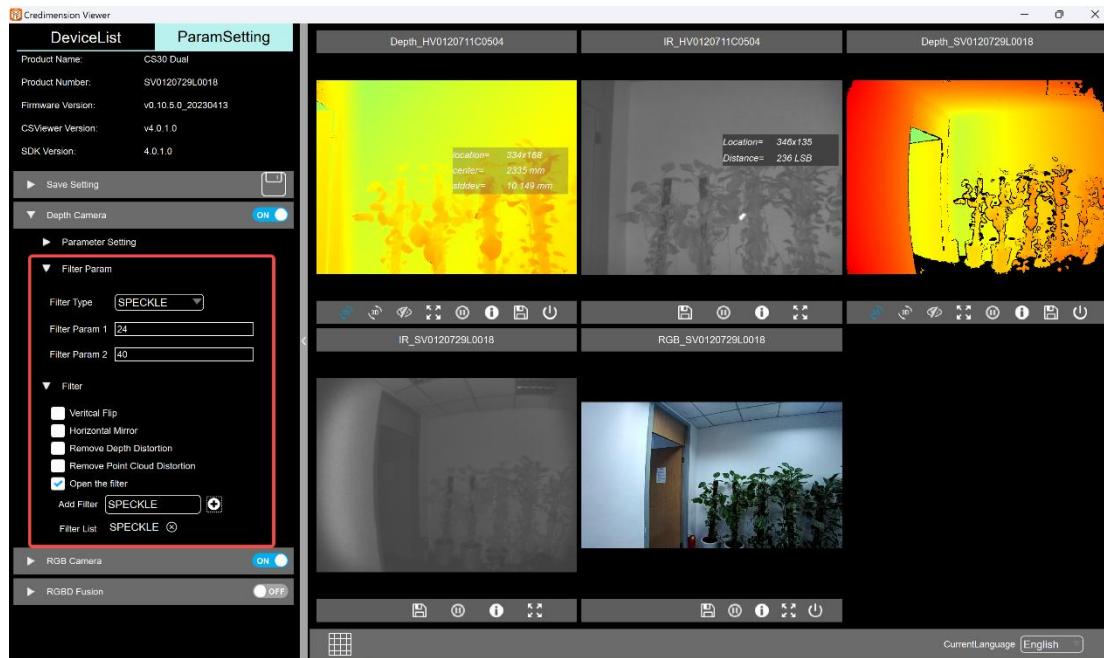
Boundary filtering sets maximum depth effect:



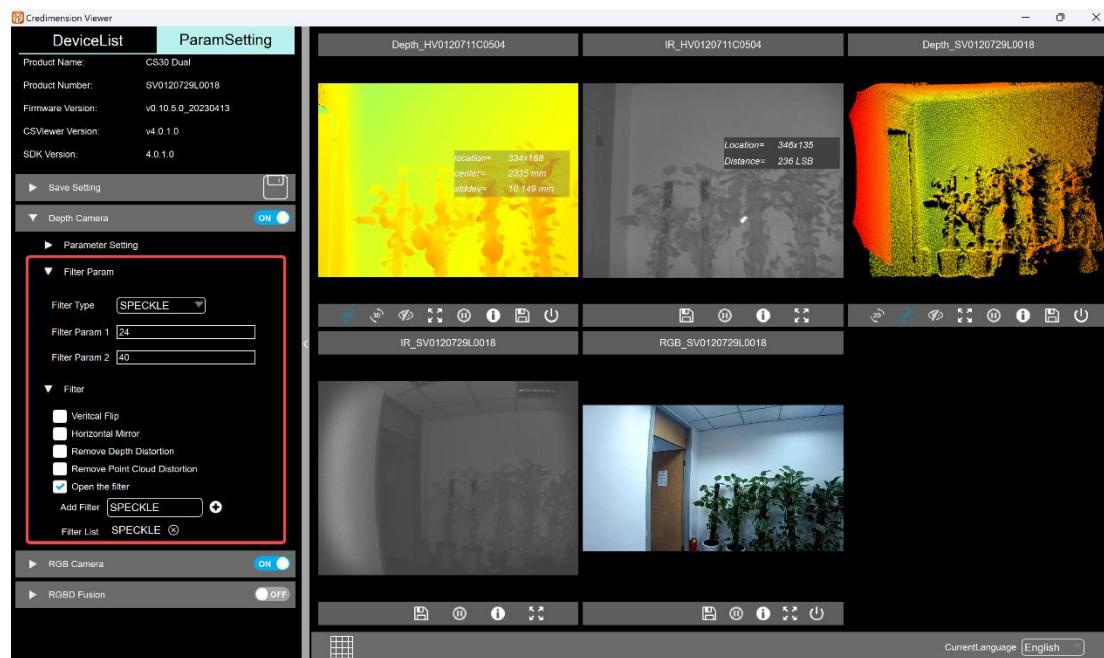
Boundary filtering to set the maximum point cloud effect:



## Depth effect after setting the minimum value of spot filtering:

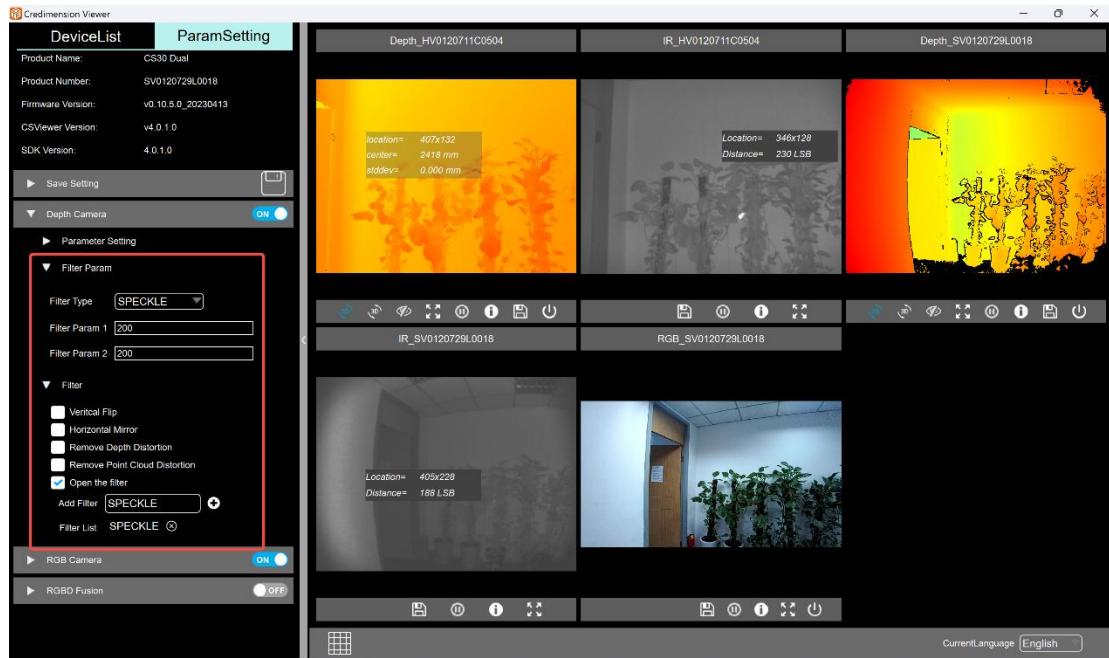


## Point cloud effect after spot filtering is set to the minimum value:

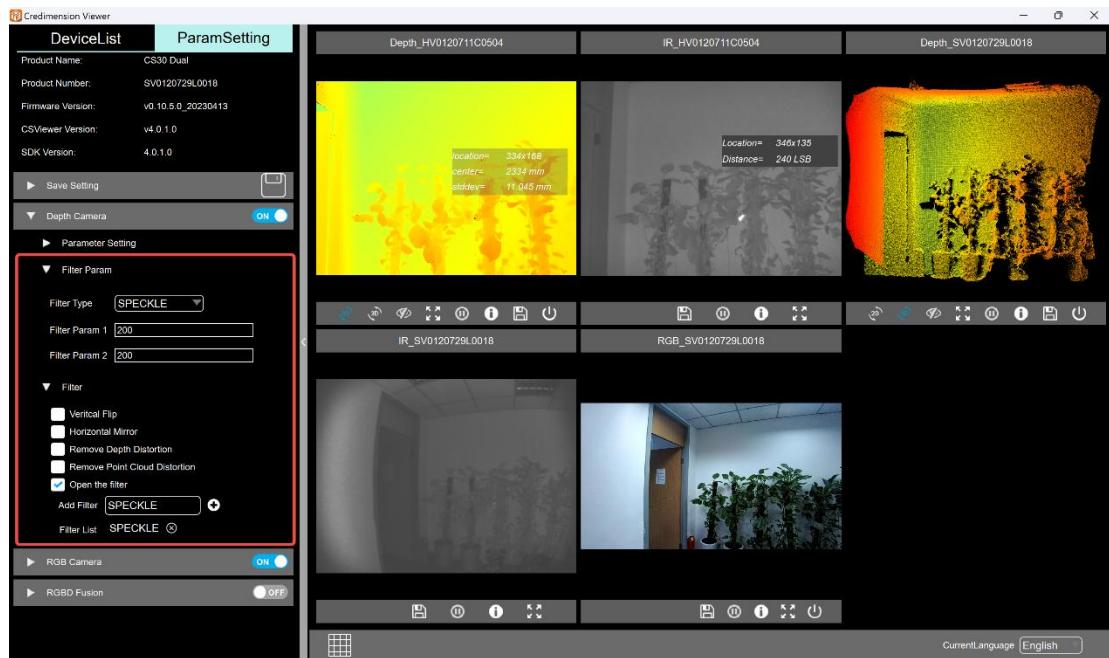


## Credimension Viewer instruction manual

### Depth effect after setting the maximum value of spot filtering:



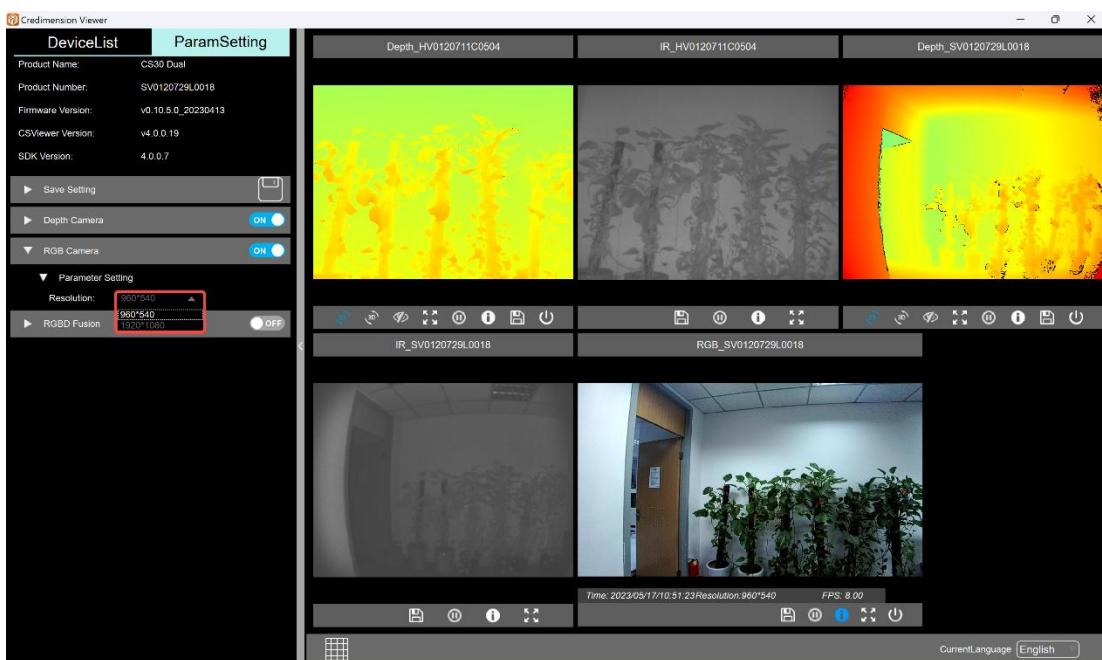
### Spot filter setting the maximum point cloud effect:



### 3.17. Turn on RGB

Note: CS20 no RGB, no RGB+RGBD related functions, the following instructions for RGB and RGBD are only for CS30, the following example is currently a CS20 depth has been enabled, turn on CS30 depth+RGB.

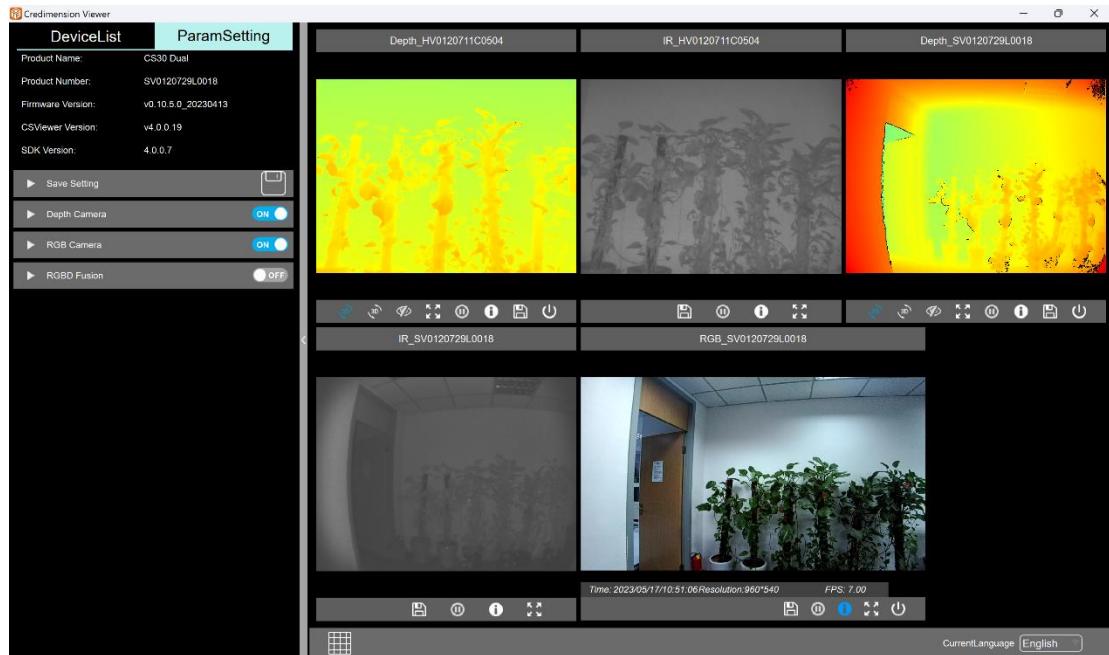
Click the RGB Camera switch to display the RGB image, the default resolution of RGB for the first time is 960\*540, the resolution can be switched to 1920\*1080, and the mouse can drag the RGB window size or move the RGB window position when the RGB screen window.



### 3.18. Display RGB screen information

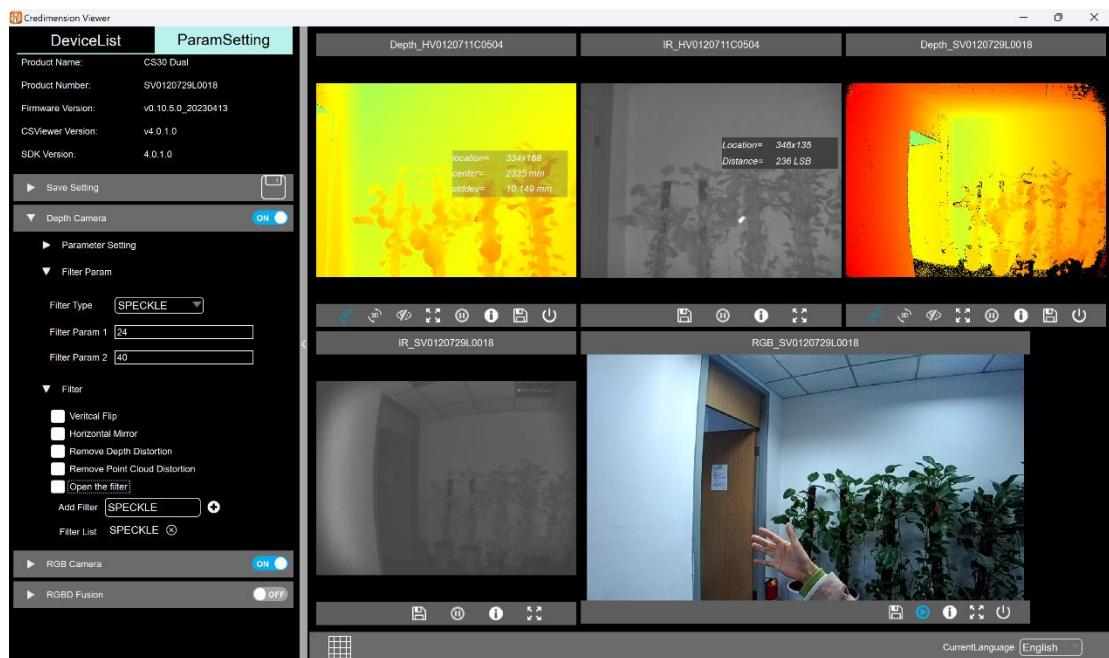
Click the screen information button at the bottom of the RGB screen to display the current time information, current resolution, and current frame rate information in the lower left corner of the RGB screen

## Credimension Viewer instruction manual



### 3.19. Pause the RGB screen

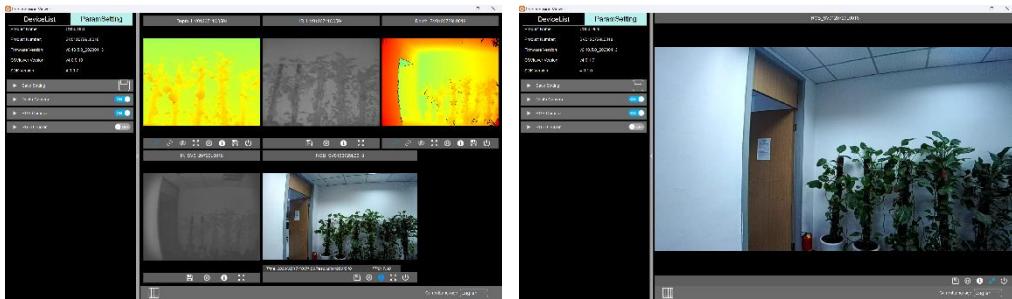
Click the pause button at the bottom of the screen to pause the RGB screen



### 3.20. RGB window enlargement/restore

Click the screen maximize button at the bottom of the RGB screen

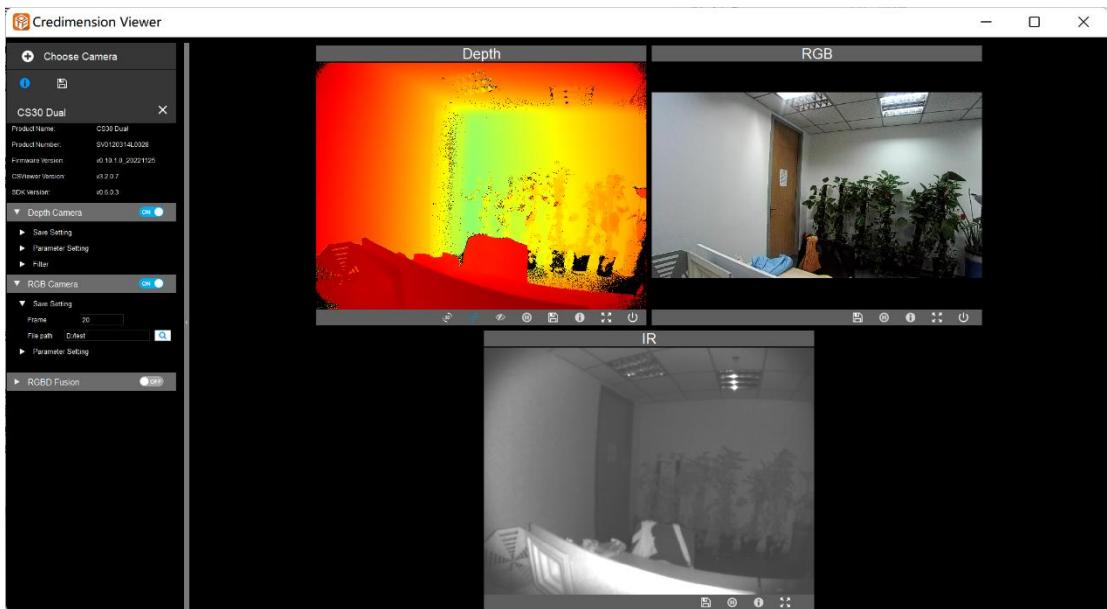
(opening the RGB screen window alone is invalid, you need to open the depth window at the same time, or there are other device screen windows that have been opened), the RGB screen can be displayed as maximized, other windows are hidden, click the restore button again, RGB and other windows are displayed normally. The effect after zooming in is as follows:



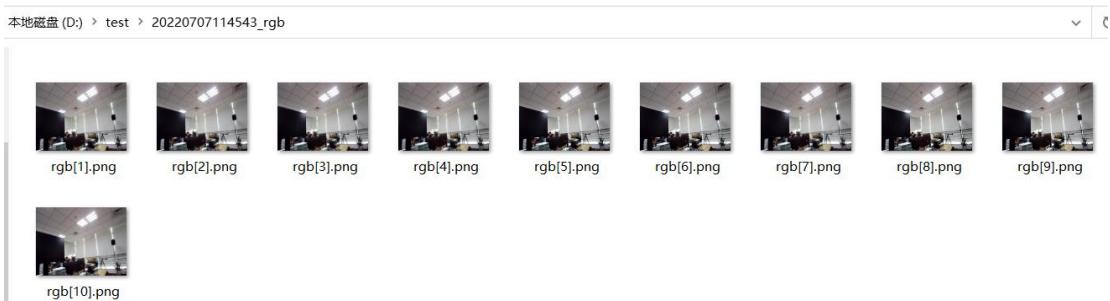
### 3.21.RGB image saving

Click the drop-down arrow on the left side of RGB Camera to set the save information, set the resolution, etc. Click the drop-down button on the left side of save setting, you can set the number of data frames to be saved (the default number of saved frames is 1 frame), select the file path to save the data (the default path is the current software installation path), after setting, the software will default to the latest set save path, number of save frames, etc. when it is started again (Note: do not contain Chinese/Chinese characters in the save path).

Click the Save button at the bottom of the RGB screen to save successfully.

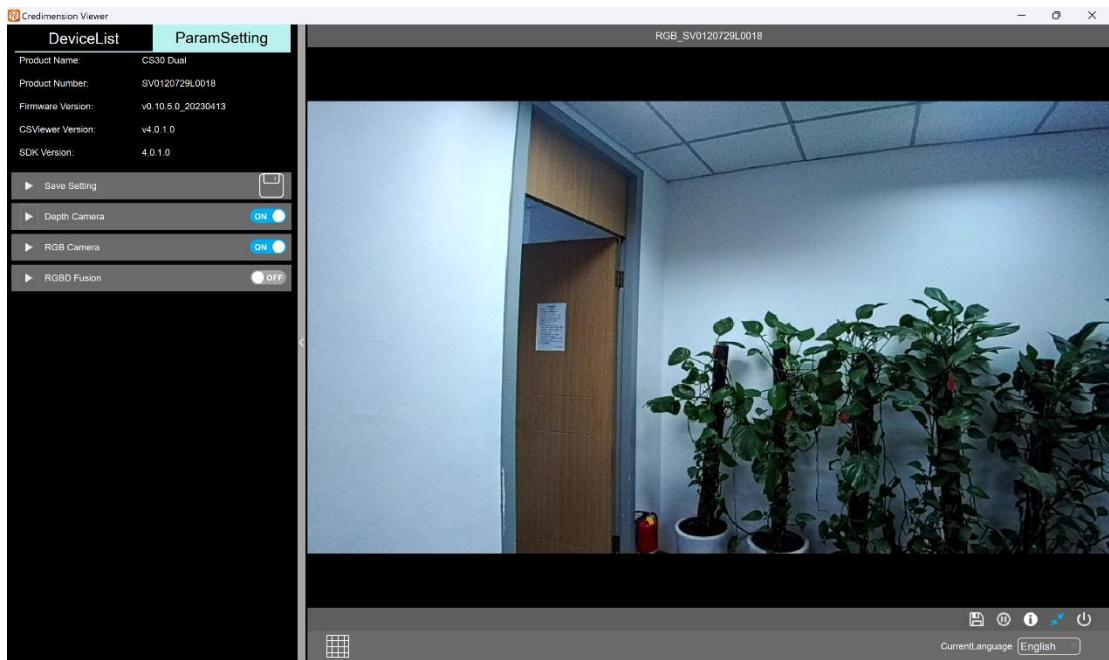


Create folders in chronological order after saving to automatically save data:



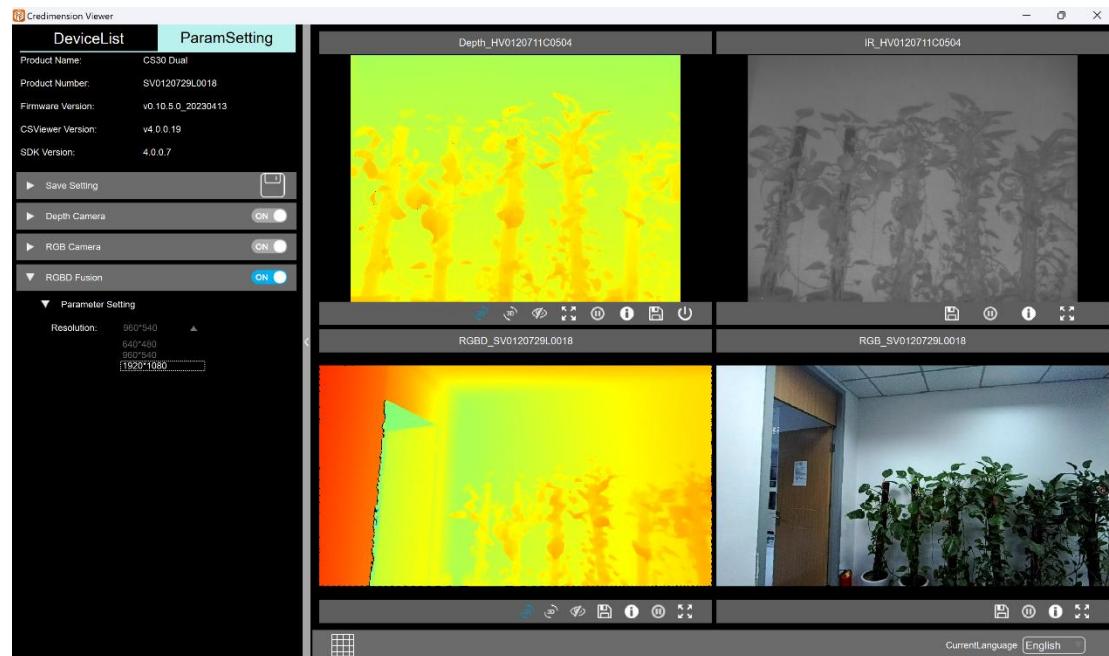
### 3.22. RGB switch resolution

RGB is currently turned on by default to 960\*540 resolution, which can be switched to 1920\*1080 resolution, only when the RGB window is opened, click the save button under the RGB screen window and click the total save effect, save the data for the current window of consecutive frames of RGB data, save the data resolution is consistent with the current open resolution. The save path setting and the number of saved frames are set in RGB Save Setting under Save Setting, the default save path is within the current program sibling path, the number of frames is 1 by default, after modifying once, close the software and turn it on again, the save path and frame number remain as the data after the previous modification.



### 3.23.RGBD fusion

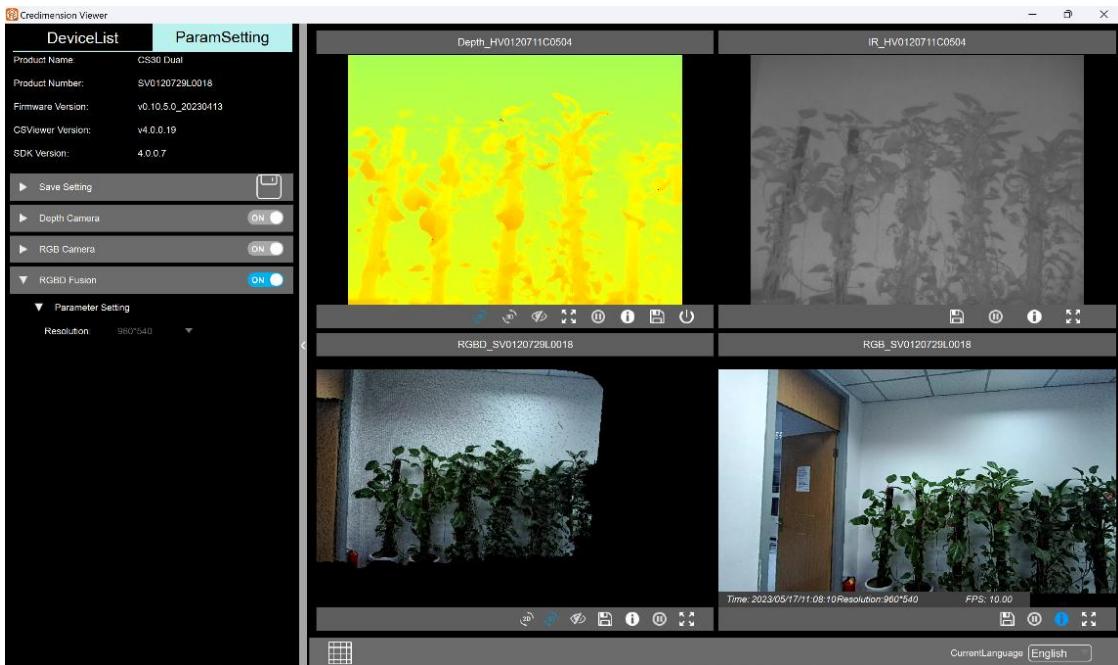
After turning on the RGBD Fusion button, the screen displays RGBD, the default resolution is 640\*480, RGB has no 640\*480 resolution, at this time the screen display content in the RGB window is RGBD (RGB mapping point cloud) after 3D mapping, and the resolution can be switched to 1920\*1080, or 960\*540.



Note: After RGBD is enabled, only the integration time + distance range + filter + screen setting flip functions in the Depth parameter are allowed to be adjusted, and the rest of the functions such as switching depth resolution and removing distortion are not allowed to be modified, and the RGB resolution cannot be modified; After RGBD is enabled, the point cloud data saved are all RGB mapped point cloud data.

### 3.24.RGB Map Point Cloud (RGBD 3D)

Click the 3D button under the RGBD window to display the RGBD 3D fusion (RGB mapping point cloud) screen



### 3.25.RGBD save

Click the Total Save button to save the currently set depth (currently selected save type picture) + RGB to the Depth and RGB setting paths (if RGBD is currently enabled, the saved data shall be subject to the number of frames, save path, and save content in the RGBD save settings).

If RGBD is not currently enabled, click the Total Save button, save the data, create a folder in chronological order, mark the folder according to ToF/RGB, and store it in the file path set by them; If you click Save after

currently enabling RGBD, the save path is set for the current RGBD and a date-time + SN number \_RGBD folder is created.

› 此电脑 › Data (D:) › 20230519163332\_SV0120729L0018\_rgbd



Note: After RGBD is turned on, click Save, RGBD original frame rate of 10fps will reduce the frame rate by 4fps-5fps during the saving process (for example, turn on RGBD, save the frame rate to 50fps, after clicking Save, the frame rate of RGBD will be displayed as 4fps-5fps at about 10S)

### 3.26.Error message DMP address

Under the crash folder at the same level of the installation directory, find the folder corresponding to the error date to find the DMP file, as shown below

GUI_4.0.1.0_202305191650 > GUI > crash > 2023-5-22			
名称	修改日期	类型	大小
GUI_4.0.1.0_202305191650 > GUI > crash > 2023-5-22\Crash\2023-5-22\Credimension-13.56.59.dmp	2023/5/22 13:57	DMP 文件	825,041 KB

## 4. Connected device example

Note: General computer (including notebook, both sides of the notebook have USB ports) support 2 devices running at the same time, the number of multi-machine equipment operation according to the computer configuration and the computer comes with USB port to decide, connect the device as far as possible directly to the computer native USB port, if you need to connect to the external HUB, please supply power to the HUB end according to the actual situation.

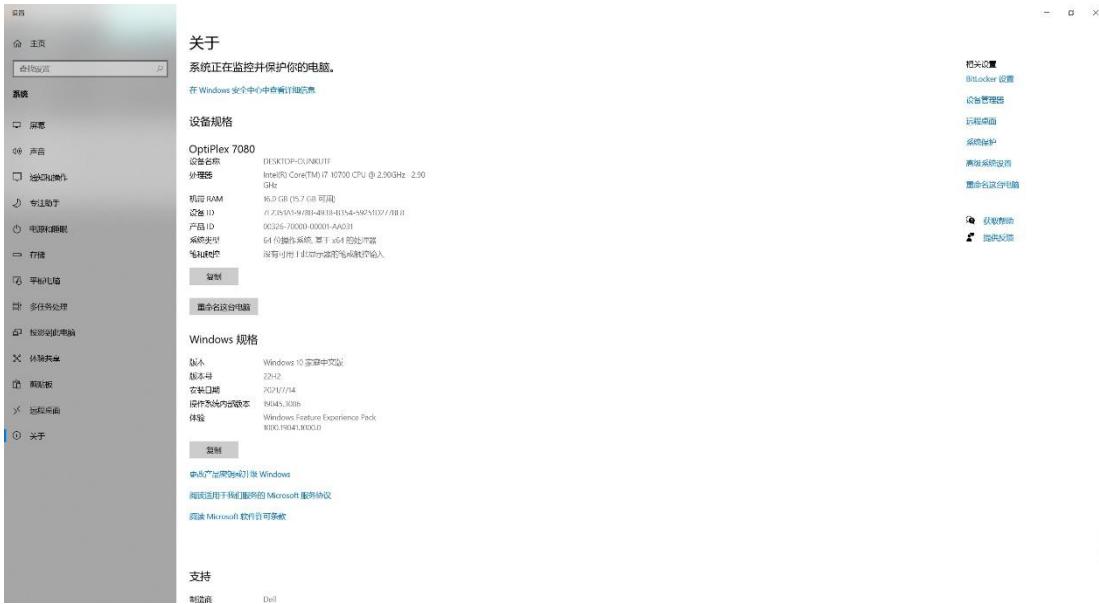
### 4.1. Example 1 desktop computer (5 devices can run simultaneously):

Test 2 hosts can run 5 devices at the same time

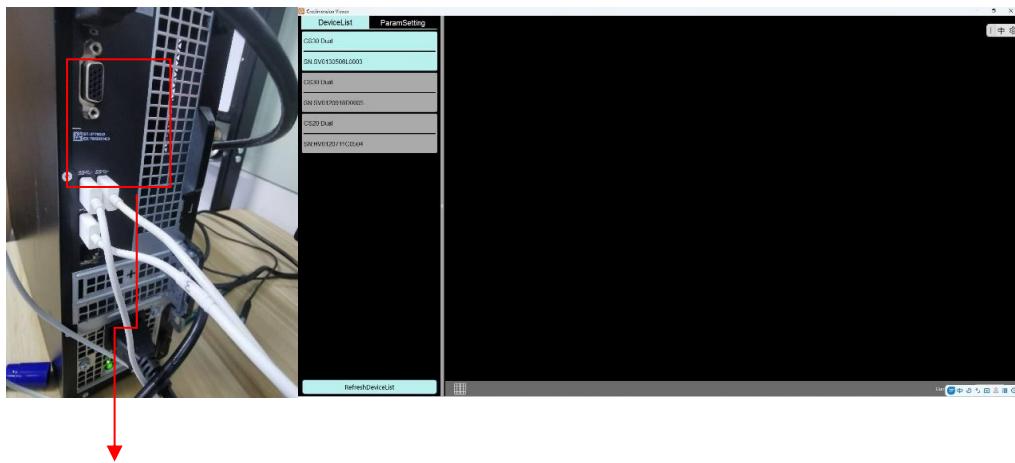
Computer 1 configuration:



Computer 2 configuration:



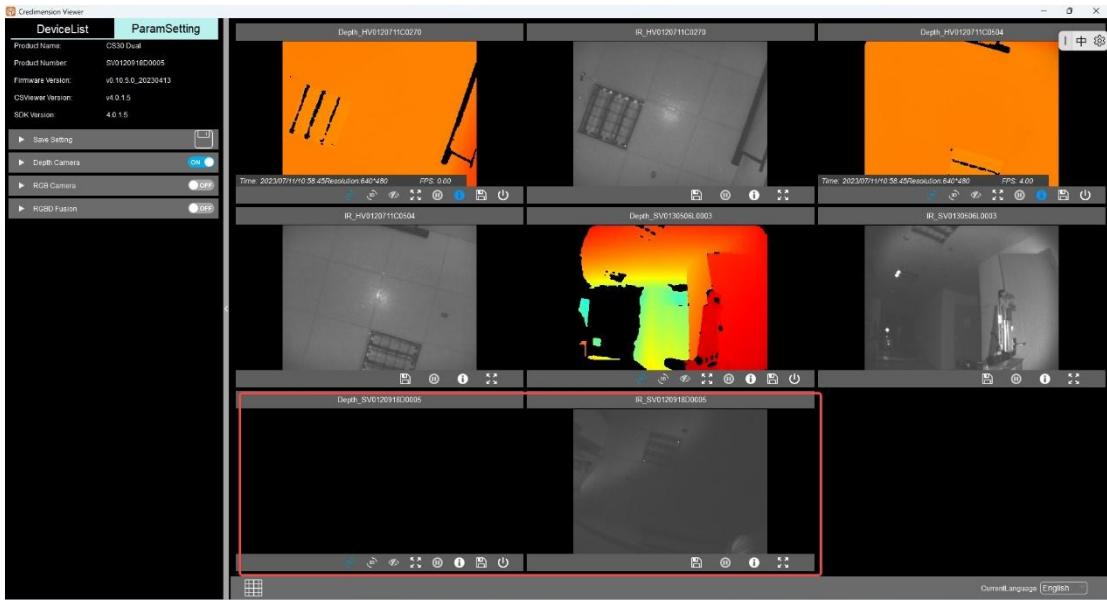
Connect 2 module devices to open the flow normally. When three modules (CS20+CS30+CS30) are connected on the same side of the host (connected to the left figure below), the device list is refreshed normally, and one of the module devices (CS20) is prone to frame rate stop after the current is turned on.



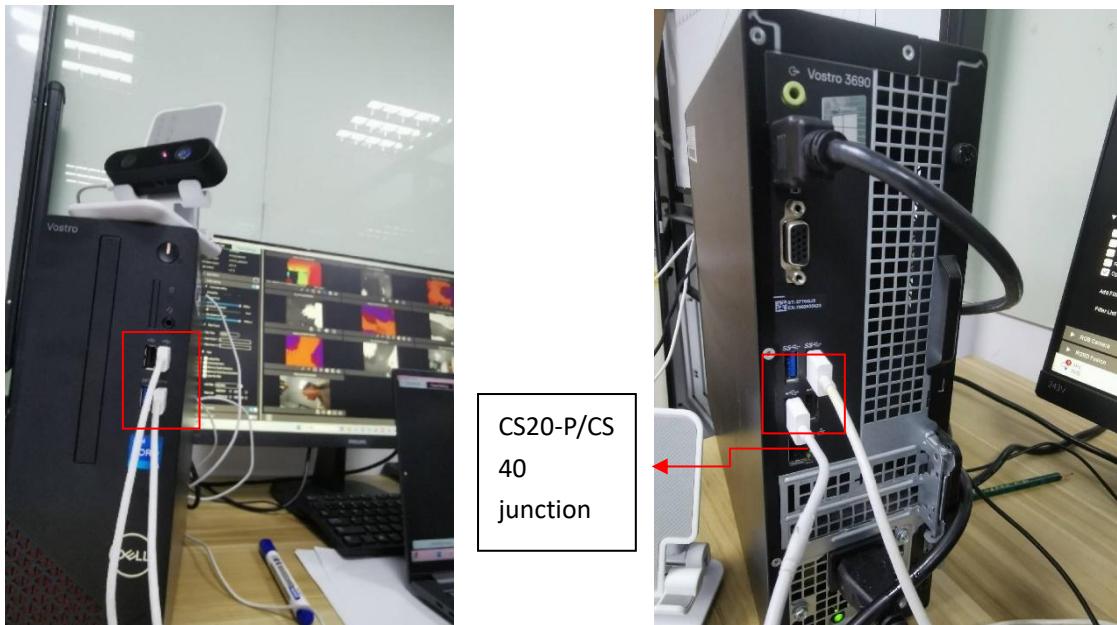
Note: Try not to connect 3 module devices to the USB port on one end, and try to avoid side by side when the two devices are connected (easy to light out)

Connect 4 devices (two on the front and back), of which the two on the front are connected side-by-side USB ports, the open current is shown in the figure below, and the USB is connected side-by-side and

the final open current module lights off:

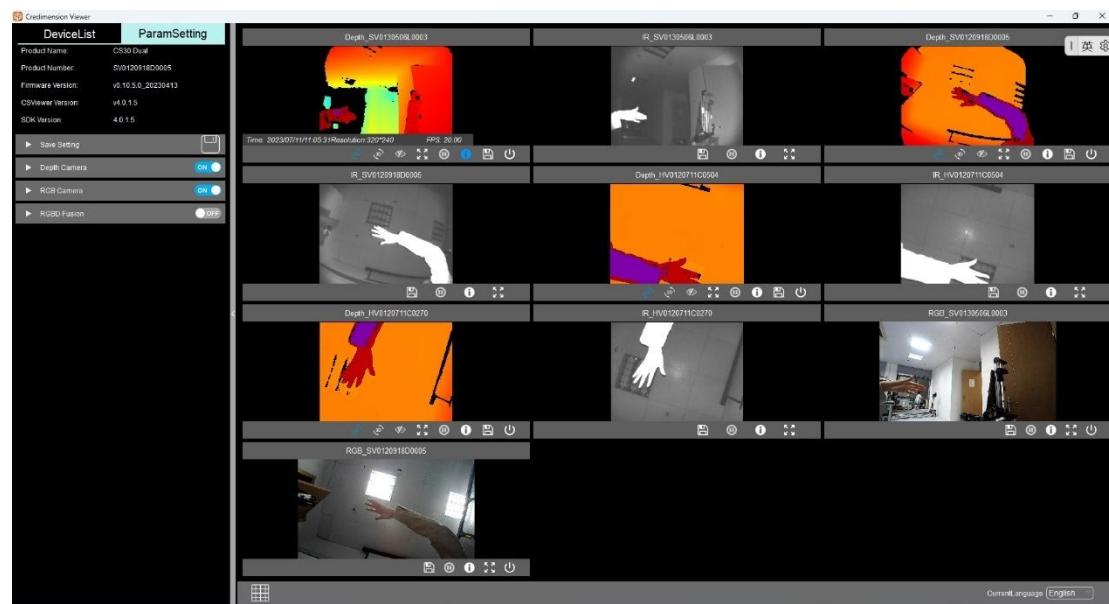


When connecting 4 module devices (CS20+CS30+CS20+CS30), try not to connect CS20 to the side of the computer at the same time as CS20, connect CS20+CS30 on one side, and place another set of CS20+CS30 on the other side as shown below:

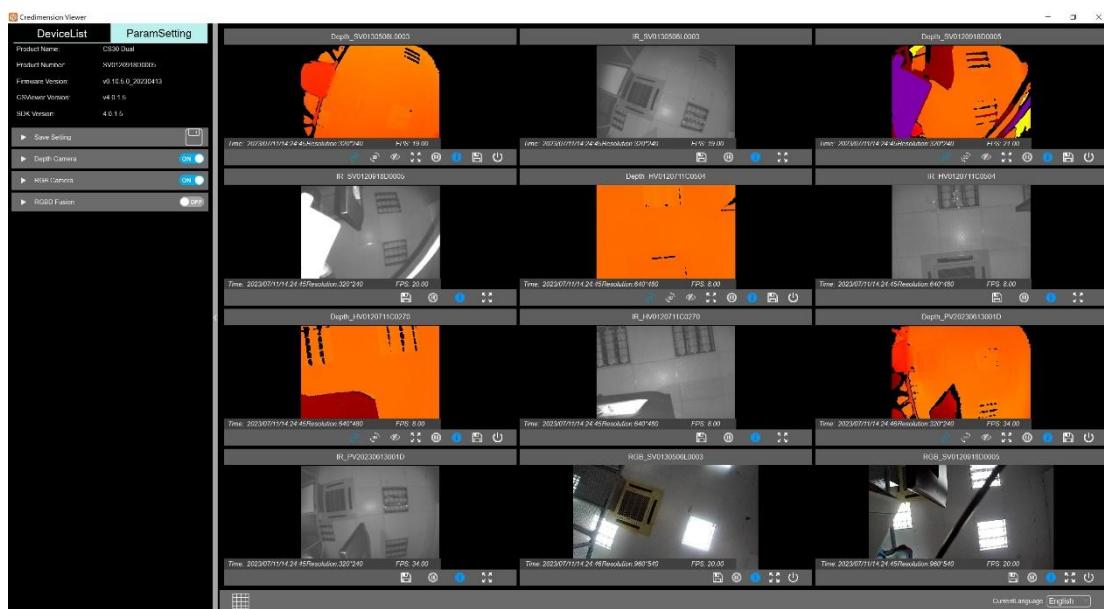


The following figure shows that the device is open normally:

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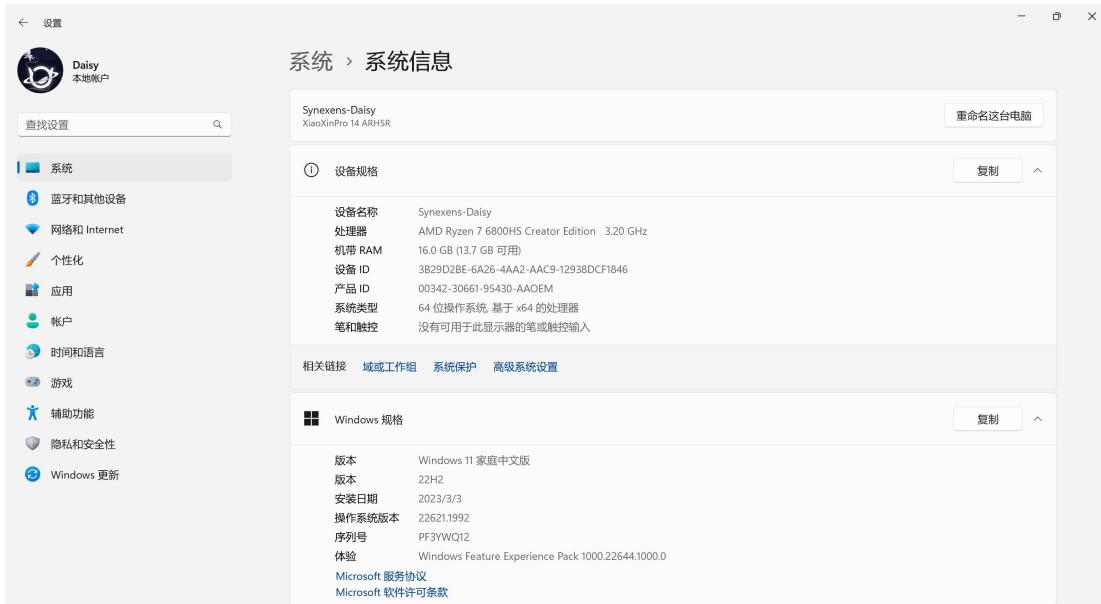


Connect 5 module devices (CS20+CS30+CS20+CS30+CS20-P), except for CS20-P connected to the network port, the remaining four connections are as above (the USB port distribution of each device is different, according to the actual situation), after connecting 5 devices, the normal current is as follows:



## 4.2. Example 2 laptop (2~3 simultaneous operation)

Computer configuration:



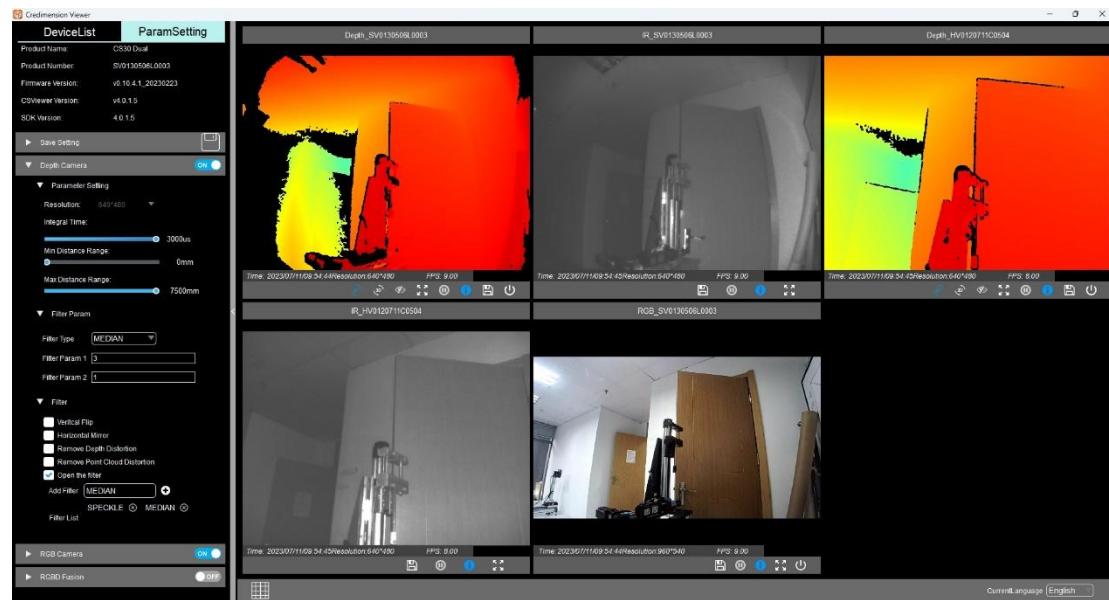
Example computer USB port:



As shown in the figure above, there is only one USB port plus a TYPE-C port of the computer, TYPE-C port can use the Hub to expand the USB port or TCP network port to connect the device (but the extended USB port can only connect 1 device), if the Hub power supply, this Hub can connect 2 devices, note that if the Hub connection device is

CS20-P/CS40 can no longer connect CS20/CS30 in this Hub, Otherwise, there will be a situation where the light of the module equipment is out (several devices can be connected to the hub, depending on the computer configuration and the power supply of the hub).

The two module devices are open normally:



## 5. Disclaimer

The device application information and other similar content described in this publication are provided for your convenience only and may be replaced by updated information. It is your responsibility to ensure that your application complies with technical specifications. The Company makes no representations or warranties of any kind, express or implied, written or oral, statutory or otherwise, with respect to the Information, including, but not limited to, representations or warranties of its use, quality, performance, merchantability or fitness for a particular purpose. The Company assumes no responsibility for the consequences arising from this information or its use. This product may not be used as a critical component in a life support system without the written approval of the Company.