LIPSedge™ DL / M3

All-purpose / Embedded 3D ToF Camera

User's Manual

June 2026
Revision 1.0

June 2026

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Contents

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Revision History

Revision	Description	Date
1.2.3	Content refactoring	2026/6/15
1.2.2	Modified Images in Pg no. 14, 15, 17, 18, and 19	2025/12/01
1.2.1	Modified the naming of Samples from pages 62 to 70.	2024/07/30
1.2	Add the Linux x64& Jetson arm64 installation guide in Chapter3 3.1-B & Chapter3 3.1-C.	2024/04/19
1.1	Re-Modified the User Guide Frame	2024/03/08
1.0	New Release	2023/10/24

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1. Package & Hardware Overview

1.1 Package Overview

A. Packing List

The packing list serves as a reference for package contents. If anything is missing, contact info@lips-hci.com.

No.	Item	Qty.
1.	LIPSedge™DL / M3 Camera	1
2.	LIPSedge™ DL / M3 Camera Quick Start Guide	1
3.	USB3.0 / USB 2.0 Y-Cable	1

B. Camera Accessories

The following supplementary options facilitate the installation process but are **NOT** included in the package. Prepare the following accessories before proceeding to the installation process:

- **Camera tripod**: Secures the camera to a stable position.

C. Supplementary Options

This section is **NOT** applicable to this model.

1.2 Hardware Overview

A. Hardware Features

LIPSedge ™ DL

No.	Name	Function
1.	**RGB Camera**	Collects RGB data.
2.	**Depth Camera**	Collects depth data.
3.	**Status Indicator**	Indicates the image streaming channel at work. – **Off**: No streaming taking place. – **Blue**: Depth / IR image streaming. – **Green**: Color image streaming. – **Aquamarine**: Depth / IR / Color streaming.
4.	**USB 3.0 Interface**	Connects to a USB 3.0 Y-Cable.
Note: Do **NOT** obscure or block the openings of the camera's optical components to ensure the optimal performance of the camera.		

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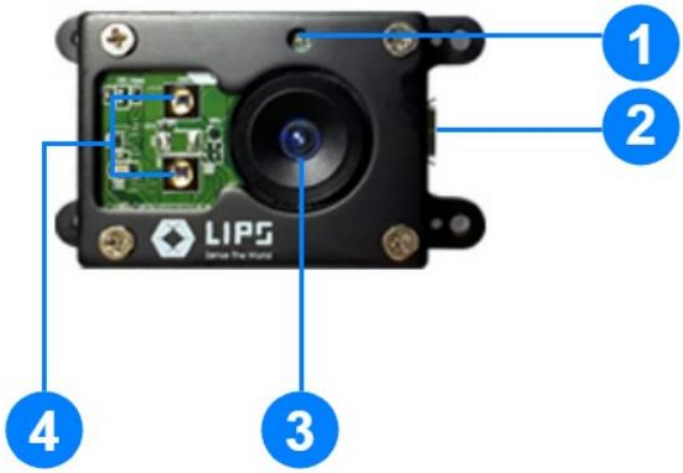
LIPSedge ™ M3



No.	Name	Function
1.	**Status Indicator**	Indicates the image streaming channel at work. – **Off**: No streaming taking place. – **Blue**: Depth / IR image streaming.
2.	**USB 2.0 Interface**	Connects to a USB 2.0 Y-Cable.
3.	**Depth Camera**	Collects depth data.
4.	**LED IR Emitter**	Emits IR signal for measuring depth value.
Note: Do **NOT** obscure or block the openings of the camera's optical components to ensure the optimal performance of the camera.		

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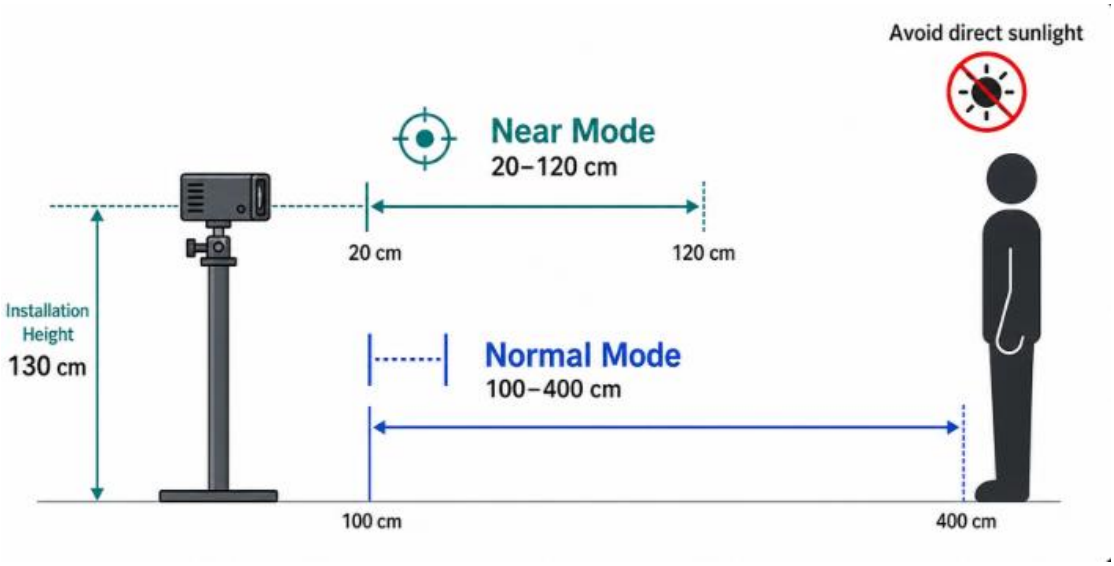
B. Hardware Installation

For optimal recognition results, follow these requirements when installing your LIPS camera.



- **Working Distance:** Install the camera approximately **20 ~ 400 cm** from the recognition target, depending on the working range for different scenarios.
- **Camera Position:** Install the camera on a **tripod** facing the recognition target. Note that LIPS Corp. does **NOT** provide a tripod within the package.
- **Illumination: AVOID** installing the camera at places under **direct sunlight** or with an illumination level **above 1000 lux**.

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C. Camera Connection

Follow the instructions to install the LIPS camera on your PC / laptop.

1. Plug the **Micro B** end of the USB-Y cable into the **LIPS Camera**.

LIPSedge ™ DL **LIPSdege ™ M3**

2. Plug both **Type-A** end of the USB-Y cable to your **PC / laptop**.

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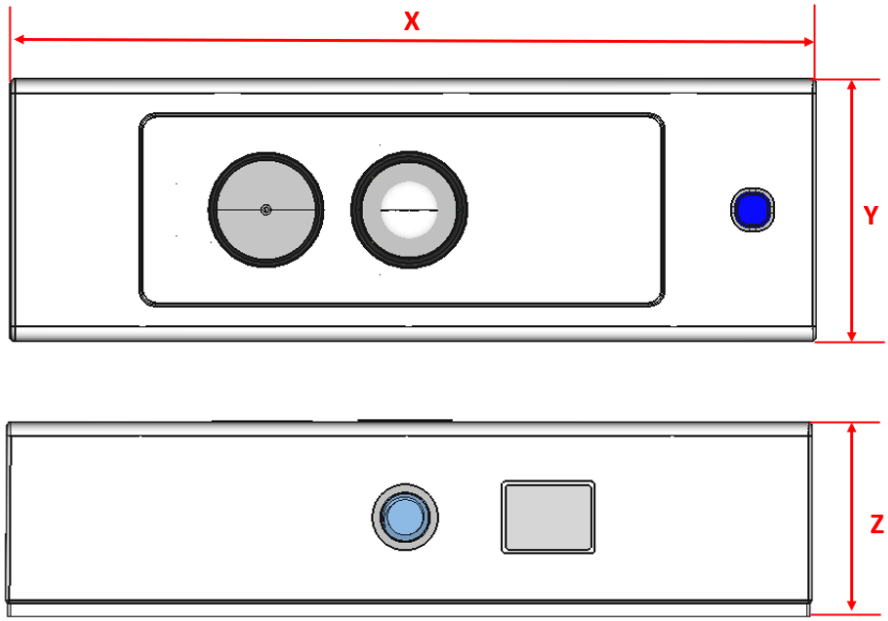
D. Mounting Options

This section is NOT applicable to this model.

E. Hardware Dimensions

LIPSedge™ DL



Dimension					
	Min	Nom	Max	Tolerance	Unit
X	112.1	112.6	113.1	±0.5	mm
Y	36.1	36.6	37.1	±0.5	
Z	26.5	27	27.5	±0.5	

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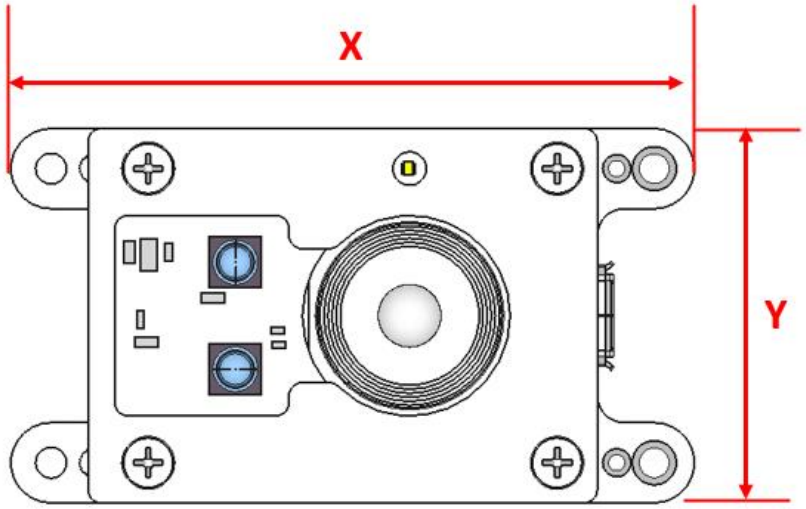
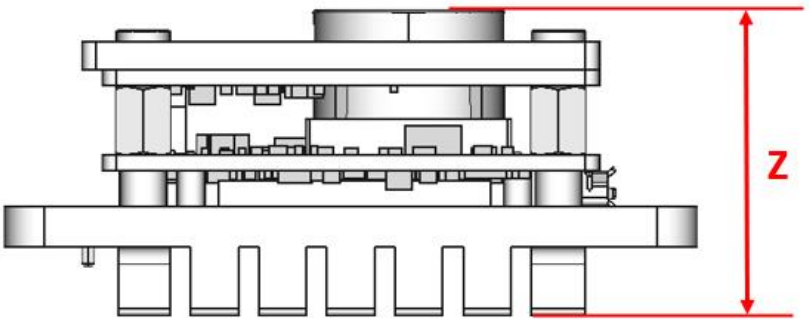
LIPSedge™ M3





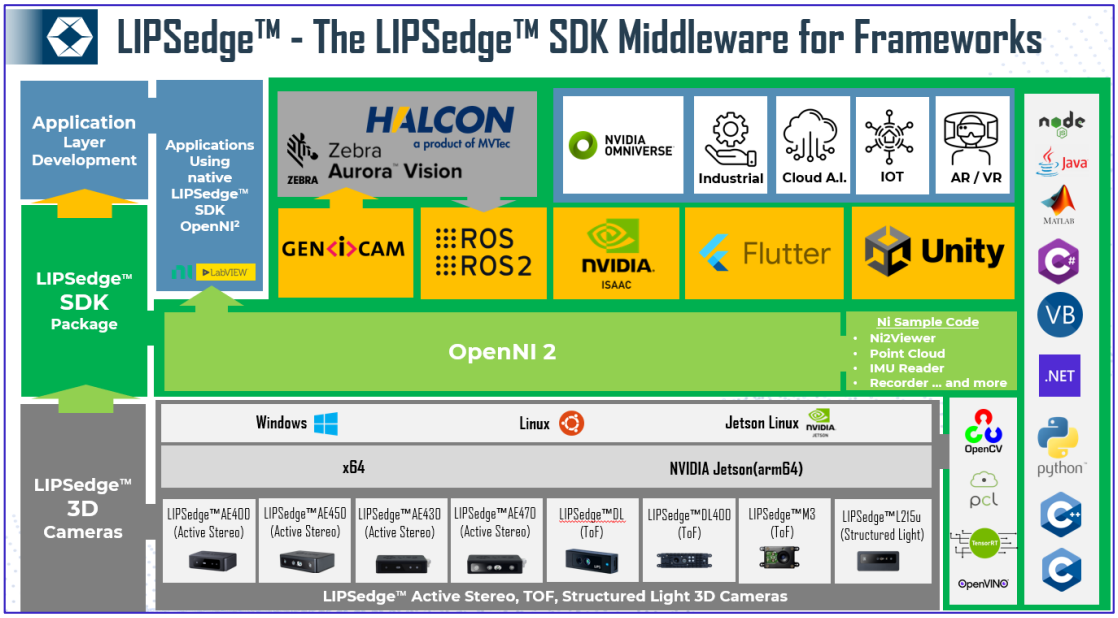
Dimension					
	Min	Nom	Max	Tolerance	Unit
X	50.8	51	51.2	±0.2	mm
Y	27.7	28	28.3	±0.3	
Z	21.05	21.55	22.05	±0.5	

2. SDK Structure

LIPS 3D camera / SDK offers a system for developing depth-sensing applications. As the LIPS system architecture illustrates, the system comprises the hardware and software layers.

The hardware layer oversees data capture, transfer, and processes.

In the software layer, the captured data is fetched by the LIPS SDK (Software Development Kit) on the OS environment. Depending on the project's complexity, wrappers and third-party utilities may be engaged before the data is eventually presented in the application layer for business applications.



The system's core, the LIPS SDK, is comparable to a toolbox full of software modules comprised of middleware, libraries, wrappers and API, and miscellaneous programming languages/platforms for application development. With extensive wrapper support, LIPS SDK enables developers to access bottom-layer data with APIs, thus eliminating the hassle of changing third-party functions. The result is a highly effective project scoping, monitoring, and execution workflow compatible with the fast-paced AIoT market and machine vision demands.

3. SDK Installation

3.1 Platforms

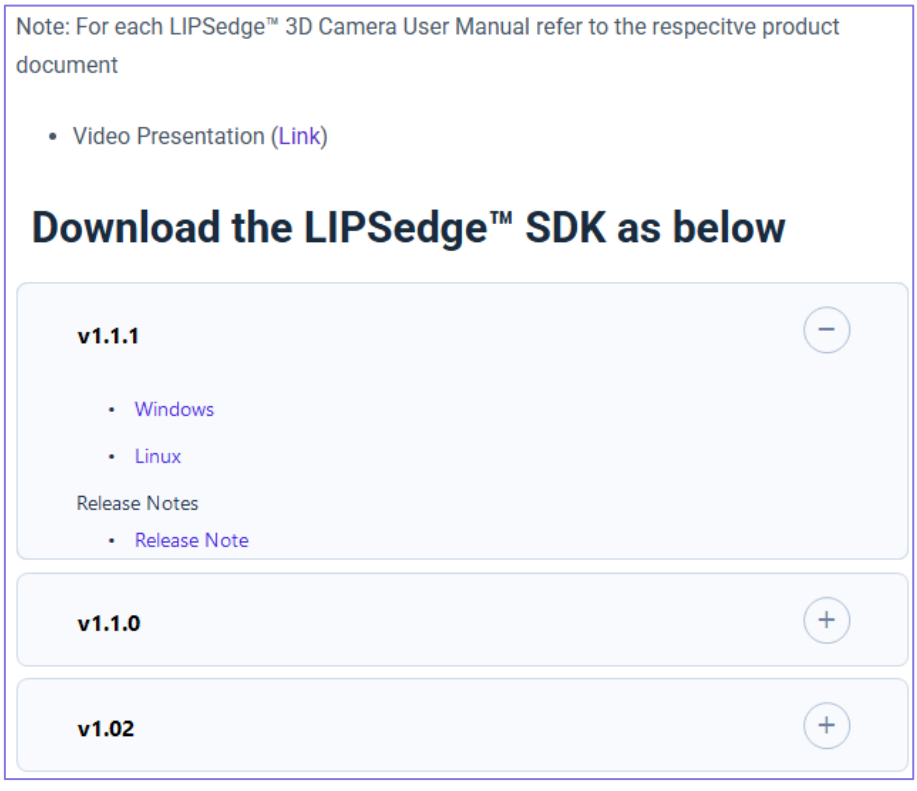
A. Windows Installation (x64)

a. SDK Installation

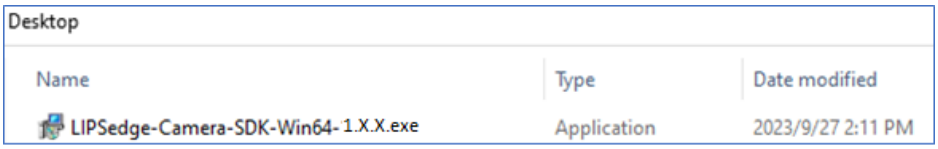
To access the SDK, visit [3D Depth Camera SDK Free Download | LIPSedge™ SDK (lips-hci.com)] and procure the package for the preferred version, framework, and compatible operating system.

1. Visit [LIPSedge™ SDK] website.

2. Under **LIPSedge™ Camera SDK**, select SDK file to download the installation file based on the preferred version, framework, and compatible operating system.

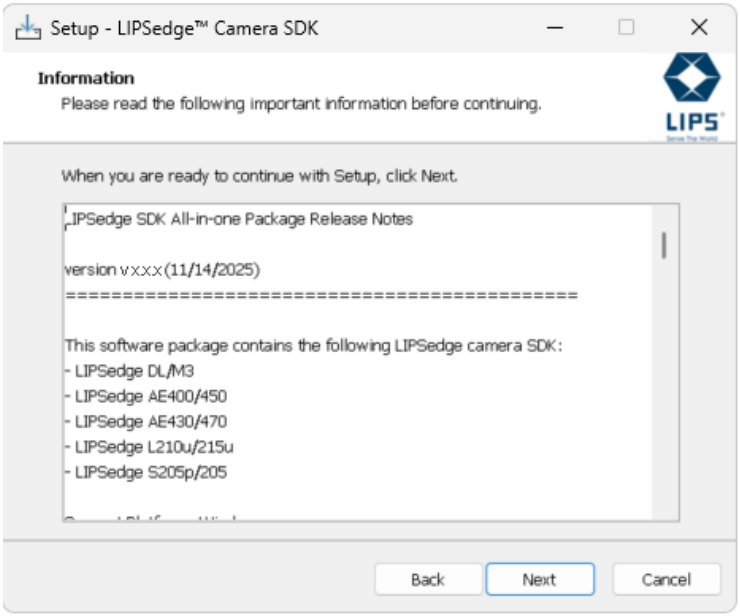


3. Download, extract, and execute the downloaded file.

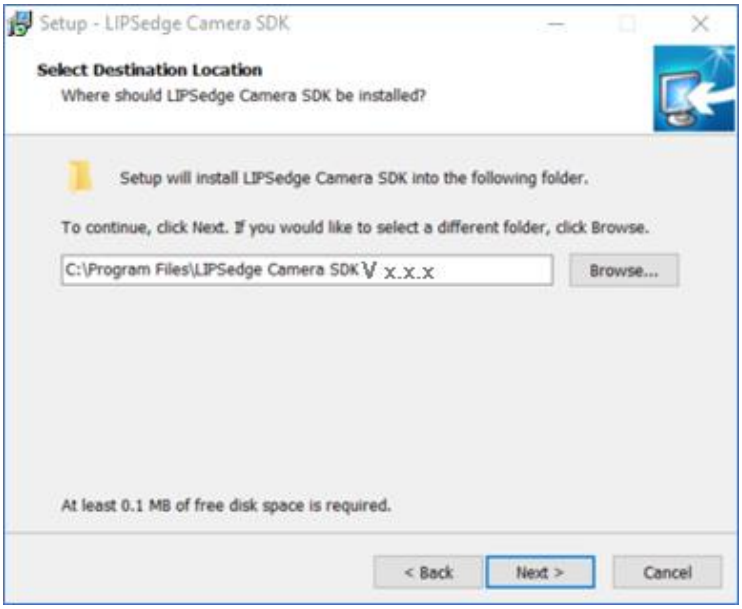


4. Click **Next**.

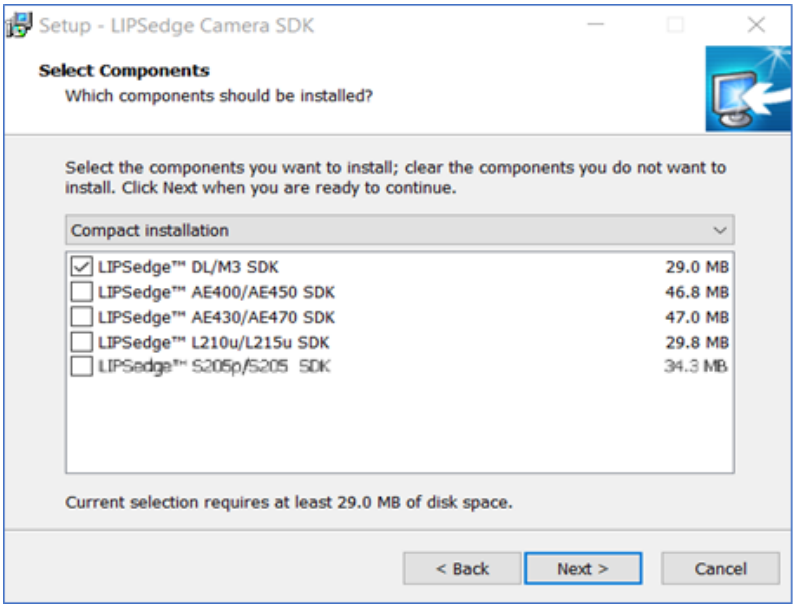
5. Click Next.



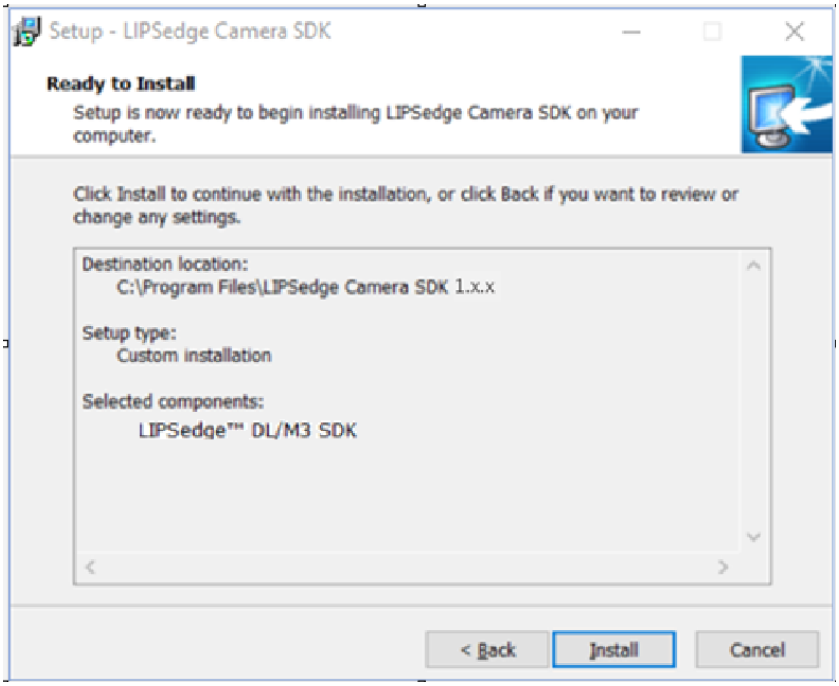
6. Select **the SDK installation location** and click **Next**.



7. From the top menu, select the type of installation for the host PC. Selecting Custom Installation > LIPSedge™ DL / M3 SDK is recommended in this case.
   - **Full Installation**: Install all LIPSedge™ SDKs with all system dependencies for all available LIPSedge™ camera models.
   - **Compact Installations**: Install LIPSedge™ SDK with minimum system dependencies for the chosen model.
   - **Custom Installation**: Install LIPSedge™ SDK with limited functionality for the chosen model.

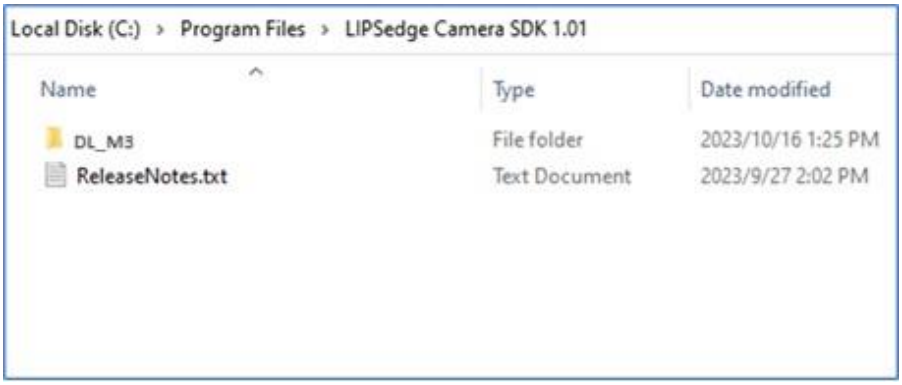


8. Click **Install**.



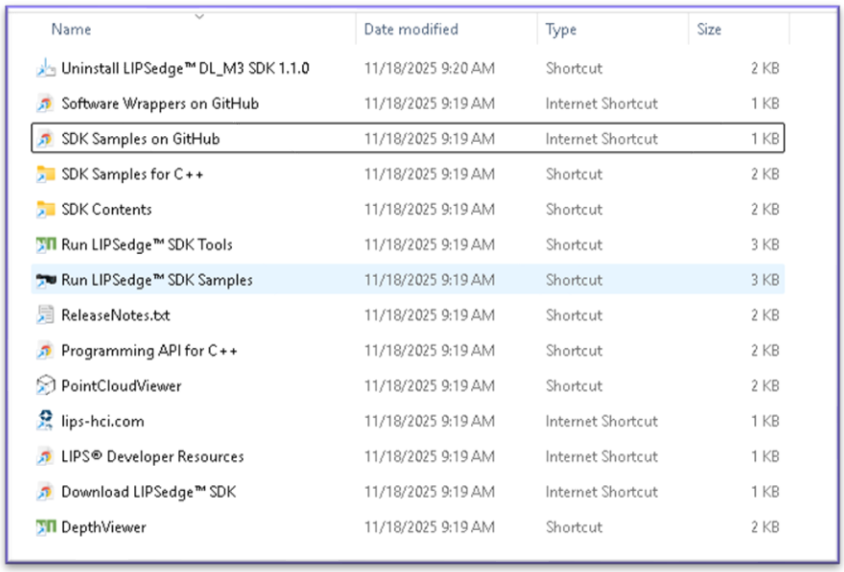
9. Click **Finish**.

10. Once the installation is successful, the LIPSedge™ SDK and its relevant components are accessible at C:\Program Files\LIPSedge Camera SDK x.xx.



11. The LIPSedge™ SDK is also accessible from the desktop shortcut.

12. The desktop shortcut folder contains:

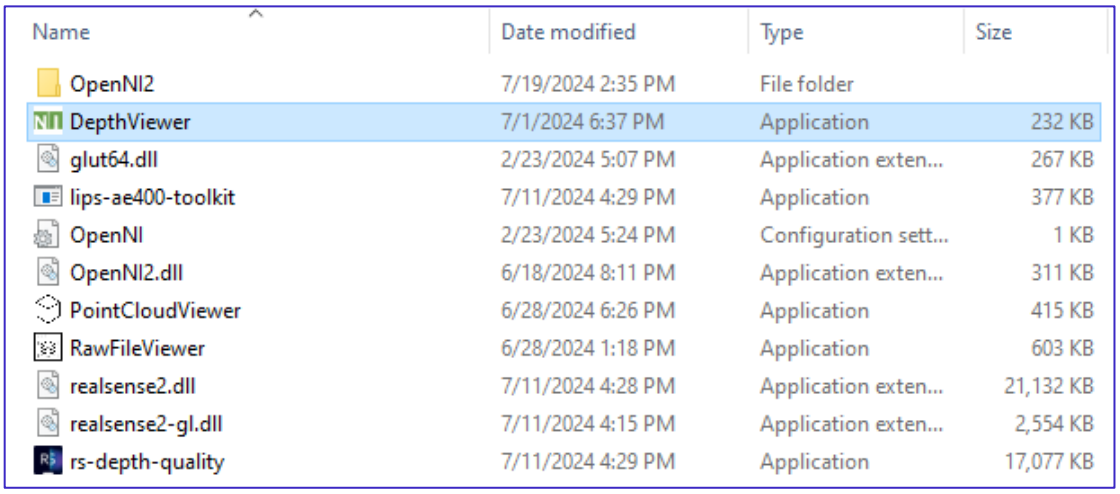


- **Browse LIPSedge SDK Samples**: A link to LIPS Corp.'s GitHub, for example applications
- **Browse LIPSedge SDK Wrappers**: Link to LIPS Corp.'s GitHub for the supported wrapper's source code.
- **Download Latest SDK**: Link to LIPS Corp's official website for the latest SDK
- **LIPS tools source code**: Contains a series of executable tools and the source code of these tools.
- **lips-hci.com**: Link to LIPS Corp's official website.
- **DepthViewer**: An image viewer for streaming RGB / depth images. Refer to
  Chapter3 3-A-c.
- **OpenNI2 Programming API**: A link to OpenNI API's programming guide.
- **Release Notes**: Announcement of the latest feature.
- **Run LIPS tools**: Contains a series of executable tools.
- **Uninstall LIPSedge™ SDK**: A quick uninstallation link for LIPSedge™ SDK.

b. Camera Access

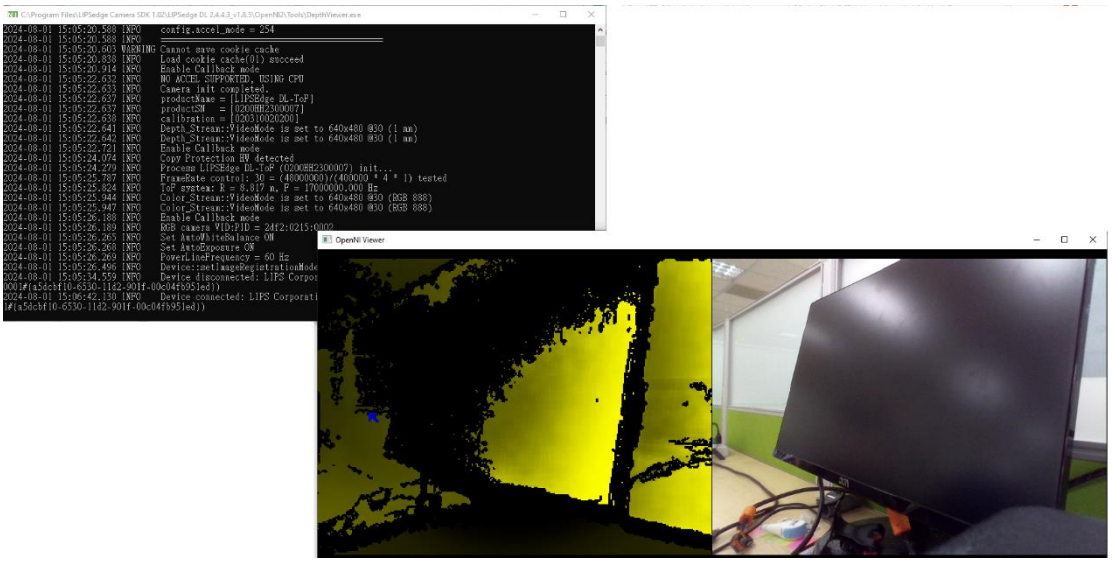
LIPSedge™ DL / M3 utilizes DepthViewer, OpenNI's signature tool, to examine and assess the quality of depth, RGB, and point cloud images.

1. Go to **LIPSedge™ DL_M3\OpenNI2\Tools** and start **DepthViewer**.

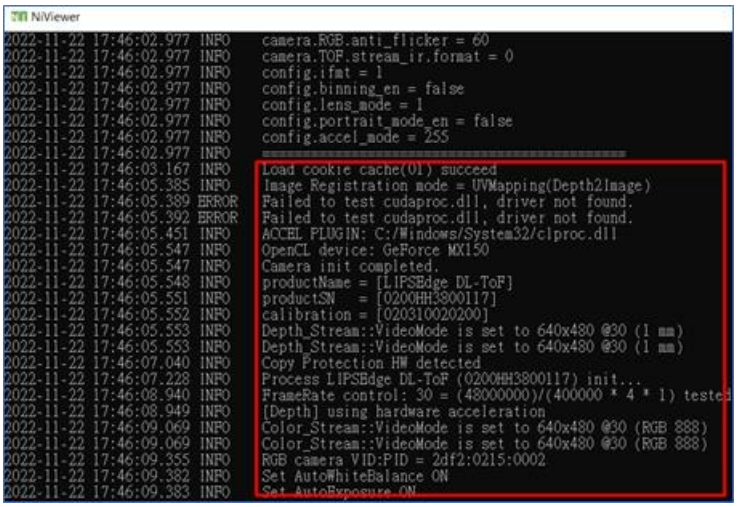


Name	Date modified	Type	Size
OpenNI2	7/19/2024 2:35 PM	File folder	
DepthViewer	7/1/2024 6:37 PM	Application	232 KB
glut64.dll	2/23/2024 5:07 PM	Application exten...	267 KB
lips-ae400-toolkit	7/11/2024 4:29 PM	Application	377 KB
OpenNI	2/23/2024 5:24 PM	Configuration sett...	1 KB
OpenNI2.dll	6/18/2024 8:11 PM	Application exten...	311 KB
PointCloudViewer	6/28/2024 6:26 PM	Application	415 KB
RawFileViewer	6/28/2024 1:18 PM	Application	603 KB
realsense2.dll	7/11/2024 4:28 PM	Application exten...	21,132 KB
realsense2-gl.dll	7/11/2024 4:15 PM	Application exten...	2,554 KB
rs-depth-quality	7/11/2024 4:29 PM	Application	17,077 KB

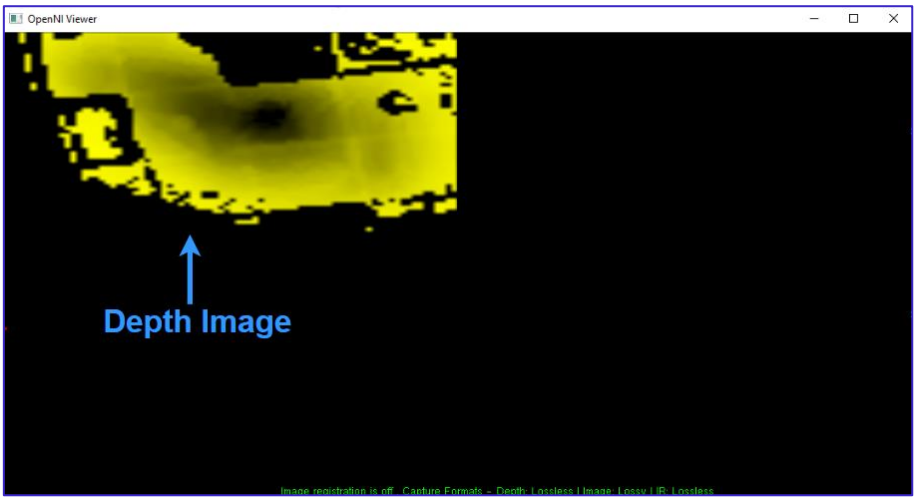
2. Upon activation, a **Status Window** and a **Viewer Window** both pop



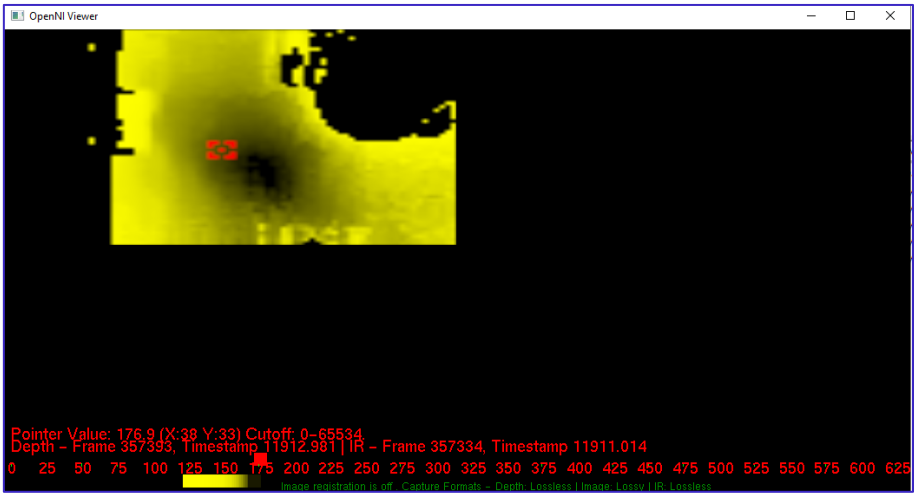
3. The **Status Window** displays the camera information, such as SDK build version, SDK time stamp, camera ID, and status. This example utilizes LIPSedge™ DL.



4. The **Viewer Window** displays the Depth image on the screen.



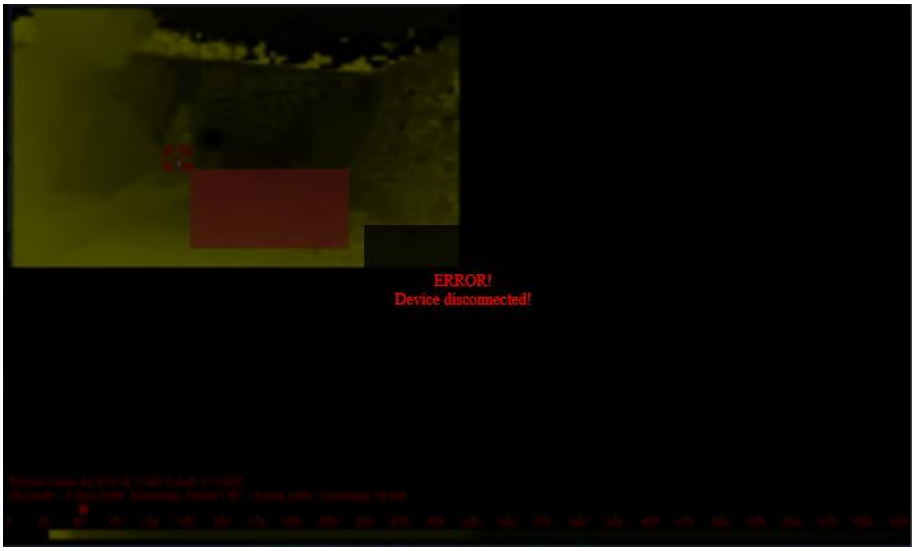
5. Press **[p]** to activate **the pointer mode**. The meter below shows the depth data of the given point marked by the indicator.



6. Measure the distance by dragging a mouse cursor from point1 to point2 as below.

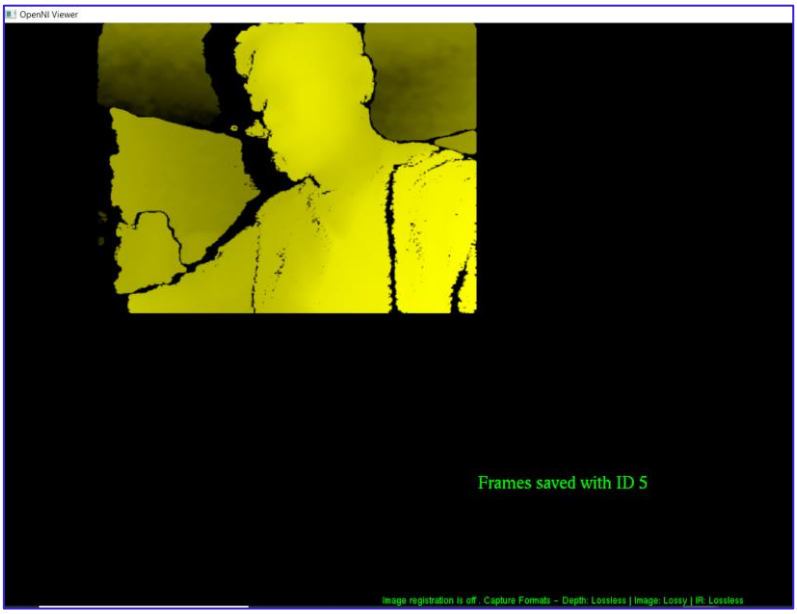
7. Optionally press F to maximize/minimize the viewer's window.

Note: If, for any reason, the USB cable is forcibly removed while DepthViewer is functioning, an **ERROR! The device disconnected** message appears on the screen. To resume livestreaming, re-plug the USB cable.



---

8. Press C to capture the current screen as a raw file. To access the raw file, go to LIPSedge™ DL SDK > OpenNI2 > Tools and drag the captured image file to the RawFileViewer.exe. For details, refer to Chapter 5 *5.1-H*.

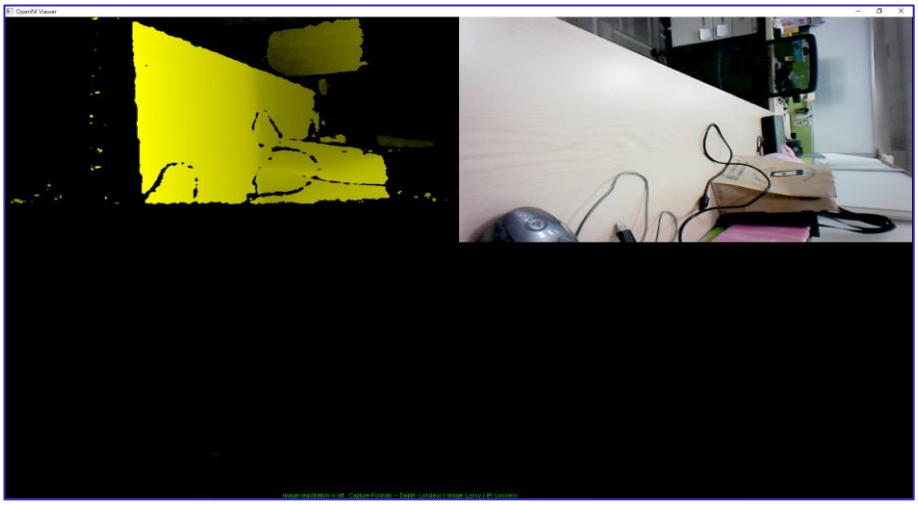


c. DepthViewer Settings

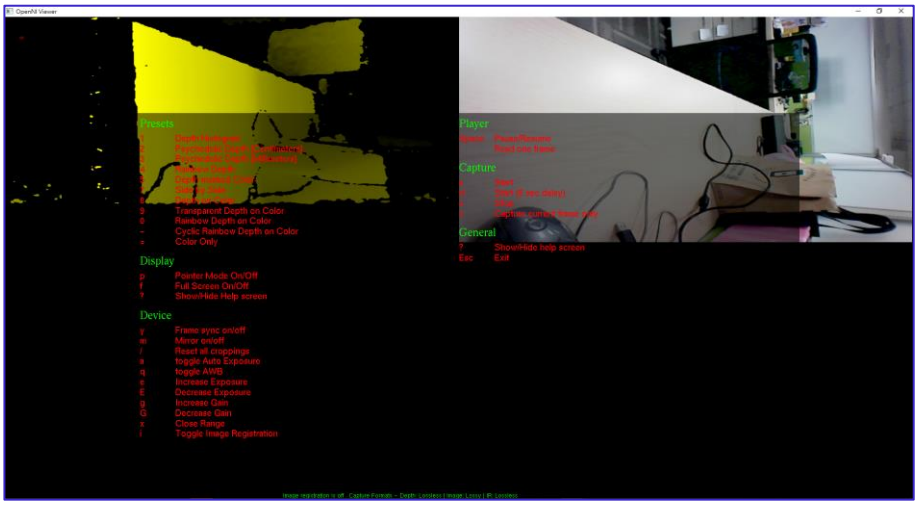
DepthViewer relies on hotkeys, which are listed in the help menu, to control its functionality and adjustments. By default, the menu in DepthViewer is hidden to provide an unobstructed viewing experience. To access this menu, press Shift + ?.

Note: LIPSedge™ M3 only supports depth / IR images and functions. IR images will be displayed when functions involving color streaming is selected.

Default – The help menu hidden



The help menu displayed



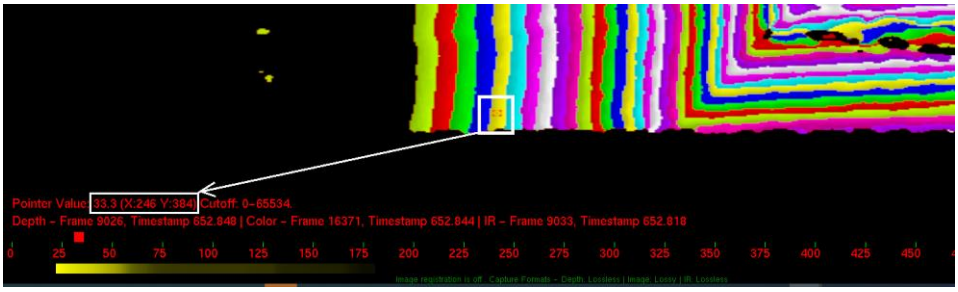
The help menu provides the following functionalities:

General

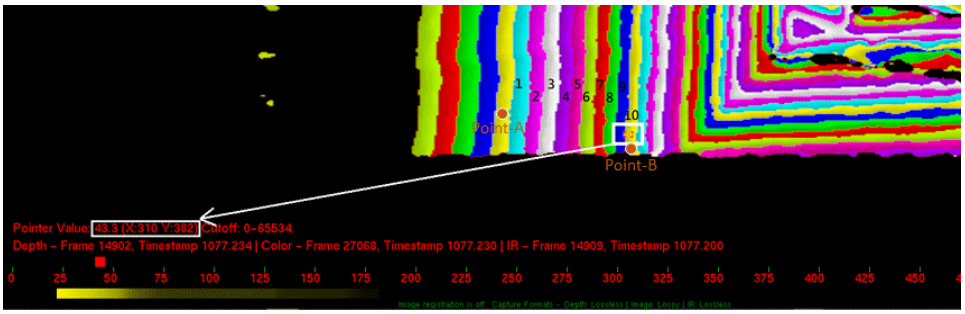
- **Show / Hide Help Screen [Shift + ?]**: Shows the **Help Screen**, which contains the description of keyboard shortcuts and their functions.
- **Esc**: Exits the DepthViewer.

Preset

- **Presets**: Displays the depth/color images in 11 styles. Press the hotkey mentioned by the screen hint to select the image styles. By default, depth/color images are displayed Side By Side. In this example, LIPS Corp. demonstrates a way to assess the depth image quality using the psychedelic depth style with the pointer mode [p].
  - **Psychedelic depth [3]**: Visualizes the depth images in a psychedelic style, aiding in the evaluation of image capturing presentation and quality.
    33.3 represents the depth value from the camera lens to the object. (The unit is cm.)

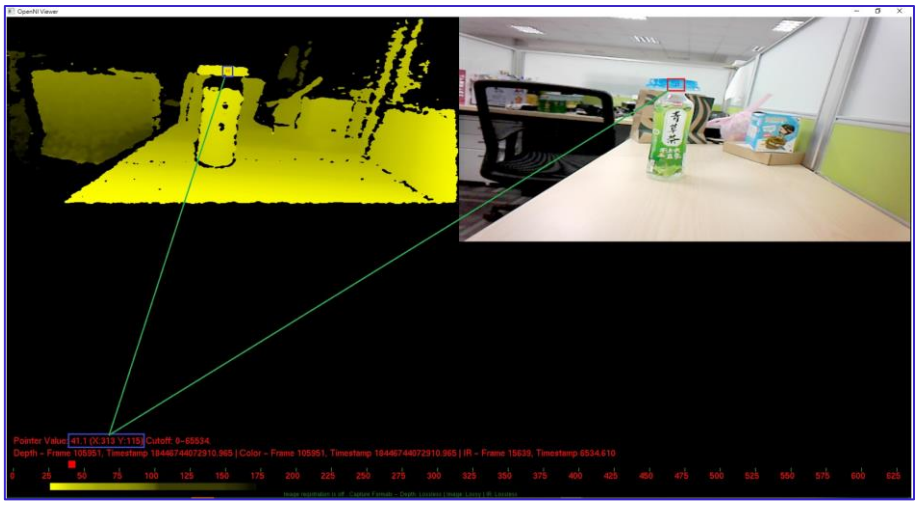


There will be 9 intervals from one color area to the same one-color area, and each interval means 1cm unit. This means the depth value will increase by 10cm from one color area to the same one-color. For example, the depth value will become 43.3 from Point A to Point B.



Display

- **Pointer Mode On / Off [p]**: Enables **Pointer Mode** to show a red dot, which indicates the depth value (unit: mm), representing the distance from the camera lens to the object located at a specific point on the image.



- **Full Screen On / Off [f]:** Displays the camera images in full screen or turns the full screen display off.
- **Reset IR histogram [h]:** Clears the IR histogram.
- **Show / hide help screen [shift+?]:** Shows the **Help Screen** which contains the description of keyboard shortcuts with their functions.

Device

- **Depth-Color Frame Sync [y]**: Synchronize the timing between depth / color images.
- **Depth-IR Frame Sync [u]**: Synchronize the timing between depth / color images.
- **Zoom crop on / off [z]:** Enable / disable a cropping mode that magnifies the displayed area, focusing on a specific region of the image.
- **Mirror All [m]**: Flips the streaming image horizontally for every stream.
- **Reset all croppings [/]**: Reset the cropping area previously assigned.
- **Toggle Auto Exposure [a]**: Automatically adjusts exposure settings for optimal image quality.
- **Toggle AWB [q]**: Enables or disables automatic white balance adjustment.
- **Increase Exposure [e]**: Raises the camera's exposure level for brighter images.

- **Decrease Exposure [E]**: Lowers the camera's exposure level for darker images.
- **Increase Gain [g]**: Enhances image brightness by increasing the camera's gain.
- **Decrease Gain [G]**: Reduces gain to control image brightness.
- **Toggle Close Range [x]**: Toggles between close-range and default focus settings.
- **Toggle Image Registration [i]**: Activates or deactivates image registration.
- **IR Emitter On / Off [t]**: Turns the infrared emitter on or off for depth image capture.

Player

- **Pause / Resume [Space]:** Pauses the playback of the recording or resumes playback.
- **Read one Frame [;]**: This function appears only when the playback is paused. Click to load the playback image of the next frame.

Capture

- **Start [s]**: Assigns a path for saving the recording files and start recording images.
- **Start (5 sec delay) [d]**: Starts to record images 5 seconds upon clicking this function.
- **Stop [x]**: Stops recording camera image.
- **Capture current frame only [c]**: Saves the current frame as an image file.

d. IP Address Configuration

This section does **NOT** apply to **LIPSedge™ DL / M3** since a web interface is not available for these models.

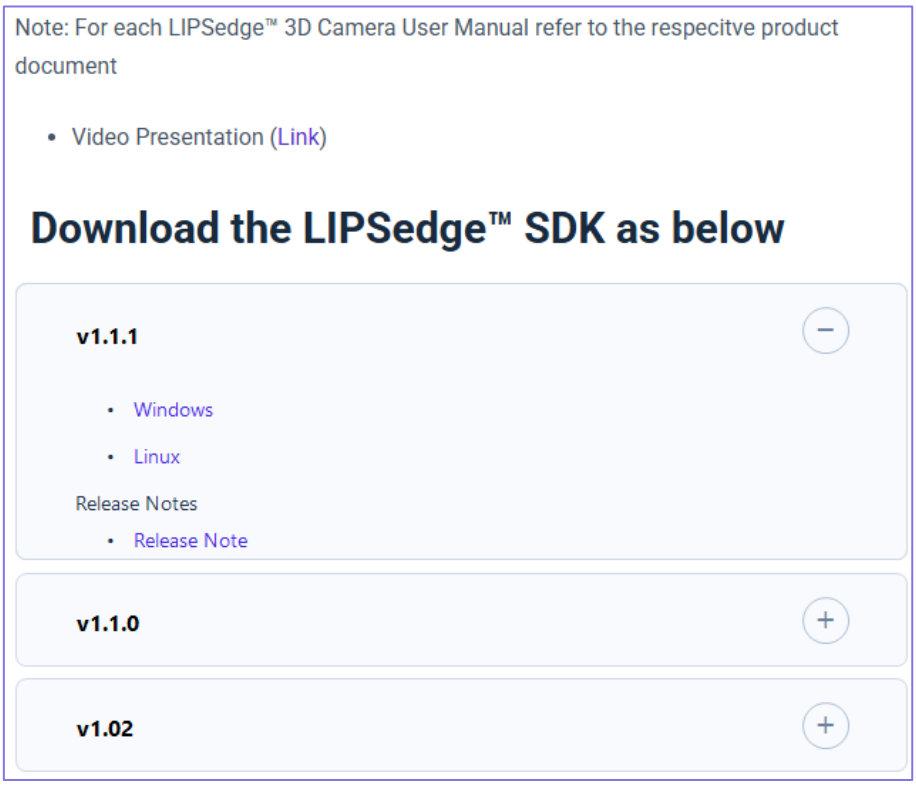
B. Linux / Ubuntu / Jetson Installation

a. SDK Installation

To access the SDK, visit [3D Depth Camera SDK Free Download | LIPSedge™ SDK (lips-hci.com)] and procure the package for the preferred version, framework, and compatible operating system.

1. Visit [LIPSedge™ SDK] website.

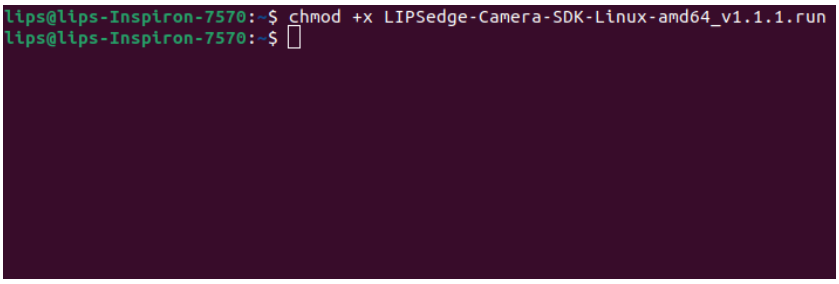
2. Select the installation file based on the compatible operating system and download the installation file.



3. Start **terminal** and go to **the installation file's location**.

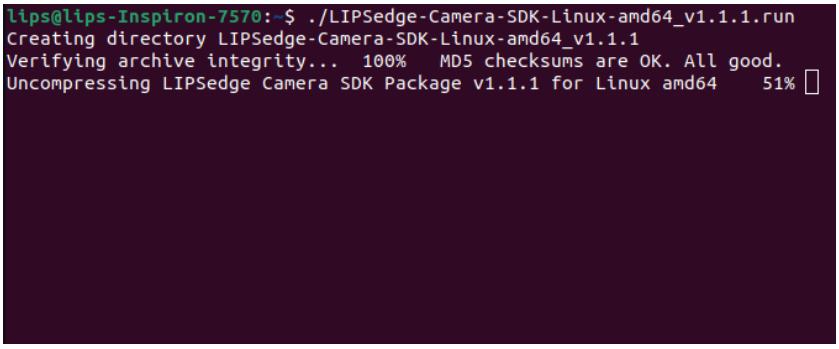
4. Change the **installation file's access permissions.** Here, **Version 1.1.1** is used as an example. Enter the version downloaded in the previous steps.

```
chmod +x LIPSedge-Camera-SDK-Linux-<version>.run
```

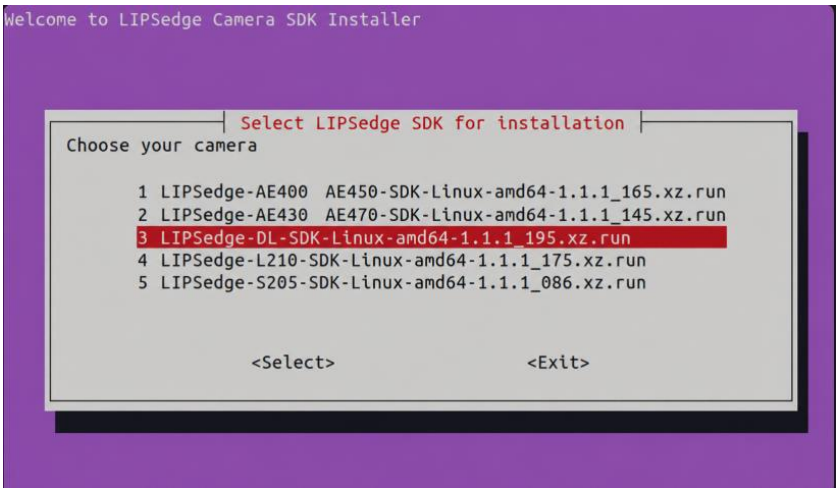


5. Execute the installation file.

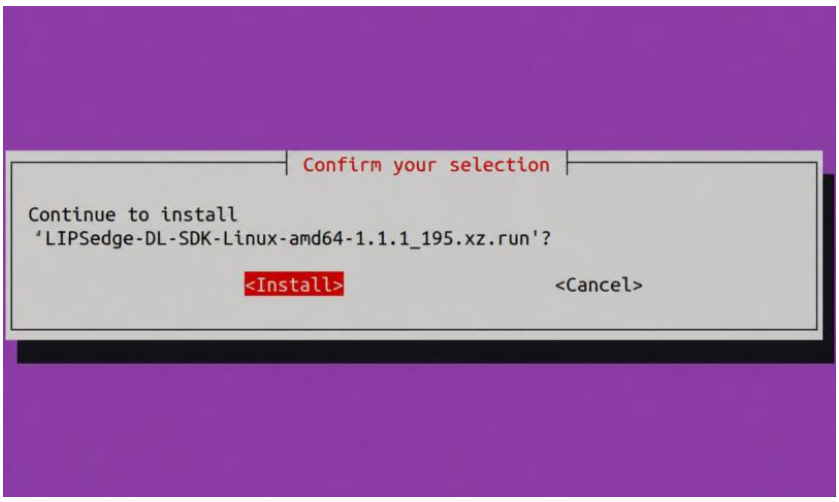
```
./LIPSedge-Camera-SDK-Linux-<version>.run
```



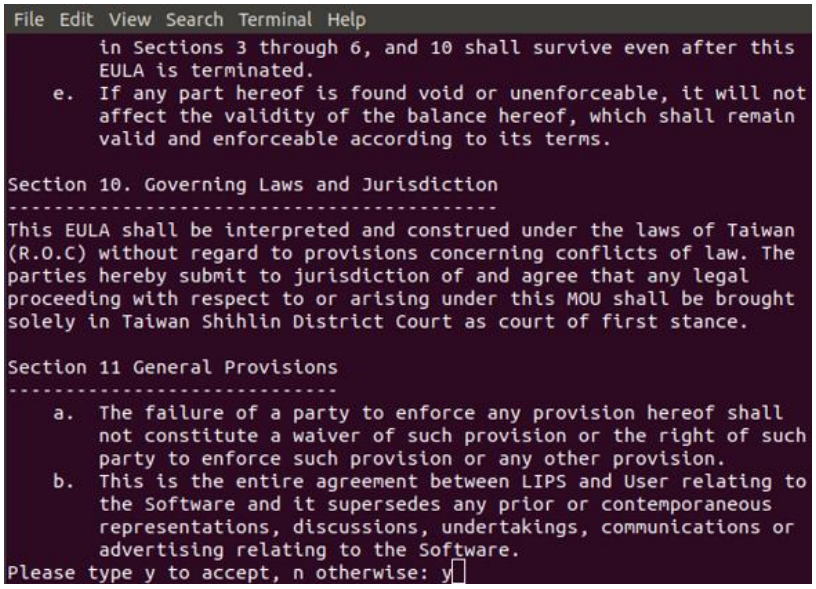
6. LIPSedge™ SDK supports various LIPSedge™ cameras, select the intended model for LIPSedge™ SDK installation.



7. Select **Install**.

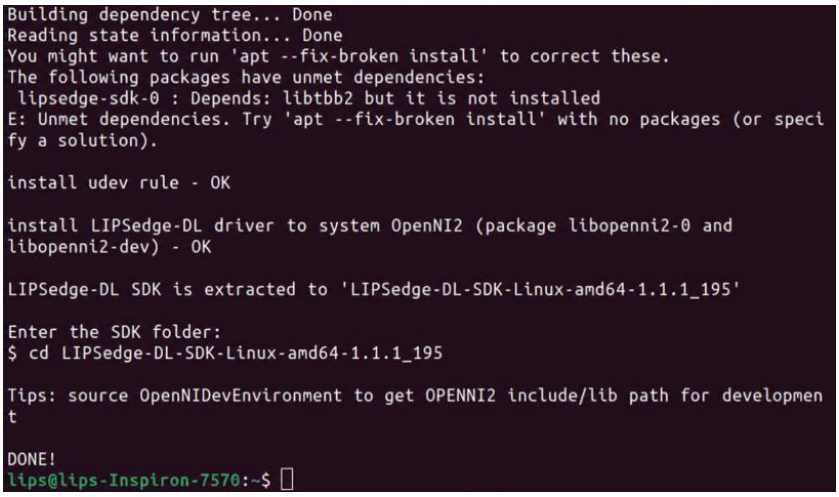


8. Press **Y**.

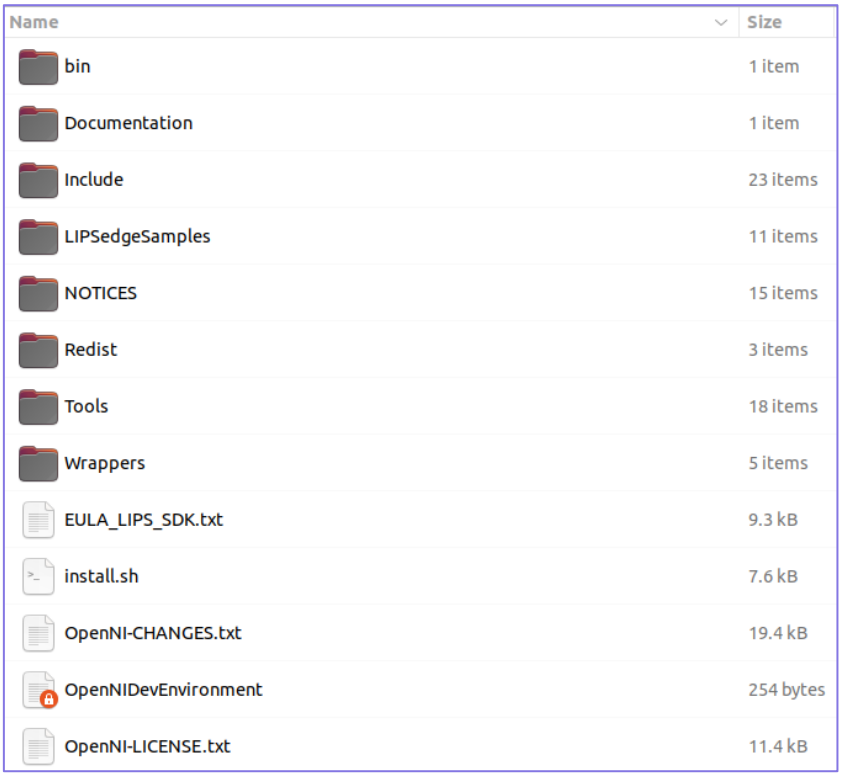


9. Select **Install**.

10. Once the installation is successful, the Terminal will prompt a **DONE!** message.



11. The LIPSedge™ SDK and its relevant components are then accessible at the **installation location**. In this example, the installation location is ./home. For the folder content, refer to similar content in *Chapter3 3.2-A*.

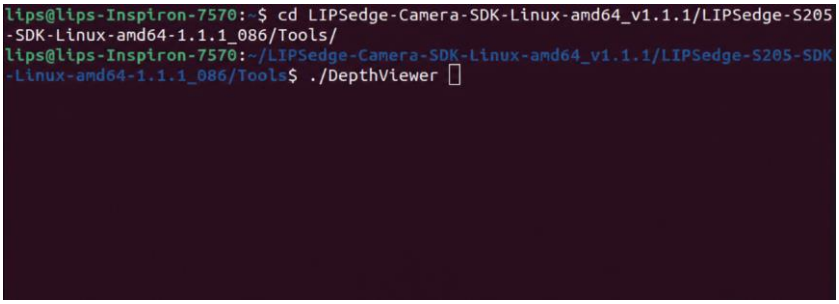


b. Camera Access

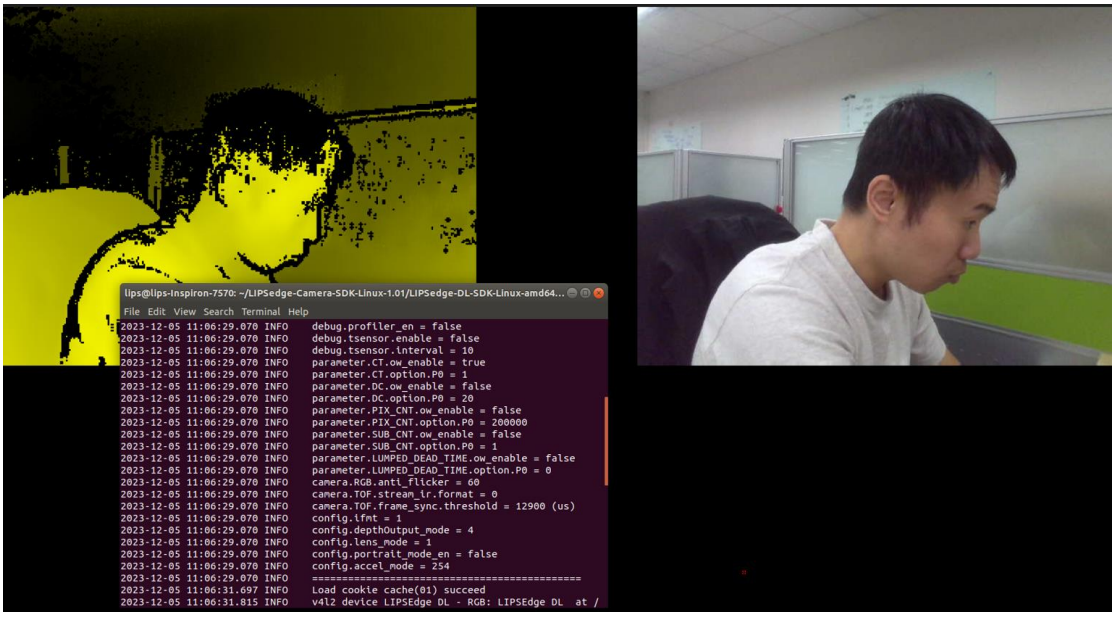
LIPSedge™ DL / M3 SDK utilizes DepthViewer, OpenNI's signature tool, for examining and assessing the quality of depth, RGB, and point cloud images. **Refer to *Chapter3 3.1-A-b* for details.**

1. Go to LIPSedge-Camera-SDK-Linux-<version>/LIPSedge-<Model>-SDK-Linux-<version>/Tools and type the following command:

```
./DepthViewer
```



2. Upon activation, a **Status Window** and a **Viewer Window** both pop



c. DepthViewer Settings

DepthViewer relies on hotkeys listed in the help menu to control its functionality and adjustments. The hotkey functions for the DepthViewer of the Linux version are identical to its Windows counterpart. Refer to *Chapter3 3.1-A-c* for details.

d. IP Address Configuration

This section does **NOT** apply to **LIPSedge™ DL / M3** since a web interface is unavailable for these models.

A. Other OS (by request)

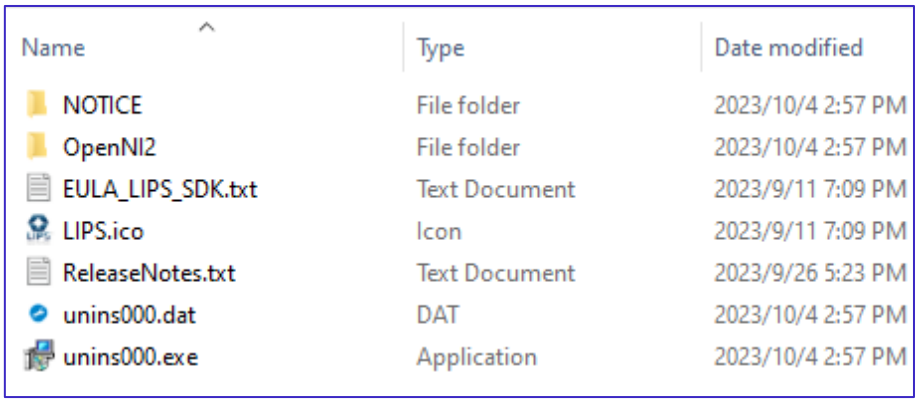
Other OS support by request.

3.2 SDK Knowledge Base

The LIPSedge™ DL/ M3 SDK consists of **two** main components: **OpenNI2 and other dependent files**. Except for the OpenNI2 folder, all the rest of the files are dependent files.

A. SDK Folder Structure

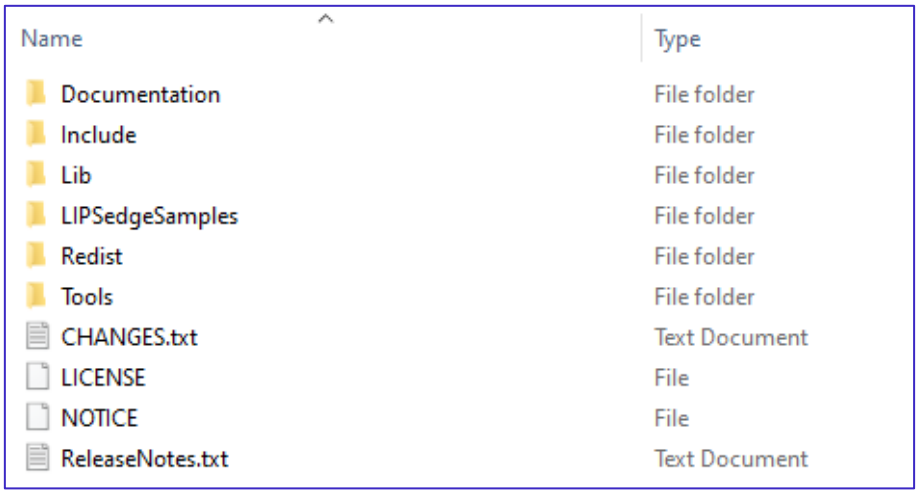
a. Windows



- **NOTICE**: Dependent libraries necessary for LIPSedge™ DL / M3 SDK functionality. Do NOT modify or delete the folder content.
- **OpenNI2**: OpenNI-related files essential for camera integration and function control, including system configuration files and example applications.
- **Auxiliary files**: Supplementary information for the LIPSedge™ DL / M3 SDK.
  - **EULA_LIPS_SDK.txt**: The end user agreement.
  - **LIPS.ico**: LIPS Corp.'s icon, which appears during application operation.
  - **ReleaseNotes**: Announcement of the latest feature.
- **Uninstallation components**: Run unins000.exe for uninstallation. Note that unins000.dat must be present.

[OpenNI2 Folder]

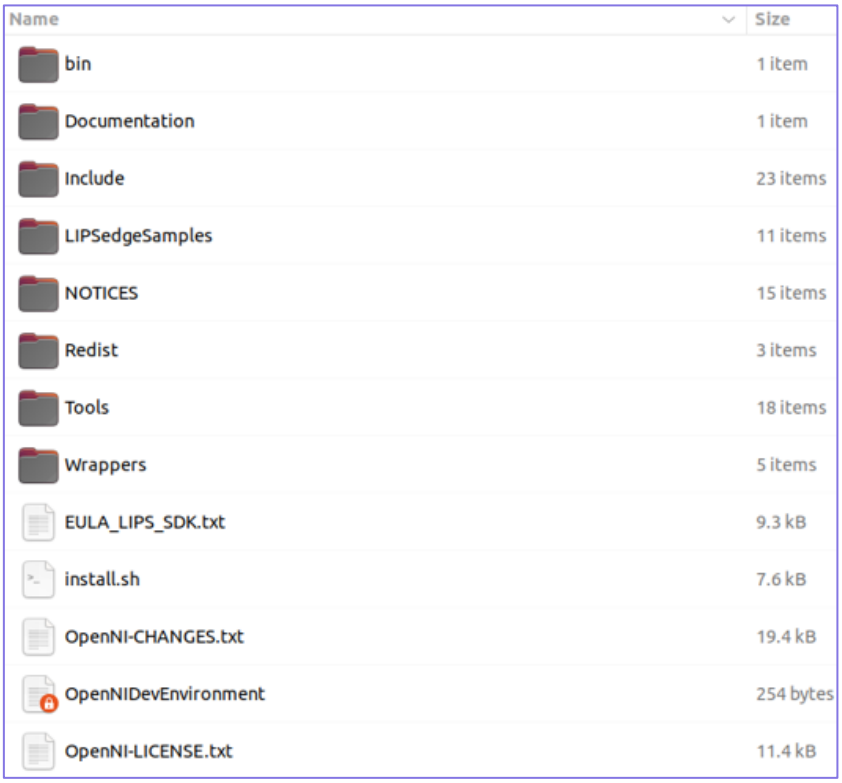
The SDK package for LIPSedge™ DL / M3 provides a comprehensive set of files and folders to support camera integration and development. These resources include OpenNI C++ API documentation, header files, libraries for compilation, sample applications, system files, and essential information such as licenses and release notes.



- **Documentation**: Contains essential OpenNI C++ API documentation.
- **Include**: Contains essential OpenNI C++ headers. These headers can be checked along with the associated library files to facilitate development.
- **Lib**: Contains library files, specifically OpenNI2.lib, and realsenses2.lib. These libraries are used in conjunction with MS Visual Studio C++ for compilation.
- **LIPSedgeSamples**: Contains a series of executable tools and the source code of these tools.
- **Redist**: Contains network configuration files, camera drivers, and system files necessary for image streaming.
- **Tools**: Holds captured frames from example programs and other camera configuration files.
- **CHANGES**: The change log for OpenNI.
- **LICENSE**: Contains information about the licensing terms for the SDK.
- **NOTICE**: Contains copyright and attribution notices relevant to the OpenNI components.
- **ReleaseNotes**: The latest system requirements for OpenNI.

b. Linux

In LIPSedge™ DL / M3 SDK for the Linux system, the folders are structured so that the OpenNI2 and dependency files are **adjacent to the application that requires these external resources**. Go to **./home/LIPSedge-Camera-SDK-Linux-<version>/LIPSedge-<model>_SDK-Linux-<version>/Tools** for OpenNI C++ API documentation, header files, libraries for compilation, sample applications, system files, and essential information such as licenses and release notes.



- **bin**: Consists of the USB driver files for the LIPS camera.
- **Documentation**: Contains essential OpenNI C++ API documentation.
- **Include**: Contains essential OpenNI C++ headers. These headers can be checked along with the associated library files to facilitate development.
- **LIPSedgeSamples**: Contains a series of executable tools and the source code of these tools.
- **NOTICE**: Contains copyright and attribution notices relevant to the OpenNI components.
- **Redist**: Contains network configuration files, camera drivers and system files necessary for image streaming.
- **Tools**: Holds captured frames from example programs and other camera configuration files.

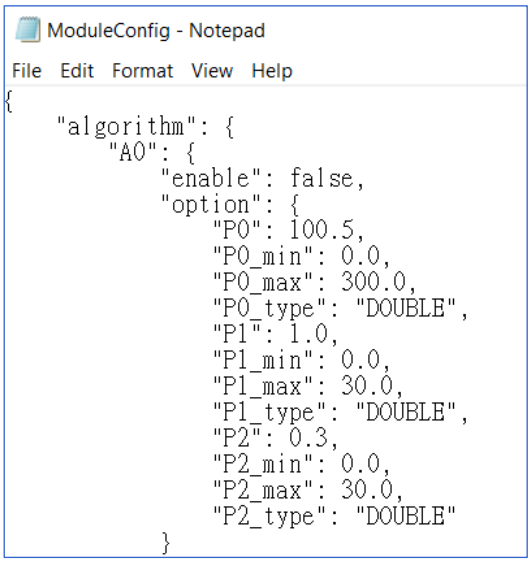
- **Wrappers**: Contains essential wrapper files that provide language-specific interfaces for integrating the SDK into supported applications.
- **EULA_LIPS_SDK.txt**: The end user agreement.
- **Install.sh**: In cases where the Linux / Ubuntu SDK installation was aborted, execute install.sh to install the SDK.
- **OpenNI-CHANGES.txt**: The change log for OpenNI.
- **OpenNIDevEnvironment**: The OpenNI2 development environment and configuration files for application development.
- **OpenNI-LICENSE.txt**: Contains information about the licensing terms for OpenNI.
- **ReleaseNotes**: The latest system requirements for OpenNI.

B. SDK Setting Configurations

In addition to the OpenNI2 settings, the camera image settings are also available for adjustment in the **ModuleConfig.json** file, written in key / value pairs. To modify the SDK settings, edit the ModuleConfig.json file in the following location:

Location	
Windows	C:/LIPSedge™ DL SDK path/Tools/OpenNI2/Drivers
Linux	C:/LIPSedge™ DL SDK path/Tools/OpenNI2/Drivers

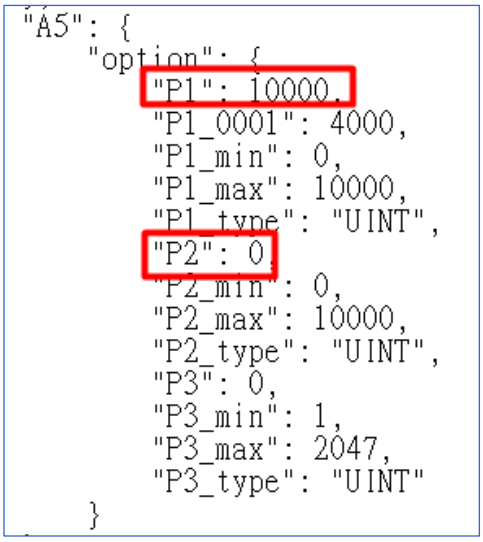
Open **ModuleConfig.json** with **administrator privilege**. Users can change the settings for different applications. Below is the interface of moduleConfig.json.



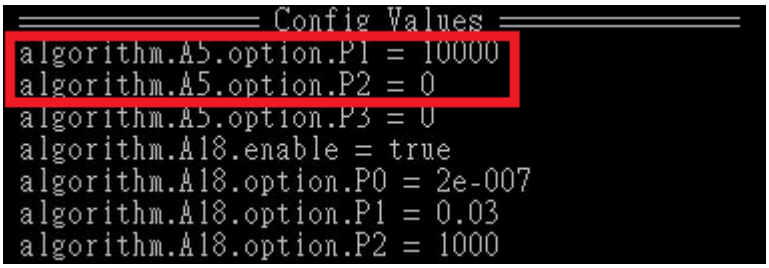
a. Cutting Range

The cutting range function allows users to specify the minimum and maximum working range by filtering unwanted or out-of-range images.

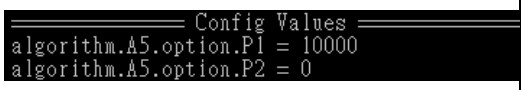
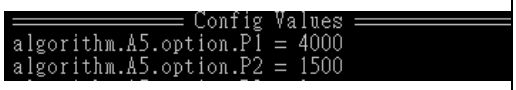
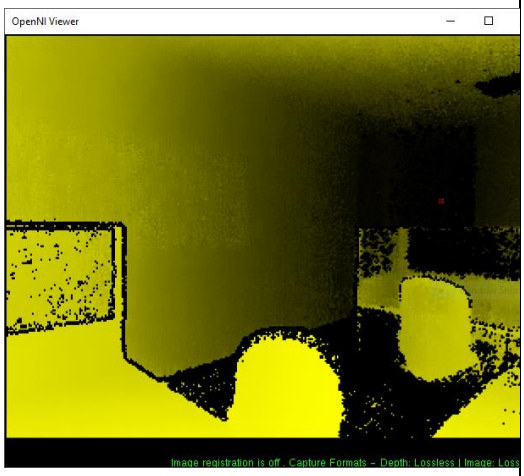
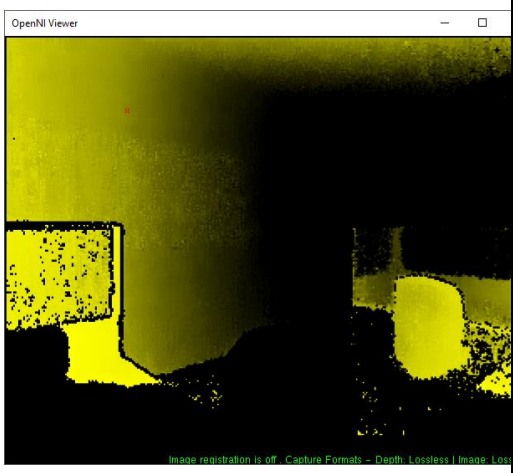
1. In the **ModuleConfig.json** file, find object **A5**.
2. Adjust the distance value. By default, the value for P1 is 10000, and P2 is 0.
   - **P1** represents the **maximum distance**.
   - **P2** represents the **minimum distance**.
   - **1000** value represents **1 m** of physical distance.



3 Save the settings and launch the viewer to verify if the change is applied successfully.

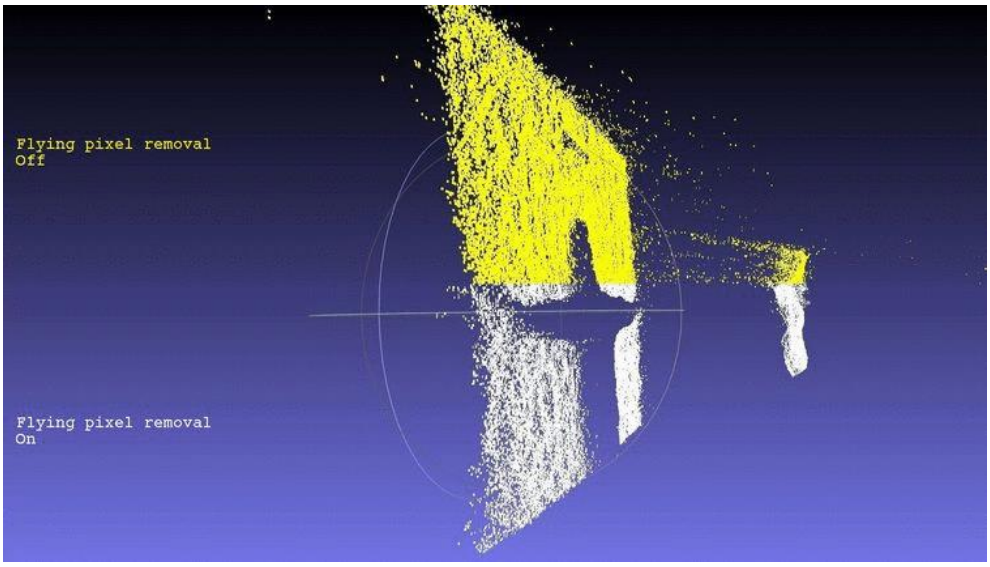


4 Here's a comparison between images with different detection zone.

Default	Maximum distance < 4 m
A5->P1: 10000 A5->P2: 0	A5->P1: 4000 (4 m) A5->P2: 1500 (1.5 m)
	
	

b. Flying Pixel Removal

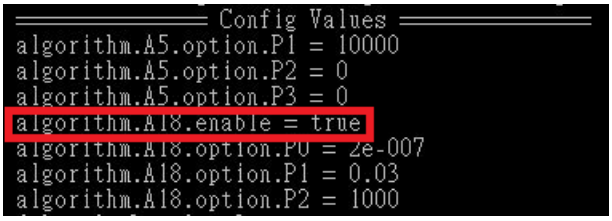
The Flying Pixel Removal function filters noises resulting from discrepancies between the object's reflected depth and background. By default, the Flying Pixel Removal function is enabled.



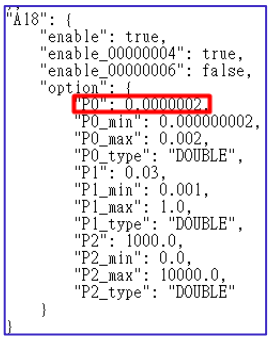
1. In the **ModuleConfig.json** file, find object **A18 > enable_00000004**.
2. Set the object's value as **true/false** to **enable/disable** the filter.

```
"A18": {
    "enable": true,
    "enable_00000004": true,
    "enable_00000006": false,
    "option": {
        "P0": 0.0000002,
        "P0_min": 0.000000002
        "P0_max": 0.002,
        "P0_type": "DOUBLE",
        "P1": 0.03,
        "P1_min": 0.001,
        "P1_max": 1.0,
        "P1_type": "DOUBLE",
        "P2": 1000.0,
        "P2_min": 0.0,
        "P2_max": 10000.0,
        "P2_type": "DOUBLE"
    }
}
```

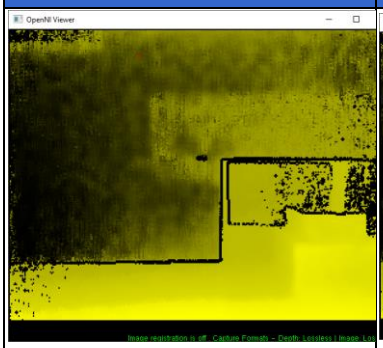
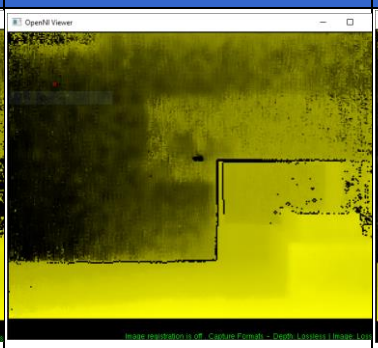
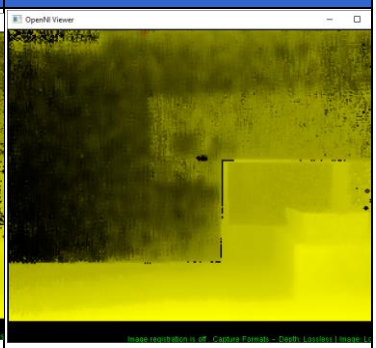
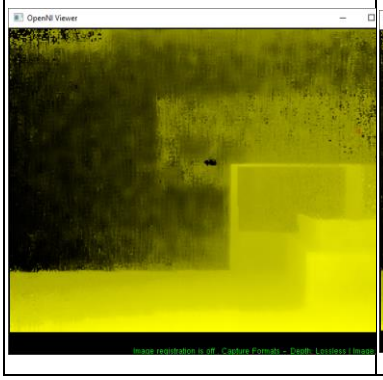
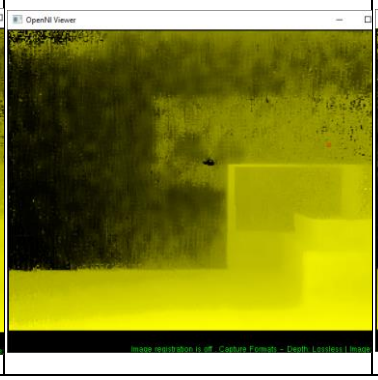
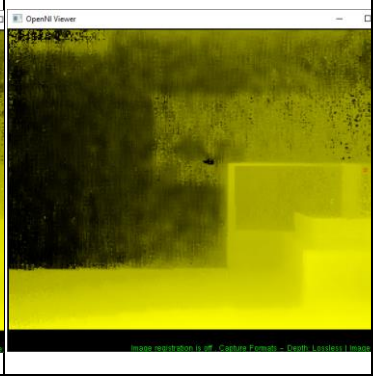
3. Save the settings and launch your viewer to verify if the change is applied successfully.



4. Optionally, change the value of object **P0** to adjust the filter strength. **0.000000002** represents the strongest filter, while **0.002** represents the weakest.



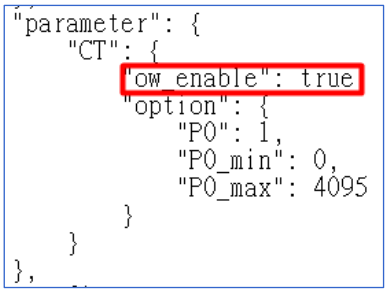
5. Here's a comparison between images with different levels of filter.

P0: 0.000002	P0: 0.000004	P0: 0.000008
		
P0: 0.000016	**P0: 0.000032**	**P0: 0.000064**
		

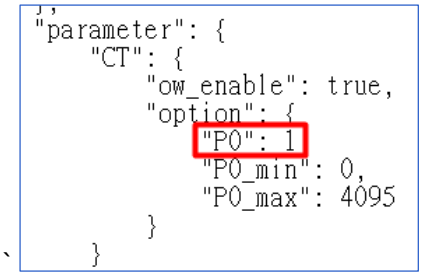
c. OWCT Settings

Overwrite Confidence Threshold (OWCT) allows users to minimize unfavorable pixels/depth information caused by diffusive reflection, resulting in a smoother camera image.

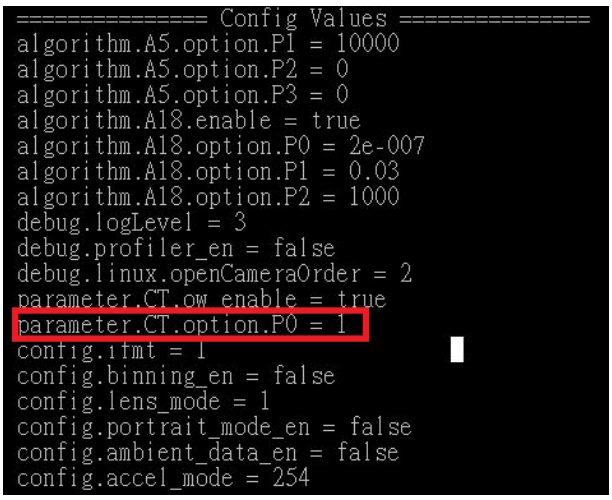
1. In the **ModuleConfig.json** file, find object **CT**.
2. Under **CT**, adjust the parameter of **ow_enable**. To **enable/disable** OWCT, type **true/false**.



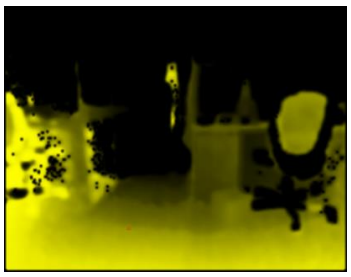
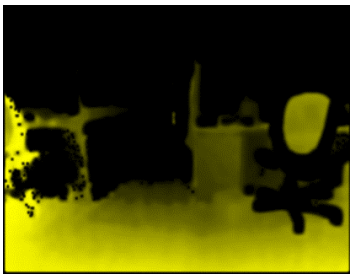
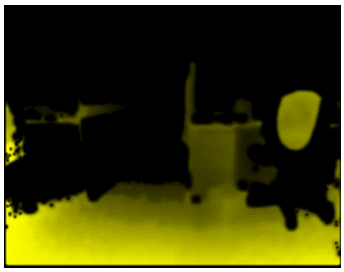
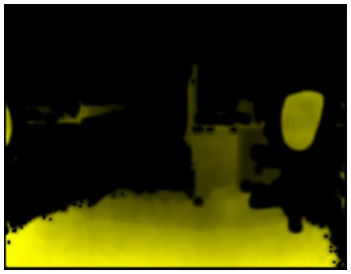
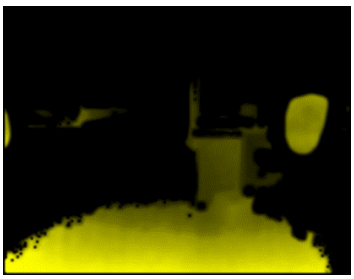
3. Optionally, change the value of object **P0** to adjust the filter strength.
   1 represents the weakest filter, while **10** represents the strongest.
   By default, the threshold value is 1.



4. Save the settings and launch your viewer to verify if the change is applied successfully.



5 Here's a comparison between images with different confidence threshold levels.

OWCT Level 1	OWCT Level 2	OWCT Level 3
		
OWCT Level 4	**OWCT Level 5**	**OWCT Level 6**
		

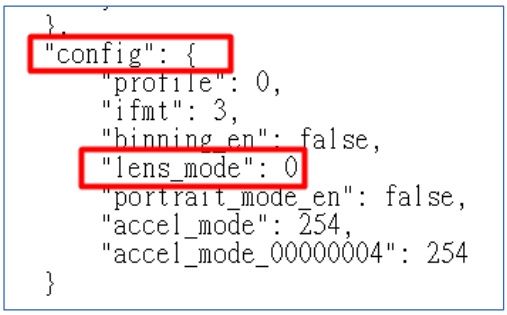
d. Working Range Settings

LIPS Camera supports two working range settings: **Normal Range** (1 ~ 4 m) and **Close Range** (0.2 ~ 1.2 m). You can adjust the working range settings depending on the estimated distance between the camera and the target. By default, the camera works on the Normal Range.

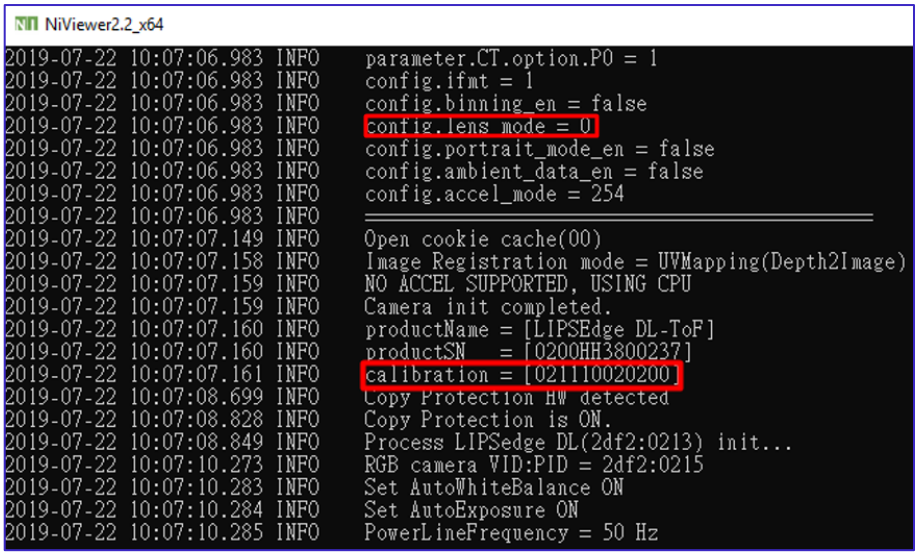
Note: Configuration process may vary from model to model.

---

1. In the **ModuleConfig.json** file, find the object **config**.
2. Under **config**, adjust the parameter of **lens_mode**. To enable **Normal Range**, type **1**. To enable **Close Range**, type **0**. By default, the value of lens_mode is 1.



3. Save the settings and launch your viewer to verify if the change is applied successfully. On the **Calibration column,** the parameter beginning with 0203 represents the Normal Range, and 0211 represents the **Close Range** in LIPS SDK.



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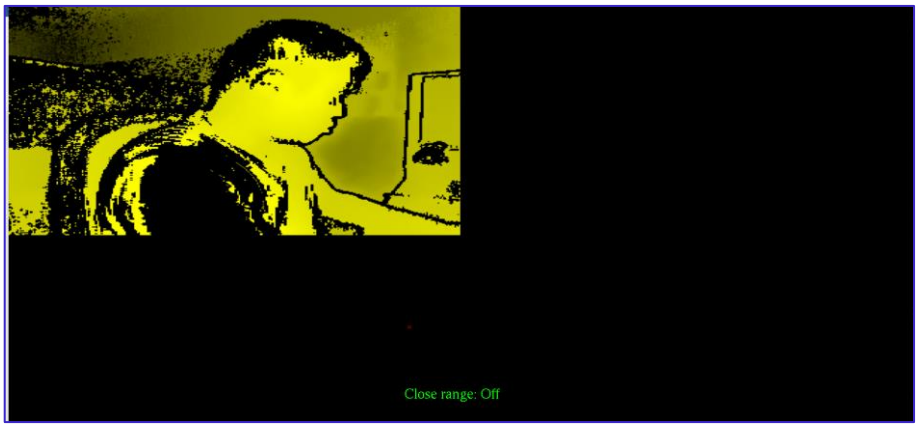
2F, No. 100, Ruiguang Rd, Neihu Dist, Taipei 114, Taiwan (R.O.C.)
https://www.lips-hci.com

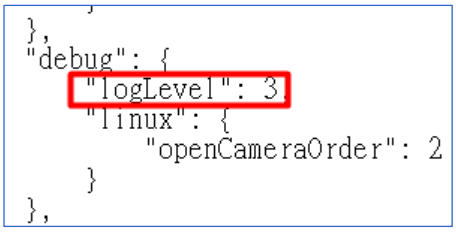
4. Users can instantly switch between Close and Normal Range by pressing **x**.



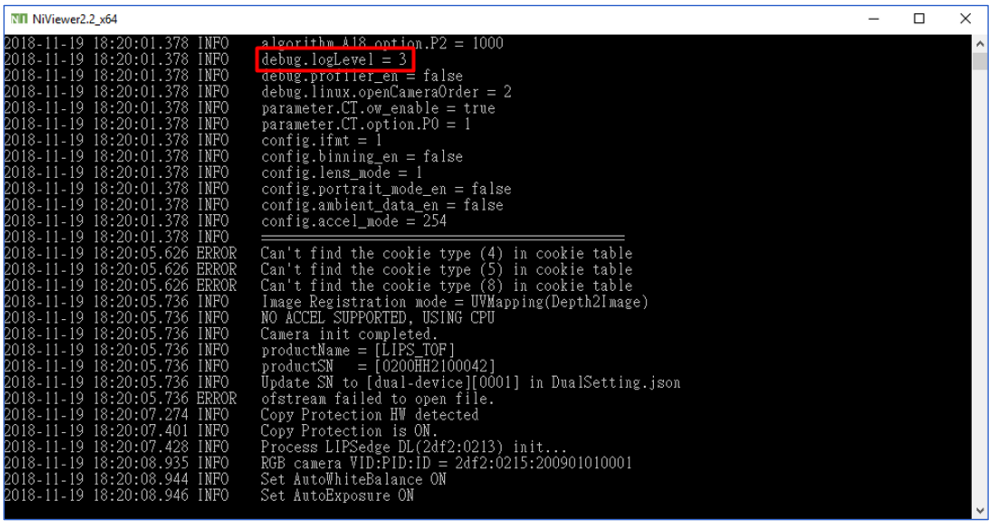
e. Output log level

LIPS Camera keeps a system log for system activities, warnings, and errors. You can turn the system log **ON** or **OFF** by typing Log Level Codes.

1. In **ModuleConfig.json**, find the object debugging.
2. Under debug, adjust the value of **logLevel**. 3 turns the system log **ON**, and 7 turns the system log **OFF**.



3. Save the settings and launch the viewer to verify if the change is applied successfully.



f. Camera Temperature Display Settings

This feature works for **LIPSedge™ DL** only. Users can monitor the camera's temperature on live upon the activation of DepthViewer through the **Status Window**. The recorded temperature will be updated every 10 seconds on the Celsius scale (∘C).

1. In **ModueConfig.json**, find object **debug**.
2. Under debug, adjust the value of **the sensor**. To **enable/disable** temperature display, type **true/false**.

```
"debug": {
    "logLevel": "verbose",
    "tsensor": {
        "enable": true,
        "interval": 10
    }
},
```

3. Save the settings and launch your viewer.
4. verify if the change is applied successfully on the Status Window.

```
Process LIPSedge DL(2df2:0213) init...
RGB camera VID:PID = 2df2:0215
Set AutoWhiteBalance ON
Set AutoExposure ON
PowerLineFrequency = 60 Hz
Current depth sensor (tSensor) temperature: 37
Current depth sensor (tSensor) temperature: 39
Current depth sensor (tSensor) temperature: 40
```

g. Exposure Frequency Settings

This feature works for **LIPSedge™ DL** only. This feature works for **LIPSedge™ DL** only. Users can match the camera imager's exposure frequency with the frequency of the indoor light source to reduce image flickering. The camera supports **two** frequencies: **50 Hz** or **60 Hz**.

1. In ModuleConfig.json, find the object camera.
2. Under the camera, adjust the value of anti_flicker. Type 50 for 50 Hz, 60 for 60 Hz.

```
"camera": {
    "RGB": {
        "_comment": "Anti_Flicker. 0 = disable, 50 = 50 Hz, 60 = 60 Hz.",
        "anti_flicker": "60"
    }
},
```

3. Save the settings and launch your viewer to verify if the change is applied successfully.

```
Process LIPSedge DL(2df2:0213) init...
RGB camera VID:PID = 2df2:0215
Set AutoWhiteBalance ON
Set AutoExposure ON
PowerLineFrequency = 60 Hz
Current depth sensor (tSensor) temperature: 37
Current depth sensor (tSensor) temperature: 38
```

4. Here's a comparison between normal and flickering images.

Normal Image	Flickering Image
	

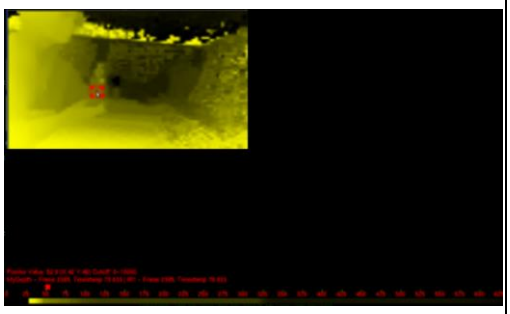
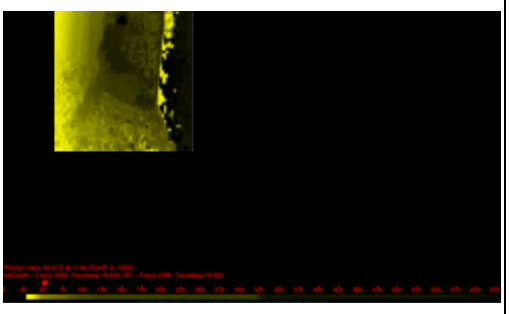
h. Orientation Settings

This feature works for **LIPSedge™ DL** only. This function allows the camera's color or depth image to rotate by 90∘.

1. In **ModuleConfig.json**, find object **config**.
2. Under **config**, adjust the value of **portrait_mode_en**. To **enable/disable** image rotation, type **true/false**.

```
"config": {
    "version": "1.5.0.8",
    "profile": 0,
    "ifmt": 1,
    "ifmt_00000005": 3,
    "ifmt_00000006": 3,
    "binning_en": false,
    "lens_mode": 1,
    "portrait_mode_en": true
    "ambient_data_en": false,
    "accel_mode": 254,
    "accel_mode_00000004": 254,
    "accel_mode_00000006": 254
```

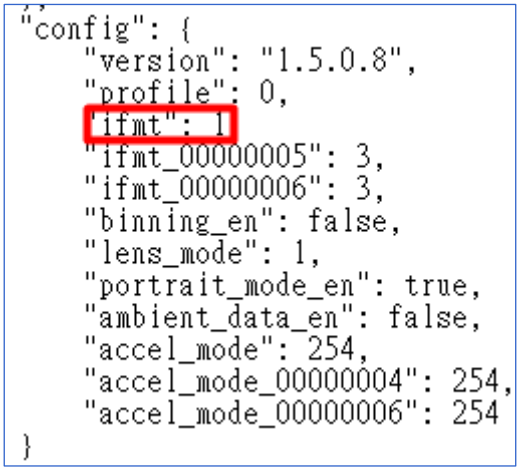
3. Save the settings and launch the viewer to verify if the change is applied successfully.
4. Here's a comparison between color/depth images with different image orientation settings.

Horizontal Image	Flipped Image
	

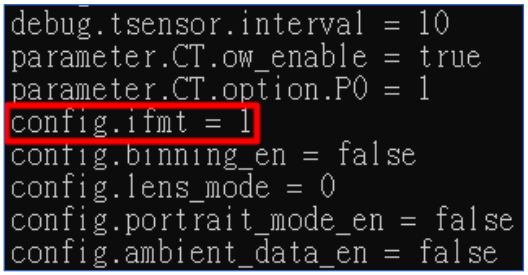
i. Streaming Format Settings

This feature works for **LIPSedge™ DL** only. DepthViewer supports **YUY2** or **MJPEG** format for color image streaming. You can manage image quality and bandwidth by adjusting the encryption format for color image streaming. **YUY2** provides better image quality while costing more bandwidth. On the contrary, **MJPEG** requires less bandwidth for smoother transmission, but the image quality is less optimal.

1. In **ModuleConfig.json**, find object **config**.
2. Under **config**, adjust the value of **ifmt**. To enable **the YUY2** format, type **1**. To enable the **MJPEG** format, type **3**.



3. Save the settings and launch the viewer to verify if the change is applied successfully. With **YUY2** encryption, the live stream will have a slight delay. With **MJPEG**, the live stream will be smoother.



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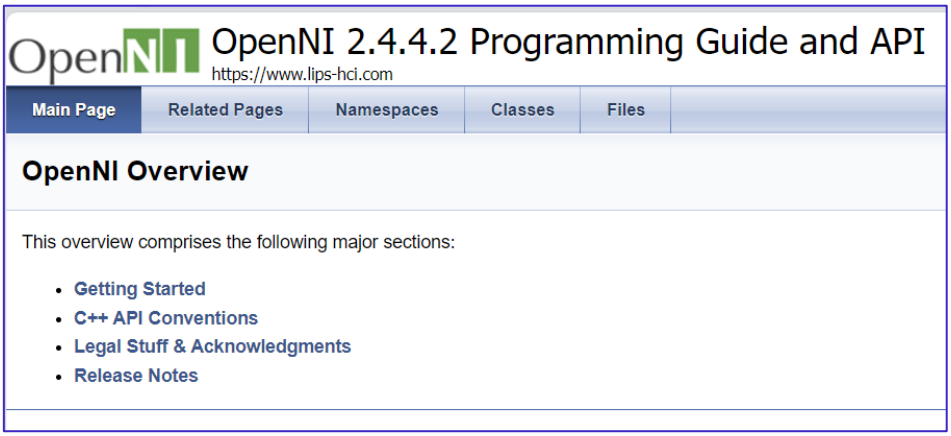
2F, No. 100, Ruiguang Rd, Neihu Dist, Taipei 114, Taiwan (R.O.C.)
https://www.lips-hci.com

C. Camera Web Interface

This section does **NOT** apply to **LIPSedge™ DL / M3** since a web interface is unavailable for these models.

4. APIs

LIPSedge™ DL / M3 SDK is integrated with OpenNI APIs. The key strength of this robust framework lies in its effortless access to the camera's internal parameters, empowering developers to delve deep into raw data and tailor applications to specific functionalities. Developers can access the programming guide for the API at: **/LIPSedge[Model]-SDK/Documentation.**



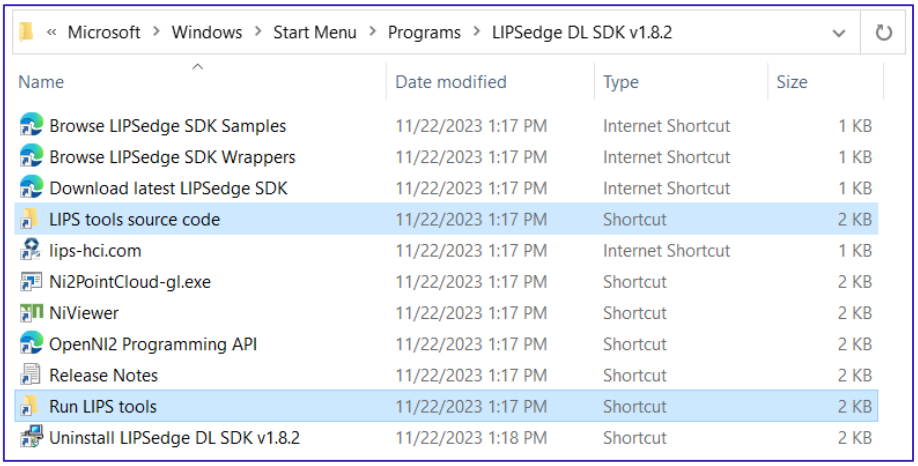
1. **Main Page**: This tab provides a clear overview of the OpenNI API, including a quick installation guide, an introduction to the coding conventions, legal documents, and the release notes.
2. **Related Pages**: This tab provides a selection of the information related to OpenNI.
3. **Namespaces**: This tab provides users with a hierarchical structure of namespaces that categorize the specific functionalities of the API.
4. **Classes**: This tab dives deeper into each class within the OpenNI API, outlining its properties and methods to enable developers to fully understand and utilize each element.
5. **Files**: This tab describes the source code files that make up the OpenNI API.

5. Tools

LIPSedge™ DL / M3 SDK provides a series of executable tools and their source code essential for visualization, data capture, camera parameters acquisition et cetera to facilitate the development of applications and solutions for LIPSedge™ DL / M3 cameras. These tools and their system components are placed in the following folder:

- **Run LIPS tools Source code**: Contains a series of executable tools; users can refer to ***Chapter 5.1 Samples codes*** for reference.

- **LIPS tools source code**: Contains a series of the source code of these tools. Users can refer to ***Chapter 5.2 Compilation*** for reference. These codes can also be downloaded from the link below for the latest updates: https://github.com/lips-hci/LIPSedge-sdk-samples

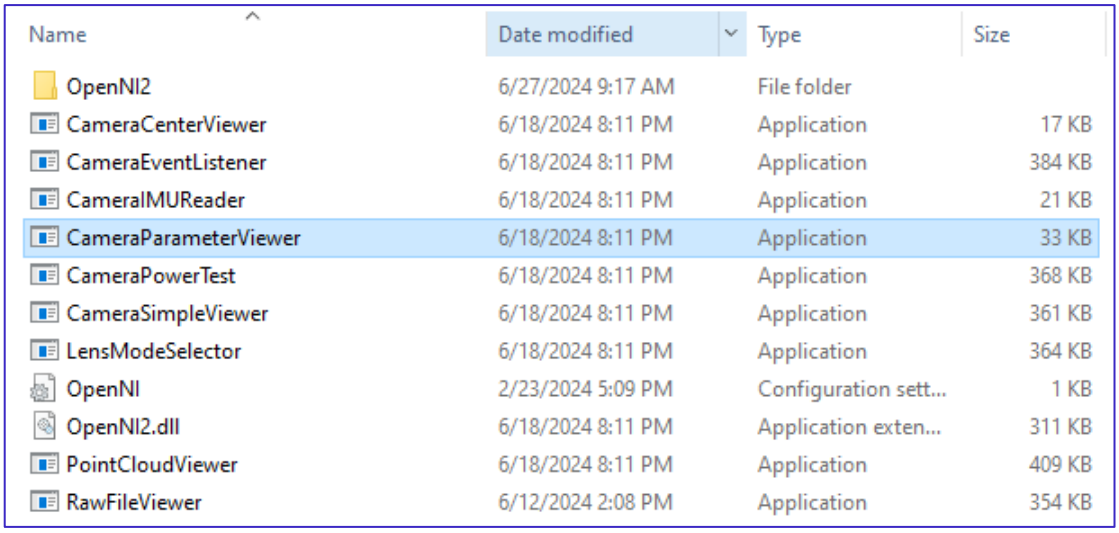


5.1 Samples codes

A. CameraParameterViewer

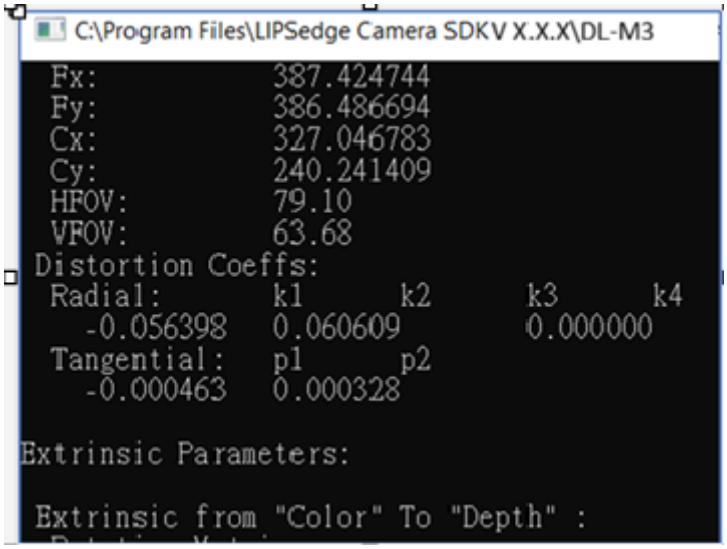
A simple OpenNI2 tool to query supported video modes and list camera intrinsic/extrinsic parameters.

1. In **Bin**, click **CameraParameterViewer.exe**



Name	Date modified	Type	Size
OpenNI2	6/27/2024 9:17 AM	File folder	
CameraCenterViewer	6/18/2024 8:11 PM	Application	17 KB
CameraEventListener	6/18/2024 8:11 PM	Application	384 KB
CameraIMUReader	6/18/2024 8:11 PM	Application	21 KB
CameraParameterViewer	6/18/2024 8:11 PM	Application	33 KB
CameraPowerTest	6/18/2024 8:11 PM	Application	368 KB
CameraSimpleViewer	6/18/2024 8:11 PM	Application	361 KB
LensModeSelector	6/18/2024 8:11 PM	Application	364 KB
OpenNI	2/23/2024 5:09 PM	Configuration sett...	1 KB
OpenNI2.dll	6/18/2024 8:11 PM	Application exten...	311 KB
PointCloudViewer	6/18/2024 8:11 PM	Application	409 KB
RawFileViewer	6/12/2024 2:08 PM	Application	354 KB

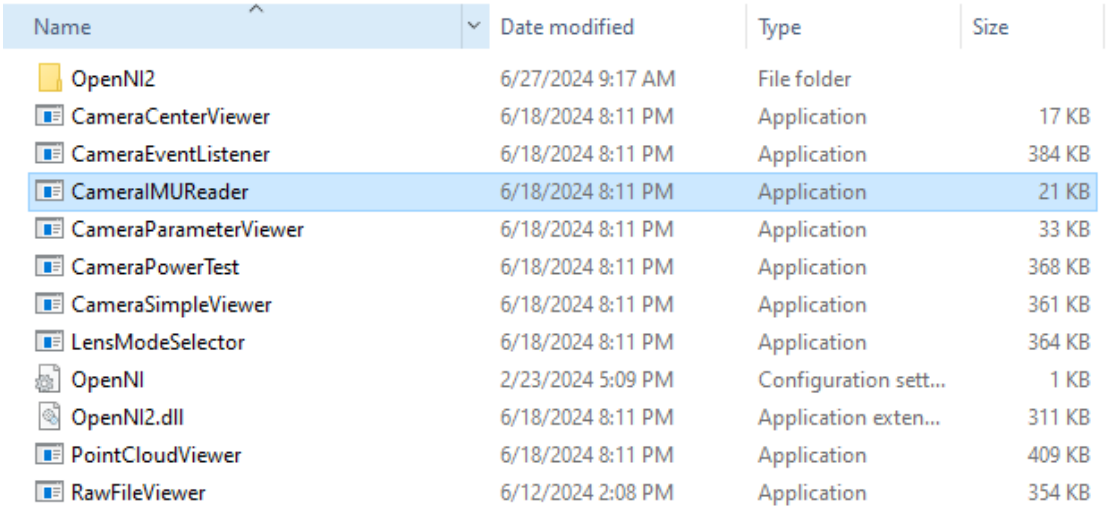
2. Provides detailed camera parameters for depth, IR, and color cameras.



B. CameraIMUReader (Coming Soon)

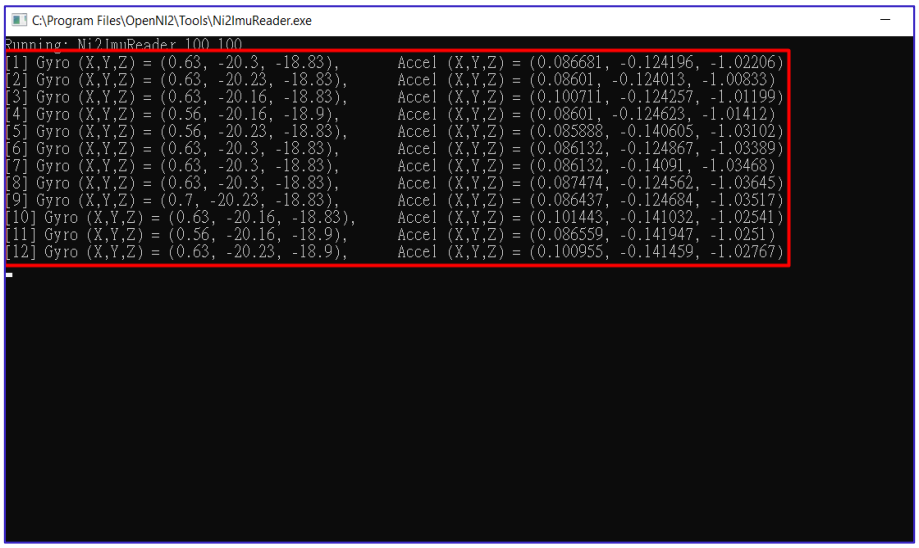
A tool to read IMU sensor data (Accel. & Gyro) from LIPSedge™ camera.

1. In **Bin**, click **CameraIMUReader.exe**.



Name	Date modified	Type	Size
OpenNI2	6/27/2024 9:17 AM	File folder	
CameraCenterViewer	6/18/2024 8:11 PM	Application	17 KB
CameraEventListener	6/18/2024 8:11 PM	Application	384 KB
CameraIMUReader	6/18/2024 8:11 PM	Application	21 KB
CameraParameterViewer	6/18/2024 8:11 PM	Application	33 KB
CameraPowerTest	6/18/2024 8:11 PM	Application	368 KB
CameraSimpleViewer	6/18/2024 8:11 PM	Application	361 KB
LensModeSelector	6/18/2024 8:11 PM	Application	364 KB
OpenNI	2/23/2024 5:09 PM	Configuration sett...	1 KB
OpenNI2.dll	6/18/2024 8:11 PM	Application exten...	311 KB
PointCloudViewer	6/18/2024 8:11 PM	Application	409 KB
RawFileViewer	6/12/2024 2:08 PM	Application	354 KB

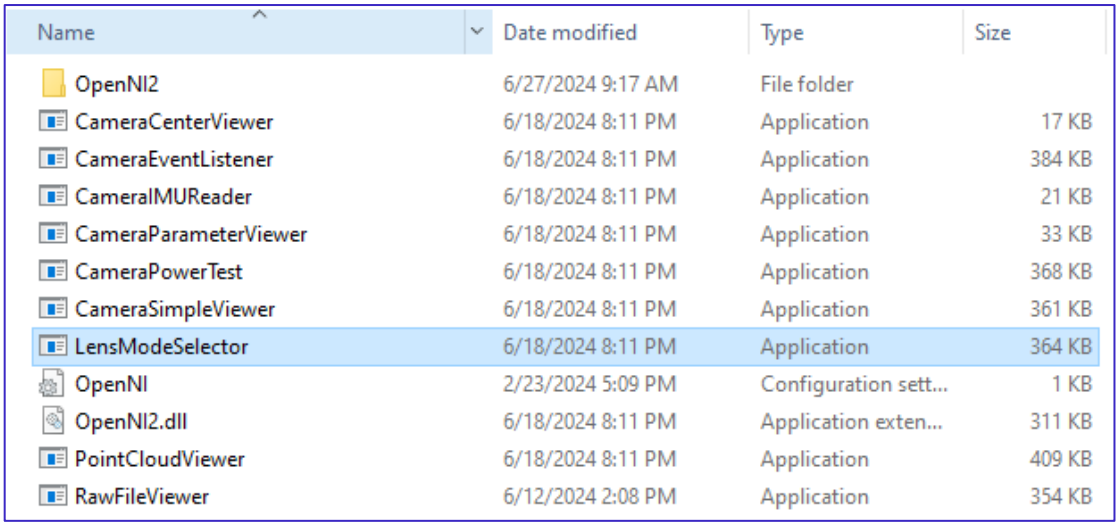
2. A window containing 100 frames of IMU detection results pops up.



C. LIPSLensModeSelect-gl

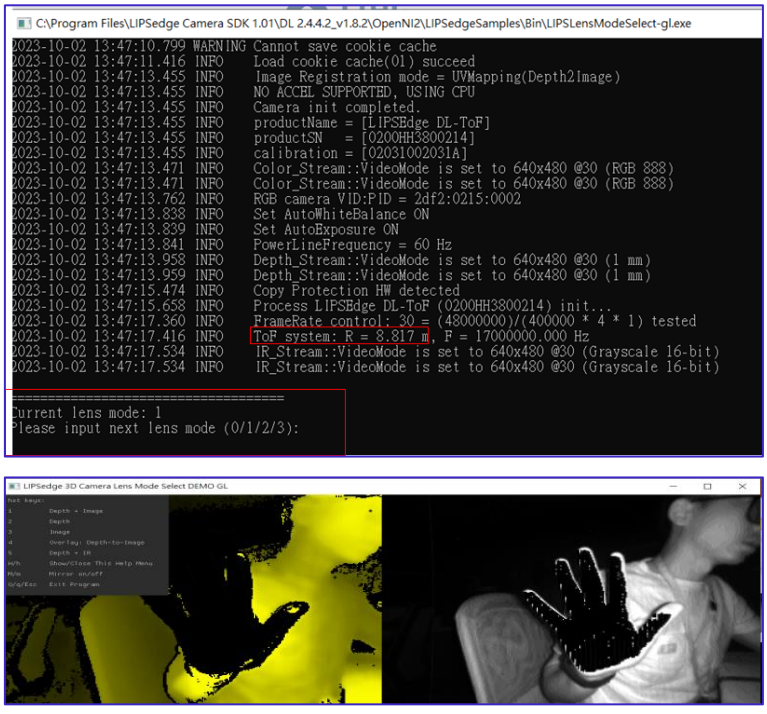
At runtime, control the LIPSedge™ camera to toggle between two range modes, normal and near(or close).

1. In **Bin**, click **LensModeSelector.exe**

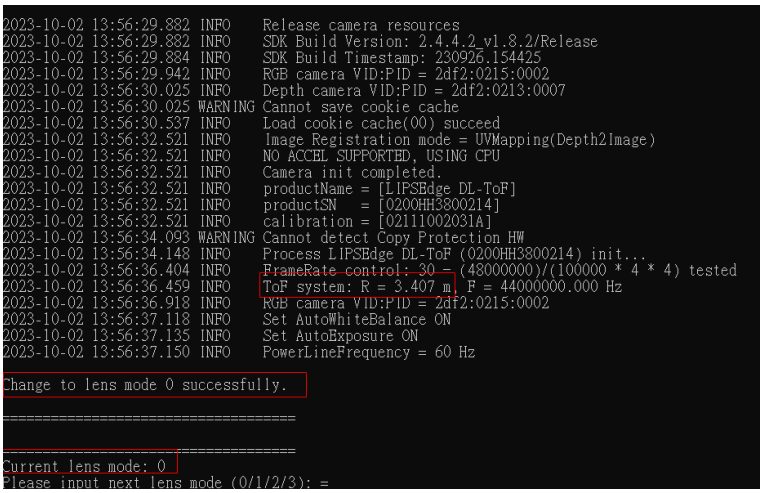


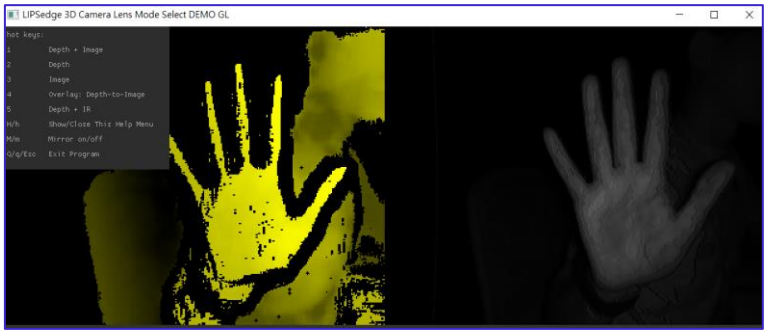
Name	Date modified	Type	Size
OpenNI2	6/27/2024 9:17 AM	File folder	
CameraCenterViewer	6/18/2024 8:11 PM	Application	17 KB
CameraEventListener	6/18/2024 8:11 PM	Application	384 KB
CameraIMUReader	6/18/2024 8:11 PM	Application	21 KB
CameraParameterViewer	6/18/2024 8:11 PM	Application	33 KB
CameraPowerTest	6/18/2024 8:11 PM	Application	368 KB
CameraSimpleViewer	6/18/2024 8:11 PM	Application	361 KB
LensModeSelector	6/18/2024 8:11 PM	Application	364 KB
OpenNI	2/23/2024 5:09 PM	Configuration sett...	1 KB
OpenNI2.dll	6/18/2024 8:11 PM	Application exten...	311 KB
PointCloudViewer	6/18/2024 8:11 PM	Application	409 KB
RawFileViewer	6/12/2024 2:08 PM	Application	354 KB

2. Provides two user-selectable modes for camera operation. In the default mode (Mode 1), the camera has a range of up to 8 meters.



3. Alternatively, switching to Mode 2 changes the lens mode to 0, allowing the camera to achieve a range of up to 3 meters.

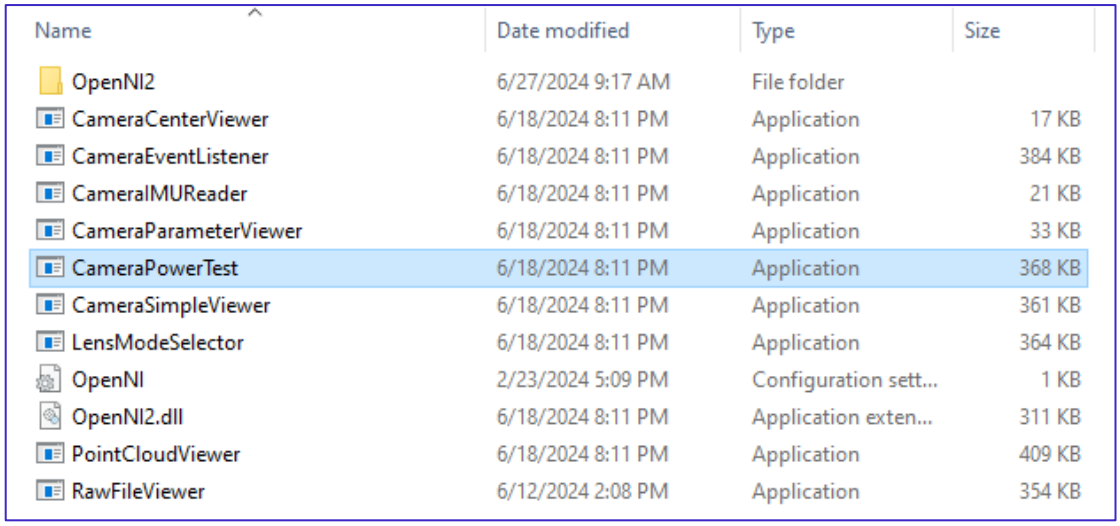




D. CameraPowerTest

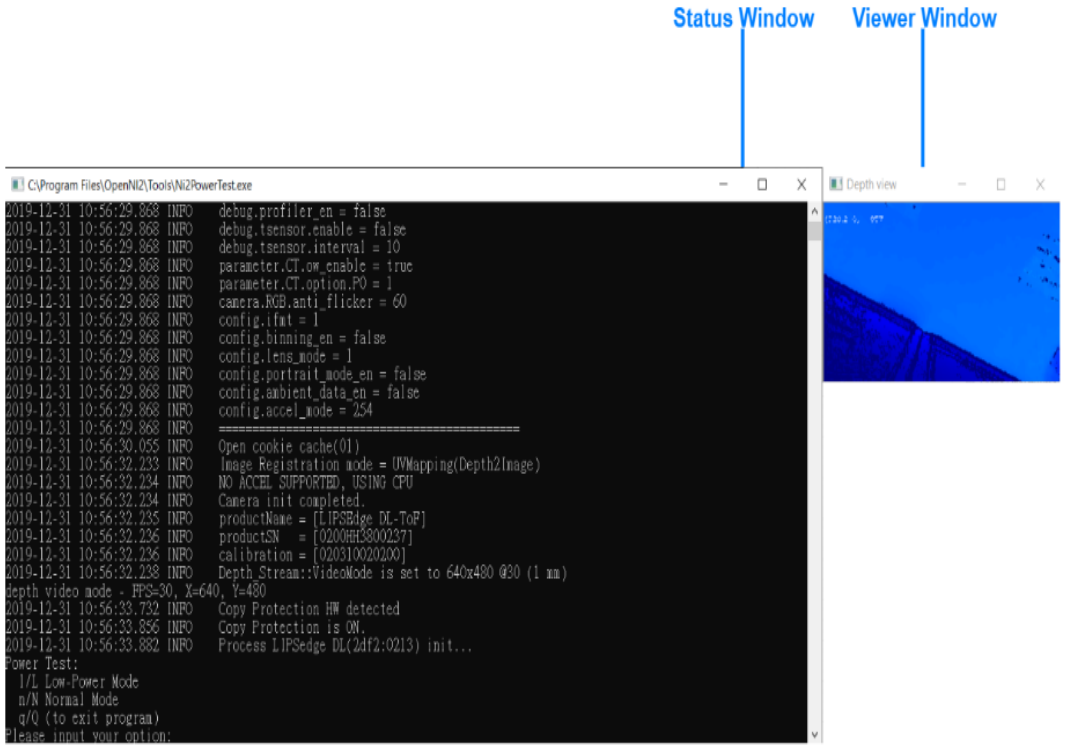
This feature includes a Standby Mode (Low Power Mode) that allows users to temporarily pause and resume live streaming by sending a status code through CameraPowerTest.

1. In **Bin**, click **CameraPowerTest.exe.**

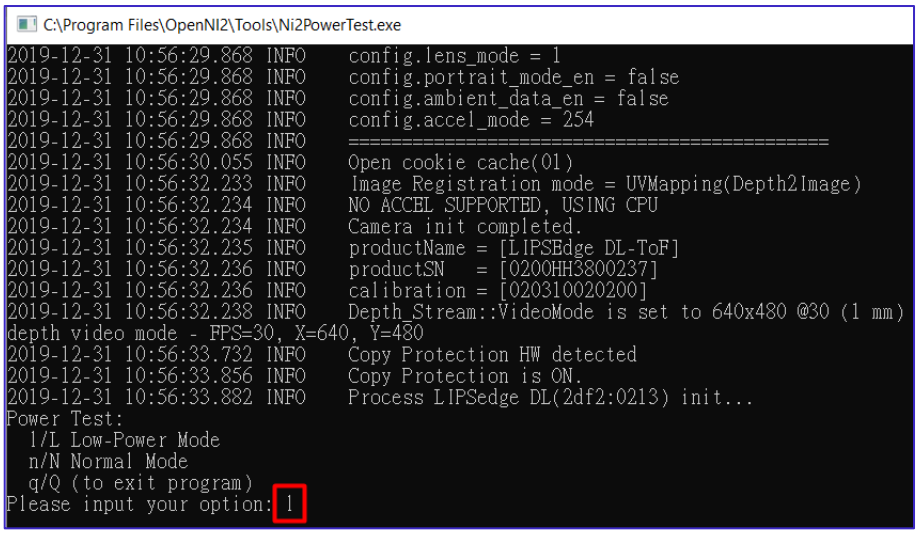


Name	Date modified	Type	Size
OpenNI2	6/27/2024 9:17 AM	File folder	
CameraCenterViewer	6/18/2024 8:11 PM	Application	17 KB
CameraEventListener	6/18/2024 8:11 PM	Application	384 KB
CameraIMUReader	6/18/2024 8:11 PM	Application	21 KB
CameraParameterViewer	6/18/2024 8:11 PM	Application	33 KB
CameraPowerTest	6/18/2024 8:11 PM	Application	368 KB
CameraSimpleViewer	6/18/2024 8:11 PM	Application	361 KB
LensModeSelector	6/18/2024 8:11 PM	Application	364 KB
OpenNI	2/23/2024 5:09 PM	Configuration sett...	1 KB
OpenNI2.dll	6/18/2024 8:11 PM	Application exten...	311 KB
PointCloudViewer	6/18/2024 8:11 PM	Application	409 KB
RawFileViewer	6/12/2024 2:08 PM	Application	354 KB

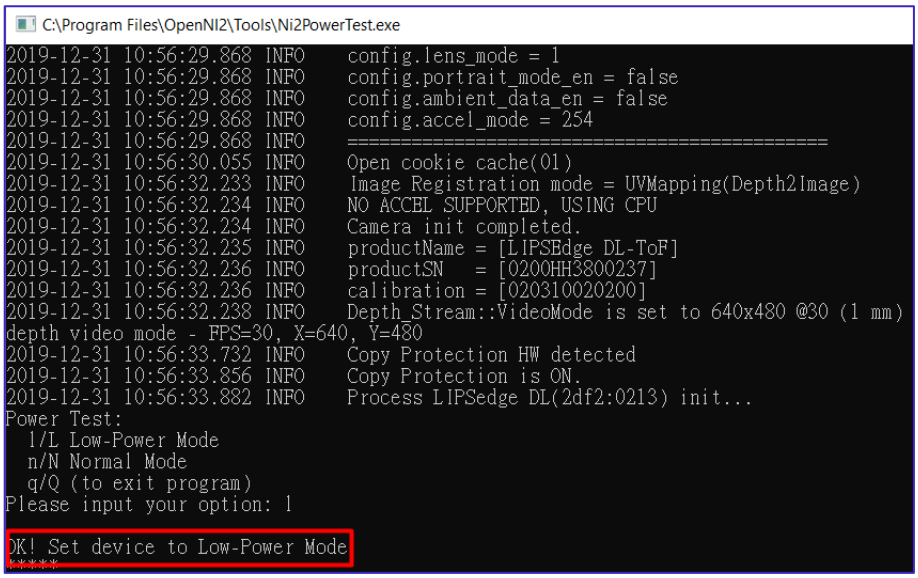
2. A **Status Window** and a **Viewer Window** pop up.



3. Type the following status code into the Status Window interface to Enable/disable the Standby Mode.
   - **l**: Enable the Standby Mode. Under Standby Mode, the live streaming stops, and the camera's Status Indicator goes off.
   - **n**: Disable the Standby Mode.
   - **q**: Exists the program.



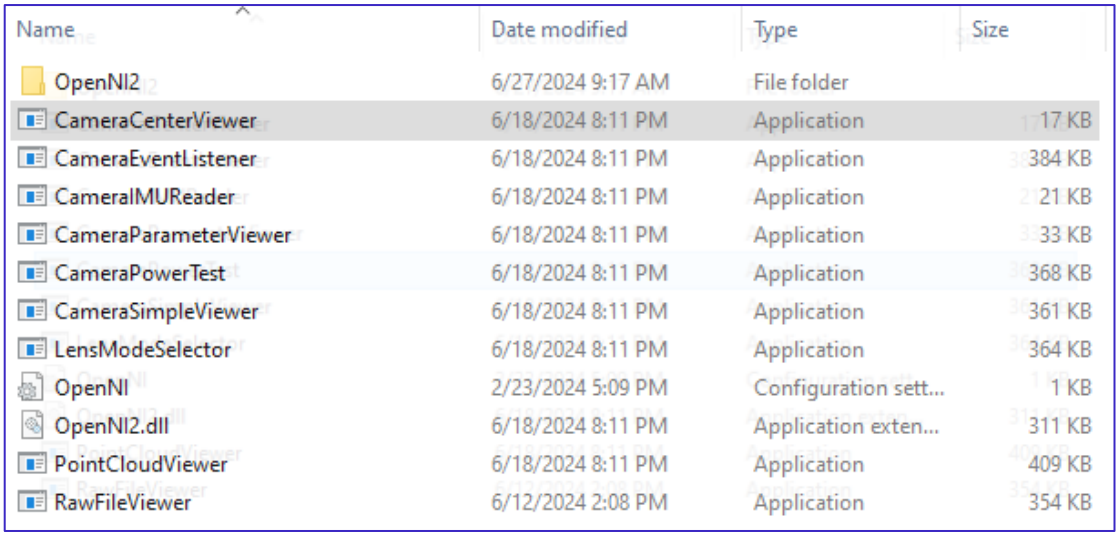
4. Press **Enter**, and the changes take place.



E. CameraCenterViewer

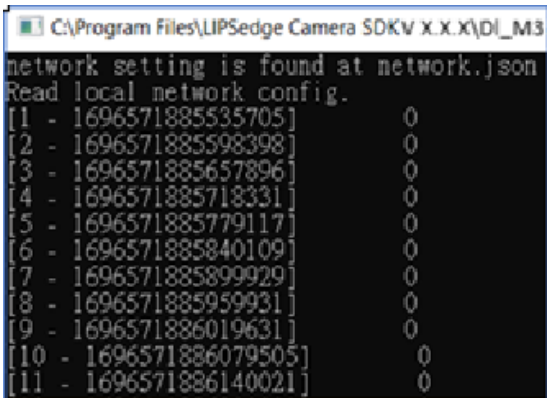
A simple OpenNI2 console program to show depth value at the center point of the frame.

1. In **Bin**, click **CameraCenterViewer.exe.**



Name	Date modified	Type	Size
OpenNI2	6/27/2024 9:17 AM	File folder	
CameraCenterViewer	6/18/2024 8:11 PM	Application	17 KB
CameraEventListener	6/18/2024 8:11 PM	Application	384 KB
CameraIMUReader	6/18/2024 8:11 PM	Application	21 KB
CameraParameterViewer	6/18/2024 8:11 PM	Application	33 KB
CameraPowerTest	6/18/2024 8:11 PM	Application	368 KB
CameraSimpleViewer	6/18/2024 8:11 PM	Application	361 KB
LensModeSelector	6/18/2024 8:11 PM	Application	364 KB
OpenNI	2/23/2024 5:09 PM	Configuration sett...	1 KB
OpenNI2.dll	6/18/2024 8:11 PM	Application exten...	311 KB
PointCloudViewer	6/18/2024 8:11 PM	Application	409 KB
RawFileViewer	6/12/2024 2:08 PM	Application	354 KB

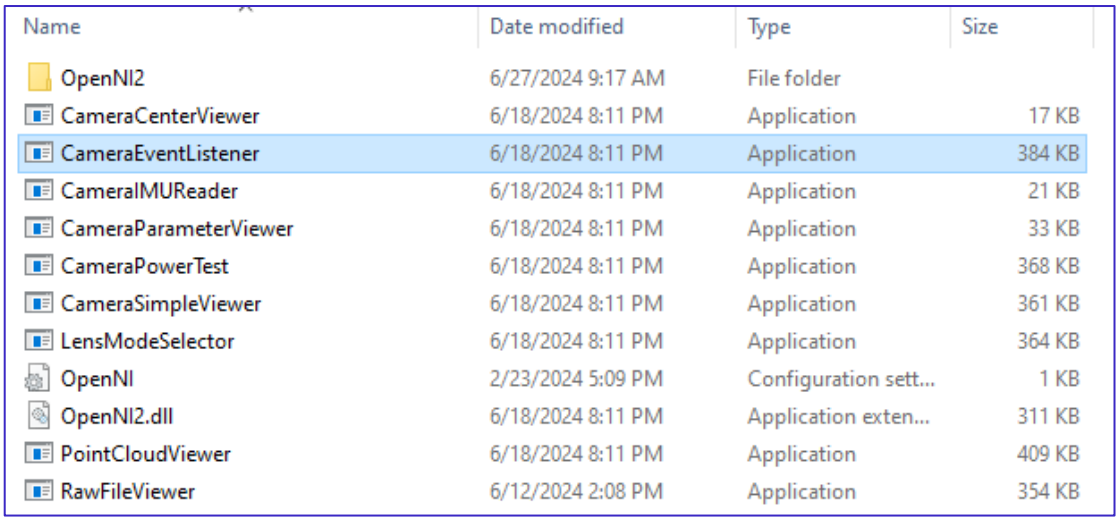
2. A simple OpenNI2 console program to show depth value at the center point of the frame.



F. CameraEventListener

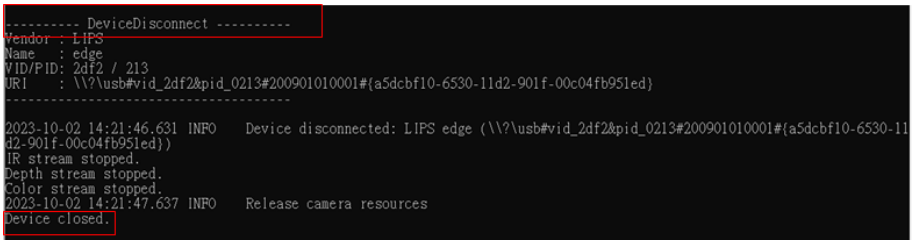
OpenNI2 device management by event-driven design.

1. In **Bin**, click **CameraEventListener.exe.**



Name	Date modified	Type	Size
OpenNI2	6/27/2024 9:17 AM	File folder	
CameraCenterViewer	6/18/2024 8:11 PM	Application	17 KB
CameraEventListener	6/18/2024 8:11 PM	Application	384 KB
CameraIMUReader	6/18/2024 8:11 PM	Application	21 KB
CameraParameterViewer	6/18/2024 8:11 PM	Application	33 KB
CameraPowerTest	6/18/2024 8:11 PM	Application	368 KB
CameraSimpleViewer	6/18/2024 8:11 PM	Application	361 KB
LensModeSelector	6/18/2024 8:11 PM	Application	364 KB
OpenNI	2/23/2024 5:09 PM	Configuration sett...	1 KB
OpenNI2.dll	6/18/2024 8:11 PM	Application exten...	311 KB
PointCloudViewer	6/18/2024 8:11 PM	Application	409 KB
RawFileViewer	6/12/2024 2:08 PM	Application	354 KB

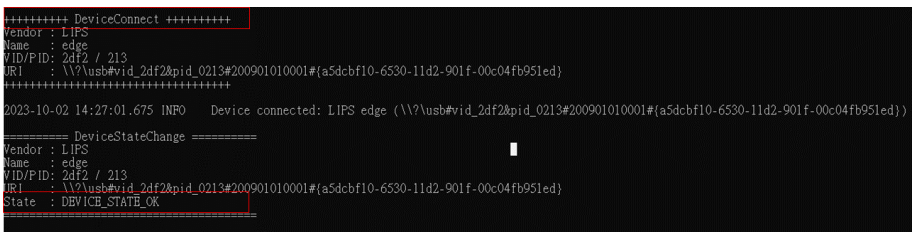
2. The Ni2EventBasedViewer-gl provides notifications when the device becomes disconnected.



```
---------- DeviceDisconnect ----------
Vendor : LIPS
Name   : edge
VID/PID: 2df2 / 213
URI    : \\?\usb#vid_2df2&pid_0213#200901010001#{a5dcbf10-6530-11d2-901f-00c04fb951ed}
---------------------------------------

2023-10-02 14:21:46.631 INFO    Device disconnected: LIPS edge (\\?\usb#vid_2df2&pid_0213#200901010001#{a5dcbf10-6530-11
d2-901f-00c04fb951ed})
IR stream stopped.
Depth stream stopped.
Color stream stopped.
2023-10-02 14:21:47.637 INFO    Release camera resources
Device closed.
```

3. When users reconnect the device, the system promptly re-establishes the connection, granting access to streaming for Depth, IR, and RGB data.



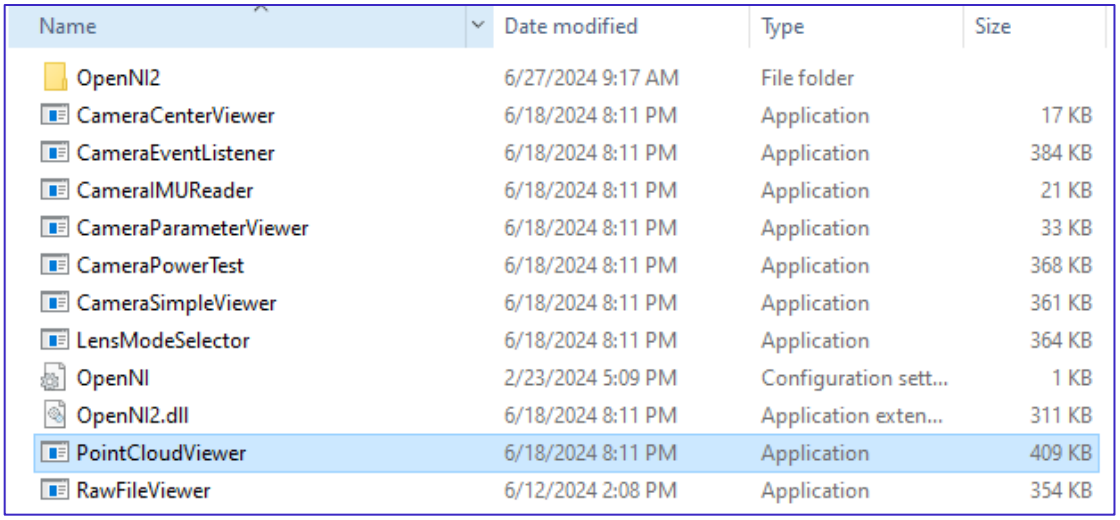
```
++++++++++ DeviceConnect ++++++++++
Vendor : LIPS
Name   : edge
VID/PID: 2df2 / 213
URI    : \\?\usb#vid_2df2&pid_0213#200901010001#{a5dcbf10-6530-11d2-901f-00c04fb951ed}
++++++++++++++++++++++++++++++++++++++

2023-10-02 14:27:01.675 INFO    Device connected: LIPS edge (\\?\usb#vid_2df2&pid_0213#200901010001#{a5dcbf10-6530-11d2-901f-00c04fb951ed})

========== DeviceStateChange ==========
Vendor : LIPS
Name   : edge
VID/PID: 2df2 / 213
URI    : \\?\usb#vid_2df2&pid_0213#200901010001#{a5dcbf10-6530-11d2-901f-00c04fb951ed}
State  : DEVICE_STATE_OK
=======================================
```

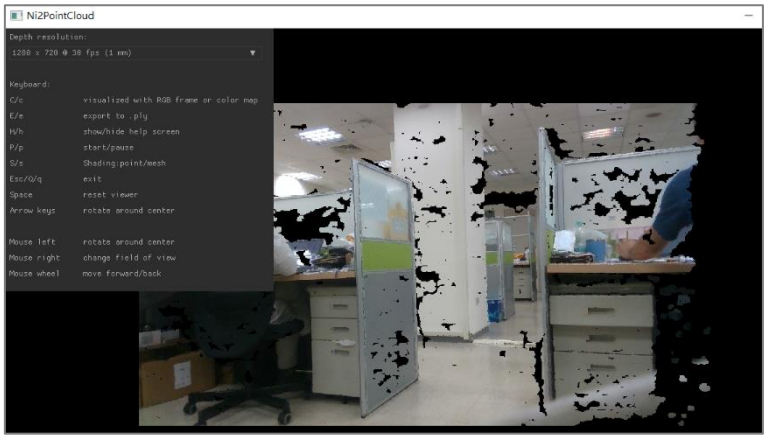
G. PointCloudViewer

1. In **Bin**, click **PointCloudViewer.exe.**



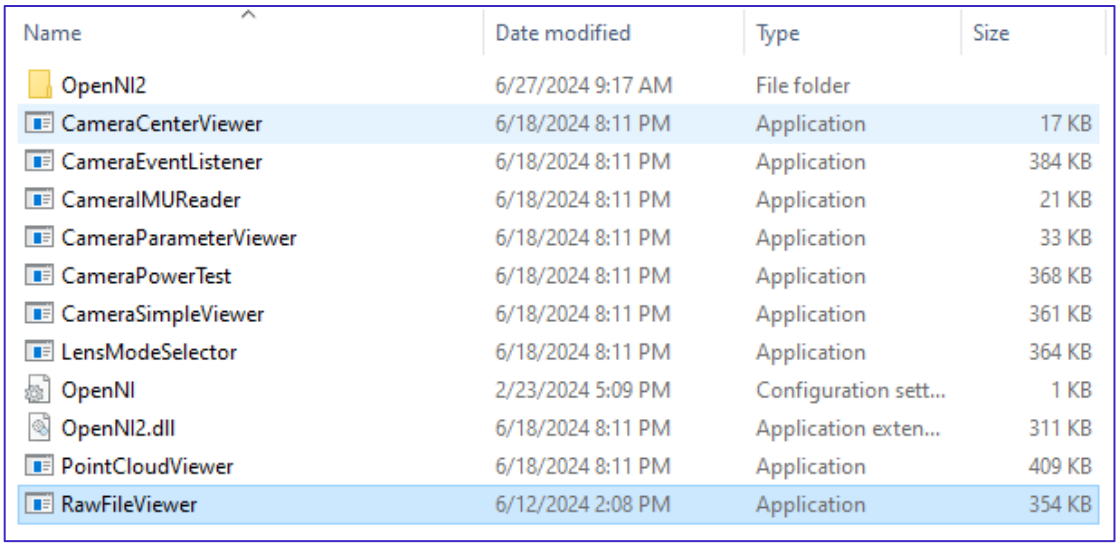
Name	Date modified	Type	Size
OpenNI2	6/27/2024 9:17 AM	File folder	
CameraCenterViewer	6/18/2024 8:11 PM	Application	17 KB
CameraEventListener	6/18/2024 8:11 PM	Application	384 KB
CameraIMUReader	6/18/2024 8:11 PM	Application	21 KB
CameraParameterViewer	6/18/2024 8:11 PM	Application	33 KB
CameraPowerTest	6/18/2024 8:11 PM	Application	368 KB
CameraSimpleViewer	6/18/2024 8:11 PM	Application	361 KB
LensModeSelector	6/18/2024 8:11 PM	Application	364 KB
OpenNI	2/23/2024 5:09 PM	Configuration sett...	1 KB
OpenNI2.dll	6/18/2024 8:11 PM	Application exten...	311 KB
PointCloudViewer	6/18/2024 8:11 PM	Application	409 KB
RawFileViewer	6/12/2024 2:08 PM	Application	354 KB

2. Another OpenNI2 sample for 3D point cloud visualization through OpenGL.



H. RawFileViewer

A tool for reading OpenNI2 frames captured in raw data format. To achieve this:



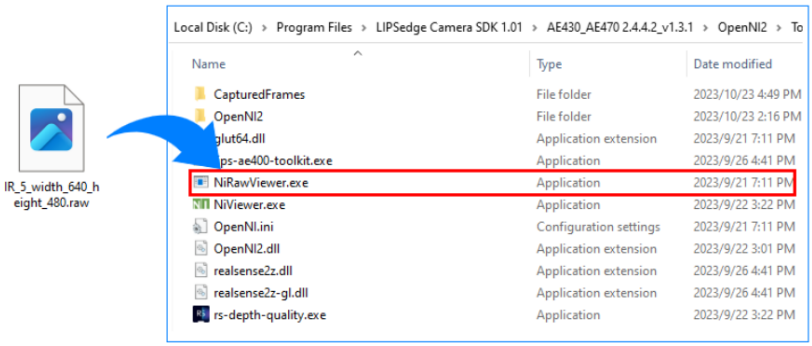
Name	Date modified	Type	Size
OpenNI2	6/27/2024 9:17 AM	File folder	
CameraCenterViewer	6/18/2024 8:11 PM	Application	17 KB
CameraEventListener	6/18/2024 8:11 PM	Application	384 KB
CameraIMUReader	6/18/2024 8:11 PM	Application	21 KB
CameraParameterViewer	6/18/2024 8:11 PM	Application	33 KB
CameraPowerTest	6/18/2024 8:11 PM	Application	368 KB
CameraSimpleViewer	6/18/2024 8:11 PM	Application	361 KB
LensModeSelector	6/18/2024 8:11 PM	Application	364 KB
OpenNI	2/23/2024 5:09 PM	Configuration sett...	1 KB
OpenNI2.dll	6/18/2024 8:11 PM	Application exten...	311 KB
PointCloudViewer	6/18/2024 8:11 PM	Application	409 KB
RawFileViewer	6/12/2024 2:08 PM	Application	354 KB

1. Start DepthViewer. Make sure the camera is configured correctly and connected.

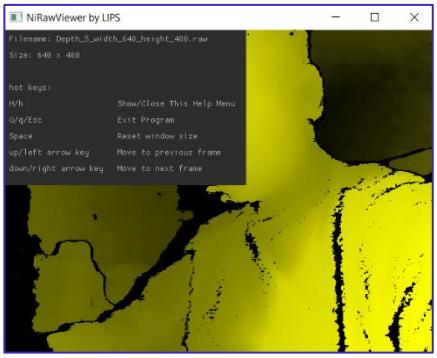
2. Press C, and the current image will be captured.

3. Go to **LIPSedge™ DL SDK > OpenNI2 > Tools.**

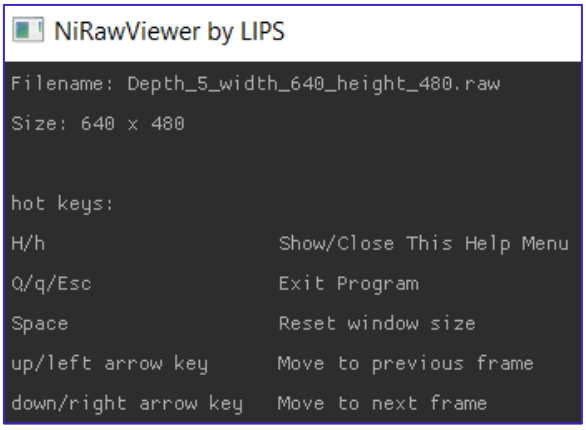
4. Drag a raw image file to the RawFileViewer-gl.



5. The raw image file will be displayed.



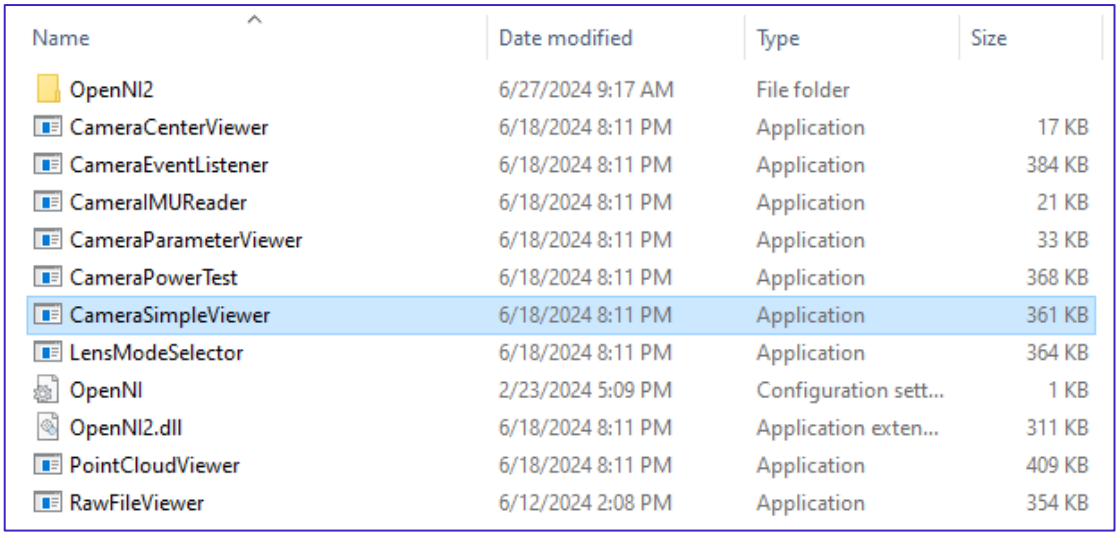
6. Users can navigate through the image with the following hotkeys:
   - **H / h**: Displays / turn off the help menu.
   - **Q / q / Esc**: Exit NiRawViewer-gl.
   - **Space**: Reset adjusted window size to its original resolution.
   - **Up / Left arrow key**: Displays the previous frame.
   - **Down / Right arrow key**: Displays the next frame.



I. CameraSimpleViewer

A simplified version of DepthViewer using OpenCV to display Depth/IR/Color frames.

1. In **Bin**, click **CameraSimpleViewer.exe.**



Name	Date modified	Type	Size
OpenNI2	6/27/2024 9:17 AM	File folder	
CameraCenterViewer	6/18/2024 8:11 PM	Application	17 KB
CameraEventListener	6/18/2024 8:11 PM	Application	384 KB
CameraIMUReader	6/18/2024 8:11 PM	Application	21 KB
CameraParameterViewer	6/18/2024 8:11 PM	Application	33 KB
CameraPowerTest	6/18/2024 8:11 PM	Application	368 KB
CameraSimpleViewer	6/18/2024 8:11 PM	Application	361 KB
LensModeSelector	6/18/2024 8:11 PM	Application	364 KB
OpenNI	2/23/2024 5:09 PM	Configuration sett...	1 KB
OpenNI2.dll	6/18/2024 8:11 PM	Application exten...	311 KB
PointCloudViewer	6/18/2024 8:11 PM	Application	409 KB
RawFileViewer	6/12/2024 2:08 PM	Application	354 KB

2. A simplified version of DepthViewer using OpenCV to display Depth/IR/Color frames.

5.2 Compilation

Examples of the application's source code: The source code of the executable tools in LIPSedgeSamples. Refer to *Chapter5 5.1 Samples codes*. In cases where the source code is corrupted, LIPS Corp. provides the source code on LIPS Corp.'s GitHub.

Application name	Source code
LIPSCameraMatrix	LIPSedge-sdk-samples/LIPSCameraMatrix at main · lips-hci/LIPSedge-sdk-samples · GitHub
LIPSImuReader	LIPSedge-sdk-samples/LIPSImuReader at main · lips-hci/LIPSedge-sdk-samples · GitHub
LIPSLensModeSelect-gl	LIPSedge-sdk-samples/LIPSLensModeSelect-gl at main · lips-hci/LIPSedge-sdk-samples · GitHub
LIPSPowerTest-gl	LIPSedge-sdk-samples/LIPSPowerTest-gl at main · lips-hci/LIPSedge-sdk-samples · GitHub
Ni2CenterRead	LIPSedge-sdk-samples/Ni2CenterRead at main · lips-hci/LIPSedge-sdk-samples · GitHub
Ni2EventBasedViewer-gl	LIPSedge-sdk-samples/Ni2EventBasedViewer-gl at main · lips-hci/LIPSedge-sdk-samples · GitHub
Ni2PointCloid-gl	LIPSedge-sdk-samples/Ni2PointCloud-gl at main · lips-hci/LIPSedge-sdk-samples · GitHub
Ni2RawViewer-gl:	LIPSedge-sdk-samples/Ni2RawViewer-gl at main · lips-hci/LIPSedge-sdk-samples · GitHub
Ni2SimpleViewer-cv	LIPSedge-sdk-samples/Ni2SimpleViewer-cv at main · lips-hci/LIPSedge-sdk-samples · GitHub
Ni2SimpleViewer-gl:	LIPSedge-sdk-samples/Ni2SimpleViewer-gl at main · lips-hci/LIPSedge-sdk-samples · GitHub

6. Supported Language & Wrappers

LIPSedge™ DL / M3 SDK supports various programming Languages/ Libraries/ Frameworks to enhance the development project. These programming language-based SDK and libraries/ frameworks are available at LIPS-HCI · GitHub.

Type	Name	Description	GitHub Link
Language	Python3	Support Python3	python3 · GitHub
	.NET	Support for .NET languages with examples in C#	.NET GitHub
	C#	Support C#	Coming Soon.
	Java	Support Java	Coming Soon.
Library	OpenCV	Integration with OpenCV computer-vision library	OpenCV GitHub
	PCL	Integration with Point Cloud Library	Coming Soon.
Framework	ROS	Integration with Robot Operating System (ROS)	Coming Soon.
	ROS2	Integration with Robot Operating System 2 (ROS 2)	Coming Soon.
	ISAAC	Support NV Isaac robot platform as depth camera data provider	Coming Soon.
	Halcon	Integration with HALCON development environment	Coming Soon.

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https://www.lips-hci.com

7. Application & Middleware

In addition to the LIPSedge™ DL / M3, LIPS Corp. offers a diverse range of advanced 3D cameras and comprehensive solutions catering to various imaging and sensing requirements. For details, refer to the following chapter:

7.1 Applications

LIPS Corp. offers a wide range of advanced 3D camera kits. These offerings encompass various technologies to cater to diverse imaging and sensing requirements. For details, refer to. https://www.lips-hci.com/.

7.2 Middleware

LIPS Corp. offers exclusive middleware solutions. These solutions encompass various technologies to cater to diverse imaging and sensing requirements. For details, refer to. https://www.lips-hci.com/.

8. SDK Tutorial

LIPS Corp. provides extensive support for a variety of SDKs. LIPS Corp.'s GitBook tutorial offers practical examples and applications with hands-on guidance based on the following platforms:

Name	Description
C++	https://lips-hci.gitbook.io/lips-developer-documentation/sdk-code-samples-and-languages-wrappers/openni2/overview
Python	https://lips-hci.gitbook.io/lips-developer-documentation/sdk-code-samples-and-languages-wrappers/openni2/overview-1
Java	https://lips-hci.gitbook.io/lips-developer-documentation/sdk-code-samples-and-languages-wrappers/openni2/overview-2
OpenCV	https://lips-hci.gitbook.io/lips-developer-documentation/sdk-code-samples-and-languages-wrappers/openni2/overview-3
GenICam	https://lips-hci.gitbook.io/lips-developer-documentation/sdk-code-samples-and-languages-wrappers/openni2/genicam
ROS	https://lips-hci.gitbook.io/lips-developer-documentation/sdk-code-samples-and-languages-wrappers/openni2/overview-4

9. Appendix (Private by owner)

9.1 Regulatory Compliance Notice

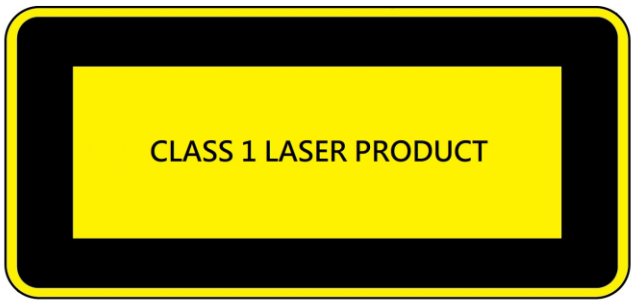
FCC Compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.
Increase the separation between the equipment and receiver.
Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
Consult the dealer or an experienced radio/TV technician for help.

Caution: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Label Notice



This device complies with part 15 of the FCC Rules. Operation is subject to the following conditions:

(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

CE Compliance

This is a Class B product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

RoHS Compliance

All lead-free products offered by the company comply with the requirements of the European law on the Restriction of Hazardous Substances (RoHS) directive, which means our manufacture processes and products are strictly “lead-free” and without the hazardous substances cited in the directive.

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