

Camera Installation and AAGI Activation

Table of Contents

1. Camera Installation	3
1.1. Available Cameras	4
1.2. Camera Arms	7
1.3. How to Install a RealSense Camera	8
1.4. Connect a RealSense Camera to PC	9
1.5. Install and Connect a UVC Camera	10
2. Starting AAGI	11
2.1. Starting AAGI	12
2.2. "Home" and "Viewer" Window	13
2.3. "Viewer" Window	14
2.4. "Home" Window	15
2.5. "Global Settings" Window	17
2.6. "Camera" Tab	18
2.7. Flip Mode Selection	19
2.8. Apply Depth Filter	20
2.9. Show Depth Image	21
2.10. Show Depth Filtered Image	24
2.11. Quit AAGI	25
3. Module Selection	26
3.1. Module Selection	27

1. Camera Installation

1.1. Available Cameras (1)

1. Camera Installation

RealSense cameras can use **all modules**.

RealSense Depth Camera D415

The D415 is commonly used in a variety of situations. It is suitable for covering distances ranging from **400 mm to 1600 mm**. If installation of the D415 is feasible, it is recommended for general use.



D415

Most Recommended

RealSense Depth Camera D405

The D405 is used when the camera must be positioned very close to the gesture site. It is suitable for covering distances ranging from **70 mm to 500 mm**.



D405

For Short Distances

1.1. Available Cameras (2)

UVC cameras can only use **Slight** to recognize small movements.

ELP-USBFHD06H-MFV (5-50)

This camera is capable of high magnification zooming.

This can be used to recognize very small movements because of its high zoom magnification.

It is suitable for covering **more than 300mm**.



ELP-USBFHD06H-MFV (5-50)

ELP-USB4KHDR01-MFV (2.8-12)

This camera is used when the camera must be positioned very close to the gesture site.

It is suitable for covering **less than 300mm**.



ELP-USB4KHDR01-MFV (2.8-12)

1.1. Available Cameras (3)

Available Combinations of Cameras

The following camera combinations are available for use with AAGI.

- One RealSense Depth Camera



- One UVC camera



- One RealSense Depth Camera + One UVC camera



- Two UVC cameras



1.2. Camera Arms

Appropriate Camera Installation for the User's Recognition Area

When using any of the modules, the camera must be installed first.

Select a Camera Arm or Head

Choose a camera stand or mount based on the user's needs. Here are some examples of affordable options (under 2,000 JPY) that can be easily purchased online:

For Upper Body:

- Logitech Camera Arm Stand (64cm or 33cm)

For Lower Body:

- UTEBIT Clamp Camera Head Set
- NAGAO INDUSTRY Free Head Clamp
- SmallRig Double Ball Head Arm & Super Clamp Kit

For more detailed installation instructions specific to each recognition module, please refer to the relevant module's manual.



7

1.3. How to Install a RealSense Camera

Before starting AAGI, position the camera towards the target area. The target area should be approximately as specified for each module. Connect the camera to the computer using a USB cable.

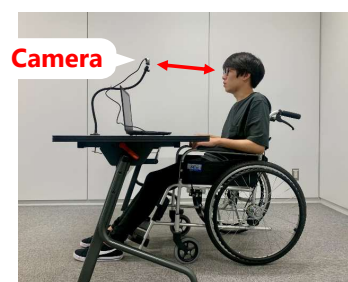
You may use either the original cable supplied with the camera or a longer cable (up to 3 meters for D415 model, or up to 2 meters for the D405 model).

Camera Installation Position Common to All Modules

The camera should be positioned and angled to meet the following conditions:

- The part of the body where the gesture will be performed should be closest to the camera.
- The distance between the camera and the gesture-performing body part should be set as follows:
 - D415: at least 40 cm away
 - D405: at least 8 cm away
- Ensure there are no other objects between the camera and the area where the gesture will be performed.

For detailed camera positioning instructions specific to each module, please refer to the relevant module's manual.



Example of camera installation while seated in a wheelchair



Example of camera installation while lying in bed

8

1.4. Connect a RealSense Camera to PC

Connection Instructions

Connect the camera to your computer using the included USB cable.

- Please insert a Type-C (D415) or Micro Type-B (D405) connector into the camera and the Type-A connector into the computer.
- If you insert the cable slowly, Windows may recognize it as USB 2.0. To ensure proper recognition, disconnect the cable and reconnect it quickly.

Purchasing a USB Cable

The original cable is approximately 1 meter long, which may not suffice for all setups.

- When purchasing a replacement, ensure the Type-C to Type-A cable is USB 3.1 Gen 2 compliant and choose a length suitable for your operating environment, with a maximum length of 3 meters as per specifications.
- If your computer has a Type-C port, you can also use a Type-C to Type-C cable.

Note:

For the D405 model, the camera uses a Micro USB Type-B (3.0) connector, with a maximum cable length of 2 meters per standard.



1.5. Install and Connect a UVC Camera

UVC Camera Installation

Before starting AAGI, position the camera roughly towards the target area **to satisfy the following**.

You can look examples of an image of camera by referring to the manual '**Usage of Slight**' in '**3. How to Use Each Module**'.

- Please use the UVC cameras as follows:
 - ELP-USBFHD06H-MFV (5-50) : When placing the camera away from the gesture site and using zoom.
 - ELP-USB4KHDR01-MFV (2.8-12) : When placing the camera close to the gesture site to the subject to capture it large.
- Ensure there are no other objects between the camera and the area where the gesture will be performed.
- The camera clearly shows the gesture-performing body part.*
 - * If the gesture is very small, use the zoom to get a larger image of the body part.

Connection Instructions

Insert the end of the cable extending from the camera body into the computer.

2. Starting AAGI

2.1. Starting AAGI

After connecting the camera, double-click the "AAGI" icon to launch the application.

- **If you are using a laptop computer, be sure to use it while the power cable is connected.**
It will not operate properly on battery power.
- Upon first launch, you may see a message saying "Windows protected your PC." Please click "More info" and then select "Run anyway" to proceed. (It may take some time to start)

For more information, please see

7.Troubleshooting and Reference '1.4 Run as administrator' p.10

- If you attempt to start AAGI without the camera connected, a message will appear. Click "OK" to connect the camera, and then restart AAGI.

- **AAGI has the capability to record an operation log.**
Logging occurs when the "AAGI\data\log.dat" file is present. The log file (log.txt) is stored in the AAGI folder and is not sent outside the system. If you do not require logging, you can delete the log.dat and log.txt files.

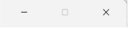


"AAGI" icon

2.2. "Home" and "Viewer" Window

When you start AAGI, two screens will appear as shown on the right.

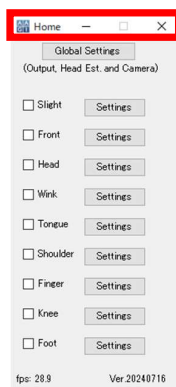
These two windows can be **double-clicked at the top to bring all AAGI windows to the front**.*

* Click on the area where  is not displayed.

1. "Home" window

This window changes depending on the used camera or the combination of them.

In this window, you can select the module you wish to use by checking the checkbox next to the module name.



"Home" window



"Viewer" window

2. "Viewer" window

This window displays the camera feed.

13

2.3. "Viewer" Window

A Window Size

You can adjust the size of the "Viewer" window to facilitate simultaneous use with other applications, such as an on-screen keyboard.

Screen Magnification

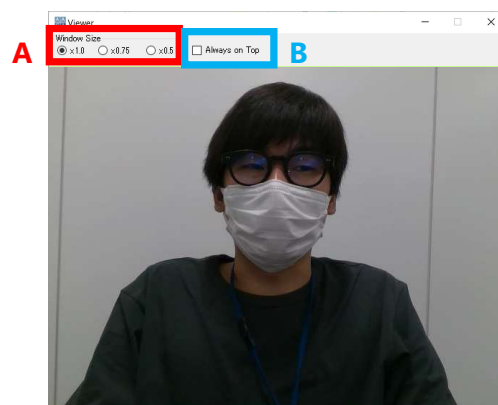
- x1.0: Default size at initial startup.
- x0.75: Three-quarter size at initial startup.
- x0.5: Half size at initial startup.

Select the desired magnification by checking the corresponding radio button. The window size will adjust accordingly. On subsequent startups, the "Viewer" window will appear at the size it was set to during the previous session.

B "Always on Top" Checkbox

By checking this checkbox, the "Viewer" window will remain visible in the foreground, even when other applications are in use. This allows you to monitor the user's gestures while using other software.

If you use other software, the windows except the "Viewer" window become invisible. You can bring the all windows to the foreground to click the "Viewer" window.



14

2.4. "Home" Window (1)

This page is for when either one RealSense Depth Camera or one UVC camera is used. If you are using two cameras, see the next page.

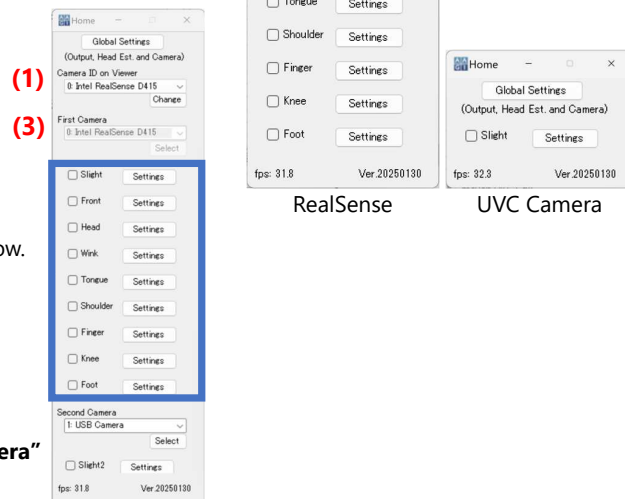
"Home" Window changes depending on using a kind of camera.

If your computer is connected an unused camera, for example, a camera on the laptop, please read the following.

When your computer is connected an unused camera, "Home" Window for two cameras appears.

Firstly, follow below steps and use **the blue box** when configuring the module.

1. To find the ID of the camera to be used, switch the camera displayed in the "Viewer" window and check the image.*
 - * To switch the camera displayed in the "Viewer" window, follow the steps below.
 - i. Select the camera to be displayed from **the pull-down menu under "Camera ID on Viewer"**.
 - ii. Click the **"Change" button**.
2. Once found, display the image of that camera in the "Viewer" window.
3. If you are using a UVC camera, select the camera ID you found from **the pull-down menu under "First Camera"** and press the **"Select" button**.



Window for Two Cameras

2.4. "Home" Window (2)

This page is for when two cameras are used. If you are using one camera, see the previous page.

The "Home" window change depending on whether you have a RealSense + UVC camera or two UVC cameras.

A Camera Selection Menu

You can select which of the connected cameras to display in the "Viewer" window.

Procedure for switching the camera to be displayed

1. Select the camera you want to display from **the pull-down menu under "Current Camera ID"**.
2. Press the **"Change" button**.

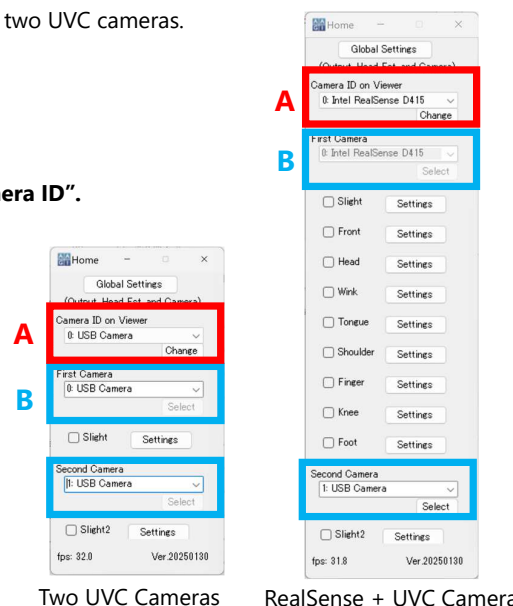
B Camera Assignment Menu

You can select which of the connected cameras to assign as the first or second camera.

- In case of RealSense + UVC camera, **only the second camera can be selected** since the first camera is fixed to RealSense.
- If the PC is rebooted or the cable connection is changed, the camera assignments **may not be restored correctly**.

Camera Assignment Procedure

1. Select the camera you wish to assign to the first or second camera from **the pull-down menu under "First Camera" or "Second Camera"**.
2. Press the **"Select" button**.



Two UVC Cameras

RealSense + UVC Camera

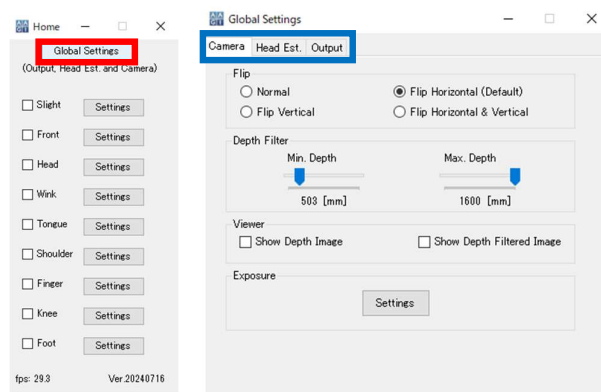
2.5. "Global Settings" Window (Camera, Head Est., Outputs)

When you click the **"Global Settings" button** at the top of the "Home" window, the "Global Settings" window will appear.

The "Global Settings" window has three tabs: **"Camera"**, **"Head Est."**, and **"Output"**.

* If you are not using a RealSense camera, the **"Head Est."** tab will not appear.

- **"Camera" Tab:**
Configure settings related to the camera.
- **"Head Est." Tab:**
Set up the configurations necessary for using gestures associated with the head.
- **"Output" Tab:**
Configure the virtual keys and relay switches corresponding to each gesture.



"Home" window

"Global Settings" window
("Camera" tab)

2.6. "Camera" Tab

In the **"Camera" tab**, you can set the **mirror mode**, **distance filter**, **display of distance image**, and **application of distance filter**.

For details on each setting, see the following pages and beyond.

- The "Exposure" is automatically adjusted, so manual adjustment is not necessary. Please adjust it manually only if the automatic adjustment does not work properly.

For more information, please see

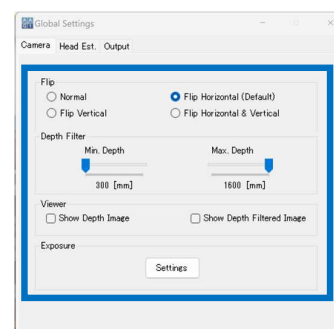
7.Troubleshooting and Reference '1.3. Camera Exposure Error' p.9

Please read the following only if you are using two cameras.

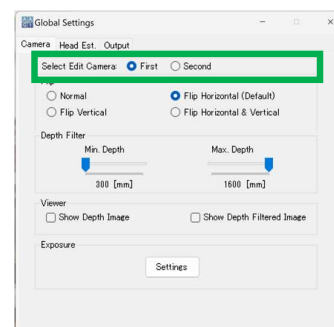
If you are using two cameras, the **"Select Edit Camera"** will appear at the top of the **"Camera" tab**.

This radio button allows you to **select which camera settings to change**.

Use the radio buttons to select which camera you wish to configure the settings for, and then proceed to the next page to configure the settings.



"Global Settings" window
("Camera" Tab)



"Camera" Tab for Two Cameras

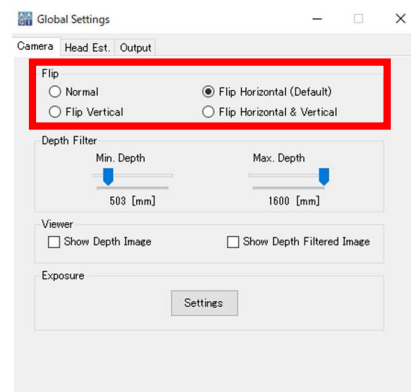
2.7. Flip Mode Selection

Flip mode allows you to display the camera image in the “Viewer” window with **horizontal and/or vertical inversion**.

The following four modes are available:

- **Normal:** The camera image is displayed without any inversion, horizontally or vertically.
- **Flip Horizontal:** The camera image is inverted horizontally, creating a mirror effect.
- **Flip Vertical:** The camera image is inverted vertically.
- **Flip Horizontal & Vertical:** The camera image is inverted both horizontally and vertically.

The default mode is “Flip Horizontal.” Adjust the setting based on the camera’s installation position to achieve the best viewing experience.



“Global Settings” window (“Camera” tab)

2.8. Apply Depth Filter

This setting does not appear when a UVC camera is configured.

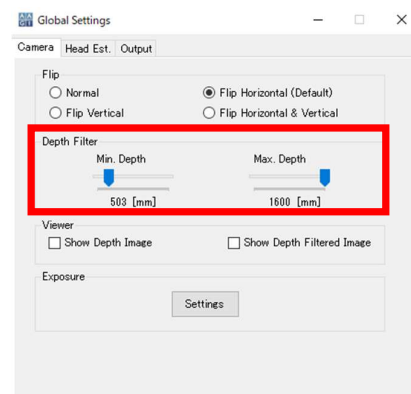
Depth Filter specifies the range of distances within which gestures will be recognized. For example, in the image on the right, if the minimum distance is set to 300 mm and the maximum distance to 1600 mm, AAGI will recognize gestures within this 300 mm to 1600 mm range from the camera.

Adjust the minimum and maximum distance sliders to set the desired range for the depth filter. Note that the range of distances that can be recognized depends on the type of depth imaging camera used.

For more information, please see

This manual **'1.2. Available Cameras' p.5**

- If you replace the camera with a different type, the depth filter settings will be reset.
- It is not possible to replace the camera with a different type while AAGI is running.



“General Settings” window (“Camera” tab)

2.9. Show Depth Image (1)

This setting does not appear when a UVC camera is configured.

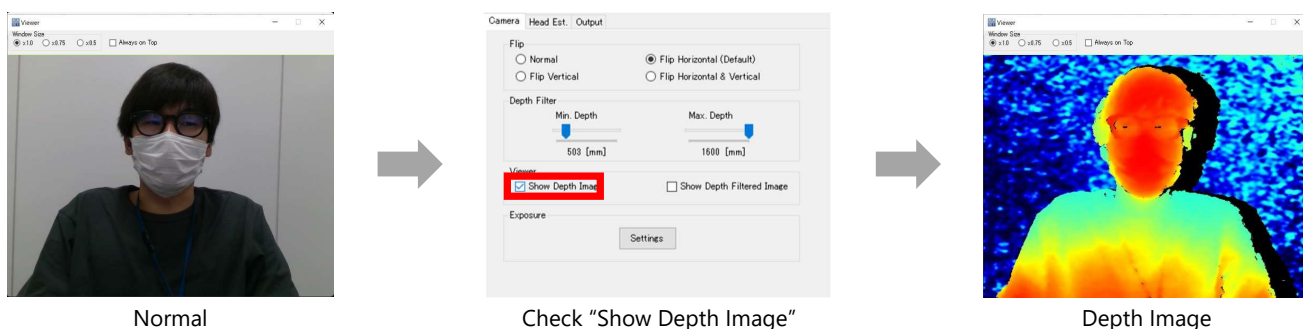
“Show Depth Image” Checkbox

To view a depth image in the “Viewer” window, open the “Camera” tab in the “Global Settings” window and check the “Show Depth Image” checkbox.

In a depth image:

- **Closer** distances appear **red**.
- **Farther** distances appear **blue**.
- If the image is not recognized due to distance, material, or environmental factors, it will be displayed in **black**.

If gesture recognition is not functioning as expected, verify that the depth image of the part you want to recognize is visible and not affected by these issues.



21

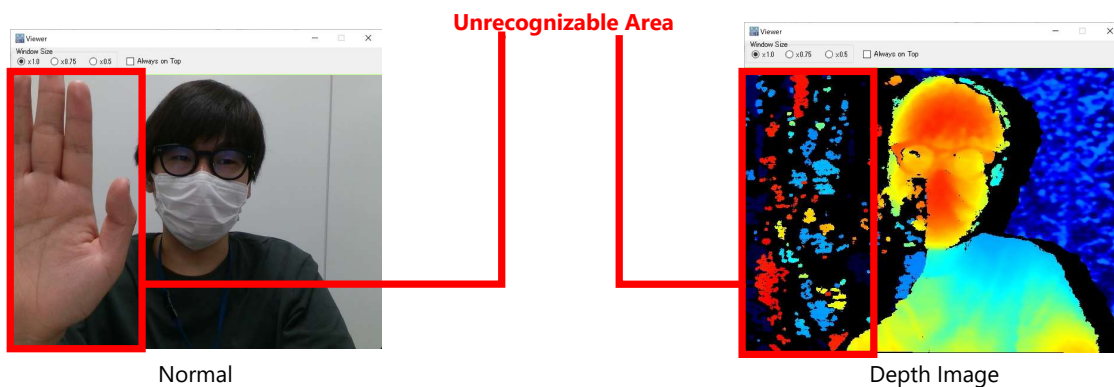
2.9. Show Depth Image (2)

The minimum distance that can be recognized varies depending on the camera model. When displaying the depth image, areas with **excessive noise** cannot be accurately recognized. For example, if the distance between the palm of the hand and the camera is too close, the image may appear black because the distance cannot be measured.

Minimum Distance That Can Be Recognized:

- RealSense Depth Camera D415: 400 mm from the camera
- RealSense Depth Camera D405: 70 mm from the camera

Ensure that the camera is positioned at a distance greater than the minimum distances specified above to avoid issues with recognition.



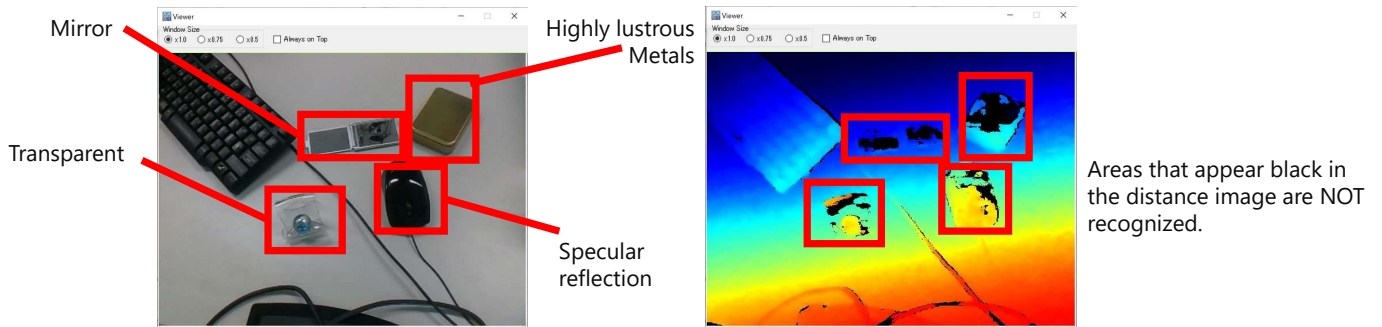
22

2.9. Show Depth Image (3)

Depending on the type of distance camera, there are certain materials and environments where obtaining a distance image can be challenging. Specifically, distance images may be difficult to capture in the following conditions:

- **Direct Sunlight** (please make good use of curtains, etc.)
- High-Gloss Metal
- Mirrors
- Fluffy, Black Woolen Materials

Ensure that these materials and conditions are either not within the recognition range or are not targets for recognition.



2.10. Show Depth Filtered Image

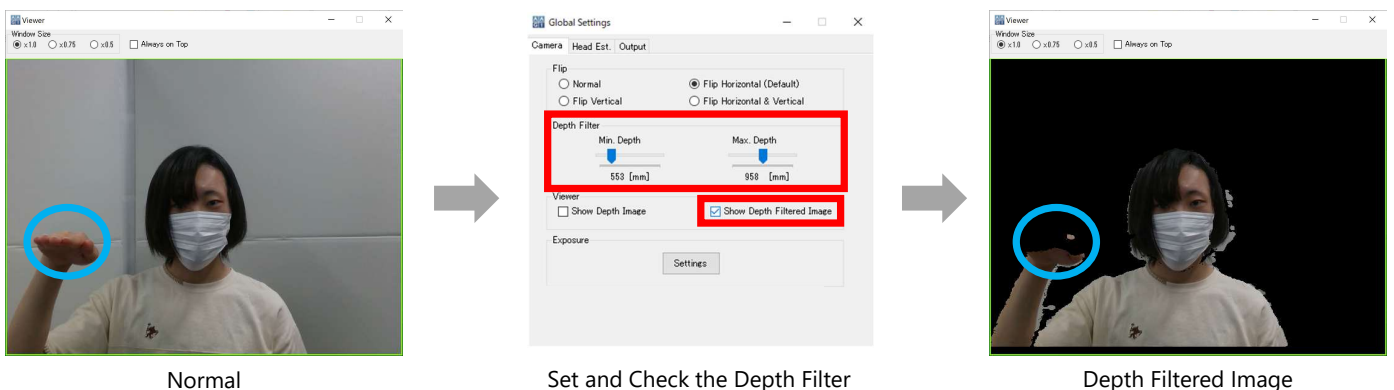
This setting does not appear when a UVC camera is configured.

“Show Depth Filtered Image” Checkbox


By opening the “Camera” tab in the “Global Settings” window and checking the “**Show Depth Filtered Image**” checkbox, you can display only the range within which the distance filter is applied in the “Viewer” window.

In the example below, if the minimum distance is set to 587 mm and the maximum distance is set to 975 mm, the image will show only objects within this distance range.

- **Fingertips** located **closer** to the camera than the minimum distance will be displayed in **black** and will not be visible.
- A **wall farther** from the camera than the maximum distance will also be displayed **black** and will not be visible.



2.11. Quit AAGI

To exit the application, click  in the upper right corner of the "Home" window. This action will close all AAGI windows, including any open configuration windows for individual modules.

When the application closes, all settings made in AAGI are saved. The next time you start AAGI, it will reopen with the previously saved settings.

Please note that settings will only be saved if the program exits normally. Any changes made will not be saved if the application is closed unexpectedly or via other means.



"Home" window

3. Module Selection

3.1. Module Selection

Once you have installed the camera, checked the rough image in the Viewer, and confirmed that the distance is acceptable, proceed to the manuals for each module.

Module Selection Menu

In the "Home" window, select the module you wish to use. For detailed settings on how to use each module, refer to the corresponding manual.

- If you have two cameras, please set up a module **for each camera**.
- **Slight** is the **only module** that can be used with **UVC cameras**.

Gestures Available for Each Module

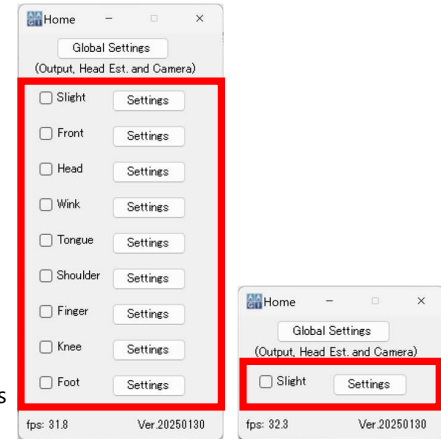
Modules can be broadly categorized into the following types:

Modules Independent of Body Part:

- **Slight:** For fine movements
- **Front:** For movements in the area close to the camera

Modules Used for each Body Part:

- **Head:** For head movements
- **Wink:** For Eye movements
- **Tongue:** For mouth and tongue movements
- **Shoulder:** For shoulder movements
- **Finger:** For finger movements
- **Knee:** For knee movements
- **Foot:** For foot movements



Decide which module best suits your needs and refer to '**3. How to Use Each Module**' for detailed instructions on using the selected module.