
Webcam video capture and streaming tool

VCapStream Ver.1.01

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1 Overview

This software provides the following features:

- Capture and display images from a web camera connected to a PC.
- Save the captured video and audio to a file.
- Play the saved video file.
- Transfer live images captured from a webcam to this app running on another PC.
- Receive and display live images transferred from this app running on another PC.

2 Operating environment

Windows 10, Windows 11

3 Tools used

This software uses the following NuGet packages to implement functions for capturing and playing camera images, capturing and playing audio, and saving and playing video files.

- Accord.Video.DirectShow (Accord.NET-Framework) By: Accord.NET
Used for capturing images from a camera, obtaining camera information, and setting camera settings.
- Accord.Video.FFMPEG (Accord.NET-Framework) By: Accord.NET
Used for saving and playing video files.
The license terms for Accord.NET-Framework are described in Accord.NET-Framework-license.txt in the installation folder.
- NAudio By: Mark Heath & Contributors
Used for audio input from a microphone, audio output to speakers, and saving and playing audio files.
The NAudio license terms are described in NAudio-license.txt in the installation folder.
- FFmpeg (Used as an external program if installed)
Used to combine audio (wav) and video (mp4) files when saving a video, and to separate audio files from video files when playing a video.

4 File structure

When you unzip the archive, the following files will be generated:

setup.exe	setup program
VcapStream_Setup.msi	installer

5 Install

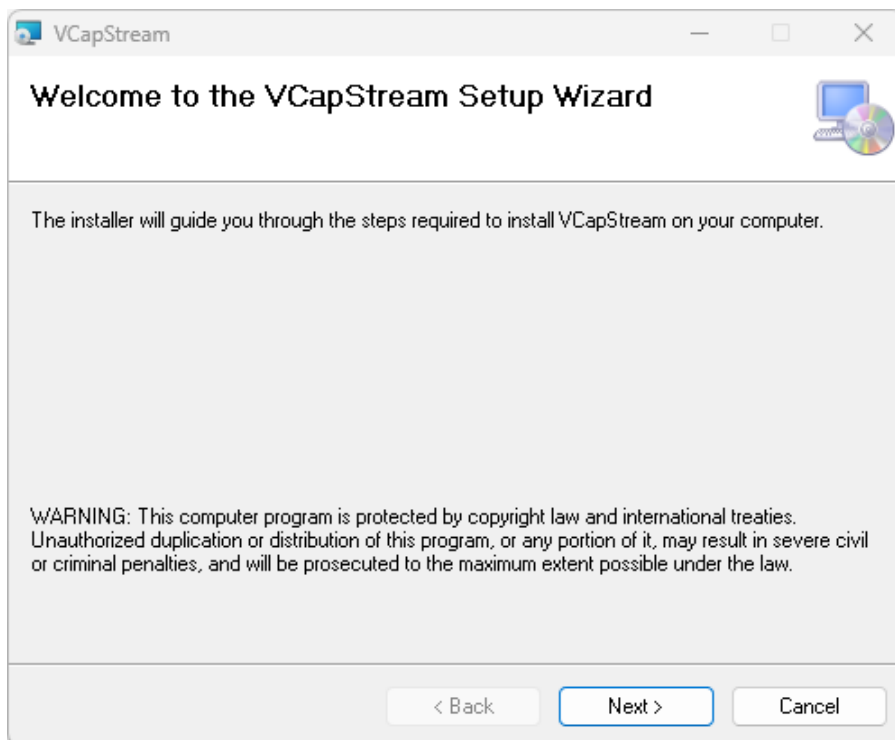
5.1 Installation of the Software

This software uses .NET Framework 4.7.2, so the necessary files will be downloaded from the .NET Framework download site during installation.

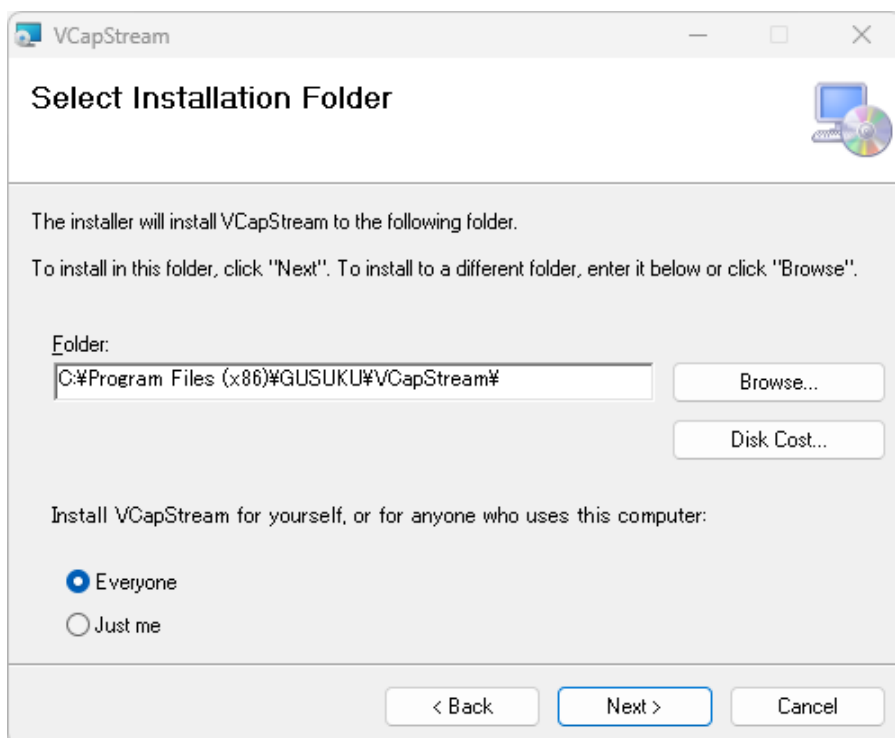
Therefore, when installing, please make sure you are in an environment with an internet connection and run setup.exe beforehand.

This does not apply if .NET Framework 4.7.2 is already installed.

After unzipping the software archive and running setup.exe, the setup wizard screen shown below will appear. Follow the on-screen instructions to proceed with the installation.

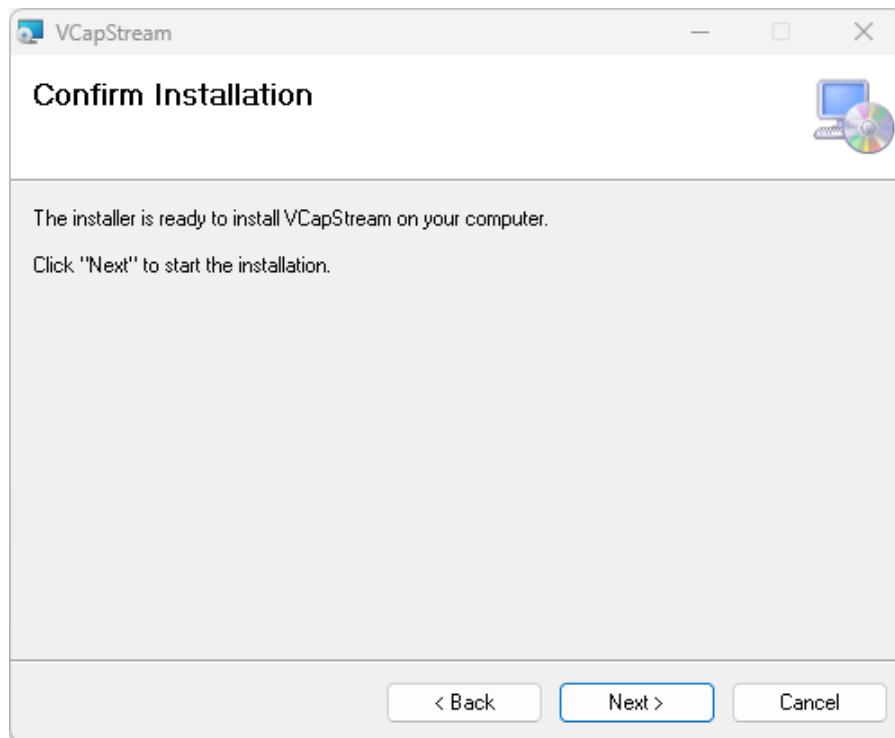


When you press the "Next" button in the image above, the "Select Installation Folder" screen shown below will appear.

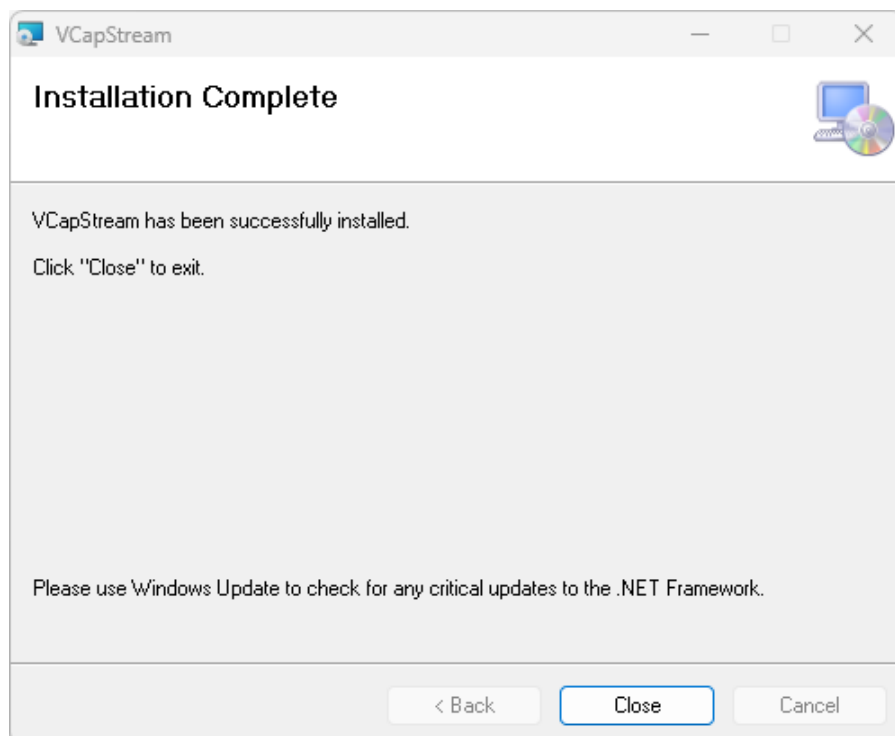


Once you have selected the installation folder and target users, click the "Next" button to proceed.

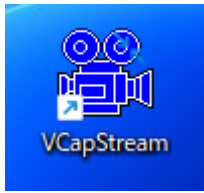
When you proceed, the following screen will appear, so click the "Next" button to proceed.



When the installation is complete, the following screen will be displayed. Click the "Close" button to finish.



A VCapStream shortcut will be created on your desktop as shown below.



When registering to the Start menu, a VCapStream shortcut may be placed in All Programs, or a folder called GUSUKU may be created and a VCapStream shortcut may be placed in it.



Help files are available in Japanese and English as PDF files.

Help_en.pdf	English help file
Help_ja.pdf	Japanese help file

A brief program description is provided in the Readme file below.

Readme_en.txt	English version
Readme_ja.txt	Japanese version

5.2 Installing Ffmpeg

FFmpeg is not included in this program's installer.

To install FFmpeg, open a command prompt as an administrator and run the following command:

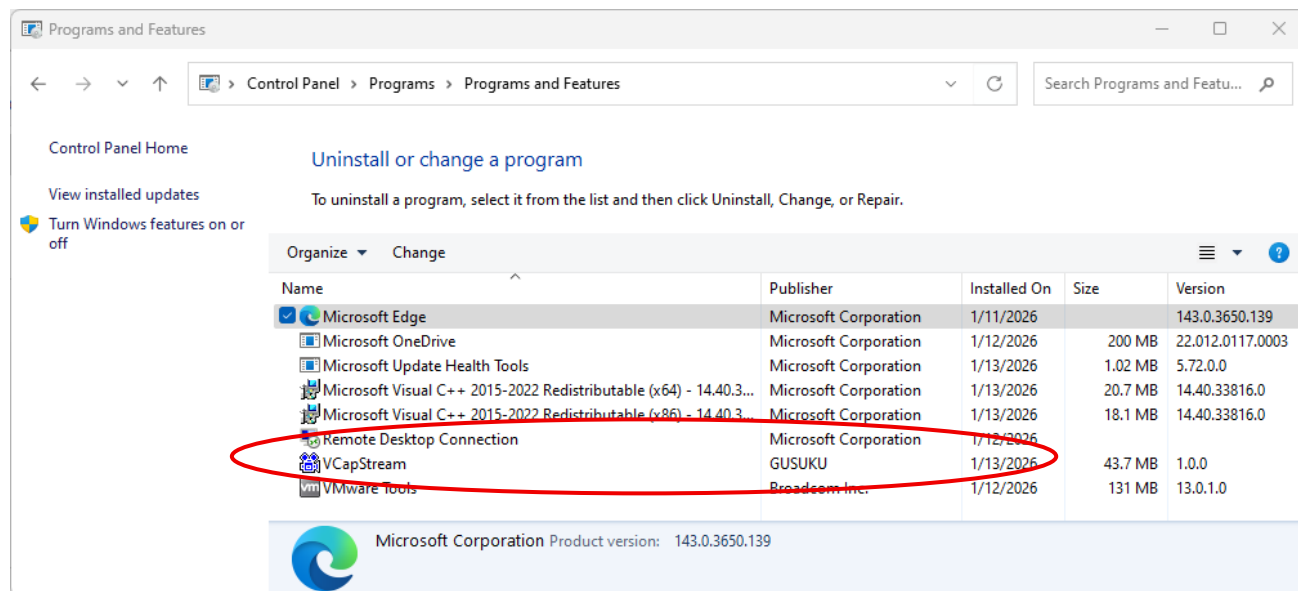
```
winget install --id=Gyan.FFmpeg -e
```

You must be connected to the Internet when running the above command.

6 Uninstall

Open the Control Panel and select "Uninstall a Program" if you are viewing by Category, or "Programs and Features" if you are viewing by Large or Small icons.

Select VCapStream from the "Uninstall or change a program" list on the Programs and Features screen and uninstall it.



7 How to start

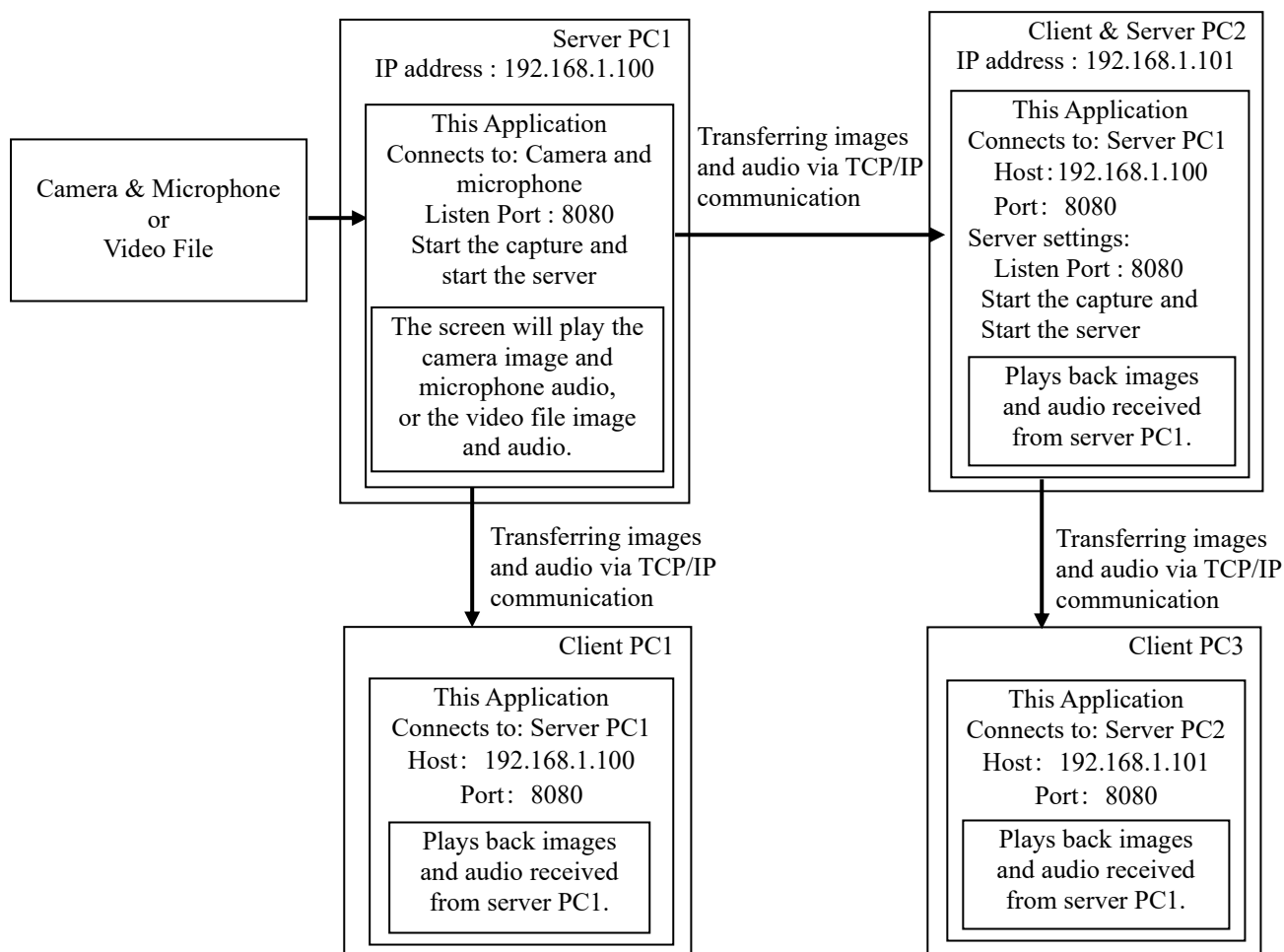
Select VCapStream from the All menu in the Windows Start menu and start it.

If you cannot find VCapStream in the Start menu, it may be in a group called GUSUKU. In that case, launch VCapStream in GUSUKU.

8 Connection Diagram

This application has the function of connecting to a webcam, capturing and displaying camera images, and also the function of starting a server function while capturing camera images, and streaming the captured images if a client connects.

The image below shows the connection when capturing and streaming camera images.

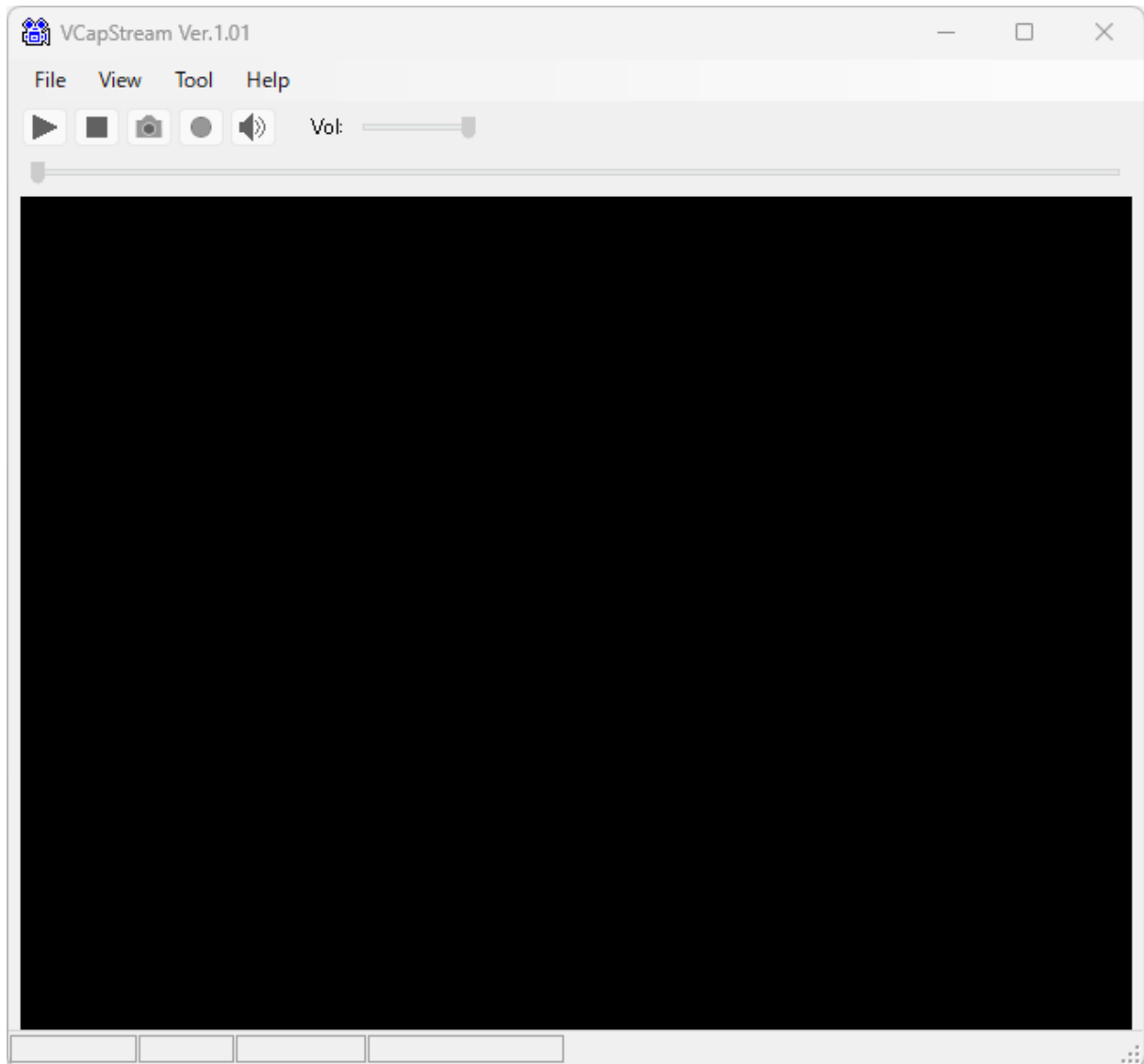


The server accepts connections from multiple clients, making it possible for connections like those shown in the diagram above for Server PC1.

A client can connect to a server and become a server at the same time, so it can relay images received from the server and send them to another client.

9 Screen Description

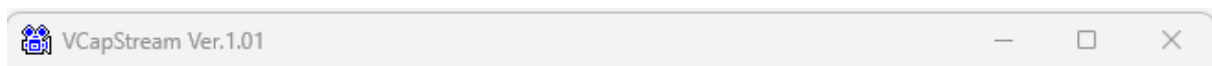
When you start VCapStream, the screen below will appear.



The screen shown above is explained below.

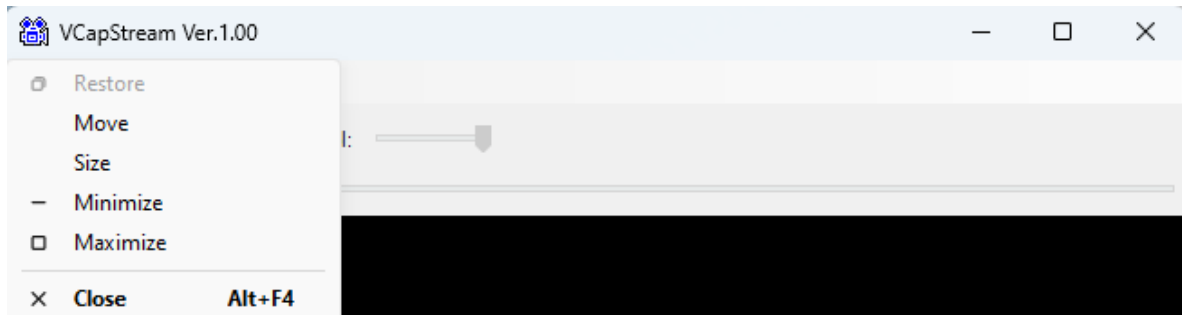
9.1 Title Bar

The title bar displays the application title and version number.



Pressing the " - ", "□", or "×" buttons on the right will perform the actions of "minimize", "maximize", or "exit application", respectively.

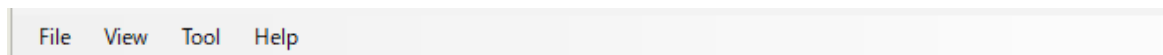
Click the icon on the left to display the system menu.



We will not explain the functions of the system menu as they are standard for Windows.

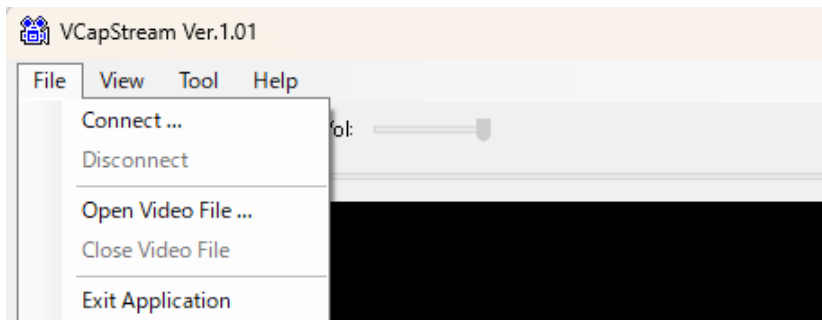
9.2 Menu Bar

The menu bar has three menu groups.



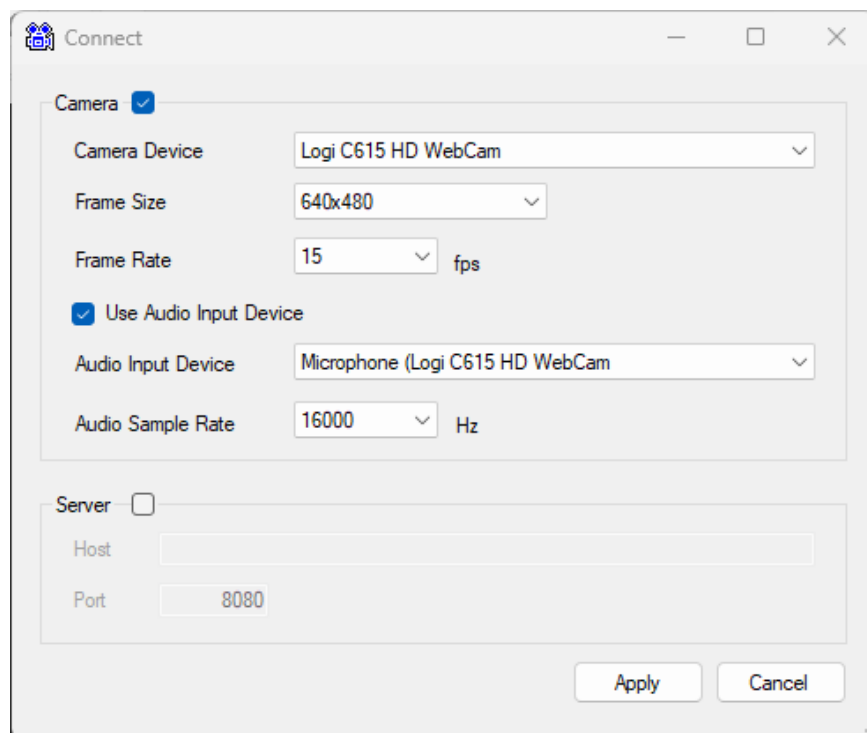
9.2.1 File menu

The File menu has the following items:



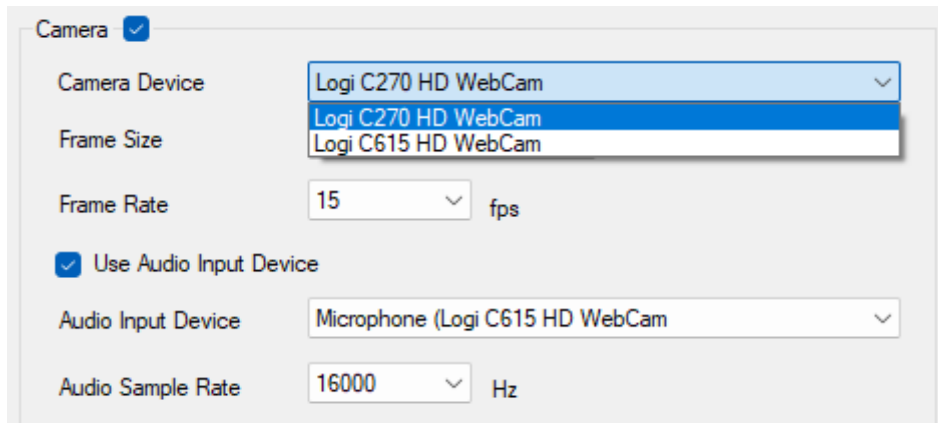
(1). Connect

The Connect dialog shown below will be displayed, allowing you to connect to the camera or server.



If the "Camera" checkbox is checked, a connection to the camera will be made.

Select the camera to connect to from the "Camera Device" combo box.

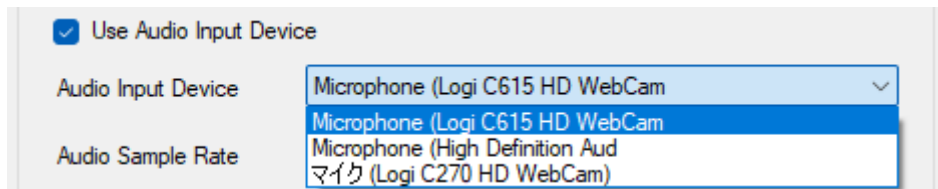


The screenshot shows a settings window with a 'Camera' section. The 'Camera' checkbox is checked. Below it, the 'Camera Device' dropdown menu is open, showing two options: 'Logi C270 HD WebCam' and 'Logi C615 HD WebCam'. The 'Frame Size' dropdown is also open, showing the same two options. The 'Frame Rate' is set to '15' fps. The 'Use Audio Input Device' checkbox is checked. The 'Audio Input Device' dropdown is set to 'Microphone (Logi C615 HD WebCam)'. The 'Audio Sample Rate' is set to '16000' Hz.

In the example above, when you open the combo box, two cameras are displayed, so you can select the camera you want to connect from there.

When "Use audio input device" is checked, you can capture audio input from the microphone along with the image.

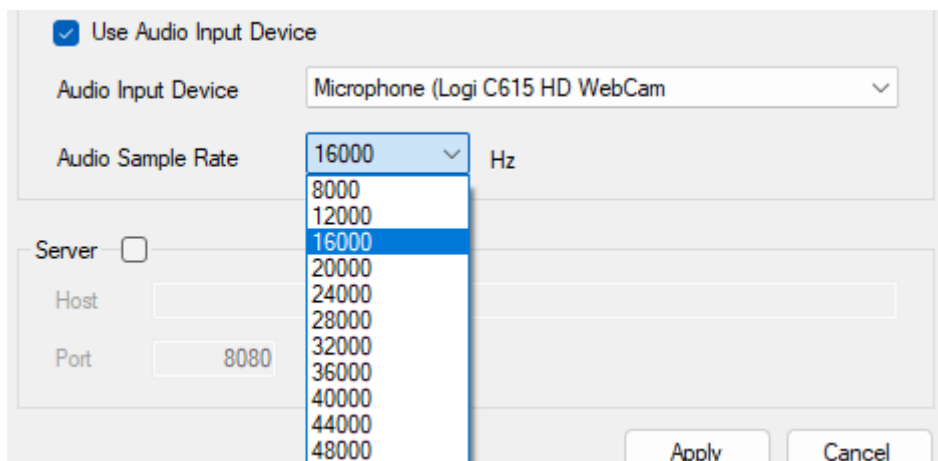
When "Use audio input device" is checked, the "Audio input device" combo box will become selectable, so select the microphone device from there.



The screenshot shows a settings window with the 'Use Audio Input Device' checkbox checked. The 'Audio Input Device' dropdown menu is open, showing three options: 'Microphone (Logi C615 HD WebCam)', 'Microphone (High Definition Aud', and 'マイク (Logi C270 HD WebCam)'. The 'Audio Sample Rate' is set to '16000' Hz.

The input audio will also be available in the server function described below, and can be heard at the destination of the stream.

If you check "Use audio input device", you will also be able to select the "Audio sample rate" combo box.



The screenshot shows a settings window with the 'Use Audio Input Device' checkbox checked. The 'Audio Input Device' dropdown is set to 'Microphone (Logi C615 HD WebCam)'. The 'Audio Sample Rate' dropdown menu is open, showing a list of sample rates: 8000, 12000, 16000 (selected), 20000, 24000, 28000, 32000, 36000, 40000, 44000, and 48000. The 'Server' checkbox is unchecked. The 'Host' field is empty. The 'Port' field is set to '8080'. There are 'Apply' and 'Cancel' buttons at the bottom right.

The default audio sample rate is 16000 Hz, but if you select a value higher than that, the streaming audio may be interrupted.

When the "Server" checkbox is checked, it will connect to a VCapStream running on another PC.

In the example above, we will connect to VCapStream, which is running as a server on the PC with the IP address specified in "Host".

VCapStream running on the PC specified in "Host" must be connected to the camera and "Start Server" must be selected from the "Tools" menu.

The port number in the "Connection" dialog must match the port number for "Listen TCP Port" in the "Option Settings" dialog opened from the server's "Tools" menu.

The server's port number is specified in the "Option Settings" dialog opened from the "Tools" menu.

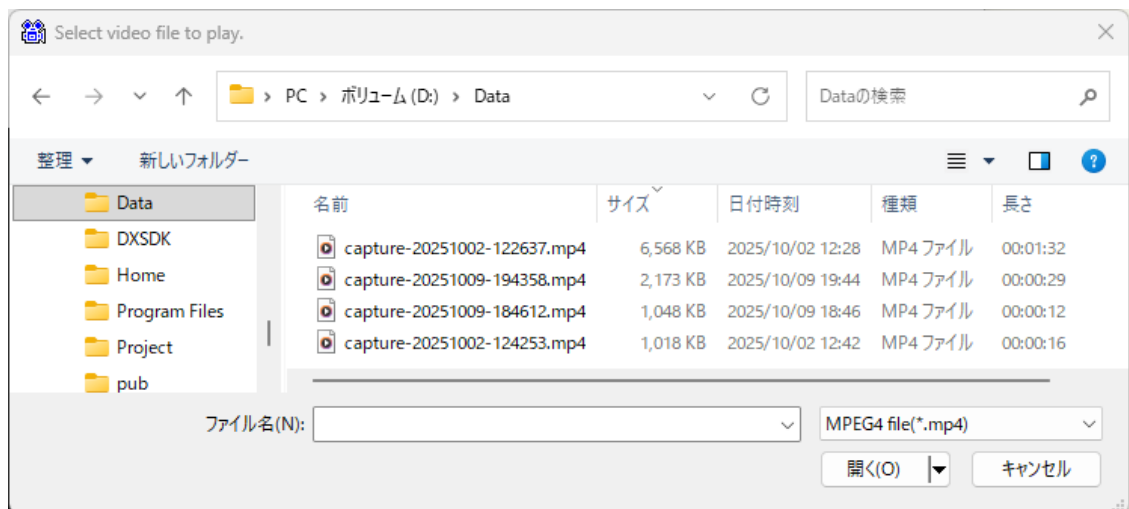
The connection destination of the server-side VCapStream can be another VCapStream server.

(2). Disconnect

Disconnects from the connected camera or VCapStream server.

(3). Open Video File

To play the recorded video file, open the video file (MPEG4 file) in the file selection dialog.



If you did not use FFmpeg to combine and save the video and audio during recording, the video data (mp4) and audio data (wav) will be saved as separate files with different extensions.

Therefore, if there is a file with the same name as the video file but a wav extension, you will be asked if you want to use it as the audio data. Selecting OK will allow you to play the video with audio.

If there is no wav file with the same name as the video file, and FFmpeg is installed, an attempt will be made to extract the audio data from the video file and play it.

If the video file does not contain audio data, it will play without audio.

(4). Close Video File

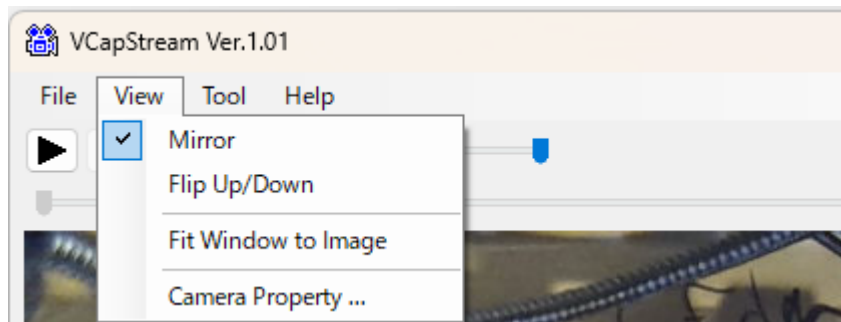
Closes an open video file.

(5). Exit Application

Quit the application.

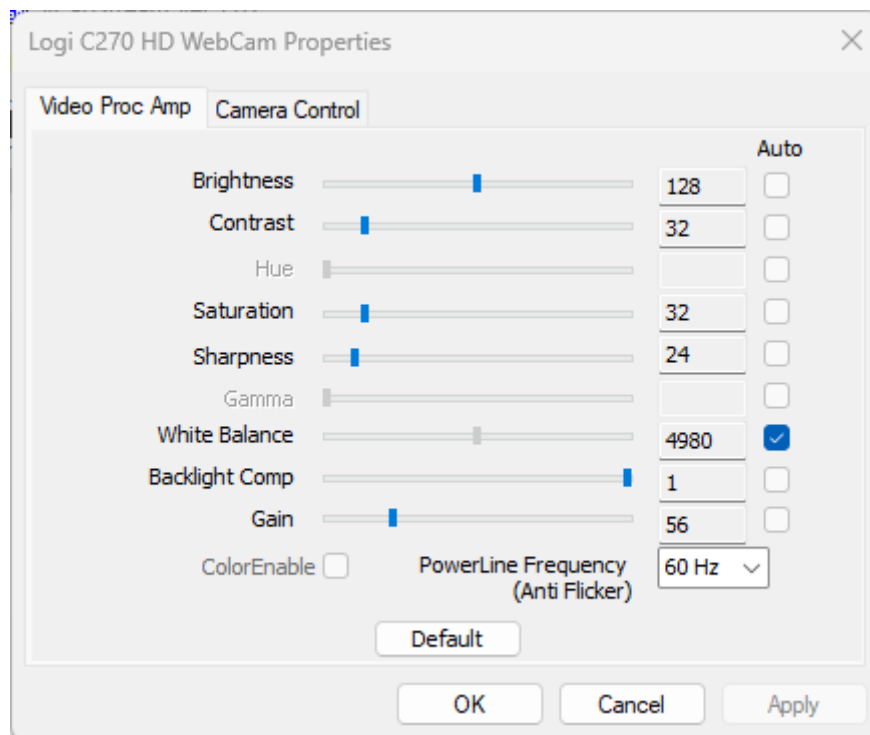
9.2.2 View Menu

The "View" menu has the following items:



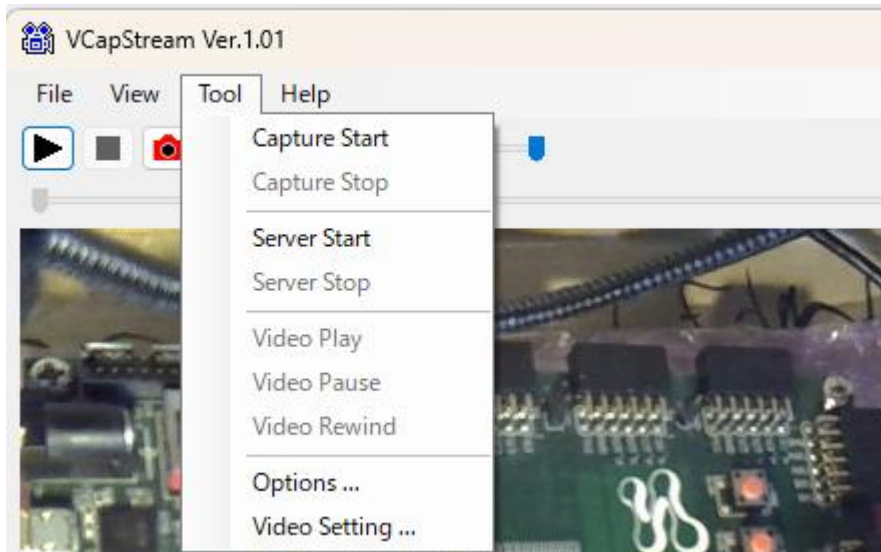
- (1). Mirror
Reverses the image horizontally.
- (2). Flip Up/Down
Flips the image upside down.
- (3). Fit Window to Image
Resize the window to fit the image size.
- (4). Video Property
Displays the properties dialog for the connected camera.

The properties dialog will vary depending on the camera, below is an example for the Logitech C270 HD WebCam.

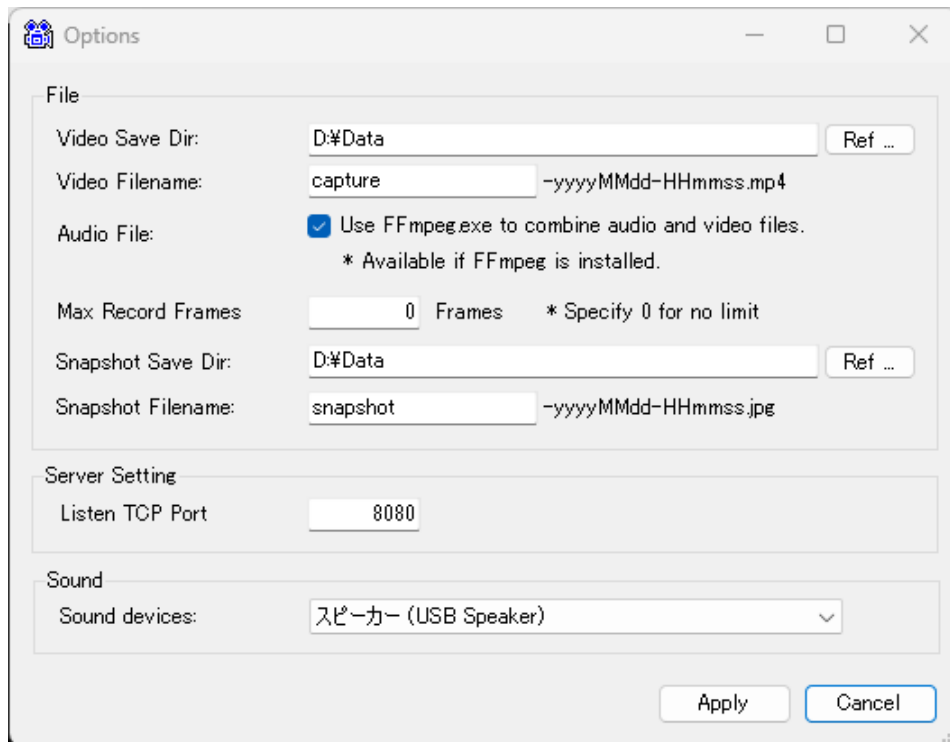


9. 2. 3 Tool menu

The Tool menu has the following items:



- (1). Capture Start
Starts capturing video from a camera or server.
- (2). Capture Stop
Stops capturing video from the camera or server.
- (3). Server Start
Start the video streaming server.
- (4). Server Store
Stop the video streaming server.
- (5). Video Play
Starts playing the opened video file.
- (6). Video Pause
Stops playing an open video file.
- (7). Video Rewind
Returns the playback position to the beginning of the opened video file.
- (8). Options
The option setting dialog shown below will be displayed.



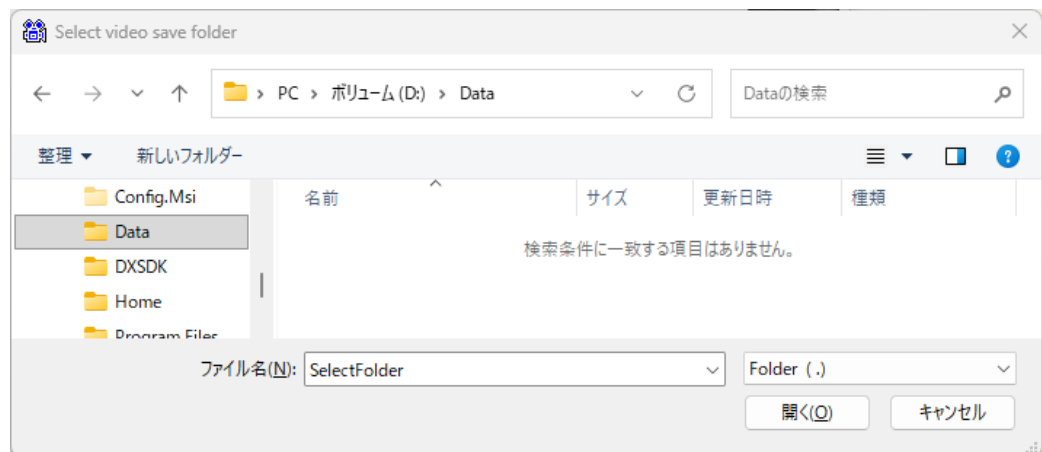
In the option settings dialog, set the following items.

- [File] group

1. Video Save Dir.

Set the directory (folder) where you want to save the video files.

[Ref ...] button, the folder selection dialog shown below will be displayed. You can select the desired folder by opening it and pressing the Open button.



2. Video Filename

Set the file name when saving the video file.

The date and time will be added to the end of the file name you set for the saved file.

3. Audio File

If FFmpeg is installed, this option determines whether to merge audio files into video files.

If you check "Use Ffmpeg.exe to combine audio and video files", the audio data will be combined

with the video file to create a single video file (mp4) with audio.

If this checkbox is not checked, or if it is checked but FFmpeg is not installed, the video file and audio file will be saved as separate files.

In that case, the file names will be the same, but the video file will have the mp4 extension and the audio file will have the wav extension.

4. Max Record Frames

Sets the maximum number of frames for a video file to be saved.

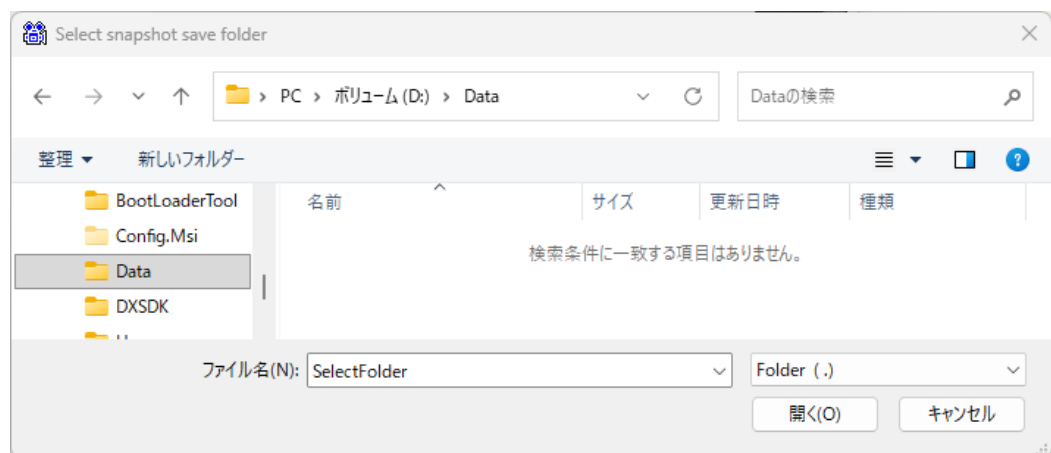
Recording will stop automatically when the specified number of frames is reached.

If the setting value is 0, recording will be performed without frame limit.

5. Snapshot Save Dir.

Set the directory where snapshot images are saved for capture images.

[Ref ...] button, the folder selection dialog shown below will be displayed. You can select the desired folder by opening it and pressing the Open button.



6. Snapshot Filename

Set the file name for saving the snapshot image of the captured image.

The date and time will be added to the end of the file name you set for the saved file.

- [Server Setting] group

1. Listen TCP Port

Specify the server's listening port number.

- [Sound] Group

1. Sound Device

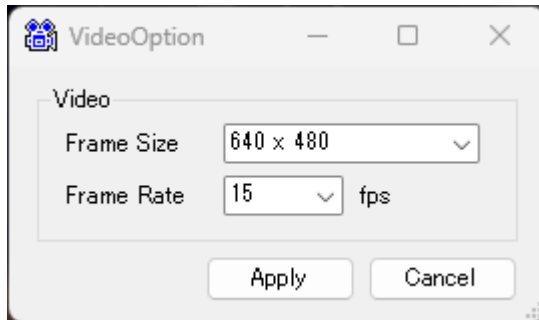
Select the speaker device for audio output from the combo box.



The combo box displays the currently connected speakers.

(9). Video Settings

Open the Video Options dialog shown below.

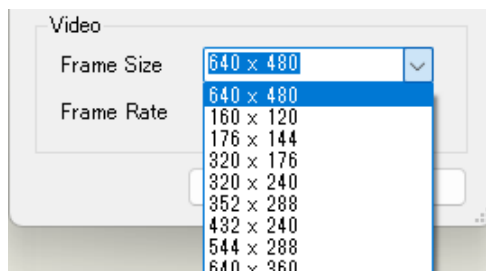


In the Video Option dialog, set the following items:

- [Video] Group

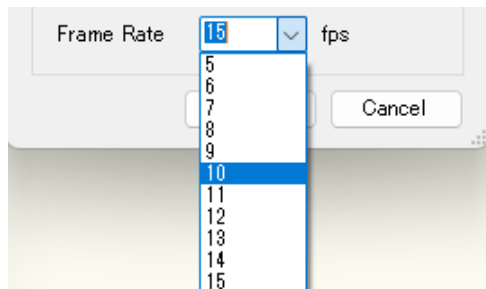
1. Frame Size

Sets the size of the image captured by the camera.



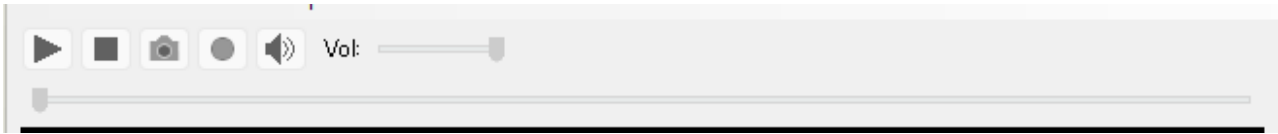
2. Video Filename

Set the frame rate for video captured by the camera.

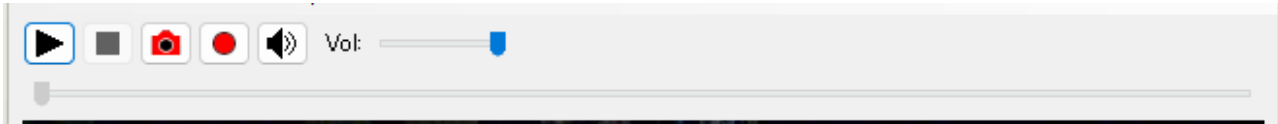


9.3 Control Area

The control area contains controls for capturing and playing video files.



The control area becomes operational when you connect to a camera or VCapStream server or open a video file.



The control area contains the following controls:

- (1). [Start] button

Starts capturing from a camera or playing a video file.



- (2). [Stop] button

Stops capturing from the camera or playing a video file.



- (3). [Snapshot] button

Saves a snapshot image of the video being captured from the camera or server in JPEG format.



- (4). [Record] button

Turn on the "Record" button and then press the "Start" button to save the captured image to a video file.



(OFF state)

When the "Record" button is on, the background color will turn orange.



(ON state)

The video file will be saved in the folder you specified in the options settings.

- (5). [Sound] button

Switches the audio playback on the speaker ON/OFF.



(OFF state)

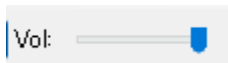
When the "Sound" button is ON, the background color will turn orange.



(ON state)

(6). Audio volume adjustment trackbar

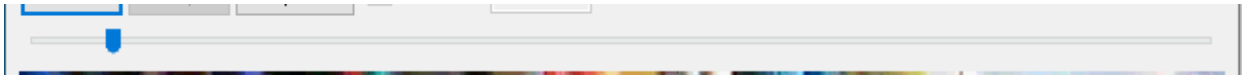
Adjust the volume of the audio being played.



(7). Video playback position change track bar

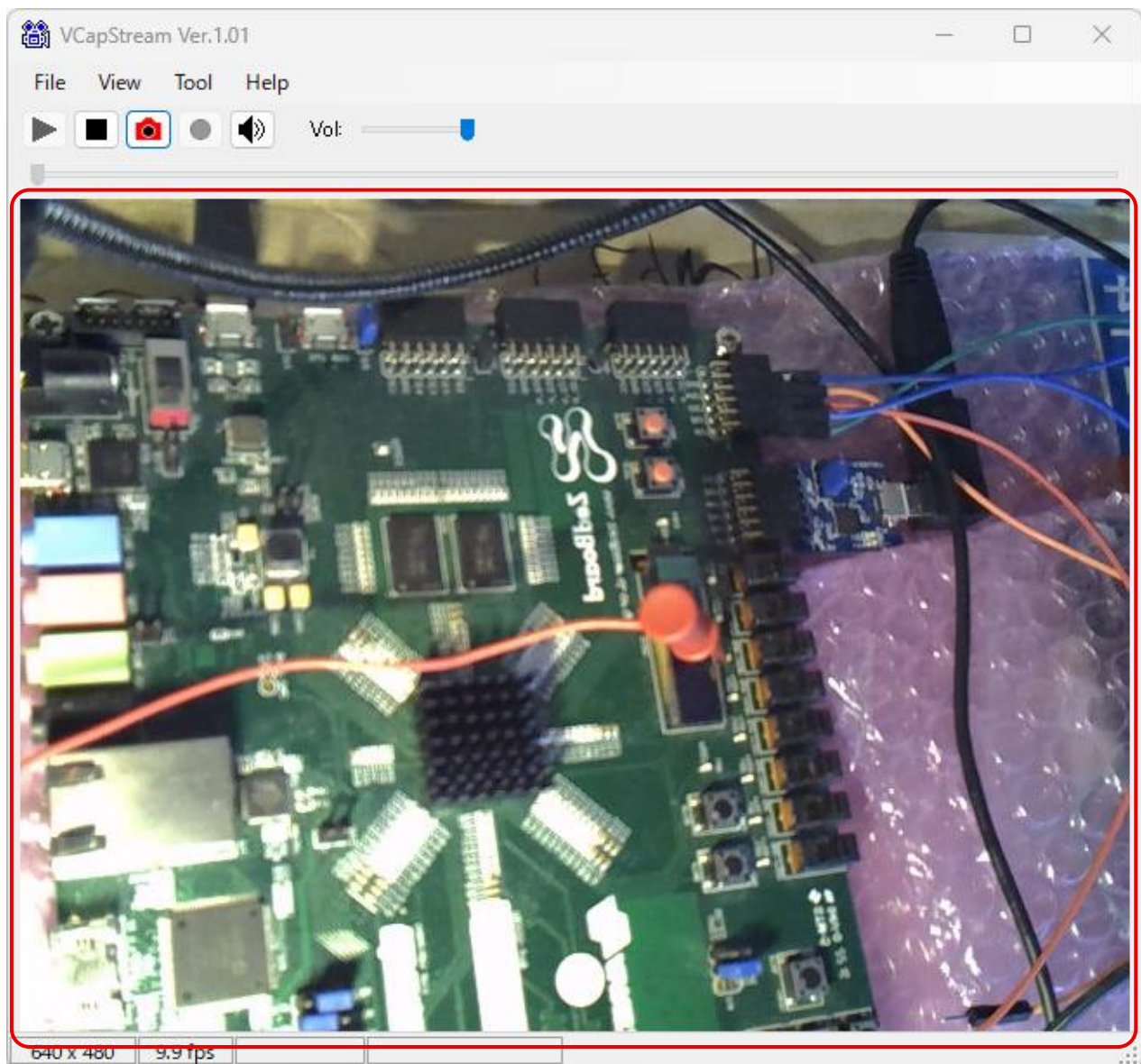
Change the playback position when playing a video.

Drag the knob or click the mouse button on the track bar to move the playback position of the open video file.



9.4 Display Area

It displays captured images from the camera, received images from the server, and playback images of video files.

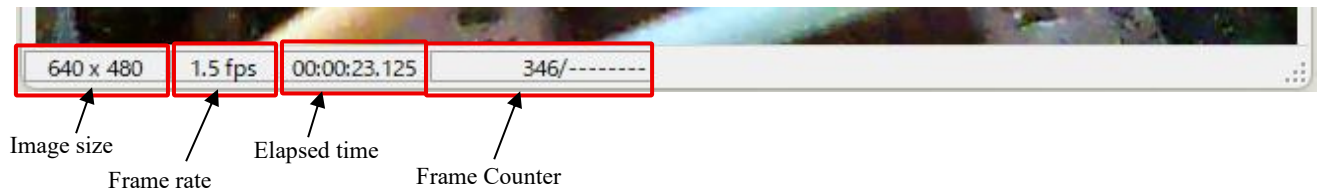


The image above shows the screen while an image is being captured from the camera.

If you change the window size, the image size in the display area will be enlarged or reduced to fit the window size.

9.5 Status bar

The status bar displays various information.



The information displayed in the above image is explained below.

(1). Image size

Displays the pixel size of the captured image or video file in width x height format.

(2). Frame rate

Displays the frame rate of the captured image or video in fps (frames per second).

(3). Elapsed time

The time elapsed since the start of capture or playback

(4). Frame Counter

When capturing, the number of frames captured from the start is displayed.

When playing a video file, the current frame position and total number of frames are displayed.

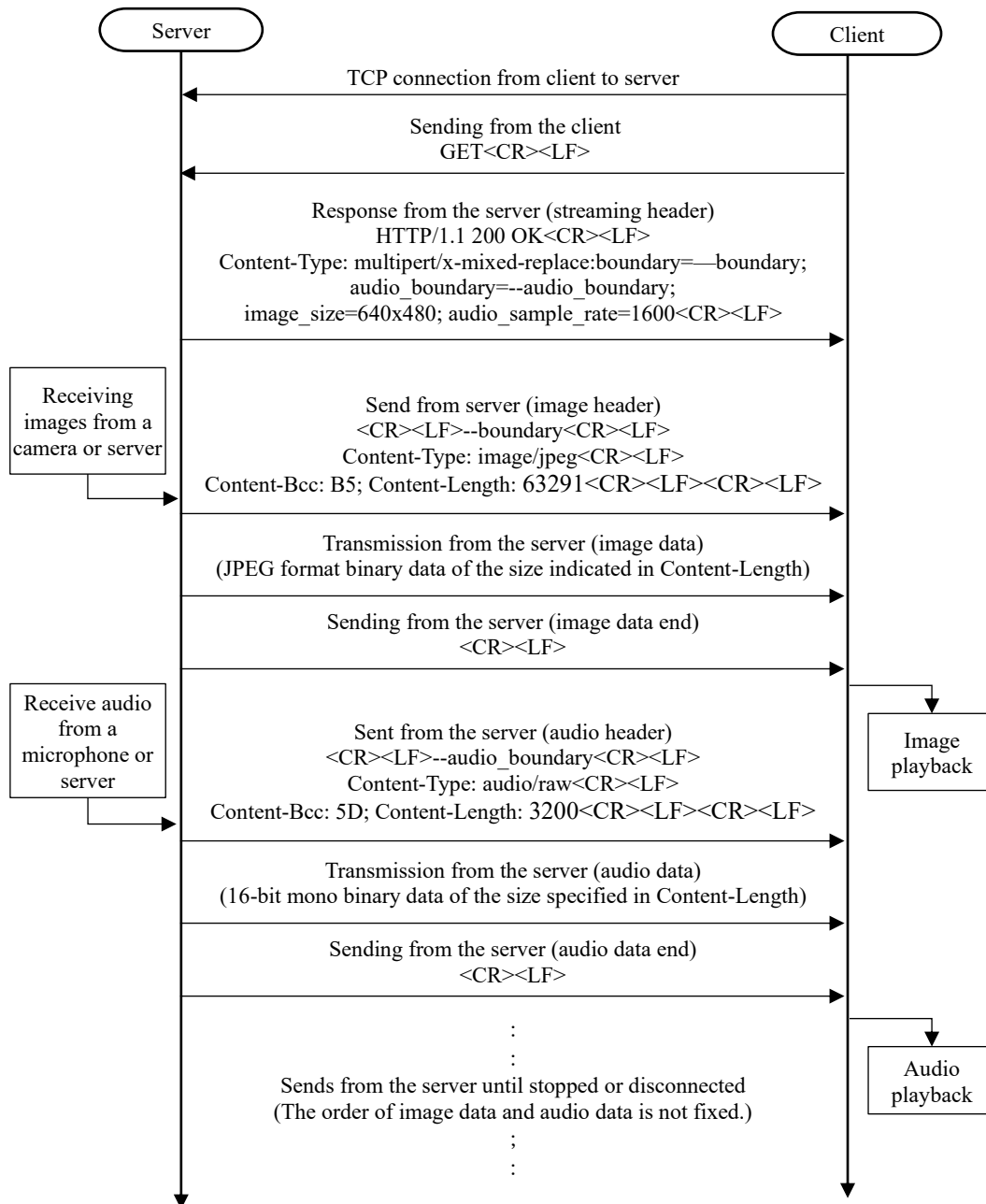
10 Streaming Formats

Video and audio are transmitted over a single TCP/IP port.

10.1 Streaming Sequences

The sequence for connecting from the client to the server and sending video and audio from the server to the client is as follows:

(The <CR><LF> below represent the line break codes 0x0d and 0x0a in hexadecimal.)



10.2 Incoming requests from clients

When a client connects to a server, it sends the following receive request to the server and waits for a response:

GET<CR><LF>

10.3 Streaming Headers

Upon receiving an incoming request from a client, the server sends the following message to the client:

- When audio data is included, image size is 640x480, and audio sample rate is 16000Hz.

(The second line is wrapped for page convenience, but it is actually one line.)

```
HTTP/1.1 200 OK<CR><LF>
```

```
Content-Type: multipart/x-mixed-replace; boundary=--boundary; audio_boundary=--audio_boundary;  
image_size=640x480; audio_sample_rate=16000<CR><LF>
```

- When the image size is 640x480 without audio data

(The second line is wrapped for page size, but it is actually one line.)

```
HTTP/1.1 200 OK<CR><LF>
```

```
Content-Type: multipart/x-mixed-replace; boundary=--boundary; audio_boundary=--audio_boundary;  
image_size=640x480<CR><LF>
```

10.4 Image Data

When the server receives an image from a camera or another server, it sends the image data in the following format:

```
<CR><LF>
```

```
--boundary<CR><LF>
```

```
Content-Type: image/jpeg<CR><LF>
```

```
Content-Bcc: F5; Content-Length: 63291<CR><LF>
```

```
<CR><LF>
```

Image data (jpeg format data of the size specified by Content-Length is sent in binary format)

```
<CR><LF>
```

The image data checksum is the F5 part of Content-Bcc: F5, which is the value obtained by XORing the image data byte by byte from the beginning to the end.

When the client receives the --boundary line, it determines that this is the start of the image data and continues to receive the data that follows in order. After receiving the image data length and checksum, it imports the image data after the blank line, calculates the checksum, and if they match, converts the image data into an image and imports it.

If the checksum calculation does not match, it is discarded.

10.5 Audio Data

When the server receives audio data from a microphone or another server, it sends the audio data in the following format:

<CR><LF>

--audio_boundary<CR><LF>

Content-Type: audio/raw<CR><LF>

Content-Bcc: B4; Content-Length: 3200<CR><LF>

<CR><LF>

Audio data (16-bit audio data of the size specified by Content-Length is sent in binary format)

<CR><LF>

The audio data checksum is the B4 part of Content-Bcc: B4, which is the value obtained by XORing the audio data byte by byte from the beginning to the end.

When the client receives the --audio_boundary line, it determines that this is the start of audio data and receives the data that follows in order. After receiving the audio data length and checksum, it takes in the audio data after the blank line, calculates the checksum, and if it matches, takes in the audio data.

If the checksum calculation does not match, it discards it as noise.

11 Configuration file(VCapStream.ini)

A settings file named VCapStream.ini is automatically generated.

The VCapStream.ini file attempts to save it in the folder where the application is installed, but if the application is installed in a system-protected folder such as "C:\Program Files" or "C:\Program Files (x86)", the file cannot be written to by the application, so VCapStream.ini is saved in the application settings folder.

In most cases, it is created in the folder indicated by the following path:

•C:\ProgramData\GUSUKU\VCapStream

The items in VCapStream.ini are explained below.

[SETTING]

CONNECT_TYPE=0

CAMERA_NAME=Logi C270 HD WebCam

FRAME_WIDTH=640

FRAME_HEIGHT=480

FRAME_RATE=15

AUDIO_INPUT_ENABLE=True

AUDIO_INPUT_NAME=Microphone (Logi C270 HD WebCam)

AUDIO_SAMPLE_RATE=16000

SERVER_NAME=192.168.1.26

SERVER_PORT=8080

VIDEO_DIR=D:\Data

VIDEO_FILE_NAME = Capture

REC_FRAME_COUNT=0

SNAPSHOT_DIR=D:\Data

SNAPSHOT_FILE_NAME=snapshot

LISTEN_PORT=8080

AUDIO_OUTPUT_NAME=Speaker (USB Speaker)

Settings section

Destination 0=Camera 1=Server

The name of the last connected camera

Frame size (width)

Frame size (vertical)

frame rate (fps)

Microphone input availability

(True=yes, False=no)

Microphone device name

Audio sampling rate

The host name/IP address of the last connected server

TCP port number of the last connected server

Path to the folder where video files are saved

video file name

Maximum number of frames to save

(0 = no limit)

Path to the snapshot storage folder

Snapshot save file name

TCP port number to listen on when the server is running

Audio output (speaker) device name

12 [Update history]

Ver.1.00 2026/ 01/13

- Initial Release

Ver.1.01 2026/01/31

- Added a checksum to the transferred data.
- If FFmpeg is installed, it will launch ffmpeg as an external program to combine the audio and video and save them into a single file.
- Fixed a bug where audio from the server could not be saved to the video file.
- Added audio input sample rate setting.
- Added streaming header items (image size, audio sample rate, etc.).

13 [Acknowledgments]

We would like to thank the following people who provided us with the NuGet packages used in this program.

- Accord.Video.DirectShow Created by: Accord.NET

Used for capturing images from the camera, obtaining camera information, camera settings, etc.

- Accord.Video.FFMPEG Created by: Accord.NET

Used for saving and playing video files.

- NAudio Created by: Mark Heath & Contributors

Used for audio input from the microphone, audio output to speakers, and for saving and playing audio files.

If FFmpeg is installed, this program will combine audio and video when saving a video file to create a video file with audio (mp4).

Thank you for providing these useful libraries.

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