

Calumino CaliVision

User Manual

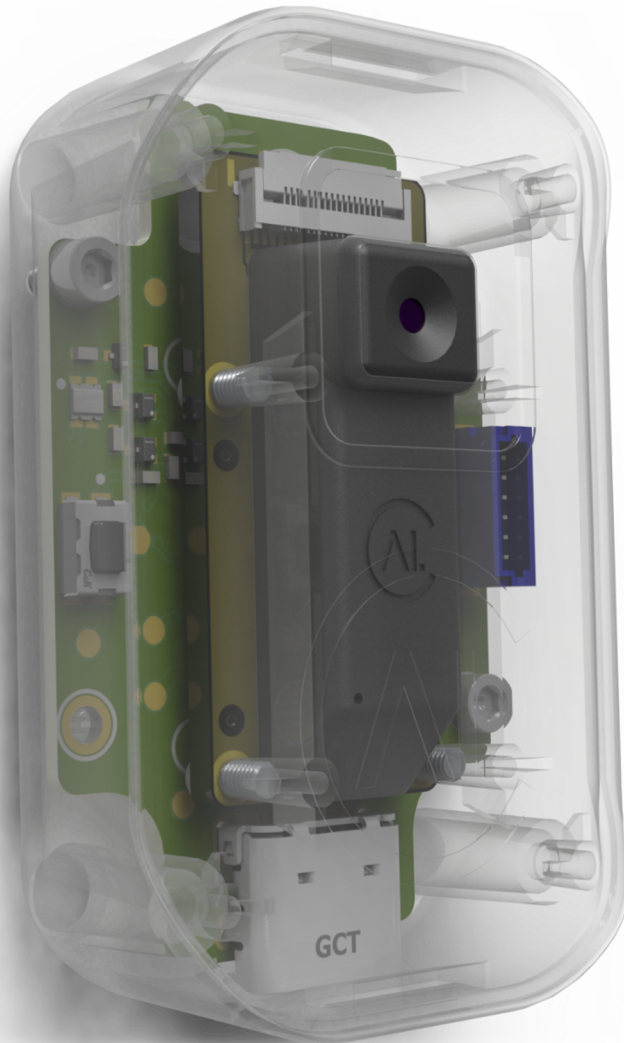


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Introduction

Calumino's CaliVision application enables users to visualize real-time thermal imagery from CTS sensors via the EVK, evaluate people-counting accuracy with CV overlay, and configure application-specific features.

CaliVision enables users to:

- Visualize real-time thermal imagery from CTS sensors via the EVK.
- Evaluate people-counting accuracy with CV overlay.
- Update the firmware binary on the EVK.

Future updates to the application will enable the following:

- Configure and test application-specific features: door counting, occupancy zones, exclusion zones, and regions of interest (ROI) for industrial monitoring.
- Record and play back sensor data for offline analysis.
- Export time-series data for integration with external tools.

Handling Instructions

The thermal sensor incorporates precision-engineered cantilevered mirrors. While the sensor is designed to withstand standard handling, care should be taken to avoid excessive shock or impact, which may affect its operational integrity. To ensure the device maintains its calibration accuracy and continues performing optimally, ensure it is handled with care.

1 Quick Setup Guide

The steps below can be followed to get the EVK up and running.

1. Navigate to the SharePoint link provided by the Calumino team and download the latest version of the CaliVision application.
2. Unzip/extract the downloaded folder
3. Double-click on the CaliVision executable.
4. Connect your EVK to the computer.
5. Locate and press the 'Connect' button on the left of the window.

2 Basic Operation

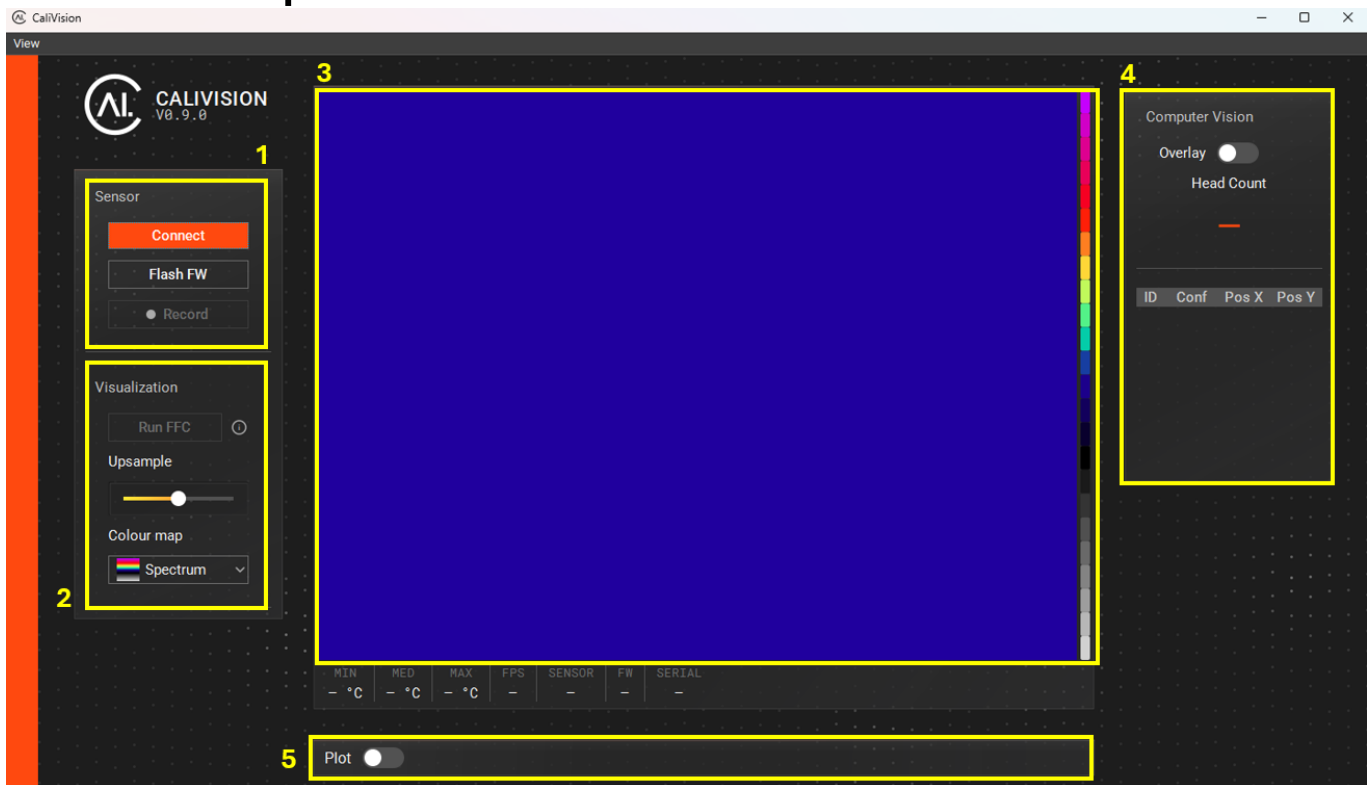


Figure 1 - CaliVision (No sensor Connected)

The CaliVision application is conveniently broken up into a few main sections.

1. Sensor operations, including connecting, disconnecting, updating firmware and recording.
2. Visualisation settings, including updating the background reference image (FFC), upsampling the thermal image, and changing the colour map.
3. The Thermal visualisation
4. Computer Vision (CV) information, including the option to overlay the detections on the thermal visualisation, the total number of people detected in the field of view (FoV)
5. Optional plotting, Headcount or Temperatures seen in the FoV (Minimum, Median, Maximum).

2.1 Sensor Operations

Connecting/Disconnecting

A device can be connected and disconnected from the application via the “Connect/Disconnect” button. A device must be connected to before the visualization will begin.

Flashing Firmware

The firmware running on the hardware can be updated using the “Flash FW” button.

Once pressed, a file explorer window will appear, allowing the user to select the firmware binary from their system. Once selected, the flashing button will transition to a progress bar, allowing the user to monitor the flashing process. **Ensure only officially distributed Calumino binaries are flashed.**

Recording

The CaliVision application includes the ability to record sensor data for future playback.

The following data is included in the .h5 file:

- Thermal stream (8.6 frames per second), frame IDs and Timestamps
- Computer Vision Data
 - Frame IDs
 - Headcounts
 - Confidence Levels
 - Entity information such as location and velocity.
- Calibration information
- Sensor metadata, such as device serial number, firmware version, calibration date etc.

2.2 Visualisation Settings

Flat Field Correction (FFC)

An FFC is a quick calibration step that helps your sensor produce a cleaner, more accurate thermal image. Over time and with changes in ambient conditions, small variations can develop between individual pixels, which may appear as faint patterns or uneven backgrounds in the image. Running an FFC allows the system to reset its baseline using a uniform scene, ensuring that the background looks even and that real temperature differences stand out clearly. This improves image quality, temperature consistency, and the reliability of any analytics that rely on the thermal data.

An FFC can be performed by placing a flat object, uniform in temperature and material in front of the sensor, at a distance of approximately 5mm (ensuring the entire FOV is covered) and pressing the 'Run FFC' button.

Upsampling

The thermal visualisation can be upsampled either two or four times using the slider.

Thermal image upsampling is a visual enhancement that makes the thermal image appear smoother and easier to interpret by increasing the number of displayed pixels using interpolation. It works by estimating intermediate values between the sensor's original pixels, which can improve perceived clarity and make shapes or temperature patterns easier to see. Importantly, upsampling does not increase the true resolution of the sensor or reveal additional thermal detail. The underlying thermal data and accuracy remain unchanged. Upsampling only affects how the image is displayed to the user.

Colour Map

The thermal visualisation can be displayed in multiple colour maps, selectable via the drop-down menu. Spectrum is the default, however, Turbo can also be used.

2.3 Thermal Visualisation

The main element of the application is the thermal visualisation, which is in the centre.

2.4 Computer Vision Information

Overlay

The 'Overlay' toggle allows the user to enable the CV outputs (People counting locations) onto the thermal visualisation. People are marked with a small crosshair.

Headcount

The headcount indicates the total number of people detected in the FOV by the computer vision algorithm.

ID

Each detected person in the scene is allocated an ID. This is simply to track each thermal blob whilst in the scene. As there is no way to identify the identity of a person, if a person leaves the FOV and then returns, there is no guarantee that they will receive the same ID.

Confidence (Conf)

The conf column indicates the level of confidence the CV has in its identification of a human within the FoV.

Position (PosX and PosY)

The position of each tracked ID is also displayed to the user. This is a value between 0 and 1, with 0.5, 0.5 being the centre of the FoV.

2.5 Plotting

There are two options for plotting: Headcount and Temperature

Headcount

When the plot is enabled with the toggle, and the drop-down menu is set to 'Head Count', the plot will display a time series plot of the head count within the FoV.



Figure 2 - Time series plot of Head Count

Temperature

When the plot is enabled with the toggle, and the drop-down menu is set to 'Global Temperature', the plot will display a time series plot of the maximum, minimum and median pixel temperature within the FoV.

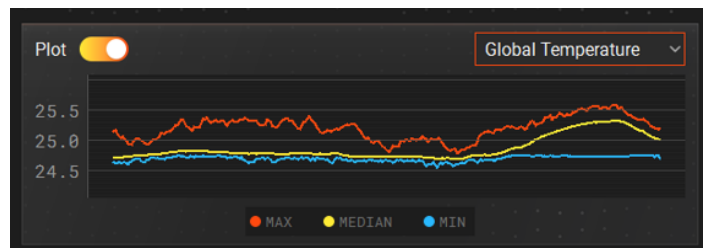


Figure 3 - Time series plot of Global Temperature

3 Troubleshooting Guide

Software Pre-requisites:

Calumino CaliVision and EVK are designed only to be operated with **Windows 11** operating systems.

The following are general recommendations for using the EVK connected to a Windows PC/laptop:

- If the application is installed on a laptop, please ensure that the computer remains plugged into power throughout the entire time you are using the application.

3.1 I am having issues connecting to the device

Possible cause: The correct device driver is not yet installed.

Solution: Download the drive from the “Drivers.zip” folder from the SharePoint. Once downloaded, extract the contents. Right click on the ‘ftdibus.inf’ file and select install. Repeat this procedure for ‘ftdiport.inf’. Restart your computer and attempt to connect to the device through the visualisation application again.

4 Revision History

Table 1- Document Revision Details

Revision	Date	Change
00	TBD	Initial release