

Calibrating a camera connected to your computer source

This is a brief step-by-step tutorial on how to quickly calibrate a camera connected to your PC either through USB or some video capture card. It assumes that the camera is correctly connected to your computer and is functioning properly using DirectShow drivers (these should be shipped with your camera/capture card).

NOTE: You will need to close all other applications, which use your camera before trying to connect to the device though the calibration application or it will not be possible to initialize a connection to the device.

Step 1 – Start the application

Start the camera calibration application by double clicking the executable file. The application window should look something like **Figure 1a**.

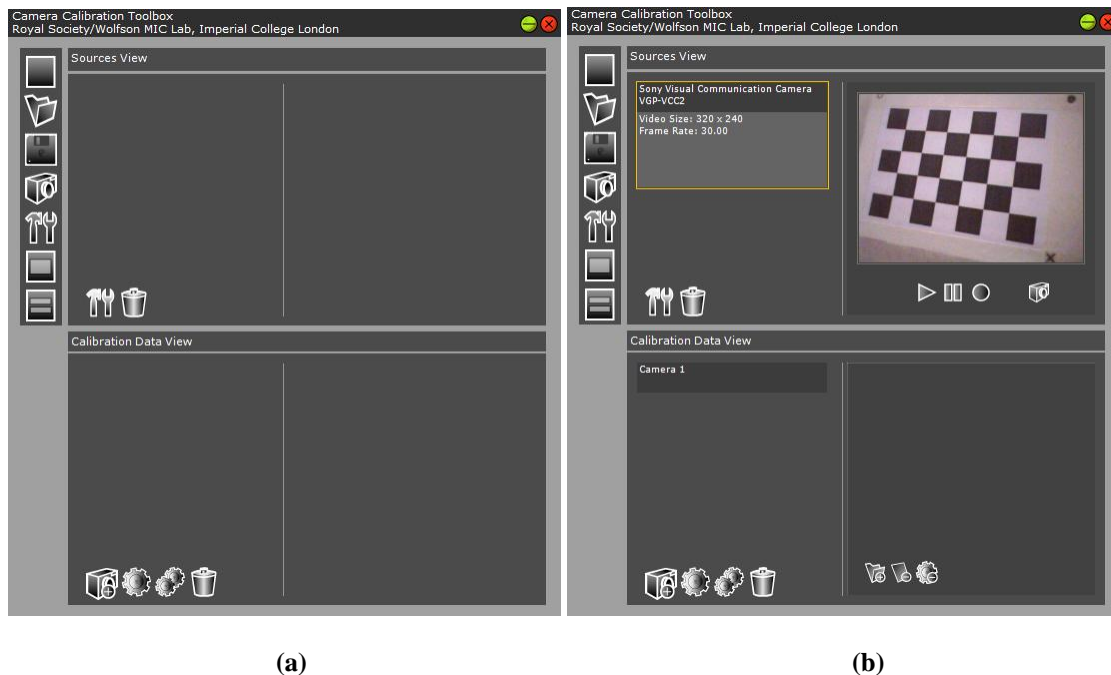


Figure 1. (a) Main application window (b) A selected live video source and preview.

Step 2 – Connect to the video source

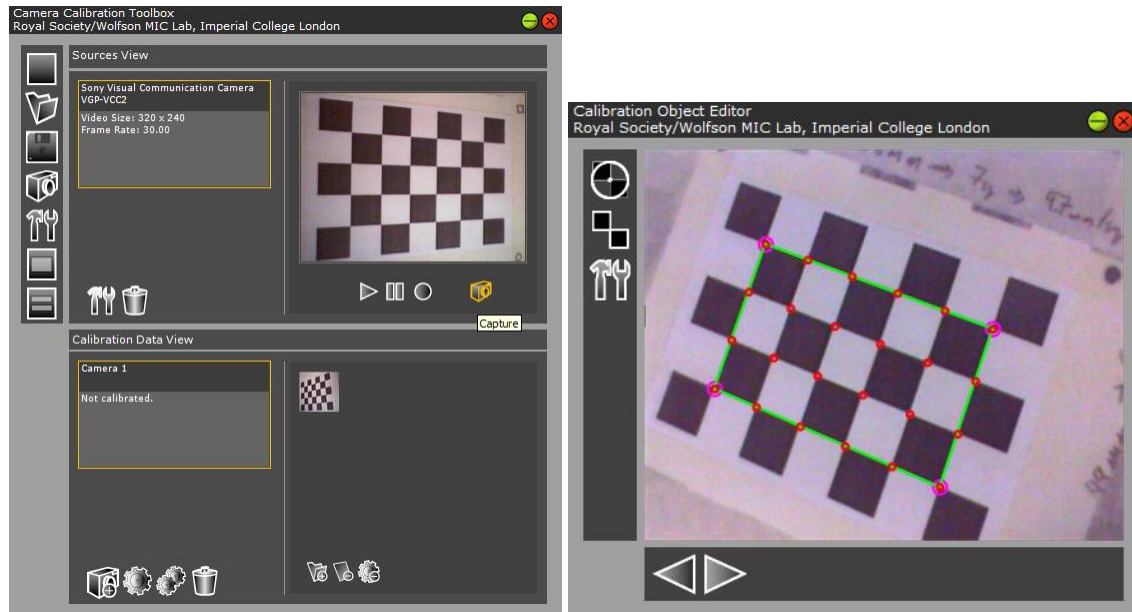
Click on the camera icon in the main application toolbar. This will bring up a dialog box listing all video capture sources available on your system. Select the source you wish and click OK.

In the Sources View area a panel with the device name should be visible and in the Calibration Data View area a new camera will have been inserted. You can select/activate the source by clicking on its name panel as shown in **Figure 1b** and this will make a preview window with a number of control buttons appear beside the source. The camera active in the Calibration Data View can be selected in the same manner.

NOTE: Video source drivers may support several different video formats. You can click the settings icon below the source list to access some of these settings though the property page of the driver (the only setting of importance is the video dimensions as all images are forced to RGB24 colour format by the software). This topic will not be covered in more detail in a separate documentation file.

Step 3 – Capture calibration images

With a camera and a source selected you may capture some images of your calibration object to use for calibration. To do this simply position the object in the view of the camera and click the capture icon in the camera controls (below the video preview window). The captured images will appear as small icons in a control beside the camera in the Calibration Data View screen as shown in **Figure 2a**.



(a)

(b)

Figure 2. (a) Captured some calibration images (b) Calibration object detection after clicking on the four border corners.

Step 4 – Detect object points

By double clicking on any of the captured image icons you will bring up a dialog for detection of the calibration object points. Click on the Settings icon in the dialog to set the object properties, such as number of squares and square size (in mm) and click OK.

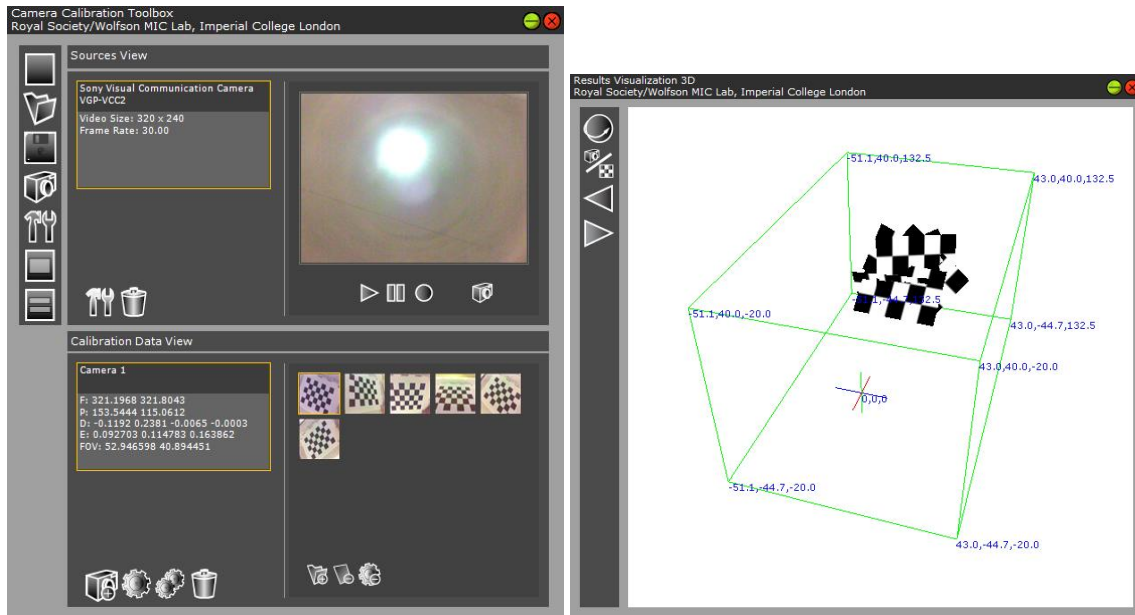
Now click the select points button at the top of the toolbar, this will change the cursor to a target picker. Click on the four extreme corners of your calibration object in clockwise order (for each view of the object the order in which you click the four corners must be the same). When you click on the final corner the application will automatically estimate the position of points in the grid.

Repeat the process for all images. To navigate through all the calibration images you have collected use the buttons at the bottom toolbar of the Object Editor dialog.

NOTE: You do not need to be very accurate with the selection of corner points as the application automatically tries to find the best corner with sub-pixel accuracy, however, by clicking close to the actual corner you will get better convergence.

Step 4 – Calibrate

Once all the calibration points have been detected in each image you can Click the Calibrate button in the toolbar below the camera panel in the main application window. This will execute the calibration algorithm using the current settings (Optimizer tolerances, active images, active camera parameters) and then show the results as text under the camera panel and display a 3D view of the camera and object relationship as shown in **Figure 3**. You may then save the results by using the workspace save button in the main toolbar.



(a)

(b)

Figure 3. (a) Calibrated camera view with intrinsic parameters in the camera panel (b) 3D view of the relationship between the camera and the calibration object.