Calibration App

This document describes the usage of the Calibration native application of Accuware Inc.

The Calibration App is a complete command-line program allowing to perform advanced camera calibration and is available for Linux (Ubuntu) and macOS. It is meant to be used when the [Accuware Dragonfly Web Application](#) appears to be too limited for the user camera or accuracy requirements.

This application is well suited for the calibration of custom stereo cameras.

Requirements

- Ensure that the Dragonfly application is properly installed. Dragonfly dependencies are indeed required by the Calibration app. You can find [here](#) the instructions regarding the Dragonfly installation.
- Download and extract the Calibration app package available at [this link](#).
- Print the calibration pattern provided [here](#) and accurately measure the HDIST value **in meters**.

Run the Calibration App

- Open a Terminal
- Go to the directory associated to your system (`ubuntu` or `macos`) in the extracted Calibration App directory.
- Run the executable by typing `./CalibrationApp` . It should display the help and all the available options.

Camera opening examples

In every cases, be careful to provide the `--hdist` value **in meters**.

Monocular

```
./CalibrationApp --webcam 0 --width 640 --height 480 --hdist 0.182 --output my_file
```

Stereo camera

Single device (concatenated image) case:

```
./CalibrationApp --webcam 0 --width 640 --height 480 --split vertical --calib_left
left.json --calib_right right.json --hdist 0.182 --output stereo
```

Dual devices (separated cameras) case:

```
./CalibrationApp --webcam 1 --webcam_right 2 --calib_left left.json --calib_right
right.json --hdist 0.182 --output stereo
```

Commands

Here is the list of available actions when the camera is opened.

Command	Action
P	Take picture
ENTER	Calibrate
Q	Quit

How to calibrate

Here is a little explanation about how to properly calibrate a camera.

Good practices

- The pattern should remain flat. It is a good idea to stick it on a rigid board.
- Hold the pattern close to the camera. It should fill the camera frame as much as possible.
- The pictures taken should be as diversified as possible:
  - Translate and rotate the pattern between each picture along every axis.
  - Avoid taking two pictures of the pattern in the same position.
- Be patient and take the proper amount of pictures, depending on your use-case (see below).

Monocular calibration

In the monocular case, it is required to:

- Take at least 30 pictures before calibrating a standard camera.
- Take at least 50 pictures before calibrating a fisheye camera.

Usage example

```
./CalibrationApp --webcam 0 --width 640 --height 480 --hdist 0.182 --output my_file
```

Stereo calibration

The stereo calibration is tricky and longer to perform. It has to be very accurate, and it is highly recommended to follow the good practices described above.

First, it is required to perform a monocular calibration of the two cameras following the **Monocular calibration** instructions. Keep the two generated calibration files for the left and the right camera.

If you have a single device stereo camera with concatenated images, you can use the `--split` and `--select` options to calibrate each camera separately:

Usage example

```
./CalibrationApp --webcam 0 --width 640 --height 480 --split vertical --select left --hdist 0.182 --output left
./CalibrationApp --webcam 0 --width 640 --height 480 --split vertical --select right --hdist 0.182 --output right
```

Once the calibration file for both cameras is available, you can perform the stereo calibration by providing the two calibration files in option. At least 40 pictures are required.

Usage example

```
./CalibrationApp --webcam 0 --width 640 --height 480 --split vertical --calib_left left.json --calib_right right.json --hdist 0.182 --output stereo
```