



Qt Camera Manager

User guide



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2014 edition





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Pages 9 and 10 from Thomas Dubrulle

Pages 1 to 8 and 11 to 20 by Antonin Durey

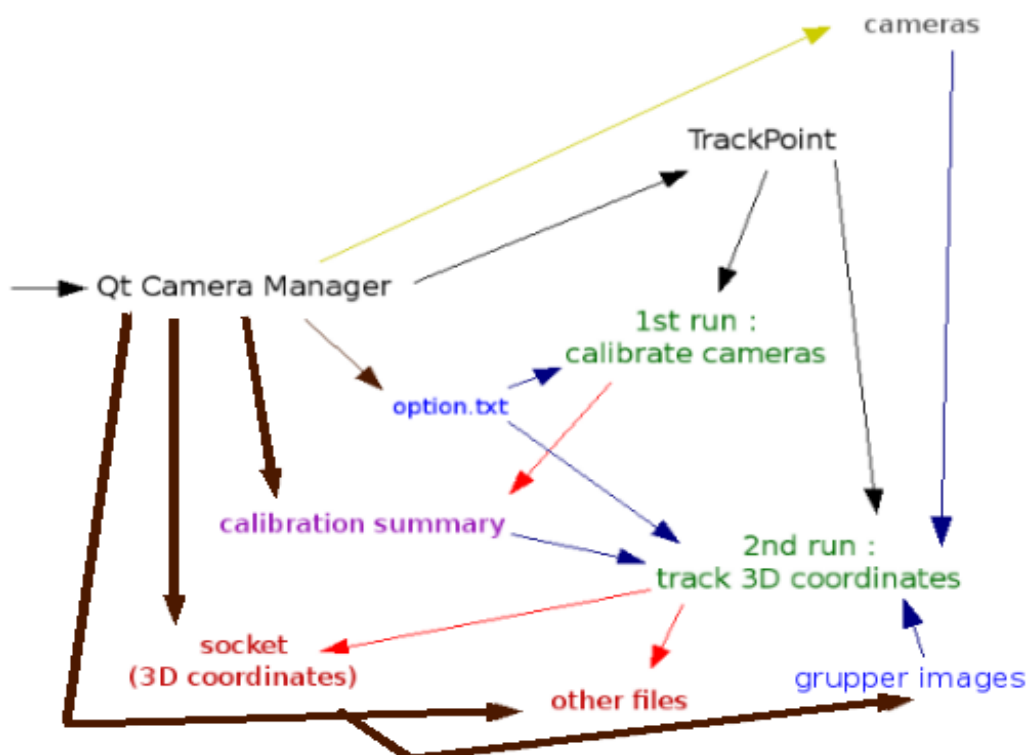
I) General explanations

Qt Camera Manager is a software to help camera configuration and 3D datas visualization. In fact, it works with TrackPoint, which is a 3D detections software.

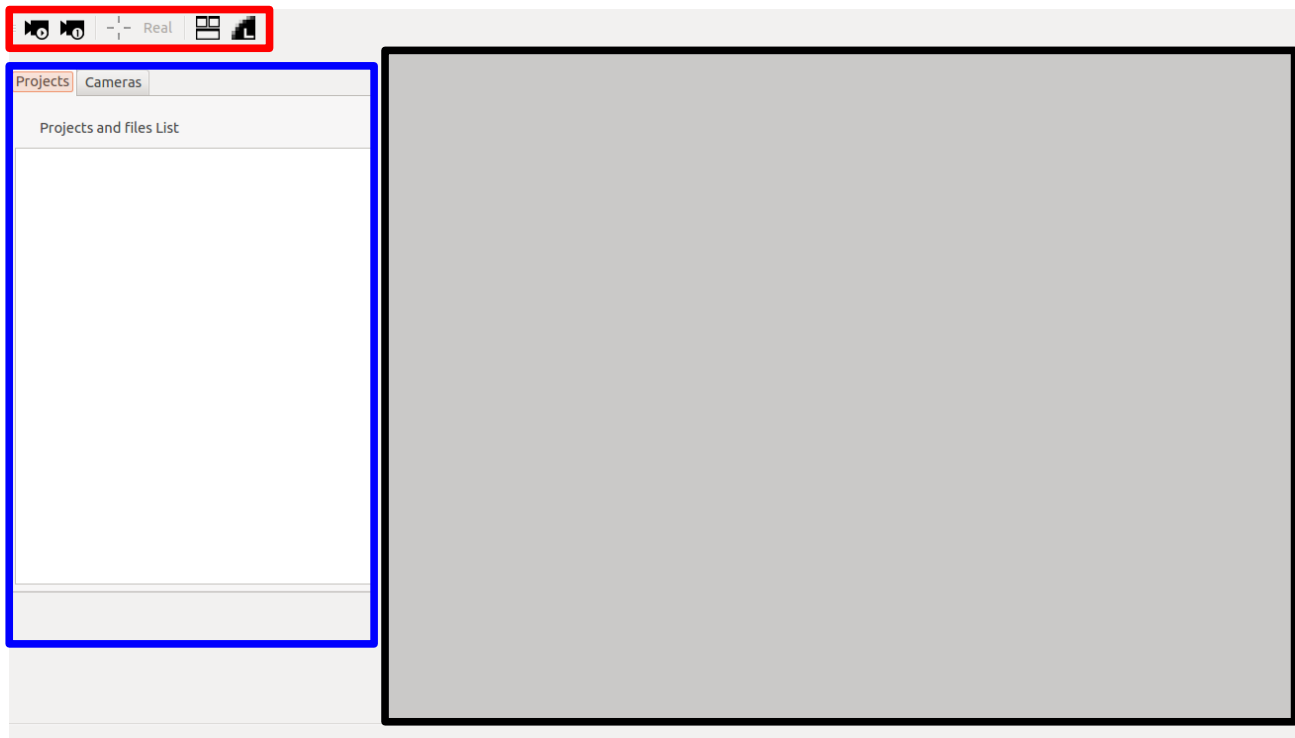
TrackPoint gets two type of runs :

- The first takes the option.txt file in input, calibrate the cameras, and show the calibration results in some files, which the main is calibration_summary.
- The second work with this file and the option.txt file. It takes images for the 3D detection either from the cameras, or from existing images named grupper images. The second run generates many files for each time, a resume of the coordinates which is the socket files and some others.

Before, there wasn't a graphical interface to show the coordinates, and the configuration had to be done manually. Qt Camera Manager allows you to check cameras and their properties, edit calibration files, and show the 3D datas in several views. Moreover, with it, you have access to a wizard and a text view that simplify the edition of the configuration file.



II) The main interface



The main interface is made of 3 parts :

- The red part is the toolbar. It provides actions for the visualisation of the images coming from cameras. Explained in details page 7
- The blue part is the tab part, called *Left Menu*, in the software. There are 2 tabs : the project tab and the camera tab. The project tab is the tab shown. It is only composed of a tree view. The camera tab is composed of a tree view and a table to show and change the camera parameters. The tab are respectively explained in pages 8 and 6
- The black part is the part where sub windows are. It can be subwindows for the cameras, the configuration files and more. Each sub window is described in its own part.

A fourth part can be counted. It is the menu bar, which is up the tool bar but not shown on the image. The menu bar provides actions with keyshorts to help using Qt Camera Manager. Each actions will be explained at the right moment in the user guide.

In order to see better the subwindows and their contents, you can hide the toolbar and the tab part. Use the menu bar (*Window*, then *Hide ToolBar* or *Hide Left Menu*) or perform the key combination *Ctrl+H*, *Ctrl+T* for the toolbar, or *Ctrl+H*, *Ctrl+M* for the left menu.

III) Camera interface

3.1) The camera tab

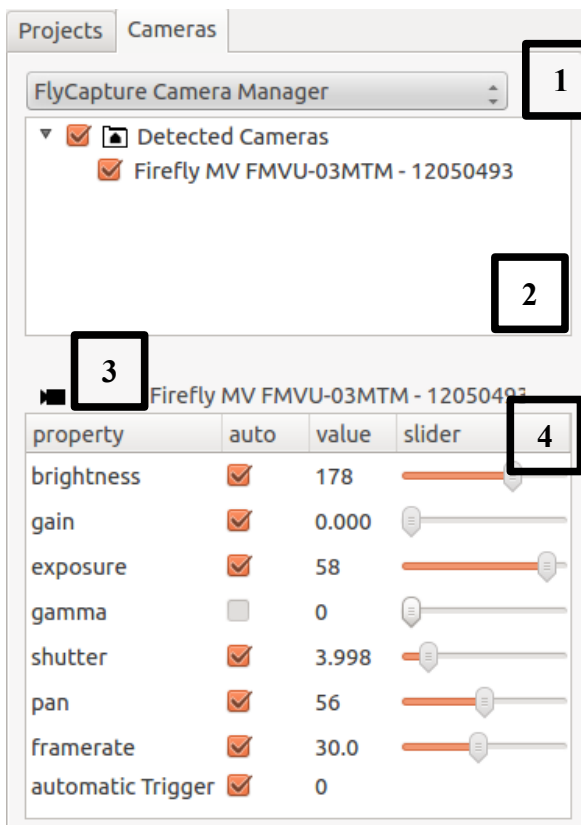


Illustration 1: Camera tab

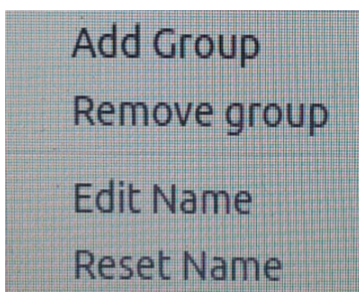


Illustration 2: menu from right click on camera tree

1 : This is the types of cameras you can choose. For the moment, there is only two choices : *FlyCapture Camera Manager* and *TestManager*. *FlyCapture Camera Manager* is the items where all the cameras you plug will be. *TestManager* is only test cameras with false images to test the buttons of the toolbar (see further).

2 : This is a tree where all the found cameras will be. For the *Test Manager* item, there are ten cameras.

For the *Fly Capture Camera Manager*, each time you plug or unplug a camera, the software will automatically detect it and update the tree.

To select a camera, just click on its name. If you want to watch the images coming from this camera, check the box left from its name, a sub window will appear on the right (see further).

Performing a right click on it will make popup a menu, which is shown on *Illustration 2*.

With it, you can *add* and *remove* a camera group. This can be very useful if you have several cameras and want to sort them by combination. You can also *edit* and *reset* the name of a camera.

3 : This is the name of the camera which is currently selected. if there is no camera selected, as shown, it is written *No Selection*.

4 : This is the table with the selected camera properties. The camera **MUST** be recording to have properties updated. Otherwise, it is properties values when the box is checked. There are four columns per property :

- the *property* name
- the *auto* box : if not checked, you can change the value by yourself. If checked, the value is automatically updated from the camera
- the *value* : the integer value of the parameter.
- the *slider* : to show the range of the value, and to change the value by yourself.

3.2) The toolbar



Illustration 3: Tool bar

This is the tool bar 'menu', at the top of the frame, just below the menu bar. It provides six actions. From left to right :

- *Live View* : start, or stop the live view. During the live view, the images into the sub windows and the checked properties are updated.
- *Update Image* : get one image coming from the camera, at the moment the action is performed.
- *Cross hair* : if *Live View* performed, draw x and y lines to locate better the point where the mouse is, and show its coordinates on the top left corner of the subwindow (see further)
- *Integer coordinates* : show coordinates with integers and not decimal numbers.
- *Mosaic view* : once clicked, all subwindows will be stretched to fill all the space. Very useful.
- *Quality* : Change the quality of the pictures. Consuming CPU, and almost no difference.

Reminder : the toolbar can be hidden to get more space, by using the menu bar (*Window*, then *Hide ToolBar*) or by performing the key combination *Ctrl+H*, *Ctrl+T* (*H* and *T* as Hide Toolbar).

3.3) Camera Sub Window



Illustration 4: Camera Sub Window, with live view and cross hair activated

To open a camera subwindow, check the box corresponding to the wanted camera. A subwindow will appear with the name of the camera as its title, here *Firefly MVFMVU...*

You can of course close it with the cross at the top right, but you cannot resize it. Use the mosaic action instead.

Once you launch the live view, you will see the images coming from the cameras, as shown. You can also see the lines drawn from the *Cross Hair* action, and the coordinates at the top left corner.

IV) Project interface

4.1) The project tab

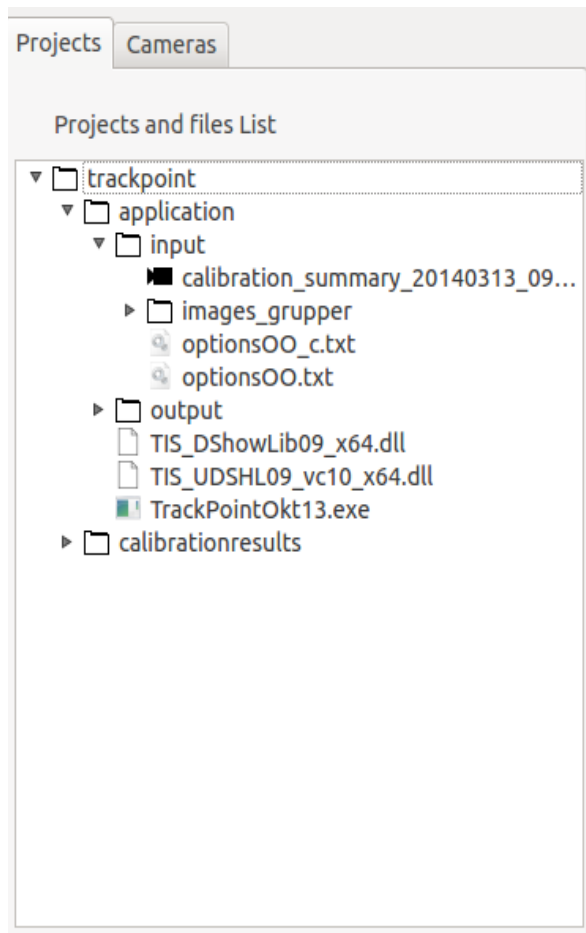


Illustration 5: project tree, with the trackpoint folder

The project tab is only made with a tree, called the project tree. The project tree is a tree to load your trackpoint project. In fact, you will only be able to load folders whose name contains 'trackpoint'. It can be the 'big' *trackpoint* folder with all the files, and the executable, but it can also be a folder you create (for example : *trackpoint record 5 June*) with some chosen files inside. This second option will not affect the way files are opened.

If you load the *trackpoint* folder.

On the Illustration 5 opposite, we can see the files, we can open with the software :

- the *calibration_summary*,
- every group of images, all contained in the *images_grupper* folder,
- the options file(s) (here, *optionsOO_c.txt* and *optionsOO.txt*)
- the socket file(s), located in the *output* folder, totally at the bottom of it.

All files and directories are sorted by alphabetical order (look for *calibration_summary* and *images_grupper* order). Be sure to look into the right folder at the right place to find what you are looking for.

4.2) Right click

Performing a right click on the project tree will make appear a menu with two actions :

- *Load project* : open a window for you to search and open your directories (see [Appendix 1 : Trackpoint FileDialog](#)).
- *Close project* : remove the selected project from the project tree.

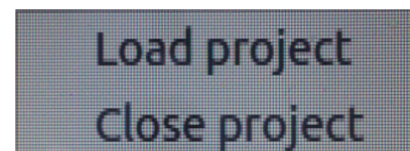
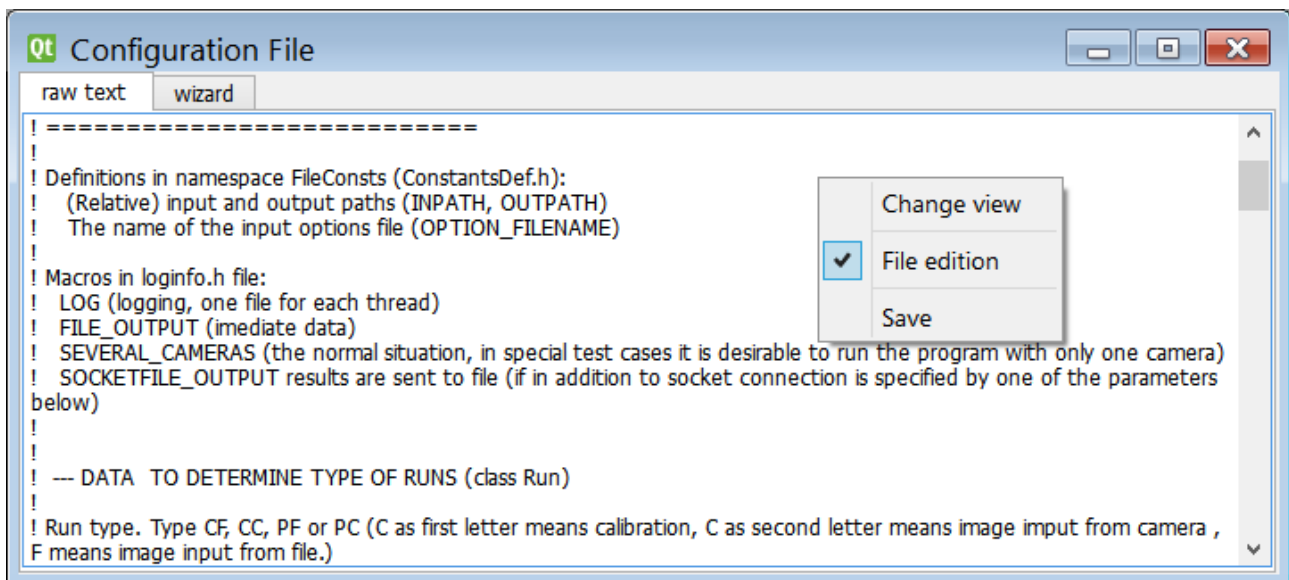


Illustration 6: menu from right click on project tree

V) The option file

When you open an file with “option” as its name, a new window will appear. It allows you to choose between two mode: the wizard mode and the raw text mode.

5.1) Raw text mode

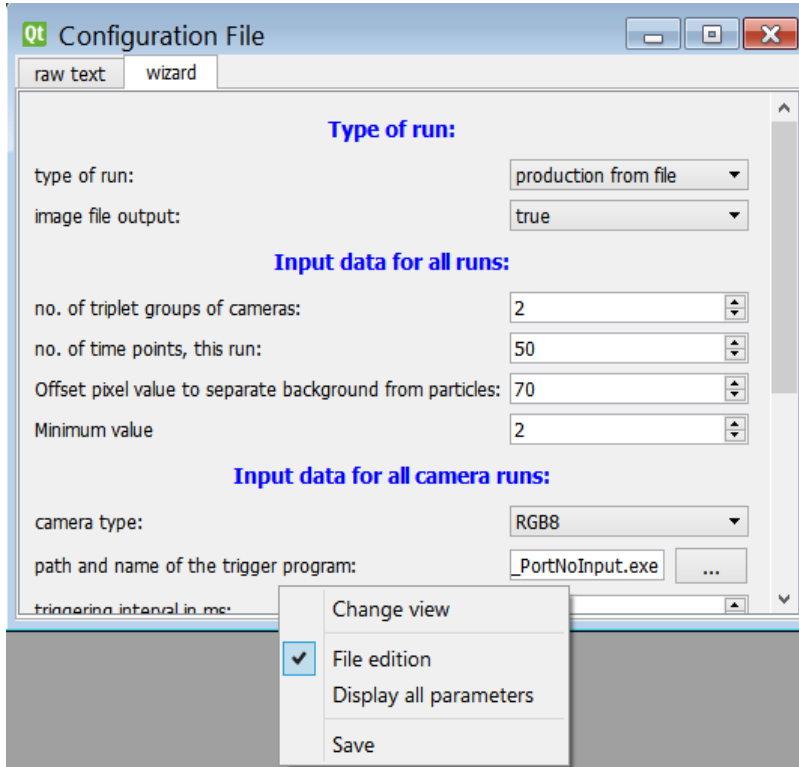


The raw text mode allows you to show you the file directly and modify it. You can use the right-click to open a menu to toggle the view between the wizard and the raw text, allow or prevent the file edition, or save the text.

Use this mode if you want to have a total control over the option file or if the structure of the file has changed significantly since the release of the software (June 2014) to the point that the wizard doesn't work properly anymore. It may be wise to use the wizard mode for other cases.

5.2) The Wizard mode

The wizard mode is composed of a list of fields you can edit. There are multiple types of fields, allowing you to edit the most important values of the configuration file. All of these values are limited to the type they normally are.



By performing a right click on the window, you can open a menu to switch view, allow or prevent file edition, to save the file and finally to display all parameters in the wizard.

Displaying all parameters in the wizard show all the parameters available in the configuration file. It may be used when you wish to access a parameter which is more rarely used. Be careful to respect its type when editing one of these, as no control will be provided.

It is possible to change manually what parameters will be seen in the wizard by modifying parameterList.txt. You can find more informations on how to do it in the aforementioned file.

VI) The calibration file

6.1) Main presentation

Groups: 1_2_5 0_3_4

Image input from file. Directory: input/images_grupper

Cam no. 0 has serial no. 10000
Cam no. 1 has serial no. 10001
Cam no. 2 has serial no. 10002
Cam no. 3 has serial no. 10003
Cam no. 4 has serial no. 10004
Cam no. 5 has serial no. 10005

Frame and wand type: ORIGINAL, with length: 74990 and coordinates:

pointNo	x	y	z
101	74997	1	1
102	19932	1	1
103	1	1	1
104	1	55012	1

SORTED - Camera combinations with 50

```
=====
1_2_3: NO CONVERGENCE - NEW IMAGES NEEDED
1_3_5: NO CONVERGENCE - NEW IMAGES NEEDED
2_3_5: NO CONVERGENCE - NEW IMAGES NEEDED
3_4_5: NO CONVERGENCE - NEW IMAGES NEEDED
1_2_5: 0.1432. Mean: 0.65, max: 0.88. No of frames used: 55
1_4_5: 0.1725. Mean: 0.63, max: 0.86. No of frames used: 55
1_2_4: 0.1829. Mean: 0.56, max: 0.71. No of frames used: 55
2_4_5: 0.1829. Mean: 0.56, max: 0.72. No of frames used: 55
2_3_4: 0.1859. Mean: 0.57, max: 0.72. No of frames used: 55
0_1_5: 0.1982. Mean: 0.76, max: 0.99. No of frames used: 55
0_2_3: 0.2003. Mean: 0.66, max: 0.84. No of frames used: 55
0_1_2: 0.2143. Mean: 1.21, max: 1.65. No of frames used: 55
0_2_5: 0.2178. Mean: 0.8, max: 1.06. No of frames used: 55
0_3_4: 0.227. Mean: 0.68, max: 0.81. No of frames used: 55
0_4_5: 0.2437. Mean: 0.71, max: 0.88. No of frames used: 55
0_1_4: 0.2453. Mean: 0.72, max: 0.89. No of frames used: 55
0_2_4: 0.2546. Mean: 0.74, max: 0.9. No of frames used: 55
1_3_4: 0.612. Mean: 2.29, max: 3.09. No of frames used: 55
0_1_3: 0.6877. Mean: 2.32, max: 2.93. No of frames used: 55
0_3_5: 0.7349. Mean: 2.41, max: 2.99. No of frames used: 55
```

Illustration 7: calibration_summary file

The *calibration_summary* file is a summary of all the calibrated combinations during the first run of Trackpoint. Let's cut this file into pieces to explain how it works.

1 : the *Groups* line : the combination which will be used for the second run are written there (here, 1_2_5 and 0_3_4). Can be changed (see further).

2 : the directory where the grupper images are.

3 : the camera lines, with their serial number

4 : Some informations useless for Qt Camera Manager

5 : The summary of each combination (Bold, Italic and Underline explained further). The lines with 'NO CONVERGENCE' are combination which cannot be used for the run. The lines are sorted with the parameter written at the 6 :. These lines can be sorted, changed, hidden to choose the best combination(s). See further to learn how to do it.

6.2) The text view

The text view is just a basic view of the calibration_summary file, with several options, reachable with right and left click

6.2.1) Right Click

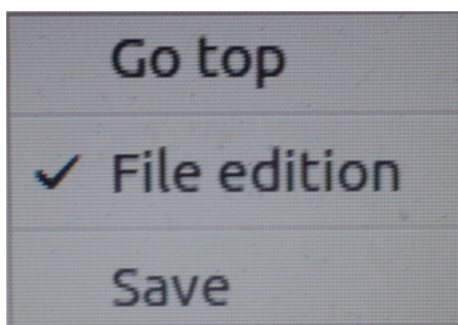


Illustration 8: menu from right click on text view

Performing a right click on the project tree will make appear a menu with two actions :

- *Go top* : bring you to the top of the file. Because of the file size, you can be very low in the file and this is a quick action to go to the main informations.
- *File edition* : allow or disallow file edition. The first time you open a *calibration_summary* file, the file edition will not be allowed. This is to avoid mistakes. You need to check this action to allow edition, and left click actions (see further). Here, the file edition is allowed.

- *Save* : save the file. Even if you perform actions or edit the file, the file is NEVER saved if you do not click on *Save*.

6.2.2) Left Click

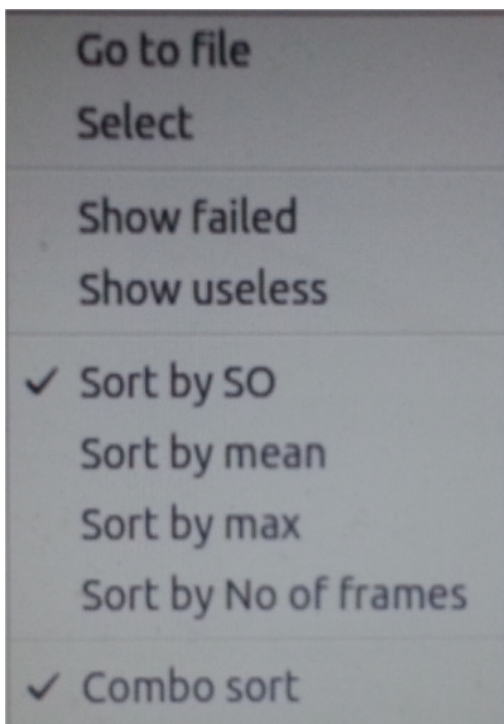


Illustration 9: menu from left click on text view

The left click only provides a menu if you are clicking on "summary lines" (see number 5 in *Illustration 7*).

The opposite menu will appear :

- *Go to file* : bring you to the selected combination calibration summary (see [Appendix 2 : Combination calibration summary](#)).
- *Select* : select the current line. Only available for lines which are not failed, or reversed line are not failed. Take back the *Illustration 7* from last page, you can only select the lines which are not underlined. Selecting a line will perform calculation to calculate the lines which are 'Useless'. For example, if you select 1_2_5 combination, all the combinations with the camera n°1, 2 or 5 would not be useful longer. Take back the *Illustration 7* from last page, the 'Useless' lines are the thin one. The selected lines are in bold. The only line which is not changed is the 0_3_4, which is the opposite from the 1_2_5



combination.

- *Show failed* : show, or hide the failed line ('Failed line' are lines with 'NO CONVERGENCE...') and their opposite. Take back the *Illustration 7* from last page, it is the underlined lines (for example : 1_2_3 and its reverse, 0_4_5). With this menu, the lines would not be shown.

- *Show useless* : show, or hide the useless lines. Take back the *Illustration 7* from last page, the 'Useless' lines are the thin one. With this menu, the lines would not be shown.

- *Sort by SO/mean/max/No of frames* : the parameter with which you sort the combination. Even if it is not written, the first parameter is always SO. We cannot guarantee the sorting if you show the failed line. In the *Illustration 7*, the lines are sorted by SO, according to the line at number 6.

- *Combo sort* : only available with 6 cameras. Take the lines with their opposite, calculate the sum of the parameter whose the sort must be, and sort the result. With the *Illustration 9*, the lines would be sort by SO, with their opposite.

1_2_5: 0.1432. Mean: 0.65, max: 0.88. No of frames used: 55
 0_3_4: 0.227. Mean: 0.68, max: 0.81. No of frames used: 55
 1_4_5: 0.1725. Mean: 0.63, max: 0.86. No of frames used: 55
 0_2_3: 0.2003. Mean: 0.66, max: 0.84. No of frames used: 55
 2_3_4: 0.1859. Mean: 0.57, max: 0.72. No of frames used: 55
 0_1_5: 0.1982. Mean: 0.76, max: 0.99. No of frames used: 55
 0_2_5: 0.2178. Mean: 0.8, max: 1.06. No of frames used: 55
 1_3_4: 0.612. Mean: 2.29, max: 3.09. No of frames used: 55
 2_4_5: 0.1829. Mean: 0.56, max: 0.72. No of frames used: 55
 0_1_3: 0.6877. Mean: 2.32, max: 2.93. No of frames used: 55
 1_2_4: 0.1829. Mean: 0.56, max: 0.71. No of frames used: 55
 0_3_5: 0.7349. Mean: 2.41, max: 2.99. No of frames used: 55

Illustration 10: combo SO sort

Here, you can watch the SO combo sort. 1_2_5 and 0_3_4 SO parameter sum is 0.3702, which is the lowest, then come 1_4_5 and 0_2_3 with 0.3728, 2_3_4 and 0_1_5 with 0.3841....

Except, *Go to file*, all the left click actions are disabled while file edition is disabled. You will probably allow *File edition*, watch the lines, especially the failed ones and hide them. Only at that moment, you will be able to sort the lines as you want.

You can also click with the left button of the mouse on a path line of a combination calibration file (see below *Illustration 11*). Left click will make appear a menu with a simple action : *Change View*. Clicking on it will change the view (what a surprise !) from text view to table view

C:\CalpointAndroid\calibration_20140313_095422\calibration_comb_0_1_2.dat

Illustration 11: path line of a combination calibration file, with the combination 0_1_2

6.3) The table view

Camno 0 Serial n° 10000	XO:	1550.54	AL:	0.684638	C:	1279.48
	YO:	-2332.08	BE:	0.898275	C std.dev.:	8.1341
	ZO:	1508.39	KA:	0.841765	XH:	-31.521
					XH std.dev.:	45.1389
Camno 1 Serial n° 10001	XO:	-185.09	AL:	-0.5526	C:	1289.68
	YO:	-2628.77	BE:	1.05218	C std.dev.:	4.1526
	ZO:	1564.74	KA:	-0.628272	XH:	5.453
					XH std.dev.:	43.2691
Camno 2 Serial n° 10002	XO:	992.32	AL:	0.369744	C:	1283.53
	YO:	-2537.91	BE:	1.05011	C std.dev.:	5.9079
	ZO:	1508.58	KA:	0.288719	XH:	-7.246
					XH std.dev.:	44.935

Illustration 12: Table View of the combination 0_1_2

The table view is a better way to show the different parameters of each cameras in the combination. It does not show the generic parameters (SO, mean, max, and No of frames).

On the left, there is a graphical component which you can read which cameras are, their number and serial number.

On the right, the graphical component sum up all the parameters, and their value, for each cameras.

There are many parameters (around 27), and all of them cannot be shown at the same time in the screen. However, a scrollbar (not shown on the illustration) at the bottom allows you to scroll to the left or to the right part of graphical component. The left graphical component does not move, which is to better see which parameters and which values belong to which camera.

VII) The socket file

7.1) What is the socket file

The socket file is the file where all the coordinates, for each camera and at each moment, are. The file is named : *socket_yearmonthday_hourminutesecond*, with ,of course, year, month, day, hour, minute and second the current information when the file was created. See *Illustration 13* below if you do not know/remember this file.

7.2) The text view

The text view is just a basic view of the *socket* file. This view is not practical because the coordinates at one time take 2 lines, so it is really not easy to read and know which camera is it, which axis and which time. Right clicking will make appear a menu with a single option : *Change View*, which will pass from text view to table view.

-0.185917	-0.164009	-0.00831997		0.192266	549.984	-0.052614	69.9583	532.534	193.009
749.726	-0.219481	0.127076	817.574	538.891	246.729				
-0.195781	-0.170445	-0.00364489		0.197877	549.96	-0.0270923	88.1552	579.037	167.187
749.727	-0.222685	0.132068	830.003	546.326	271.398				
-0.168379	-0.181439	0.00403711		0.231661	549.969	-0.0372513	100.068	571.355	154.261
749.706	-0.217593	0.117403	835.204	523.349	293.536				
-0.189889	-0.181277	0.00414504		0.218464	549.997	-0.053432	102.045	496.655	157.975
749.702	-0.217691	0.117093	832.947	448.91	318.863				

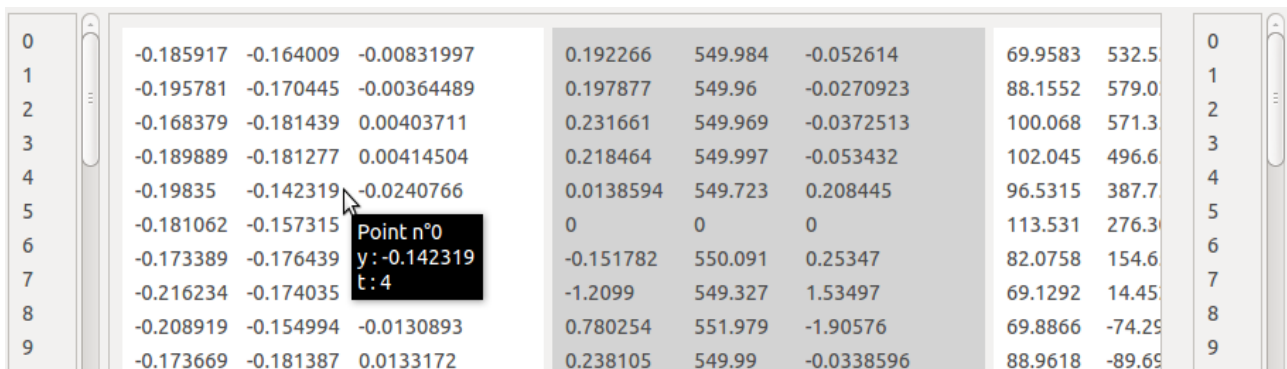
Illustration 13: text view. Each time takes 2 lines, really not practical

7.3) The table view

7.3.1) Presentation

The table view is a view which allows you to easily watch the coordinates. It is composed of 3 graphical components :

- the left and right component are the time axis.
- the central component is a table. one line per time, and 3 columns for a point (for the x, y and z axis respectively). The points have a background (white or grey) to easily make the difference between them. When you scroll up/down, the time and the central area will automatically scroll together.



0	-0.185917	-0.164009	-0.00831997	0.192266	549.984	-0.052614	69.9583	532.5	0
1	-0.195781	-0.170445	-0.00364489	0.197877	549.96	-0.0270923	88.1552	579.0	1
2	-0.168379	-0.181439	0.00403711	0.231661	549.969	-0.0372513	100.068	571.3	2
3	-0.189889	-0.181277	0.00414504	0.218464	549.997	-0.053432	102.045	496.6	3
4	-0.19835	-0.142319	-0.0240766	0.0138594	549.723	0.208445	96.5315	387.7	4
5	-0.181062	-0.157315		0	0	0	113.531	276.3	5
6	-0.173389	-0.176439		-0.151782	550.091	0.25347	82.0758	154.6	6
7	-0.216234	-0.174035		-1.2099	549.327	1.53497	69.1292	14.45	7
8	-0.208919	-0.154994	-0.0130893	0.780254	551.979	-1.90576	69.8866	-74.25	8
9	-0.173669	-0.181387	0.0133172	0.238105	549.99	-0.0338596	88.9618	-89.65	9

Illustration 14: socket table view, with point number, axis, value and time

When you move your mouse over a coordinate, a tooltip appears, informing you what point is it, the axis, the value and the time of the coordinate. On the Illustration 14 below, the mouse is on the cell line 4 column 2: it is the point n°0, axis is y, value is -0.142319 and time is 4.

7.3.2) Right click

Performing a right click on it will open a menu with the following actions :

- *Change view* : change the view from table view to 3D view.
- Point n°0/1/2... : there are as many items as points. These items are checkable. If the item is checked, the point is shown. If not, the point is hidden. This can be very useful if you are interested in some points only. In the opposite illustration, all the points are shown.

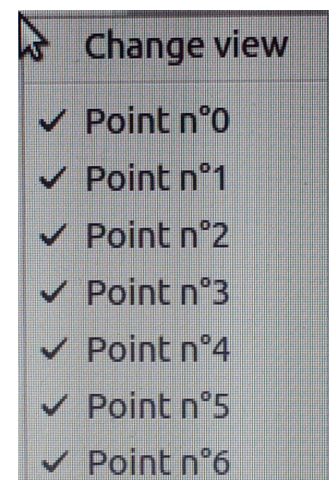


Illustration 15: right click on calibration table view

VIII) The grupper images

The grupper images are the images with the one you can make the second trackpoint run with. See [Appendix 3 : Grupper image](#) if you do not know/remember what is it.

Clicking on a point will make appear a tooltip with the point information : from which camera is it, which point is it, and its coordinates on the image.

In the image below, the point is taken from Camera n°0, it is Point n°5, x coordinate is 806 and y coordinate is 402.

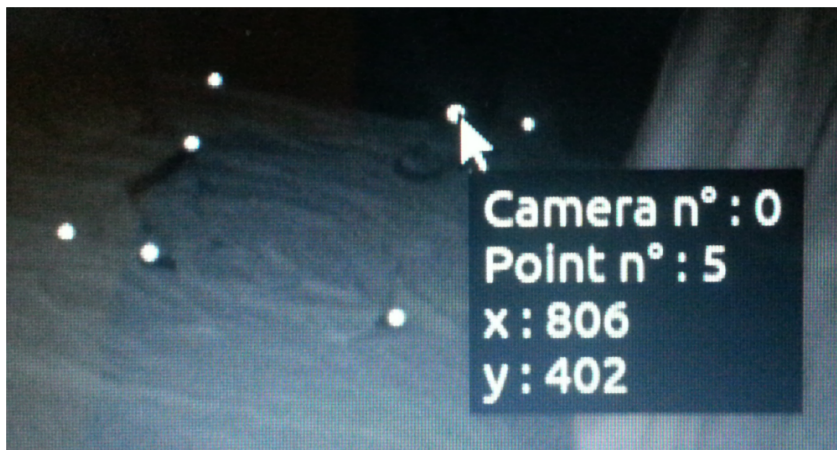
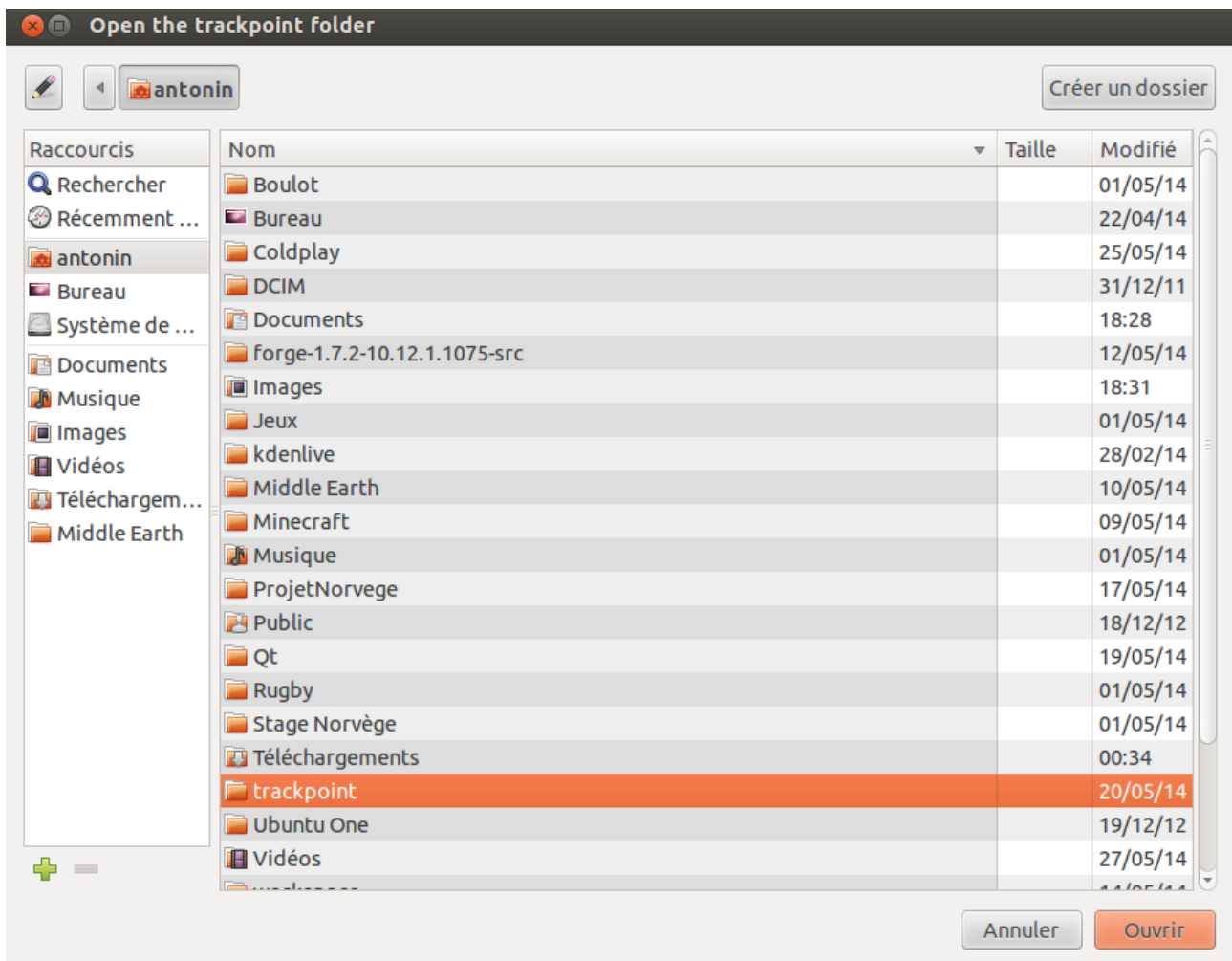


Illustration 16: grupper image, clicking on a point

Appendix n°1 : TrackPoint FileDialog



The FileDialog opens when the *Open Project* action is performed. You can navigate through your computer. Find your trackpoint folder or another folder containing 'trackpoint' in its name. Then, click on 'Open' to open it in the project tree.



Appendix n°2 : Combination calibration summary

C:\CalpointAndroid\calibration_20140313_095422\calibration_comb_1_2_5.dat

S0 = 0.1432. Mean: 0.65, max: 0.88

Camno 1. Serial no. 10001

XO: -179.81 Y0: -2617.75 ZO: 1561.13
AL: -0.576316 BE: 1.05205 KA: -0.64934

C: 1284.65 C std.dev.: 2.1051 XH: 18.404 XH std.dev.: 19.1499
YH: -6.392 YH std.dev.: 4.9431 AF: 0.000269 AF std.dev.: 0.000607
ORT: 0.000279 ORT std.dev.: 0.000343
F1: 1.12e-007 F1 std.dev.: 1.14e-008 F2: -6.63e-015 F2 std.dev.: 2.83e-014
F3: -1.27e-025 F3 std.dev.: 0 P1: -2.74e-006 P1 std.dev.: 3.98e-006
P2: -5.34e-007 P2 std.dev.: 1.22e-006 RO: 0

Camno 2. Serial no. 10002

XO: 997.07 Y0: -2525.39 ZO: 1504.62
AL: 0.327498 BE: 1.05648 KA: 0.250601

C: 1278.37 C std.dev.: 3.1431 XH: 23.295 XH std.dev.: 20.6034
YH: -19.27 YH std.dev.: 5.6458 AF: 0.000151 AF std.dev.: 0.000671
ORT: 0.000965 ORT std.dev.: 0.000717
F1: 1.23e-007 F1 std.dev.: 1.55e-008 F2: -1.46e-014 F2 std.dev.: 4.31e-014
F3: -1.75e-025 F3 std.dev.: 0 P1: -2.14e-006 P1 std.dev.: 4.69e-006
P2: 1.03e-006 P2 std.dev.: 1.94e-006 RO: 0

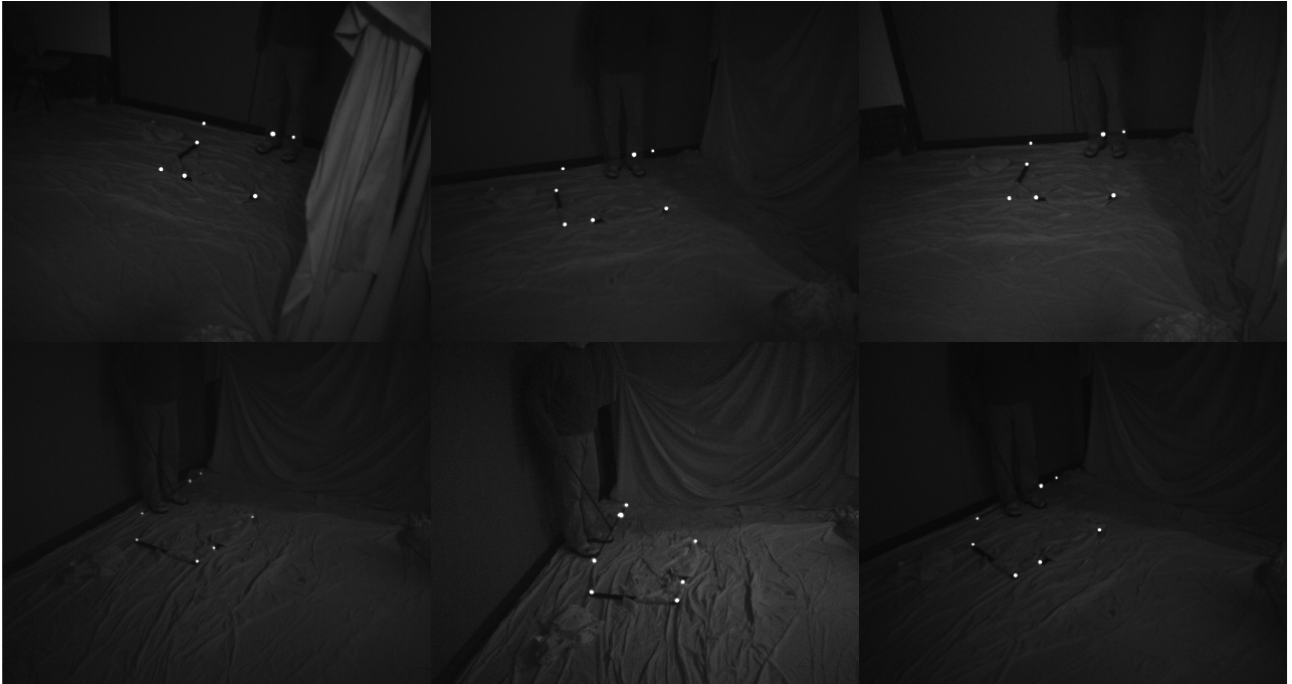
Camno 5. Serial no. 10005

XO: -1095.48 Y0: -1988.6 ZO: 1604.12
AL: -0.867158 BE: 0.765426 KA: -1.13565

C: 1286.36 C std.dev.: 2.7359 XH: -12.233 XH std.dev.: 17.0346
YH: 6.277 YH std.dev.: 6.7735 AF: -2.6e-005 AF std.dev.: 0.000583
ORT: -0.000399 ORT std.dev.: 0.000435
F1: 1.36e-007 F1 std.dev.: 1.04e-008 F2: -2.63e-014 F2 std.dev.: 2.96e-014
F3: 2.22e-025 F3 std.dev.: 0 P1: 1.26e-006 P1 std.dev.: 3.62e-006
P2: -1.16e-006 P2 std.dev.: 1.51e-006 RO: 0

This is an example of a combination calibration, which is contained into the *calibration_summary* file. Here, the combination is **1_2_5**. This is also a own file, whose the path is in the first line. Next, come the informations you can also read at the beginning of the *calibration_summary* file : SO, mean and max. then, for each camera in the combination, you can see several parameters, as XO, YO, ZO, AL...

Appendix n°3 : Grupper Image



There are 6 different images because there are 6 cameras. If there is more camera, there are always 3 cameras per line (because you always have a camera total number which is multiple of 3). The white points are the points detected during the run of trackpoint.