
RoyaleViewer

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1. Introduction

Royale provides its own visualization tool which is based on the Royale API. It will be installed with the standard Royale installation package and it can be used to display depth data from any calibrated camera and record raw data that can be played back afterwards.

2. First steps

2.1. Starting the RoyaleViewer on Windows

The RoyaleViewer can be started using the “royaleviewer”- Desktop icon or the “royaleviewer” entry in the start menu.

It is also accessible here: “C:\Program Files\libroyale\Version\bin\royaleviewer.exe” where “Program Files\libroyale” is the default installation folder and Version is the version number of the Royale package you installed.

2.2. Starting the RoyaleViewer on Android

Just tap the “royaleviewer” application. The look and feel is the same as on the x86 based OS.

2.3. Starting the RoyaleViewer on Mac OS X

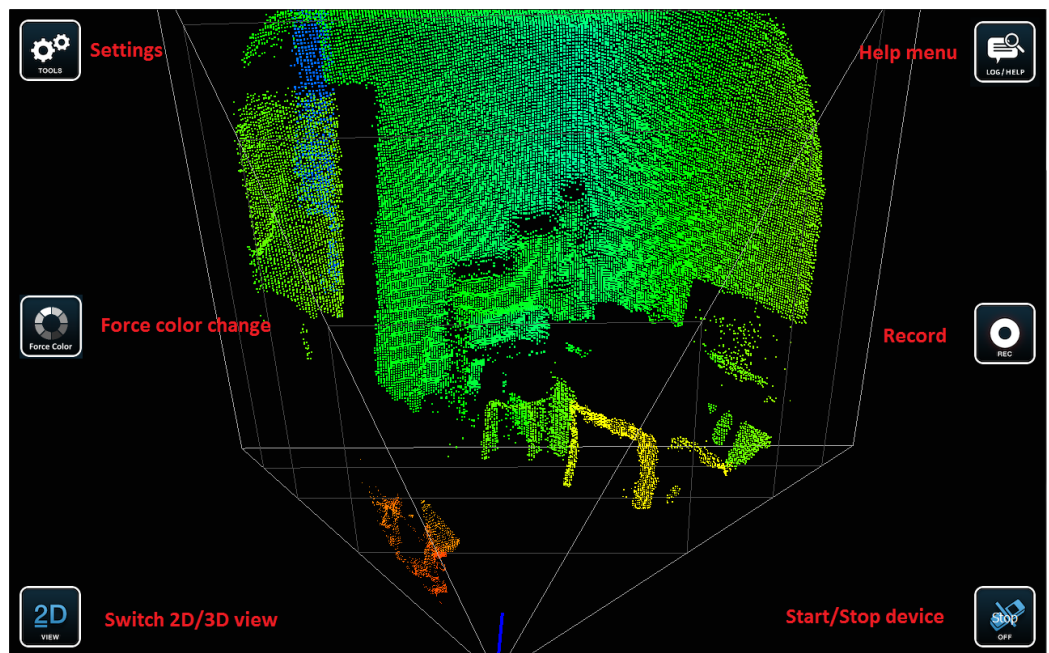
Click the royaleviewer-app in the /bin subfolder of your extracted package.

2.4. Starting the RoyaleViewer on Linux

To run the RoyaleViewer, please execute royaleviewer.sh in the /bin directory of the extract-ed Linux package. It will automatically set the right path to the necessary libraries.

2.5. Starting a camera

The application screen will open blank with the control buttons as shown below:



To start the data acquisition press “Start” in the lower right corner and wait for the camera to initialize.

To check if the camera was found and started click on the info button in the upper right corner. The Info-box can be closed by clicking on the Info button again.

At first you will see a color coded 2D visualization of the depth data.

You can switch to the 3D visualization by clicking on the button in the lower left corner.

2.6. Starting a playback

Loads .rrf (Royale recording files) files that can be played back with Royale. Clicking the connect button during a playback will unload the current file. Afterwards you can connect to a live camera again.

To load a recording, you can also drag a rrf file onto the viewer. It will then automatically open the dropped file.

After loading a recording additional control buttons will appear :



The above control buttons have the following functions:







- The left button jumps backwards (-10% during playback e.g. 90 frames for a file with a total of 900 frames and 1 frame during pause)
- The middle button stops and starts the playback
- The right button jumps forward (+10% during playback e.g. 90 frames for a file with a total of 900 frames and 1 frame during pause)
- While paused, a specific frame can be selected by the slider

2.7. Note about the 2D view

The 2D view treats the depth data as an array of z coordinates and ignores the x and y information. This will ensure that you get the depth information per pixel, but this will lose the lens calibration.

This means that you might see a distortion in the 2D view, but not in the 3D view.

3. GUI

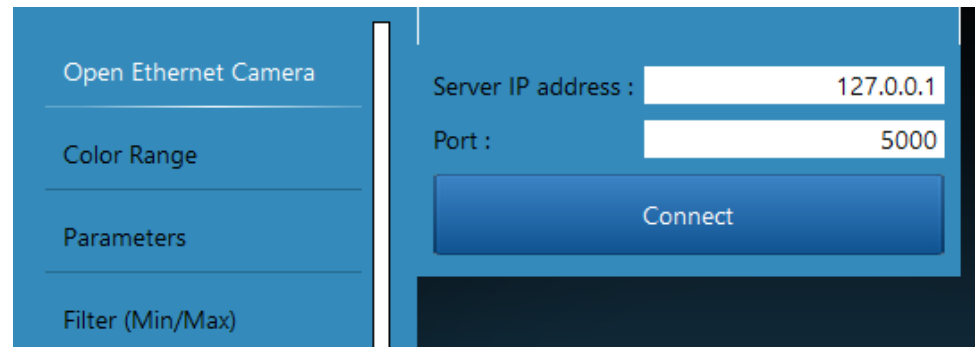
Button	Function
	Switch to start/stop the processing and display of 3D data from the camera
	Switch the visualization of 3D data between color coded 2D or 3D point-cloud view
	Settings for visualization and operation modes
	Force an adaption of the color scheme to the current scene
	Help menu with Log which provides status and history info, camera info, user's guide, license infos etc.
	<p>Record (→ turns red if active) Records Royale recording format (.rrf) as default or single 3D point cloud (.ply) and a screenshot of the current view (.png) if selected in settings</p> <p>Output folders depend on OS:</p> <p>Windows : DocumentsFolder/royale Linux : /path/to/homefolder/royale Mac OS X : /path/to/homefolder/royale Android : /storage/sdcard0/royale</p>

4. Tools

The tools menu offers different options depending on the current state (live camera/playback, 2D/3D).

4.1. Ethernet Camera

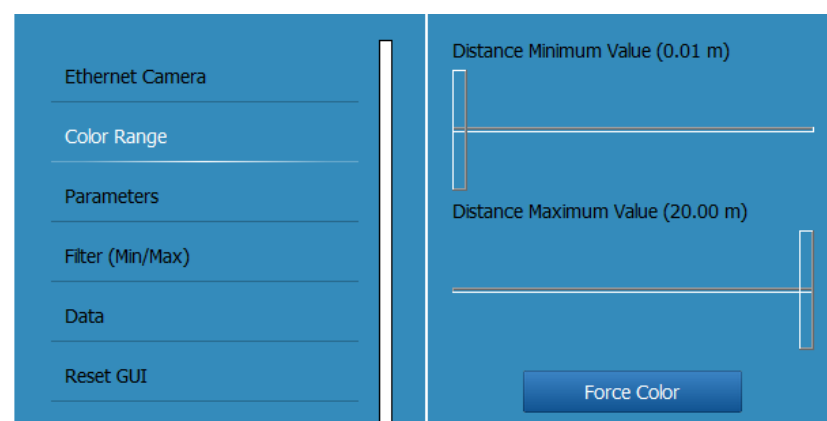
The Royaleviewer can connect to cameras via Ethernet. Enter the IP and the port on which the camera server is running and click connect. The Ethernet camera will then work as if it was started locally.



The screenshot shows a software interface with a blue sidebar on the left and a main content area on the right. The sidebar contains four menu items: "Open Ethernet Camera", "Color Range", "Parameters", and "Filter (Min/Max)". The main content area has a form with two input fields: "Server IP address" with the value "127.0.0.1" and "Port" with the value "5000". Below these fields is a large blue button labeled "Connect".

4.2. Color Range

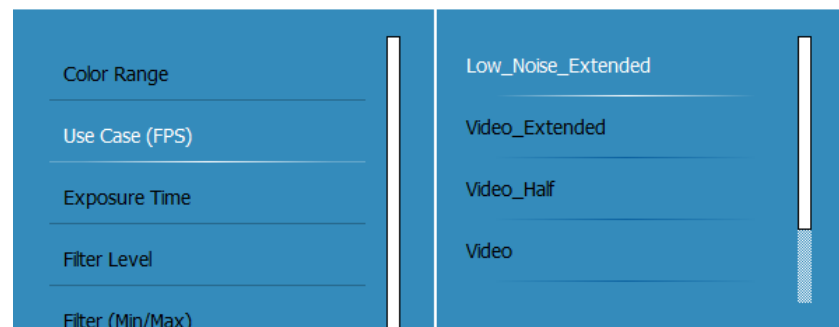
The color scale can be adjusted and reset (auto-scale between min and max range).



The screenshot shows a software interface with a blue sidebar on the left and a main content area on the right. The sidebar contains six menu items: "Ethernet Camera", "Color Range", "Parameters", "Filter (Min/Max)", "Data", and "Reset GUI". The main content area has two horizontal sliders. The top slider is labeled "Distance Minimum Value (0.01 m)" and the bottom slider is labeled "Distance Maximum Value (20.00 m)". Below the sliders is a blue button labeled "Force Color".

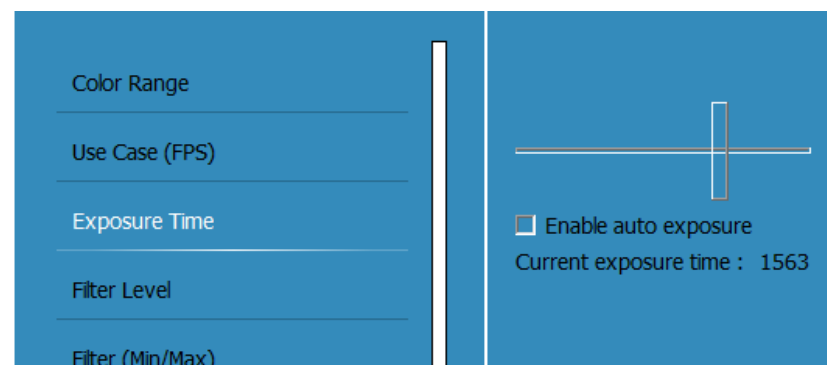
4.3. Use Case (FPS)

Selection of pre-defined operation modes. Please refer to the Royale documentation (HTML document in subfolder “doc”) for further details on operation modes.



4.4. Exposure Time

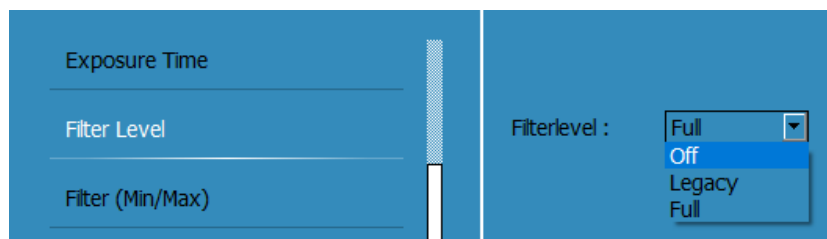
Setting the exposure time between max (default) and min exposure time for the chosen operation mode.



If “Enable auto exposure” is selected, the exposure time will automatically be adapted to the current scene.

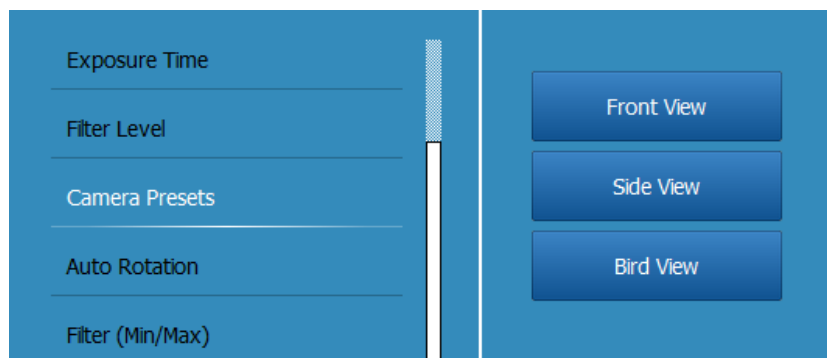
4.5. Filter Level

Selection of the filter level. Off turns all the filtering of the data off, but validation will still be enabled. Legacy is the standard setting for older cameras. Full enables all filters that are available for the current camera.



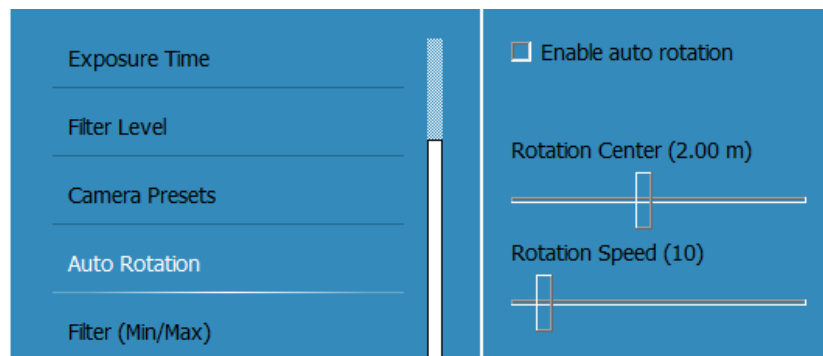
4.6. Camera Preset

Affects 3D visualization only. If the 3D point cloud visualization is active (can be activated by the button in the lower left corner) the view can be switched to front view, side view or bird view here.



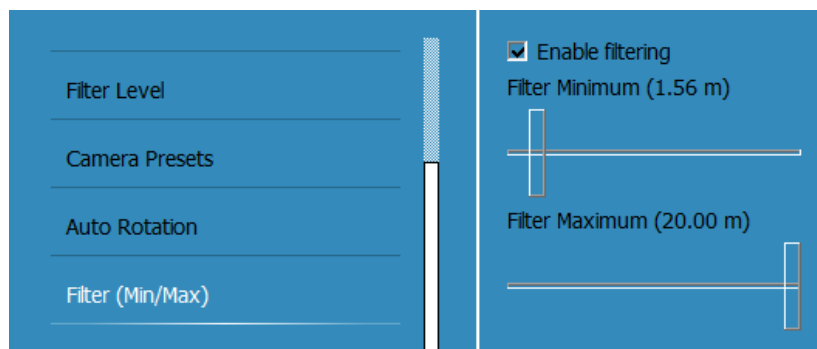
4.7. Auto Rotation

Affects 3D visualization only. If the 3D point cloud visualization is active, the view can be switched to rotate automatically. The parameters: the rotation center of the 3D point cloud and the rotation speed can be set here. The function Auto Rotation can be also activated through the mouse to directly double-click the view. During the auto rotation, the movement, zoom, and manual rotation of the view are still possible.



4.8. Filter (Min/Max)

The function Filter is disabled by default. The distance range can be adjusted when this function is enabled.



4.9. Data

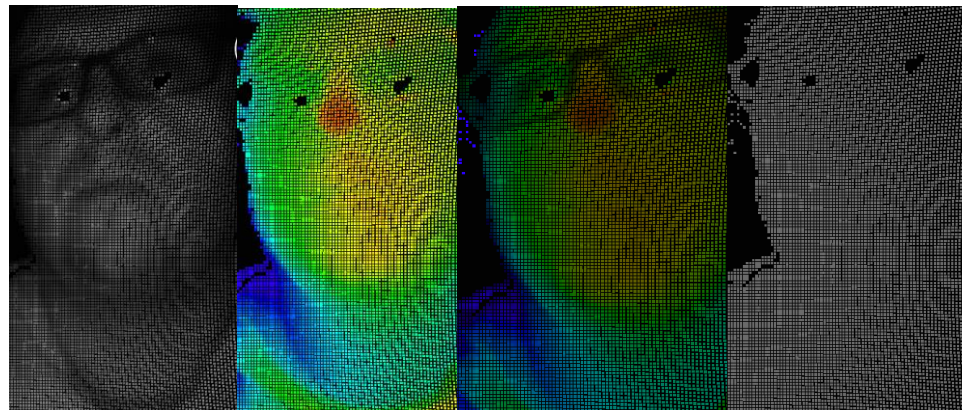
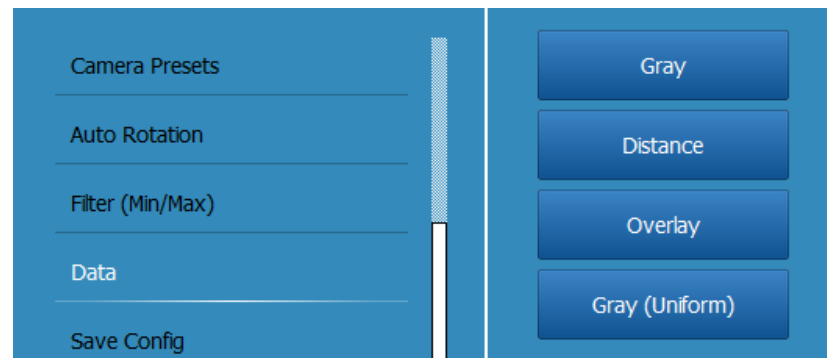
Visualization can be switched between the color-coded 3D data and Grayscale data formats.

Gray will show a gray scale IR image (2D) or be overlaid to the 3D point cloud)

Distance will show a color-coded depth map (2D) or point cloud (3D)

Overlay shows a combination of a color-coded depth and the gray image

Gray (uniform) (only available for 3D visualization) shows a uniform gray point cloud



4.10. Save Config

This button will save the current config in the same folder as the recordings (see above). The config can be loaded using a command line parameter.

4.11. Reset GUI

This button will reset the GUI to its default state.

4.12. Load File

Loads .rrf (Royale recording files) files from default storage location that can be played with the viewer. Clicking the connect button during a playback will unload the current file. After-wards you can connect to a live camera again.

To load a recording, you can also drag a rrf file onto the viewer. It will then automatically open the dropped file.



The above control buttons have the following functions:

- The left button jumps backwards (-10% during playback e.g., 90 frames for a file with a total of 900 frames and 1 frame during pause)
- The middle button stops and starts the playback
- The right button jumps forward (+10% during playback e.g., 90 frames for a file with a total of 900 frames and 1 frame during pause)
- While paused, a specific frame can be selected by the slider

4.13. Save parameter set

Can be used to save the current processing configuration. The resulting file will be saved to the default output location with the extension .rpp.

4.14. Load parameter set

Load a previously saved processing configuration.

4.15. Export all frames

When playing back a recording this can be used to export all frames of the current recording with the current settings.

4.16. Show Frustum

Enables/Disables the viewing frustum in the 3D visualization.

4.17. Flip vertical

Flips the displayed data vertically in the 2D visualization.

4.18. Flip horizontal

Flips the displayed data horizontally in the 2D visualization.

4.19. Show FPS

Shows current FPS rate if checked.

4.20. Show Stream ID

Shows the stream IDs of the current streams.

4.21. Show Range Specifier

Enabled the range specifier which can be used to limit the playback of the current file to a certain range.

4.22. Loop Playback

Loops back the playback to the beginning when playback reaches the end of the recording.

4.23. Single Frame Recording

Toggle if a single frame and a screenshot or a rrf file is recorded

5. Help menu

5.1. Log

The Log tab provides status and history info. When there is new log and this tab is not open, the icon of Help menu will turn red to remind.

5.2. Info

The Info tab provides camera info, incl.: the list of connected cameras and details of the started camera. In playback mode, the used camera of playback file will also be marked here.

5.3. Help

The Help tab provides quick links to open user's guide (this document) and installation folder of RoyaleViewer directly. On Android, the quick links are not provided.

5.4. About

The About tab provides icon and copyright notice of RoyaleViewer, icon and homepage of publishers and quick link to show related licenses.

6. Command line parameters

Some of the functionality the viewer offers can already be set before starting the viewer. Other functionality (like operating cameras as master/slave) is only available through these command line parameters:

Parameter	Function
--rrf file_to_load.rrf	Specifies a recording file which will be loaded
--cal calib_to_load.bin	Specify a different calibration file
--ac	Automatically connects to a camera
--mode "Use_Case"	Automatically sets a specified use case
--ae	Starts with auto exposure enabled
--slave	Opens the camera as a slave (please have a look at the documentation of your module to see if this is supported)
--code	Provide a Royale access code
--background	Sets a different background color for the 2D view. For example, to set a blue background call the viewer with <code>--code blue</code> .
--gamma	Set a gamma value for the colors (between 0.0 and 1.0)
--3d	Start in the 3D view mode
--fps	Start with enabled fps display
--config	Load a configuration file that was saved with the viewer

7. Shortcuts

RoyaleViewer offers shortcuts for most of the available functions:

Shortcut	Function
S	Start/Stop camera.
L	Open Help menu (if buttons are visible)
R	Start/Stop recording
H	Hide/Show buttons
ESC	Quit RoyaleViewer.
F1/F2/F3/F4	Switch data to Gray/Distance/Overlay/Uniform
2/3	Switch view to 2D/3D
C	Force color range update
Space	Pause/Resume playback of file (only available during the playback of a file)
Left	Rewind 10% during playback e.g., 90 frames for a file with a total of 900 frames and 1 frame during pause (only available during the playback of a file)
Right	Forward 10% during playback e.g., 90 frames for a file with a total of 900 frames and 1 frame during pause (only available during the playback of a file)
Alt+Enter	Switch to fullscreen mode
P	Record Single Frame as .png and .ply
Ctrl+O	Load a recording from a file

8. Mouse Control Options

The RoyaleViewer offers some mouse control options:

Mouse Gesture	Function
Left Click on the image (2D View)	Shows data about the pixel you clicked at (x,y,z-coordinates, i,j-coordinates, standard deviation, grayvalue, confidence score)
Left click on the left or right border or right click on the image (2D View)	Remove showed information about pixels that was clicked on before
Scrolling (3D View)	Zooming in/ out
Click + Move (3D View)	Changes the viewpoint
Double Click (3D View)	Start/ Stop auto-rotation
Left + Right or Middle Button pressed (3D view)	Translate the scene