FaceRig Studio Guide

version 1.01

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Overview

FaceRig Studio is a professional software that enables anyone to digitally embody CGI characters using heterogeneous tracking input from various sensors such as RGB/RGBD webcams, full body suits and other devices. All characters' animations can be recorded, edited and mixed together to create compelling videos and game ready animations. FaceRig Studio is the professional version of FaceRig Classic, designed for creative professionals such as filmmakers and videographers, animation artists and artists working in the game industry, and anyone requiring an expression tool for an ambitious creative project.

Key features:

- Real time face and body motion capture from video, audio and other sensors
- On-the-fly animation re-targeting for the tracked data and applying the animation on a user selected 3d model, with audio processing (voice alteration)
- Rendering and lighting the animated model in real time, in a user selected background.
- Encoding the rendered video and sending it further as output from a virtual webcam
- Fbx and COLLADA animation export
- Provide the interface for tuning the parameters of the above operations.
- +50 original avatars that you may use commercially. For a complete list of avatars available please see: https://facerig.com/studio-available-avatars/
- Character customization
- Open creation platform: you can make your own models or backgrounds (outside of FaceRig Studio), import and use them as your avatars. The models need to be created according to a set of published specs.
- Animation editing and mixing
- Voice changer
- Supported sensors and Tracking libraries:
    - ULSee - face tracking - (RGB webcam based)
    - Audio-based tracking - viseme tracking – (Microphone)
    - Perception Neuron - body tracking - (Perception Neuron full body suit)
    - Leap Motion - palms tracking - (Leap Motion device)
    - Intel RealSense - face and palms tracking - (RealSense Camera)

Useful links

There are a lot of learning materials and sample data that help in using FaceRig Studio to its full potential:

- FaceRig common usage manual:
- FaceRig importing custom avatars and backgrounds specification:
- Best practices for mocap session with FaceRig Studio: https://drive.google.com/file/d/0B9A2HzJCWwFWN2NGblEtUE9nNHc/view
- Mocap sample data - https://drive.google.com/file/d/0B9A2HzJCWwFWbm1hLVRjaTdfNlE/view

Getting Started

Recording a performance

FaceRig Studio can record the real-time retargeted animation into a FaceRig Performance. The performance is a set of animation parameters that control the 3D characters and is saved as a .rpl file that is accompanied by two audio files, one with the user audio recording and the voice effects applied, while the second one is the pristine version.

Recordings can be easily done following these steps:

1. Go to Advanced UI
2. Hit Record Performance
3. Hit Close Recording button when finished
4. Save the performance file

Exporting a performance as movie

1. Go to Advanced UI
2. Hit Export Performance
3. Select "Export Movie" tab
4. Select a prerecorded performance file (.rpl)
5. Hit Export button
6. The exported video is a .webm file that can be found in the same folder as the .rpl file

How to export animation

From a prerecorded performance file

1. Go to Advanced UI
2. Hit Export Performance
3. Select "Export Animation" tab
4. Set Export Type
5. Select a prerecorded performance file (.rpl)
6. Select an output file (can also be selected after step 7)
7. Hit Export button

From a live recording

1. Go to Advanced UI
2. Hit Export Performance
3. Select "Export Animation" tab
4. Set Export Type
5. Leave all the file controls empty
6. Hit Export button
7. Record an animation
8. Hit Stop recording

Timeline Editor Essentials

1. Go to Advanced UI
2. Timeline Editor (from right side menu)
3. **File > Set workspace folder** - select a folder that contains performance (.rpl) and audio (.wav) files
4. Drag a .rpl file from the workspace panel to a performance track (blue colored)
5. Add an audio track by right clicking the Tracks panel, hover **Add Audio Track** and hit the **Insert Below**
6. Drag a .wav file from the workspace panel to an audio track (green colored)
7. Hit the Play button on the 3D Character Preview
8. Start creating awesome stuff

Timeline Editor

Objective

The timeline editor is a powerful tool for editing and mixing prerecorded FaceRig Performances (FaceRig specific animations). The output can be exported as a movie (.webm file), animation (.fbx and .dae files) or FaceRig Performance (.rpl and .wav file).

A FaceRig Performance is a set of animation parameters that drives the character movement and animations, all saved into a single .rpl file. Additionally, FaceRig also records audio input data and outputs two uncompressed audio files (.wav), first one is the recording with the voice changing effects, while the second one is the pristine version without the effects applied and is usually named "name_clean.wav".

The timeline editor provides the means to crop performances, split performances into different parts and control how different performances blend together.

A simple introduction into the timeline editor works can be found in the **Getting Started** on **Timeline Editor Essentials** section.

Project structure

The projects created in the Timeline Editor can be saved in order to be opened at a later date or transferred to different computers in a .frsproj file. The contents of the project are saved in an XML format and contain inside them the following data:

- The path to the workspace
- All the tracks and the subsequent track items
- For the replay items, all the modules are stored
- Blend curves for audio and performances
- All avatar override behaviour and camera switchboard intervals

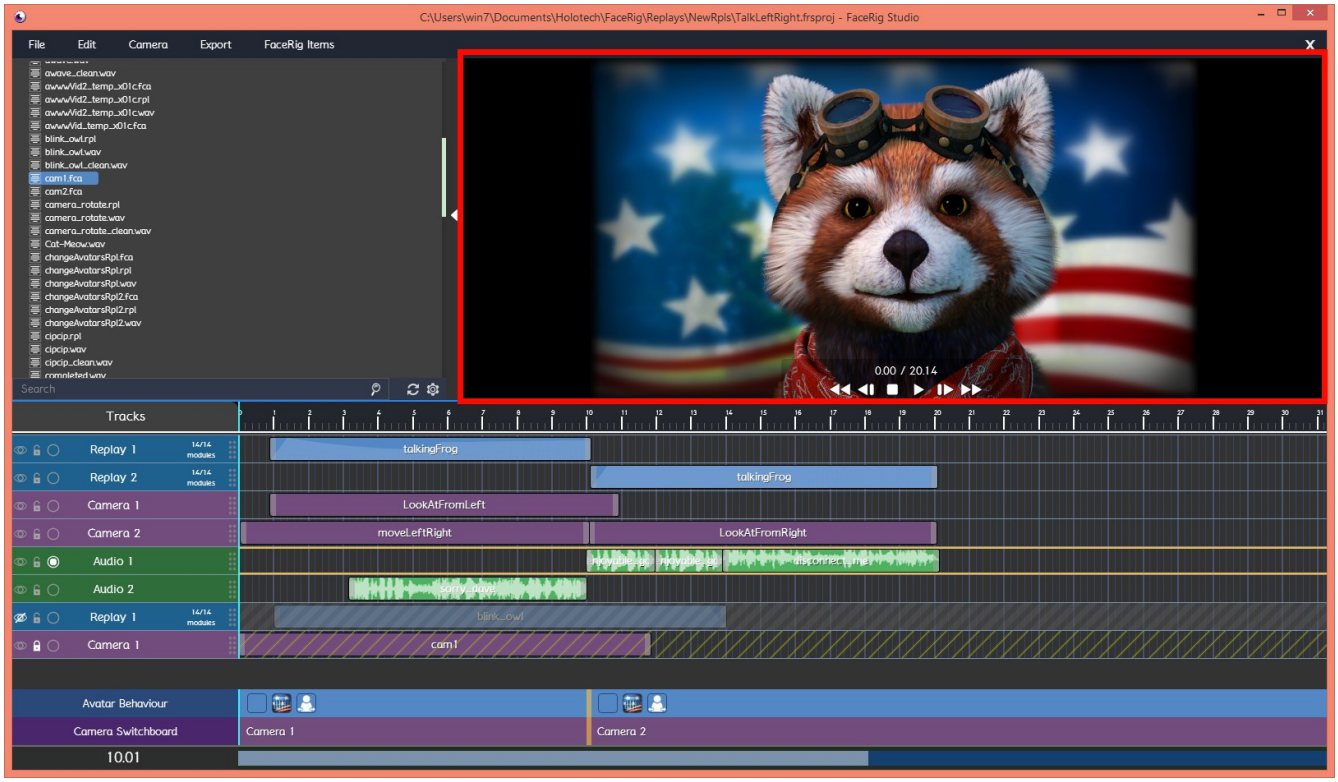
To be noted that all the files that are opened by a project are saved as relative paths to the .frsproj file itself. This means that whenever you want to move a project, all the relative paths between the .frsproj file and the other workspace files must be preserved.

Editor

The timeline editor is split into three parts: the Rendered Preview, the Workspace Panel and the Tracks Panel.

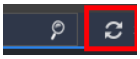
Rendered preview

The rendered preview is the result of all animation blending at a given timestamp. It features simple timeline controls, such as play/pause, step frame forward/backward, go to start/end.

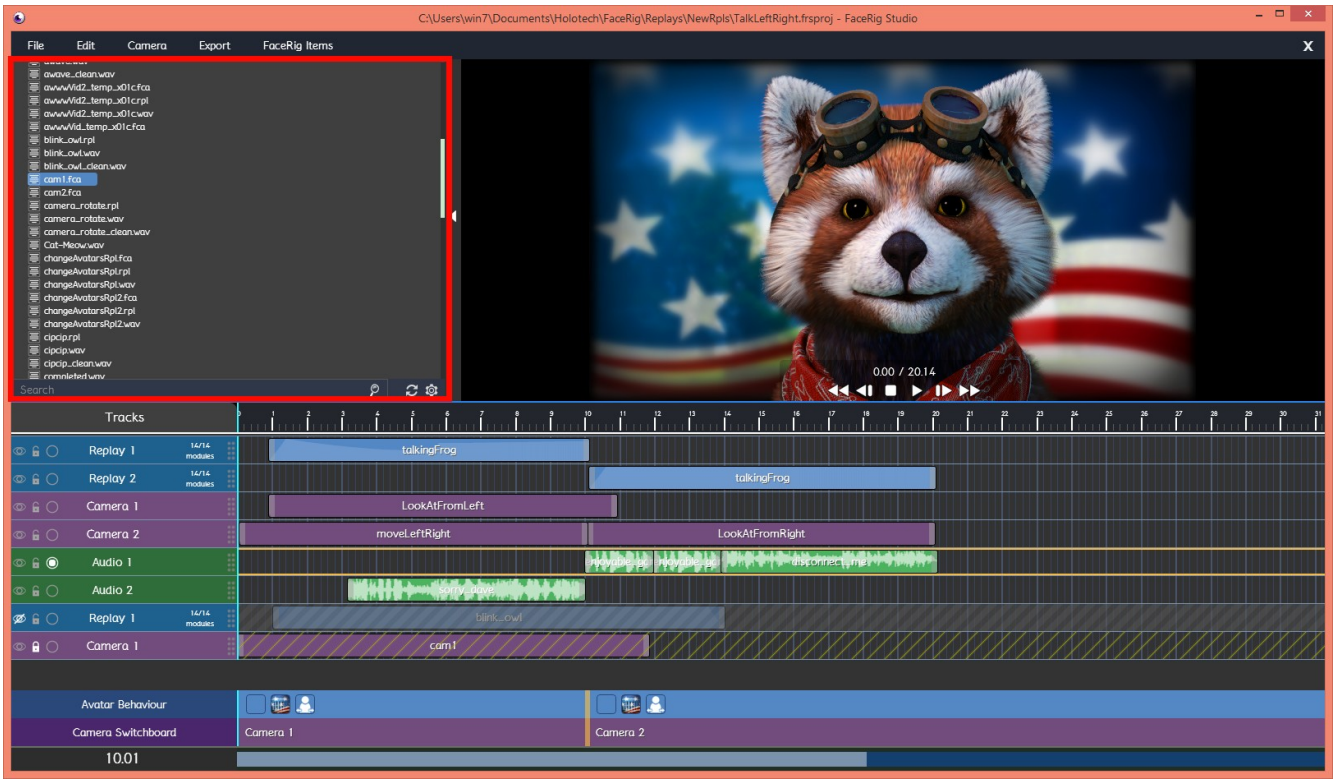


Workspace Panel

The Workspace Panel displays all the performance and audio files that can be mixed in the Tracks panel. It supports a simple search box to quickly find a desired file and can filter the files by the three extensions specific to FaceRig performances, .rpl, .fca and .wav. When the structure of the workspace changes outside the application, it is recommended hitting the refresh button so that newly added files can be accessed.



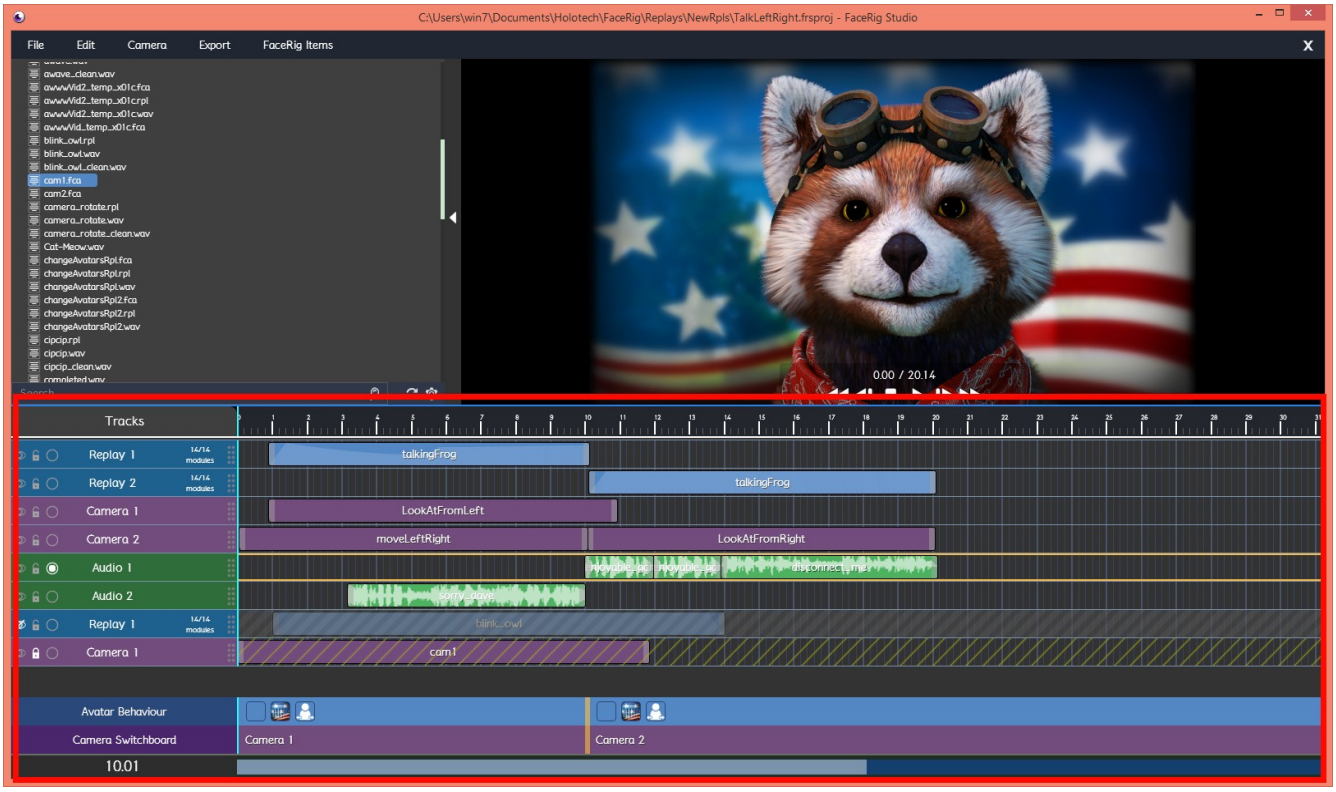
The workspace can be set by going to **File > Set workspace folder**.



Tracks Panel

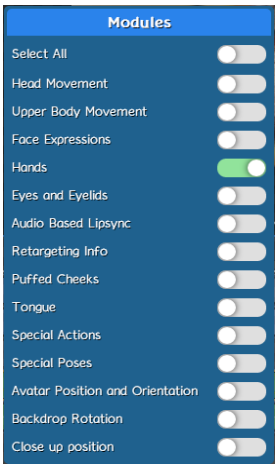
The Tracks Panel is where all performance and audio editing and mixing is done. The timeline-based editor is designed as a multi-track panel where performance and audio files can be added, moved, cropped and split. There are three distinct track types, one is for performances (.rpl files), one for camera animations (.fca), and the last is for audio (.wav files). Each track is blended with the others using a strict set of rules that can be controlled by the user. The user can control the animation modules (see **Modules** subsection) that apply on the avatar and the blending curve of each performance. In case of the audio tracks, the modules do not apply and the blending curve refers to the volume of the audio item. The camera tracks can only be active one at a time, as blending cameras doesn't make sense. As such, below the tracks panel there is a track called Camera Switchboard, which will be detailed later in the Guideline.

The tracks panel supports renaming, muting/hiding, locking any other modification or even soloing a certain track. All aspects are applied separately on each type of track, performance or audio.



Modules

FaceRig Studio supports heterogeneous tracking input, that is interpreted and then mapped/retargeted onto a 3D character. All animation information can be categorized in different groups (mouth, eyes, hands, etc) so that the user can filter exactly what animations are applied to the avatar. These animation groups are referred as *Modules*, and each performance track supports a filter of which of these modules are applied to the avatar from the performance items that are on this track.



The best example is to have two performances, one has only face expressions and the other hands movements. The recorded performances were done with two different instances of FaceRig, and you need to mix them together. The solution is to add two tracks, one for each performance, on the face expressions one you toggle off the hands movement, while on the other you only toggle the hands movement. Setting the two performance items one under the other, the system will only take face expression info from the first one and only hands animation info from the other. The result is an enhanced performance with tracking capabilities from two instances of FaceRig, without losing any of the original movement of each of the performance items.

Blending

All tracks blend together after a specific set of rules.

FaceRig Peformance

Under a specific timestamp, all animation values are added with their respective weights and then averaged to get a normalized value.

1. The blending curve (a percentile between 0 and 100) is applied, giving it a weight when adding to the output animation result.
2. If animation weights sum are over 1.0, they are normalized
3. If animation weights sum is under 1.0, the remainder to 1.0 is filled with idle pose
4. All weights and averages are applied on every module independently

Audio

Under a specific timestamp, all audio items added and normalized.

Camera Animation

No blending – See switchboard explanation

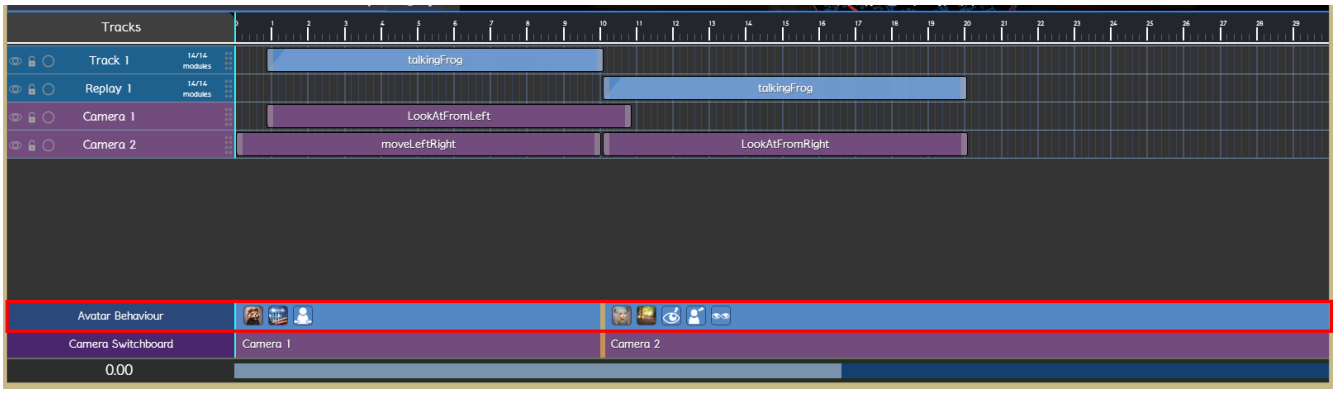
The user can control the modules of each track and the blending curves of each performance/audio item. A performance can be added by dragging .rpl file to a Performance track (blue colored), while audio items can be added by dragging the .wav file to an Audio track (green

colored). You can add the .rpl and .wav file at the same time on different tracks by dragging the replay file and holding ctrl when releasing. The program will try to find the .wav file with the same name as the rpl and add it on a separate track.

Avatar Override Behaviour Track

The avatar override behaviour track is a track on which you can override certain behaviours of the avatar, as well as the possibility of changing the avatar and background on the fly at a point in time during playback. This is done by having intervals across the playback time of the project, each of them having a set of options which get applied only when the current play time falls within that interval.

In the example below we have two intervals. The first which spans from start of the project (0.0 seconds) up to around the 10 seconds mark, and the second one from 10 seconds onward. If we look at them, we can see that they have different icons on them, which represent a part of the content of that interval. These icons are meant to show you what the interval contains, at a glance. Most importantly, we can see what avatar and background is going to be loaded, and we can observe that in the first interval we have *Fluffo* with the *Political Background*, and in the second one, we have *Midori* with the *FaceRig Forest*.



In terms of avatar behaviour which we can override, we have the following properties which can be edited for each interval on its own:

- **Setup** – Represents the Avatar and Background which will be loaded when playing through this interval. By default, the values for the avatar and background are represented by the setup you previously had when you entered the timeline. The setup allows you to choose between a set of hotkeys, which are created outside of the timeline and save the avatar and background currently selected. In order to create a new hotkey, by default, the key shortcuts are ctrl + shift + <number from 0 to 9>.
- **Cross eyes** – Toggles if cross eyes movement is allowed.

- **Eye lids Soft Link Weight** – When set to 0 the eye lids move independently of each other, whereas when set to 1 they move symmetrically.
- **Eyebrows Soft Link Weigh**t – When set to 0 the eyebrows move independently of each other, whereas when set to 1 they move symmetrically.
- **Mouth Corners Soft Link Weight** – When set to 0 the smile can be asymmetric, and when it is set to 1 the corners move symmetrically.
- **Look at Camera ratio** – When set to 0 it uses the performance data for the direction it looks at, and, when set to 1 it will overwrite the performance and look at the camera. In between 0 and 1 it blends between the two sources.
- **Orientate Head To Camera** – When enabled it will orientate the head towards the camera.
- **Point Left Arm At Camera** – Will point the left arm of the avatar towards the camera.
- **Point Right Arm At Camera** – Will point the right arm of the avatar towards the camera.
- **Enable Tracked Blink** – When enabled it will use the information from the performance to blink.
- **Enable Auto Blink + Auto Blink Behaviour Slider** – When enabled it will introduce procedural blinking at a certain frequency and speed, which can be controlled by the slider adjacent to it, the leftmost value of the slider being a simulation of tired blinking and the rightmost value simulates alert blinking
- **Enable Pupil Behaviour + Pupil Behaviour Slider** – When enabled it introduces procedural micro movements of the pupil which appear naturally as the eye shifts ever so slightly. The slider adjusts how visible these movements should be.
- **Idle Movement Weight** – Avatars by default have an Idle animation, so that they don’t look stiff as a brick. When you set this slider to 0, the animation will be completely removed, when set to 1 the animation is used entirely, and any values in between represent the ratio with which the animation is blended.

Camera Switchboard

The camera switchboard is a type of interval track. Interval tracks have properties delimited by interval markers. Active cameras are changed between interval markers. By default there is no active camera but once a camera animation is dropped in the timeline, a camera track will automatically be created and be set as the active camera track.

The camera switchboard enables you to set up the active camera track. When the interval marker has no fade zone, the camera switches instantly to the other camera track, also called a camera cut. If the second interval (which points to another camera track) has no camera animation on its track, then it just switches to the default avatar camera.

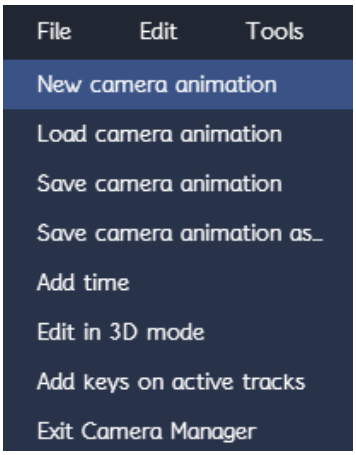
If the fade zone is non-zero, a linear interpolation of all properties of a camera (position, rotation, etc.) will be made across the fade interval. If the target track doesn't have a camera animation, it will blend with the default camera.

The Camera Switchboard supports a set of actions. Right clicking the switchboard track will prompt the following options:

- **Add Interval** – adds an interval to the right or left of the currently selected interval
- **Delete Interval To** – removes the interval to the right or to the left of the currently selected interval
- **Add Crossfade** – creates a cross fade zone of 1 second (can also be customized by dragging the margin)
- **Remove Track** – removes the track binding for the currently selected interval.
- **Assign Track** – assigns a camera track to the currently selected interval.

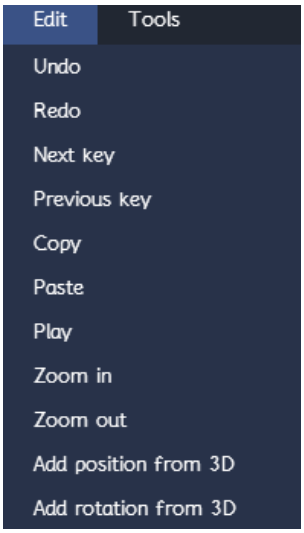
Camera Editor

File



- New Camera Animation – resets all keys (be sure to save them before doing this) and editor state.
- Load Camera Animation – resets everything and loads a new animation. Previous contents are discarded.
- Save Camera Animation – saves current animation keys
- Save Camera Animation As – saves current keys into a different file
- Add Time – doubles max time gradations in order to create lengthier animations
- Edit in 3D Mode – switches to first person mode
- Add keys on active tracks – adds a key for all key times at the current time position
- Exit Camera Manager – switches back to the timeline editor. If changes have been made you will be prompted to save them.

Edit



- Undo – undoes previous action
- Redo – redoes undoed action
- Next key – Sets current time to the next keyframe of the actively selected track (i.e. position)
- Previous Key – Sets current time to the previous keyframe of the actively selected track (i.e. position)
- Copy – copies selected keys to memory (multiple selection is possible by holding Ctrl)
- Paste – paste copied keys from memory
- Play -plays animation from current time
- Zoom In – Zooms in all tracks and gradations
- Zoom Out – Zooms out all tracks and gradations
- Add position from 3D – When in first person mode, use this option in order to create a position key from the camera position;
- Add rotation from 3D – When in first person mode, use this option in order to create a rotation key from the camera rotation;

Tools



- Generate DOF Values – For every frame of the current camera animation, it generates the correct DOF values in order to keep in focus a specific bone position (i.e. head, hands, belly, etc).
- Generate Positions – Generates position and rotation keyframes that look towards the avatar in a circle.

Key Track



This line is what represents a key track (will be referred to as a track). It contains:

- 1 – this shows if the current track is active or not. A track is considered active when it has at least one keyframe. Clicking this while active will prompt you for removing all keys from this track.
- 2 – Mutes or unmutes a track. When a track is muted the animation acts as if it doesn't contain any keys of this type.
- Position – The type of keys for this KeyTrack
- 3 – Key Type
- 4 – Key Properties (X,Y,Z) – the properties each key of this track has and their particular values.
- 5 – Property Value
- 6 – Go to Previous key;
- 7 – Create Key at current time
- 8 - Go to next key
- 9 – Keyframe on the time track
- 10 – TimeIndicator. This is where new keys are created if button 7 is pressed.
- 11 – Selected Keyframe

Additional Information :

- Holding Ctrl enables multiple key selection
- While moving a key left/right and holding Shift, it enables auto-align to keys from other tracks
- When there is a key at the current time, the current values will have a blue border around them, otherwise the current values are shown (and are linearly interpolated between keyframes).
- Scrolling while the cursor is inside a key property (I.E. Position→X) will increment or decrement the value by 1.
- Scrolling while inside the track area will zoom in/zoom out the tracks and gradation.

Play Buttons



- 1 – Moves time indicator to 0
- 2 – Moves time indicator back one frame
- 3 – Stops playing the animation
- 4 – Starts playing the animation
- 5 – Moves time indicator forward one frame
- 6 – Moves time indicator to 0.

3D Icon



- Cube icon – When clicked, it enables 3D first person mode where the Camera can be manipulated using WASD for movement and the mouse for the rotation. While in 3D mode, you will see a 3D camera model in order to show you where the camera is supposed to be at the current time.

- First time value indicates where the time indicator is now and the second value represents the current animation length.

Key Types

- Position – Camera position in 3D. These values are avatar dependent because each avatar is of a different size.
- Rotation – Camera Euler rotation.
- Look At:
  - Bone – helper to focus camera at a specific bone. When this property is not “StopLookAt”, the rotation values will be ignored and the camera will focus to the selected point. The point also follows the idle animation.
  - Spring – spring behavior so it doesn't just snap to a particular bone when animating between bones.

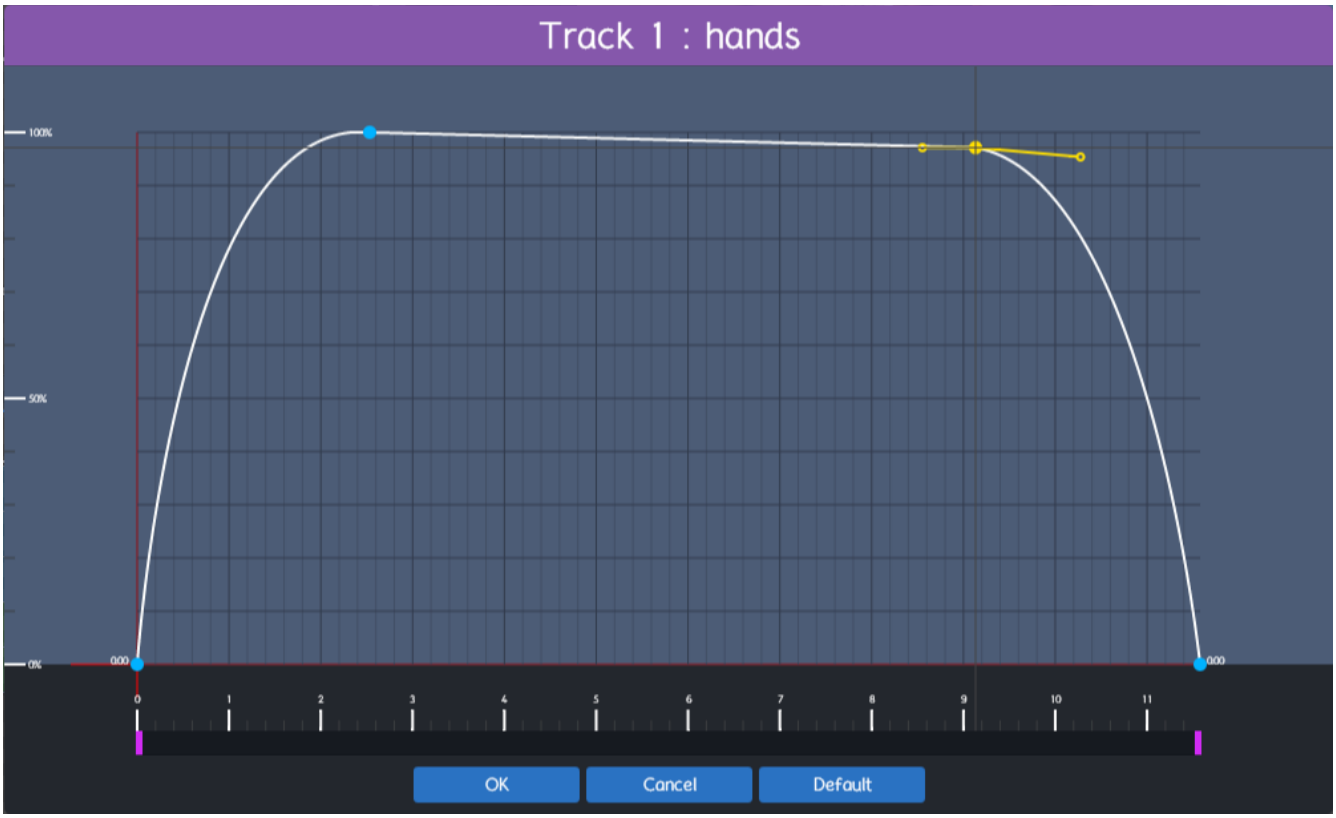
- Shaky Camera – this feature introduces a wobbly effect in order to simulate a realistic camera shooting movement.
  - Strength – the strength of the wobble, or the movement amplitude
  - Speed – how fast it wobbles or how fast it reaches a random point. Smaller
- Field of view – the angle of the field of view
- DOF Enable – Enables/Disables the Depth of Field effect.
- DOF Focus – the distance at which to focus the Depth of Field effect.
- DOF Range – the range which is considered “In Focus” for the Depth of Field effect.
- Bloom Enable – Enable/Disable the Bloom effect;
- Bloom Color – Tints bloom color.
- Bloom Intensity – The intensity of the bloom
- Enable Radial Bloom – Enable/Disable Radia Bloom.
- Radial Bloom Color – Tints the radial bloom.
- Color Saturation – Adjusts color saturation. The value is between 0 and 2 going from grayscale to overly contrasted.
- Film Grain Amount – Value is percentage of grain film to add in the postprocessing step.

Functions and Helpers

The timeline editor supports a set of editing and mixing functions and helpers:

Blending curves

The blending curves can be adjusted on each performance/audio item from a dedicated editor. The editor can be reached by right clicking the performance/audio item.



FaceRig Performance

The editor allows the user to change the weight of the current performance in the final result, where 0% means it will not affect at all and 100% means that the system will try to keep 100% of the animation info of this item in the resulted animation frame.

Audio

The editor allows the user to change the volume of the audio item.

Split function

Any item (performance/audio) can be split into two or more parts. This can be done by changing to Split mode (Edit > Split) and hitting the spot where the split should happen.

Crop function

Any item (performance/audio) can be cropped by changing the size of the item on the track.

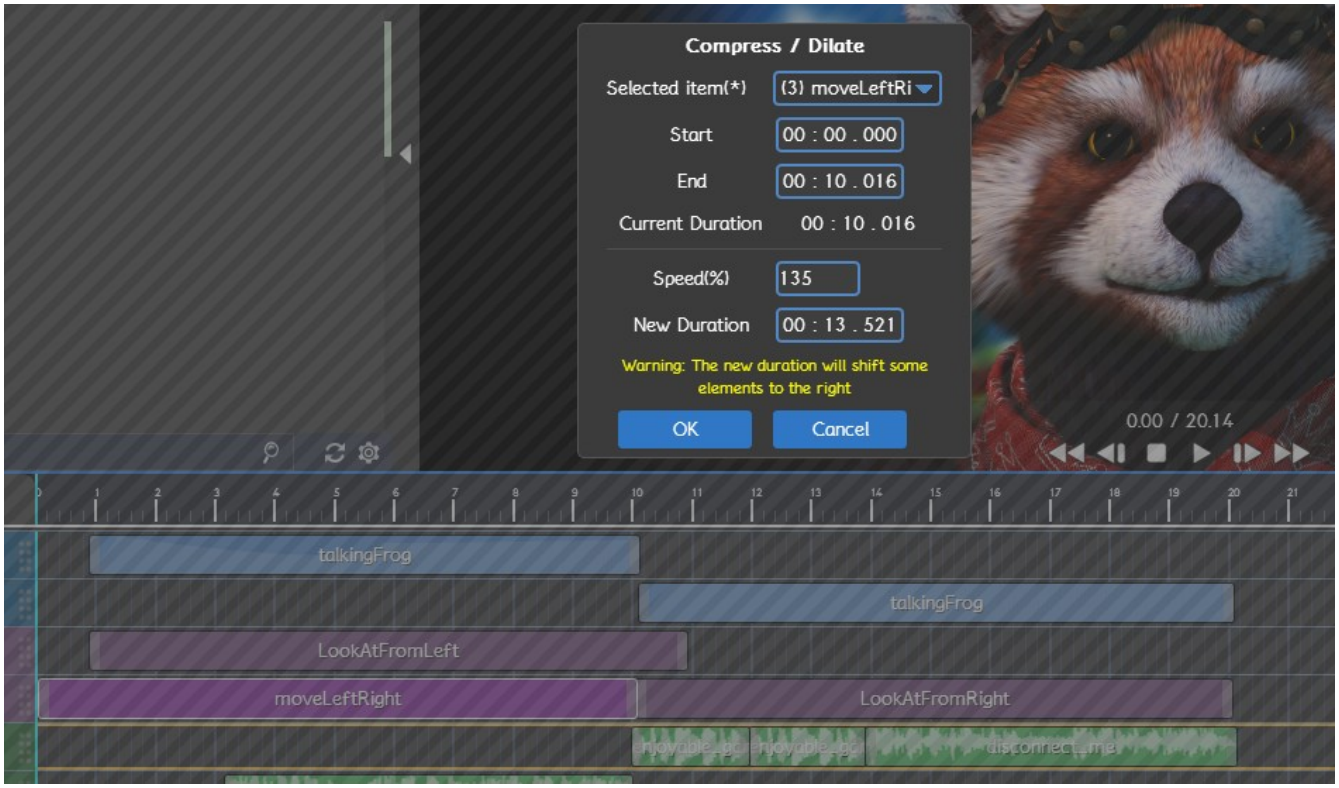
Avatar and Backgrounds

Avatars and backgrounds, and their respective customization and behavior options can be changed from the timeline editor by hitting the FaceRig Items top bar option.

Compress / Dilate item

Any item can be compressed / dilated in order to be resized to a particular duration. In the image below we are dilating a camera animation called “moveLeftRight” to 135% of its original size, starting from the mark 0:00.00 up to 0:10.016, which, in this case represents the original start and end of the animation. We can optionally selected different start and end points of the selected item.

In this case we also get a yellow warning which tells us that all the items to the right of the selected item will be shifted to the right in order to make room for our item which will be now of a larger size than before (from 10 seconds to 13.5).



Useful Hotkeys

Timeline Hotkeys

Holding Shift	Snapping behavior
Ctrl+Z	Undo
Ctrl+Y	Redo
S	Toggle split mode
Spacebar	Toggle Play/Pause
Left/Right arrows	Frame by frame Forward/Backward
Ctrl+Shift+S	Save Project As..
Ctrl+S	Save Project

Camera Editor

Delete	Deletes selected keyframes
K	Creates keys for active tracks at the current time
Space	Toggles play / pause
Arrow left / right	Previous / next key
Ctrl-Z	Undo. Camera Editor, interpolation editor and the Timeline view each have an individual undo stack. When saving or exiting the Camera Editor, the undo stack clears.
Ctrl-Y	Redo
Ctrl-C	Copy
Ctrl-V	Paste
Holding Ctrl down and clicking on keyframes	Select all so you can move them around, Copy-Paste, or by holding Ctrl+Shift, you can duplicate and move to different positions.