VRay Fly-through Animation

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Welcome to “Fly-through Animation” - Recorded LIVE Workshop!

In this workshop, you will learn our “easy to use" - flicker free animation method along with some basic fundamental camera movement principles that will help you to create better animation sequences.

Everything will be supported with dummy scenes and pre-render animation sequences in that way you will not lose time and get your hands-on practice.

The lighting for animation is not much different from lighting for stills, however, rendering setup and camera movements are a whole different story. We will concentrate on that subject more, and provide you with enough knowledge, so that you could make professional cinematographic decisions in your movie-making process.

Our main purpose is to provide you with enough production tools, so that you could start defining your personal “style and touch” and enjoy the process while bringing your scene to LIFE!

It is important to learn the rules and principles of cinematography before opening your 3D program, and base upon them your featured films, clips or even movies. However, the subject is huge and we can cover only relevant things to Architectural Visualization.

Alright, enough said.
- Let's get down to business!
Camera Animation Principles - “Good” vs. “Bad” Arch. Viz.

The best approach here would be to take what's working and use it as a reference. What I mean by that, is to get enough reference from the award winning categories and make yours better - challenging enough?

Now, you probably have your idea or a project which is personal enough for that purpose however camera moves, changes in focus, timing, framing by balancing your composition can be copied from any good director - heck yeah, take Spielberg and learn his genius camera moves.

Of course, you need to think about the Purpose and What you are trying to emphasize - What message are you trying to deliver?

- Is it calm and relaxing? OR is it dynamic and energetic? Is it old fashion or modern and minimalistic.

All these will determine the final piece, but first thing first, take a pen and piece of paper and sketch your ideas in small thumbnails. Think about what you want to see and why you want to show it? If it's not important, there's probably no need to show it.

Just think about “THE MAIN PLAYER’?

- Is it the space? Then show how big it is.
- Is it the design? Then frame it.
- Is it all about the details? Then use depth of field and zoom on objects.

If it's all together? Then take Alex Roman video and learn how he did it.

There's nothing wrong with copying, that's actually the best way to learn the detail. Professional animators always "copy” - they shoot themselves and then trying to recap the movement, of course, they add their style to it, but you got to have references, sketches and storyboard before you start moving your camera.

We can see enough bad examples with: Too fast camera movements, unbalanced framing, wrong aspect ratio and of course “flickering". We'll try to cover the major ones as briefly as possible and then concentrate on the most important - “Flicker-free animation”.

Aspect ratio - There are many different aspect ratios, but the most common ones are; Classic TV NTSC/PAL (4:3), Widescreen (16:9), Anamorphic Scope / Cinemascope (2.35:1)

As long as you're targeting your clip for internet audience, you’d probably use HD 720p or
Full HD 1080p for your renders, so yeah it is a widescreen.

- HD = 1280x720 pixels
- Full HD = 1920x1080 pixels

As far as it goes to slower computers the smart thing to do would be to run all your test renders with half a size of HD, which is 640x360 pixels.

And if we are already talking about animation, our sequences are going to have frame rate of 24 frames per second.

**Frame rate:**

- **24 frames per second:** Worldwide standard for movie theater film projectors.
- **48 frames per second:** Slow-motion photography (because it takes twice as long to play back in a 24 fps projector, the motion is twice as slow).
- **300+ frames per second:** High-speed cameras for a very slow-motion photography (often used for miniatures to make models seem larger on screen).
- **2500+ frames per second:** Very high-speed cameras for special effects such as
pyrotechnic photography and explosions.

**Balanced Composition** - While doing your fly-through animation sequence, your camera might hit weird angles that can definitely ruin observers entertainment. The trick here would be to set one solid move from point A to point B, and make sure that both points (A and B) are in balance. In case you're hiding any weird point while going from A to B, set another key frame and fix this unbalanced angle.

Here's an example of perfectly balance composition - you can click on the image and watch the whole “masterpiece” - made by Alex Roman.

Examples of unbalanced composition you can find in our PRIVATE FORUM, most of them will be addressed to:

- Too much ceiling / floor
- Camera too high / too low (cat angle)
- Object placement - Too many objects on one side vs. too little on the other.
- Too many colors, try to stick to the designers rule of “3 colors”
- Object size - Too big / too small in compare to the rest of the scene.
**Fly-through Camera Path**

Not everyone needs a cinematic pan left/right moves. Some might ask you to do a complete fly-through of entire interior space (which is very old school and almost nobody does that anymore, but it might be important for you to know this option and how to operate it.

In this case we'll use a “spline” and attach a camera to it by using “constraint path” function, in order to determine our camera path - in some cases that technique can be very essential and useful for steady fly-through.

Practice Scenes->french_scene_max2010_constraint_path.max

1. Select Camera and un-tick “Target” - you'll have only camera without “target”.
2. Go to “Motion” press Assign Controller.
3. Select Position: Path Constraint
4. Click on “Assign Controller” -> Select → Path Constraint.
5. Add Spline to be your path.

You can also selects “Follow” and “Bank” under “Path Options” - this way your camera will follow through the path Spline bend and rotate.
**HDRI Lighting for animation**

Some of you that took Stills Production workshop know the method for Lighting Up your scene with HDRI images. In this chapter, we just go through the basics of that method without getting into complete functionality of HDRI maps.

We are always going to use 2 maps for lighting our interior scene:

- We will use high definition, very clear HDRI photo in the “environment” slot for getting realistic background, that way our reflections will look very sharp and realistic.

- We are going to use blurred HDRI map, with lower resolution inside our VRayLight Dome. That image will be used to lighten the entire scene and provide us with nice soft shadows. The more you blur your image, the softer your shadows will become. Lighting strength can be controlled through the VRayLight multiplier.

*Important notes to remember:* if you rotate one of your maps to match better scene lighting the other map has to be rotated in the same angle, otherwise you’ll get a mismatch.
Besides that we always can have additional lights to emphasize better our natural lighting. For example, adding VRaySun (without VraySky), OR adding some extra VRayLights - positioned outside the window. That extra light will throw more particles into the scene and will emphasize the soft shadows even more.

In addition every opening has to have VRayLight on the Sky portal mode - if you don't want these lights to be reflected make sure to tick off the "Affect reflection" and "Affect Specular" in the VRayLight parameters rollout.

The trick is to add all the lights gradually, so you will know how much power each light produces:

1. First, setup the environment HDRI - rotate it till you find proper position for the light and adjust light intensity by increasing “Overall Mult. and Render Mult.”
2. Add VRay HDRI Dome and rotate it's position according to the Environment. Adjust this light intensity within VRayLight properties OR/AND “Overall Mult. and Render Mult.”
3. Add Extra VRayLights outside the window to emphasize better scene illumination. Of course all the openings, such as windows and doors, should have VRay Sky Portals.
Training materials: french_scene_animation.zip - french_scene_animation.max

There's is not one particular way to do it, some scenes will work better without VRaySun, some might need it - it all depends on the scene atmosphere and mood, that you are trying to achieve.

Use a “ROAD MAP” (real photo reference) - it can help you to setup better lighting, at least you will know what you are trying to achieve. Use REAL PHOTO references to tweak your lighting and get similar result, or at least try to get as closer as possible to the Lighting that is in Real Photo.

Our mind are used to trick us by delivering wrong sense of impression - do not rely on your brain to provide you with proper judgment for lighting setup, you might not see the same “mistakes” that you can discover by looking at real Photographs. Enough said, just use references to get more accurate 3D render, and trust me you'll get better results - Plus you will learn much more from observing, analyzing and dialing in to the REAL DEAL!
Flicker FREE Rendering Configuration

Alright, now we have reached the “Creme de la Creme” of this workshop. I'm gonna show you the step-by-step method for calculating “Flicker Free Animation” and explain to you some rules behind that method, so if you follow along, you'll get pretty clean animation sequences with 3Ds Max and VRay. This method is so easy, that you'll be blown away, however, you need to practice it on several scenes to get better understanding of how to use it.

Setup & Render Pre-calculation with Light Cache:
In this method, I'm going to use only “Light Cache” for calculation and rendering the whole sequence, and don't really need to do anything after you press the RENDER button.

Step 1
1. Setup a pure gray VRay material and apply it to all your scene by using Override mtl.
2. Set image sampler to “Fixed” and turn off the Antialiasing, we don't need it.
3. Hide all your window glass, otherwise your scene is not going to get any light.
Step 2

1. Set your primary and secondary GI engine to Light Cache / Light Cache.

2. Calculation Parameters:
   - Subdivs: 1000
   - Sample size: 10.0mm OR 1.0cm (depends on what you are working with)
   - Scale: World
   - Tick on “Show Calculation phase”

3. Reconstruction Parameters:
   - Pre-filter: OFF
   - Use light cache for glossy rays: OFF
   - Filter: NONE

PRESS RENDER
Our task here is to calculate the proper sample size, we don’t want our samples to be really big or really small. In that render, samples are really small and they need to be at least double if not triple size.

Let’s increase our “Sample size” to 20.0mm (or 2.0cm) and render again. The samples are still too small, but it’s slowly getting there.

Let’s increase the “Sample Size” to 30.0mm (or 3.0cm)
Our task here is to get the right sample size, not too big and not too small. At this render the samples are too small and they need to be at least 2 or 3 times bigger.
So go ahead and increase the sample size to 20.0mm (or 2.0cm) and hit the RENDER button again.
The 20.0mm is still too small, we need to increase the “Sample size” to 30.0mm (or 3.0cm) and press the RENDER button again.
This time the sample size turn out to be fine, now it’s time to move to the next step and calculate the “Filter.
Step 3

1. Now we can go back to Antialiasing and switch the “Image Sampler” from Fixed to Adaptive DMC.

2. Now we can calculate the “Filter” by multiplying it a least 6 times more than “Sample Size”.

First, we will do a test with double size, which is 60.0mm, we can see that we get a lot of artifacts, that means it’s too small and we need to increase the “Filter to at least x6 times than the sample size – 180.0mm

The render turn out to be cleaner, but still with quite a few artifacts. That means we need to go higher with out “Filter” values.
Sample size of 240.0mm, turn out to be quite clean - 8 times more than our sample size.

We will stick to that number and move on to the next stage of calculation-the ambient occlusion- in order to get detail to our render.
Step 4
We are going to use GI function to produce ambient occlusion, and the rule here is, it has to be twice bigger (2 times more) than the “Sample size”.

1. Turn on the Ambient Occlusion
2. Set the “Radius” to be 2 times bigger than the “Sample size” which is 40.0mm
3. Increase the “Subdivs” to 24 or 32 - if you want to have clean GI.
4. Increase Light Cache “Subdivs” to 2000 to have better quality and less noise.

The render turn out to be pretty clean, if you want to have better quality and less noise you can increase Light Cache Subdivs to 3000 - but this will also increase the rendering times.
**Rendering Animation**

Now it's time to set your animation sequence to be rendered, and after pressing the rendering button you need to take a walk, because this will take a while :) 

- Unhide your glass windows and do a test render of first and last frames. You might want to tweak the camera and the AO.

**Step 5**

1. Set your “Mode” to “Fly-through”
2. Click brows and save your pre-calculation file
3. Activate: Don't delete - Auto Save - Switched to saved cache - this way the animation will start automatically after the pre-calculation is done.
   - *The Light Cache calculation file will be saved* - *Just in case you need to stop the animation, you can restart it later from the last frame that you stopped.*
4. Activate your passes, if you're rendering any.
5. Set the render from “Single” to “Active time segment”
6. Save output as PNG
7. Click RENDER
You're all set - as I mentioned before, take a walk :) 

- Antialiasing filter is optional - If you're using a rendering farm you can activate “Video” filter option. Other filter that you can use is “Soft” - the rest might not be good because they will produce too sharp image and that might cause jittering. You can always add “Sharpness” in post-production.
Highlights of the method:

- This method can be use for big and small projects as one!
- Easy to setup
- Fast render - under 15 minutes per frame on QuadCore machine.
- Most important - Flicker FREE!
Alright, open After Effects and create a new composition. If you don’t have HD preset; 1280x720 - 24fps. Just go ahead and create a custom one.
Import your rendered sequence;
Make sure that your sequence playback set to 24 fps;
Drag and drop your footage to the time-line.

Now you can start your post work with LooksBuilder and add Photorealism.
  • You can adjust the sequence composition length to match your sequence
**LooksBuilder - Pro post-production techniques**

We are going to use the same method for adding photorealistic aspect to our footage. One of my favorite plug-ins for that will be LooksBuilder. You can get a LooksBuilder for After Effects, and after installing it you can apply it as an “effect” to your footage. After pressing “Edit” you'll get a LooksBuilder UI where you can adjust and add realistic aspects, such as, Chromatic Aberration, Vignette, Film grain.. etc.

- LooksBuilder for After Effects can provide us with much higher variety of effects. However, if your camera moves from one place to another, and not just standing in one place, it is not advisable to use “Spot Exposure” effect, simply because it can look good in one place, but can get overexposed while camera reaches a different angle.
- Another tip will be to experiment as much as possible with different effects and see how they can add to realism of your footage.

As you can see, I used big variety of effects, but the basics always will stay the same:
- I'll start from adding 2 crashes, yellowish and bluish.
• Add LightFlex and Deflare - balance them to get proper contrast.
• Add Color Reversal to enhance colors.
• Then add all the realistic aspects, such as; Chromatic Aberration, Vignette, Film Grain, Soft Edges and Lens Distortion.
• Telecine Net, one of my favorites, add really nice detail and is very similar to curves.
• Fix the colors in all channels by using Ranged HSL
• Add some warm color or some glow, if this is your style.
• And to finalize it, fix Curves.

That's it, you're pretty much done with realism and LooksBuilder.

You might experience a slightly change in color after applying LooksBuilder effects to your footage, this is due to the fact that LooksBuilder doesn't have color profile functionality.

I like doing final adjustments, such as; Curves, Saturation HLS and adding sharpness with regular After effects plugins.
**Additional Ambient Occlusion Pass**

Eventhough we have rendered our sequence with Ambient Occlusion burned into each image we might want to render out an additional sequence of just AO. That way we can add it and have much better result. The reason for doing that, is that “Light Cache & Light Cache” rendering method does not produce strong GI, therefore we might want to have another layer of AO in our sequence.

You can use the same [FREE 3DsMax Plugin](#) from CreativeCrash to render additional AO Sequence to match your footage. Just make sure you are not rendering single image and you are rendering the whole sequence.

There are some rules for using that pass in After Effects:

- Always apply “multiply” blending mode to AO sequence.
- Adjust the “levels” and the opacity to fit AO pass better.
- Adjust color balance to match your global colorization.
You can duplicate AO layer and use it twice to enhance the AO appearance. But this is a matter of preferences and only if you have some extra time, you can render additional passes to improve your animation. When you're done, you can go ahead and render your footage and take it to Premier in order to add sound track and create a movie.

Here's how you can do it:

Drag and drop your footage to “Render Queue” -> Click on “Lossless” and select your “Format” to be H.264 – this is mp4 format and it is most usable in today's media.

Specify “Output” location, where you want to save the file by click on “Not Specified yet” and when you're done click “Render” Button.
H.264 - Is the most famous codec for rendering outputs, however it compresses the quality. So if you want something sharper looking than that try rendering MOV.

I really encourage you to test different output file formats and see what quality you get vs. file size.
**Editing with Premier Pro**

Open a new project in premier, specify footage that will include 720p24 - this is what we have rendered earlier.

Import your footage or simply drag and drop it on your timeline. You can do the same for your music.
Play so you could hear the music – pretty easy stuff!

Now export it by using the same format H.264
AND THAT’S IT WE ARE DONE!

Play that movie and enjoy your professional VRay Fly-though Animation production!

Hope you enjoyed that training - upload your video to youtube or vimeo and share them in our Private forum to get feedback from me :)

If you interested to learn more post-production techniques, you are more than welcome to check our Photoshop Post Work 2.0 Online-training.

All the best!
Alex