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Creating Animation for LightWave 3D in Life Forms Studio 3

Introducing a new way to animate characters for LightWave 3D.

Character Animation is one of the most rewarding albeit challenging type of animation you can undertake as a 3D artist. Now, there is a new way for LightWave users to animate. You'll want to read this document if you are looking for ways to:

- Create more motion intensive projects.
- Apply mocap data to models in LightWave scene files.

This tutorial describes how we set up the project "Vampire-alive!". Vampire Alive was created with a model created in LightWave. Using bones, we applied mocap sequences to a mesh and rendered it in LightWave.

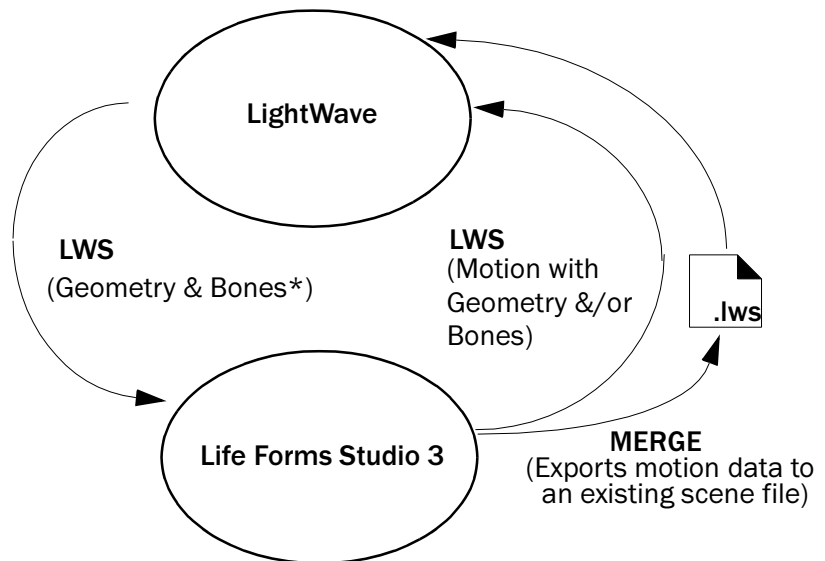
You will need **Life Forms Studio 3.0** and LightWave **5.6**, and of course the **new LightWave plug-ins** from Credo Interactive Inc.

How does it work?

Life Forms imports and exports the LightWave's scene file (.lws). This gives you maximum freedom in your 3D projects. You will be able to:

- Insert motion into existing scene files using the Merge option.
- Use Models and Motions in Life Forms PowerMoves Library for LightWave projects.
- Use LightWave's ability to deform meshes by animating bones in Life Forms.

The diagram below shows how you can move data between Life Forms and LightWave. As you can see, there are many ways to efficiently create a motion-rich scene file. You can begin your project in LightWave by building custom models. Or, you can start in Life Forms by using the models in the Model Gallery and PowerMoves Libraries. You can choose between using bones or segmented models.

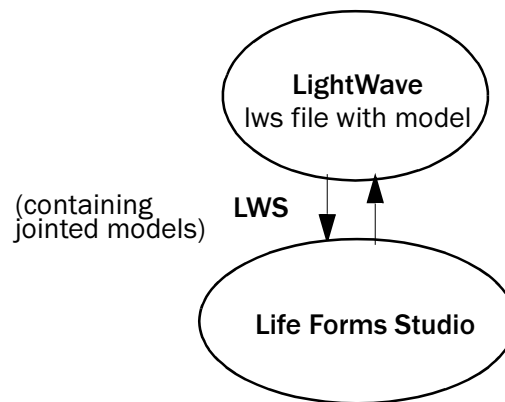


Important Please read the Installation instructions and Release Notes that come with the LightWave 3D plug-ins. These documents contain important information that is specific to the released version of the LightWave 3D plug-in.

Objective

There is no one prescribed way of using Life Forms to enhance your scene files.

This tutorial shows you how to animate jointed models for LightWave 3D. The illustration below summarizes how data moves between LightWave and Life Forms in this tutorial. For other ways of using Life Forms see **Other Techniques**.



Life Forms will animate any jointed model that has been correctly set up in LightWave. Once in Life Forms you can animate models very efficiently by using Life Form's procedural Walk Generator, key-framing and by pasting motion capture data. Here, we'll show you how to apply motion captured skate sequences to a jointed or segmented model. We'll also tweak the mocap data to get the desired results.

Summary

Life Forms will open any polygonal segmented model from LightWave allowing you to animate it quickly and easily.

Important. Please note the following:

- 1 If you have Life Forms Classic 3.0 or Life Forms 2.1 you will need to upgrade to the Studio version to use Life Forms with LightWave.
- 2 You will need latest Lightwave plug-in. Please contact us at info@credo-interactive.com.

Conventions and Files used

This tutorial uses both LightWave 3D 5.6 or Inspire 3D, **AND** Life Forms Studio 3. To make it clear which application to use at each step, the application is given on the left. Sample files are given at the end of the each step.

- Step 1**
LightWave
Setting Up the Segmented Model
In LightWave, you will need build or import a segmented model. Before it can be animated, you must set its pivot points and link each joint to another creating a hierarchy of joints. Remember that all LWO files for this model must be contained in the same folder.
- Step 2**
LightWave
Remove all but one Null root object
Unlike LightWave, Life Forms requires that each model has only one root object. The root's position and rotation is inherited by all the model's joint.
- Step 3**
LightWave
Save the file as a LightWave scene file (LWS)
Before saving the model in a scene file you should turn off all IK settings and remove all frames of animation as these are not read correctly by Life Forms. Save the file.
- Step 4**
Life Forms
Open the LWS file in Life Forms
In the File menu > Open. In the Open dialog box, locate the LWS file and click OK. When the file is open, you are ready to animate the model.
- Step 5**
Life Forms
Apply Motion Capture data
Open a motion captured motion, for example Exercise.lfa in Life Forms 3.0 Demo folder / Tutorial folder.
Copy all frames of its animation. Click in the left hand grey panel in the Timeline window to select all frames and choose Edit menu > Copy.
Click on the **first** frame of the destination file. This positions the insertion point at the first frame. In the Edit menu > Paste Default submenu, be sure that paste Relative Location and Absolute Facing is checked. Choose Edit menu > Paste.
The Joint Map Editor appears to allow you to match the source and destination joints. This tells Life Forms where to paste the motion data. More information about the Joint Map editor is found in the Life Forms User Guide.

Step 6

Life Forms

Repeat the copy and paste procedure to apply the motion data from **HipHop.lfa** (also found in the Tutorial folder) after the first sequence.

Tweaking the Motion Capture data

After mocap is applied to a model, you might notice that mocap may look awkward when applied to a model whose rest position is not exactly as that of the mocap skeleton. For example, if the legs are of the segmented model are slightly a part walk or run animations will be slightly off when applied to that model. You can correct these kinds of problems by using the **Range edit function** to apply a relative rotation to the affected joints. More information about using the Range edit function is found in the Life Forms 3 Demo folder/ Tutorial folder.

You can also add keyframes to smooth out the transition between the two motion capture sequences as we have done. Choose Edit > Insert to insert one keyframe. To insert more, click on the frame **before** which you want to add empty frames. Position the mouse over the Insertion point's handle. When the cursor changes to a double-headed arrow click and drag to insert as many keyframes as you want.

Step 7

LightWave

Merge motion to the original LWS file

In Life Forms, choose File menu > Export. In the Export file type, click the LightWave icon.

- Deselect Bones only.
- Select the Merge.

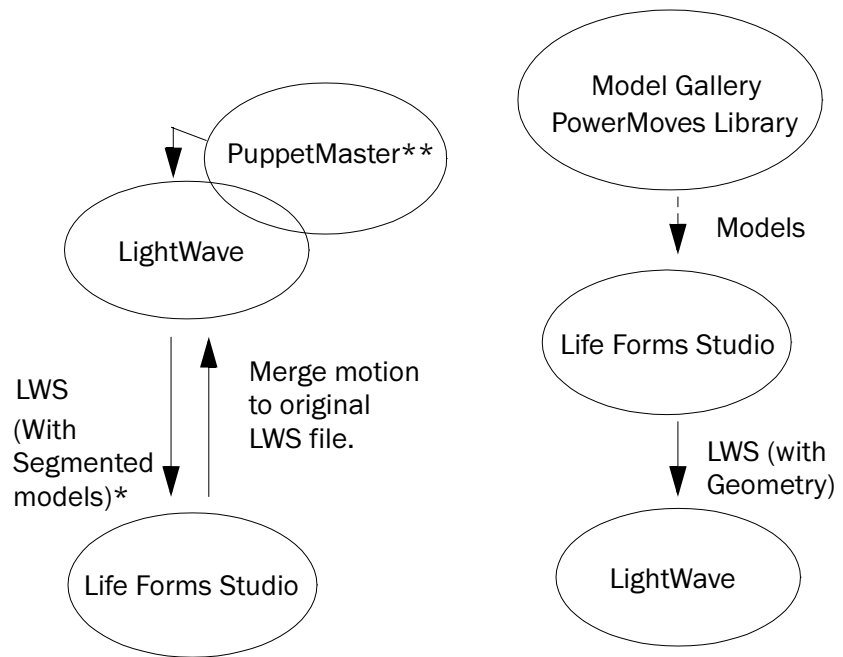
Click the Choose button. This opens the dialog box that lets you locate the source LWS file. Locate and select the file then click Open. In the Export dialog box, click OK to merge the motion data to the source LWS file.

“Merging” data to a LWS file allows you to add just the motion data to the LWS file. All the color, texture and lighting setup in the source LWS file is preserved. If you added other models in Life Forms you cannot choose to Merge. You must choose to export with Geometry.

Using Segmented Models that come with Life Forms

Life Forms reads and writes geometry in the LWS file format, you can bring segmented models into Life Forms for animation. You can also start you project in Life Forms using models from the Model gallery and PowerMoves Library. When you export LWS files click Geometry. This will export the motion and geometry for these mod-

els. The following illustration shows how two ways of working with segmented models.

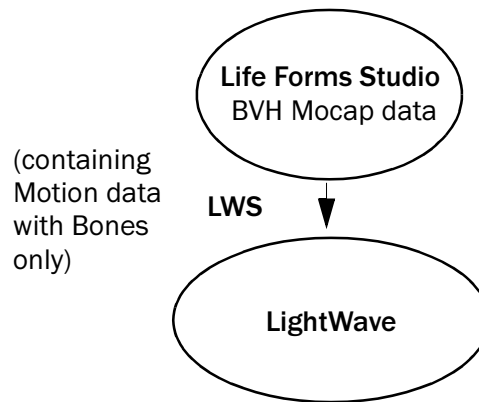


* It is recommended that you delete any keyframes before importing the LWS file to Life Forms.

** **Optional:** PuppetMaster is a LightWave 3D plug-in. It allows you to create segmented models by cutting up mesh models. When you render the animation, it will perform skinning to hide unwanted seams.

Objective

This tutorial shows you how to animate bones for LightWave. The motion of the bones will deform and animate a mesh Vampire in LightWave. The illustration below summarizes how data moves between LightWave and Life Forms in this tutorial.



Boning a mesh

Critical to this tutorial, is knowing how to *bone* a mesh. Setting up bones properly to animate a mesh requires you to have a solid understanding of how Lightwave handles bones (and some patience too). The LightWave User Guide has excellent documentation on how to set bone strength, rest length, and on how to use joint compensation to control the way bones affect the mesh.

Summary

In this tutorial, show you how to bring BVH motion data as bones into LightWave and apply it to a mesh model.

Important. Please note the following:

- 3 If you have Life Forms Classic 3.0 or Life Forms 2.1 you will need to upgrade to the Studio version to use Life Forms with LightWave 3D and Inspire 3D.
- 4 You will need latest Lightwave plug-in. You can download it from the page dedicated to LightWave 3D and Inspire 3D users at <http://www.credo-interactive.com>.

Conventions and Files used

This tutorial uses both LightWave 5.6 and Life Forms Studio 3. To make it clear which application to use at each step, the application is given on the left.

Step 1

Life Forms

Export skeleton in the default position

In Life Forms, select a motion capture file. Clear all keyframes from the animation. Set the bones to have the same default position as the mesh — this is usually legs slightly apart and arms stretch out to the side at shoulder height. Then, export a single keyframe of the skeleton in its default position in a LWS file.

Step 2

LightWave

Replace the Null root object

In LightWave, open the LWS file.

Then, replace the null root object of the skeleton with the Mesh object. You can do this in the Object dialog box by clicking the Replace Object button.

Don't worry if the Mesh is terribly distorted. This problem will be fixed when you set the rest position of the Arm bones.

Step 3

LightWave

Resize the Mesh to fit the bones

Open the Modeler, and get the Mesh. You will now have to size and position the mesh in the modeler. Check each change using the Put button and switch to Layout mode. Make all bones Active to see how the bones interact with the mesh.

Keep resizing and positioning the mesh in the Modeler, and checking the effect in layout mode until you see that the mesh and bones fit together well.

Now you want to save the adjusted Mesh as a new LWO file. Name it so that you know which skeleton to use it with.

Note You may have to zero the rest position of the root bone, or conversely offset the mesh from its zero position.

Step 4

LightWave

Adjust the Bone rest position

This is done by rotating the bones until they fit properly within the mesh. Note down the H, P and B values of the rotation. Open the Object dialog box, and click Object Skeleton. Select the joint then click Rest Position. Enter the H, P, B values and click OK.

Note that the bones no longer distort the mesh.

<p>Life Forms</p> <p>Step 5</p>	<p>Export Motion data from Life Forms</p> <p>Open the motion capture file from which you exported the bones. Export this file, with all its keyframes, as a LWS file. In the Export dialog box, Click Bones only. Click OK to export.</p>
<p>LightWave</p> <p>Step 6</p>	<p>Set the correct Rest position</p> <p>In LightWave, open the Object panel. Click Object Skeleton, select the joint and click Rest Position. Enter the H, P, B values you recorded in step 4.</p>
<p>LightWave</p> <p>Step 7</p>	<p>Apply adjusted Mesh to the motion</p> <p>In LightWave, open the LWS scene file with the animated skeleton. Replace the null object with the adjusted mesh, and voila - you have an animated mesh.</p>
<p>LightWave</p> <p>Step 8</p>	<p>Adjust the Bones strength</p> <p>Refine the interaction between the bones and mesh by adjusting bones strength and rest lengths. Pinching can be controlled using Joint compensation.</p>

File Formats Supported

LightWave

What Life Form's reads:

As Life Forms opens a LightWave scene file it interprets only the information needed to let you animate models in Life Forms. It reads the following data from scene files:

- **Geometry** – both Single -mesh & Segmented (.lwo files)
- **Bones** – any bones you have set up in LightWave

This will mean that you can animate any articulated model in Life Forms that you can create in LightWave, or that you already have in an existing project.

Coming Soon! We are currently writing a tutorial that will show you how to import the bones that you have set up in LightWave into Life Forms for animation, and then how to export the animation back into LightWave to animate a mesh model.

Life Forms will also read any keyframed rotational motion.*

What Life Form's writes:

Life Forms can export animation you created - either by using mocap data, procedurally using the Walk Generator or by keyframing to LightWave. You have several options:

- **Merge the motion data to a scene file** — If you have a scene file that contains objects that were animated in Life Forms, you can merge the animation of those objects to this scene file. This option exports motion without the geometry and preserves other scene elements such as camera, and lights. Texture and colors applied to objects are also preserved.
- **Export Motion with Bones Only** — Exports a new scene file. Allows you to export bones with animation. The benefit of this is that you can attach the bones to a mesh in LightWave.
- **Export Motion with Geometry** — Exports a scene file, creating new object files (.lwo) in the content directory for all models in Life Forms. Note, any bones in the Life Forms will also be exported as objects.

What Life Forms doesn't read or write

What it doesn't read are cameras, lights, textures and colors. When it reads in the model it will ignore any inverse kinematics (IK) settings you've set up because Life Forms has its own IK system. Bearing these factors in mind you should:

- Use the Merge command to add motion data. The Merge command inserts just the motion data to the.lws. The other scene elements are unaffected.
- Organize the project so that you color and apply textures to models, set up cameras, lights and other scene elements after creating motion in Life Forms
- For existing projects, remember to turn off all IK settings and goal objects before saving the file for Life Forms.

Project Constraints

- 1 Models must be polygonal meshes
- 2 Models must have only one null object
- 3 Only the root of a hierarchy may contain translations
- 4 Importing Scene files with Motion data into Life Forms is NOT recommended.

- 5 Merging animation to Scene files that contain motion data is NOT recommended.
- 6 Life Forms does not read Lightwave's IK settings from the Scene file. It is recommended that you disable IK set up and remove goal objects before saving a Scene file for Life Forms.

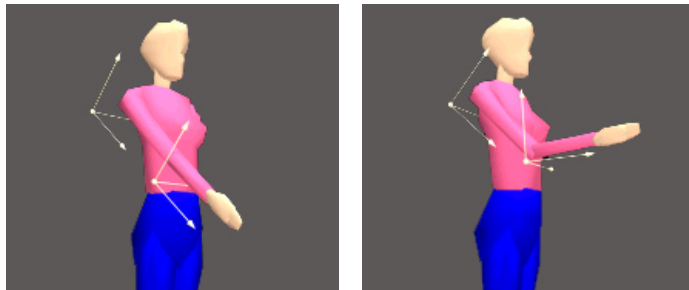
General Concepts

Setting up Segmented Models for animation

For Life Forms can only animated segmented or articulated model properly when the model's pivot points are correct, and its joints are linked in a hierarchy. In LightWave's Modeler, objects can be parented to others to set up a hierarchy. You can also set the pivot point for each object. You should rotate the joints in Layout mode to check that the pivot points are appropriate for the model.

Why Hierarchy is Important

The axis of each joint is relative to the position of the joint. Another way of expressing this concept is that each joint has its own **local axis**. The axes of a joint changes with the position of its parent joint (e.g. the upper arm is the parent of the lower arm).



Some motion data file formats store **relative** instead of absolute rotation angles, for example BioVision BVH format. Relative rotation angles are the angles of rotation given relative to the parent joint's local axes. When motion data is recorded in this way, the model that the data will be applied to must have the same hierarchy as the data in the motion file.

Why Pivot Points are Important

To understand how pivot points affect the motion applied to the model, you have to understand how motion data is described. The position of a joint is described as the angle of rotation around the

joint's pivot point. When motion data is applied it rotates the joint around the pivot point defined in the Modeler. Thus, when the pivot points of the model are wrong, the motion data will rotate the joint incorrectly. It may cause the joints to over or under rotate, or cause joints to break off from adjacent joints.

Important

This document is still being worked on. This document will be updated as more complete information is available. Your contributions and feedback are welcomed. Please send them to info@credo-interactive.com.