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09

LIGHTWAVE 3D®

MODEL | ANIMATE | RENDER

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LIGHTWAVE v9.2
GALLERY



v9.2 SNEAK PEEK
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LightWave v9 Features

Specifications subject to change without notice.

Animation Tools:

General Controls:

- Support fractional frames at make key for IK Booster
- Update Bake-able Match Goal Orientation for IK Booster
- Tool for moving an object on or by an offset distance across the surface of a target mesh.
- A new rotation controller offers quaternion rotations to minimize gimbal lock.
- Tool which modifies a channel based on closest distance between an object and a mesh or other items.
- LightWave's Align to Path command now offers a robust new align-to-path algorithm, unaffected by very slow or no motion. The original Align to Path is still available, and is now renamed to more accurately describe its function, "Align to Velocity."
- Squash and stretch tool
- Motify: Replacement Delete key option. It includes more advanced features, including clearing motions, deleting ranges of keys and deleting keys within a threshold
- Hybrid Inverse/Forward Kinematics engine improving on the industry's most flexible IK system available today
- Free-form and locked IK goals
- Separate animated channels
- Animatable UV coordinates

Relativity 2:

- Point-and-click set-up using "professors"
- Multiple levels of expressions: one object can reference another object with an expression on it, and so on.
- Expressions to react to IK-based motions
- Objects can follow points on other objects and morph between points on multiple objects, allowing higher-level "crowd control" with a series of morph targets.
- Textures can be used for displacement, deformation, color envelopes, etc.
- Functions to measure speed, acceleration, velocity, interpolation, etc.

Motion Mixer:

- Non-linear animation system for blending any curve track inside of LightWave 3D: Perfect for blending motions, endomorphs or any animatable parameter in LightWave
- Load and save Hierarchical Motion (HMOT) data containing all relevant components, motions and channels for a character group
- Position and scale motions and groups of channels in track view
- Quickly blend multiple motion tracks together with user definable curve
- Set Pre and Post behaviors for HMOT behaviors
- Channel editor allows the user enable/disable independent items or channels from each HMOT behavior
- Absolute and Relative Offset motions settings
- Animation baking for full scene or defined range
- Select by Descendants, Hierarchy, Actor or Motion

Spreadsheet Editor / Dope Sheet:

- Allows mass scene changes to be made quickly. Perfect for complex scene management as well as providing a track view time line for dope sheet style timing adjustments
- Edit sections include:
 - Bone Properties: Influence and Effect
 - Light Properties: Basic, Flags, Type Specific, and Shadows
 - Object Properties: Geometry, Morphing, Displacement, Render Options, Render Flags, Edges
 - Motions Options: IK, Controllers and Limits HPB
 - Item Flags
 - Item Names and Statistics
 - Tags
 - Channel Values
- Customizable workspace for selection of editable values and viewable fields
- Multiple list sorting options
- Multiple workspace configurations
- Dope sheet control over time line for multiple track editing
- Define range of frames for Dope sheet editing
- Item List filtering

Graph Editor (Function Curve Editor):

- Completely new Channel Editing System
- OpenGL interface allows editing hundreds of curves and thousands of key frames in real time.
- New features for handling data rich curves such as Match Footprint Time Slice, Key Reduction, Curve Filtering and Key Bins
- Multiple curve types (Linear, Bezier, Stepped, Hermite Spline, TCB) allows for multi-select and editing of heterogeneous curve types - includes key roll option, interactive key copy, and much more
- Track Layout's selection option, automatically updates current selection of editable curves to match selected item
- Curve View allows collapsible curve list and options sections to provide optimized space for curve editing
- New Lock Motion Keys in Time provides quick method for locking channels for '5.6 style' curve editing
- Customizable key editing behaviors and interface
- Production designed behaviors and options
- Interactive spline tangent (t,c,b) adjustment

Motion & Displacement Controllers:

- Modified bones deformation algorithm reduces cross talk between bones and provides a more natural deformation of skin surfaces without any point assignment required
- Spline-based motion and deformation
- New bones system with support for direct vertex assignment and soft influence as defined by user-created weight maps
- Facial animation tool with Endomorphs and Motion Mixer. Users can embed morph positions into the model file and blend between them in a non-linear fashion
- Follower channel modifier to link any items channel to another
- Oscillator channel modifier allows sinusoidal motions to be automatically generated with control of phase, time offset and damping
- Texture motion provides a method for adding a texture to a motion path
- Displacement of geometry along normals, in 3D space or along a specific axis - multiple layers allow combinations
- Integrated Sub-division Bump Displacement creates an accurate displacement of vertices on the surface at the time of subdivision creating very natural, high definition geometric bumping
- P.A.V.L.O.V. (Parameterized Animated Values Linking Objects and Variables)
- Integrated expressions engine and channel repository allowing all animated items in a scene to be referenced, link, or drive one another; also allows surfaces to be modified based on various input parameters or even linked to motions or any other envelope in the scene
- New Bone Editing Tools will make character rigging a snap. The Bone Edit tools consist of Joint Move, Tip Move, Bone Twist, Unparent Bone, Bone Split, Bone Connect, Bone Fuse, Scale Hierarchy, Copy Hierarchy, Mirror Hierarchy, Rename Hierarchy, Delete Hierarchy, Delete Bone, Align Pitch, Record Pivot Rotation, Remove RPR, Remove RPP and Bone Edit Mode.
- Import/Export RIG functions give you the ability to reuse and share rigs from object to object, via the new .rig file format.
- Bone Edit Mode allows you to edit your character rigs quickly and easily within the scene you are creating.
- Bones On/Off activates/deactivates all bones in all loaded objects.
- IK Booster allows for one-click IK setup and has intuitive tools to help with setup of constraints
- New Morph Mixer offers faster performance and an incredible range of control for object morphing, including character animation, in an intuitive interface. The user now has the ability to organize morphs into groups and display morph information and controls in a variety of ways.
- JointMorph Plus is a displacement handler for Layout. It uses the angle of a control bone to drive morphs, without using expressions.

Particle FX & Dynamics Systems:

- Faster Loading of Dynamics Scene Files
- Better Workflow with Access to Dynamics in the Scene Editor
- Improved Solving Precision
- More accurate representation of wind vector fields in Layout
- Animation Paths for Winds
- FXDynamic-Linker links objects to particles with smart routines that reduce memory requirements
- Particles have a new operation control -- random rotation and scale. This is also passed on to HyperVoxels, as noted above.
- Added a "Save All Selected Motions" option
- Soft body dynamics for cloth, hair and other simulations
- Preset cloth settings for quick application of various "materials" such as rubber, silk, cotton, etc.
- Integrated particle system for explosions, fire and smoke, using wind, gravity and collision effectors
- Simple fluid dynamics and crowd simulation with new interparticle collision calculations
- Particle spawning from parent emitters allows a single particle to become a complex emitter
- Collision spawning allows collision events to create new particles with independent attributes
- Effects grouping allows users to isolate particular wind, gravity, collisions and emitters to affect or disregard each other
- Change Group mode for collisions will force particles into a new Effects Group after collision
- Nozzle types (cone, surface, line)
- Texturing of wind power, particle velocity and wind direction
- Particles are generated with such properties as size, weight, resistance, lifetime, vibration and adherence to the motion of the parent item
- Wind types include: direction, explosion, rotation, cylinder-explosion, doughnut, turbulence, vortex, path, sticky, random, hemisphere and drag
- Collision detection with primitives or polygonal and subdivision surface LightWave objects
- Object and scene linking to particles - attach items or complete hierarchies to particles. Perfect for flocking and swarming actions
- Textured and enveloped birth rate for particles, with emission from pre-defined shapes, object vertices,

normals and textures

- Rigid Body Dynamics
- Improved Soft Body Dynamics
- Improved Cloth Dynamics
- Bone Dynamics work similar to the other dynamic tools in LightWave 3D v9, but are applied to bones instead of geometry.
- Improved Particle System Tools

Rendering:

- Implementation of BSP/KD Tree Algorithm to achieve improved speeds as scene complexity rises
- Complete replacement of the original ray tracing core
- Any function that uses ray tracing calls will be significantly faster in most cases
- Improved multi-threading with dynamic segmentation to insure maximum use of available CPUs
- Typical speed improvements at 2.5x over LightWave version 8.5 for today's increasingly ambitious high-polygon count production scenes
- Added Adaptive Sub-division methods - Per Object, Per Polygon and Per Pixel
- Highly optimized mesh, tied to render resolution when using Per Pixel
- Visibly similar to micro-poly displacement
- Improvements to Sub-division surfaces
- Support for both LightWave Subdivision Surfaces and Catmull-Clark Subdivision Surfaces
- Subdivision level can be controlled via numerical values, envelopes, expressions, motion modifiers, textures, procedurals, gradients and more
- Material Shader Node Editor
- New Shading Models
- Normal Maps from Z Brush 2 Supported
- Branches can be imported and exported
- Math Animation Nodes
- Animated Gradient Node
- Work how you want to work: Layers in Nodes; Nodes in Layers; Layers Only; Nodes Only
- Full support of native controls and envelopes
- Available in Layout and Modeler, and maintains context when switching between the two
- Full SDK Support for third parties to create nodes (including shading models) and for third party renderers to interface with / query nodal shaders.
- Node-based displacement
- Camera plane deformations
- Arbitrary projections
- UV map generation
- True orthographic rendering
- Space warp simulations
- Lens distortion duplicating physically accurate real world lenses or non-existent "imaginary" lenses
- 360 degree panorama rendering (one camera)
- Timewarp shader for
 - Bullet-time
 - Freeze-time
 - Slow-motion effects
 - Fast-motion effects
- A shader that paints a view of the scene on a surface
- A shader which stretches and squashes HyperVoxel particles based on particle properties and distance between particle and mesh.
- Filter for enabling a render to be post processed with a sketch-like treatment.
- Buffer Output to RGB can now handle Z Buffer values correctly. It also supports invert for screen mode now.
- Computation of Z-Buffers for classic anti-aliasing modes has been improved
- New fog mode generates realistic fog that supports transparent, refractive and reflective objects inside the fog.
- "Unaffected by Object" Alpha Channel mode is now implemented for ray-traced transparency and the new camera modes.
- A new tool which modulates bump amplitude based on degree of dynamic local mesh deformation to create wrinkles on bending joints or alter the color of a surface based upon polygon distortion.
- Sasquatch Lite: Hair and fur rendering using Sasquatch rendering engine, also excellent for grass and foliage. The Sasquatch engine is the fastest, highest quality hair renderer in the industry
- SkyTracer 2.0: Includes completely new, streamlined user interface. Incorporates VIPER and Preset shelf. Utilizes "SunSpot" control allowing users to enter specific time, date and global position to get universally accurate sun positions
- Digital Confusion: New Depth of Field filter that quickly and accurately adds depth of field effects to rendered imagery. Special features include, rendering of hidden geometry for accurate background blurring and optional iris shapes for matching various camera styles
- GL previews of sprites provide users a real time preview of complex sprite based HyperVoxels. Choose between procedural textures or image maps. Useful for smoke, fire or creation of forests and other instance style scenarios
- HyperVoxel texture effects modes for "Dissolve and Expand" and "Velocity Translate" simplifies creation of realistic smoke and fire
- Sprite mode for volumetric lights reduces render times up to 500%
- Soft reflection
- Soft refraction
- BESM (Big Eyes Small Mouth) shader for cartoon style rendering. (As seen on Nickelodeon's *Invader Zim!*)
- Gmill ray accumulation shader approximates radiosity effects on a selected surface
- Voxel Baking for Volume type HyperVoxels. Users can now bake volumetric clouds for incredibly fast rendering and real time OpenGL previews
- Baking of color, illumination, shaders, radiosity, caustics and diffusion into UV-defined image maps or point

maps

- Over 320 bit IEEE floating point rendering pipeline- the expandable pipeline accommodates a growing list of optional buffers, such as reflection, x and y motion, geometry, shading and depth
- Radiosity - calculation of bounced lighting for global illumination with production speed.
 - Backdrop only method for fast global illumination style renders
- Caustics - fast and accurate light reflection and refraction
- High Dynamic Range Imagery for producing accurate lighting models using images as light sources
- The industry's first Flexible Precision Image format
- Improved anti-aliasing
- Integrated volumetrics with HyperVoxels technology
- Subdivision surface rendering
- LightWave Virtual Darkroom technology to simulate film and print exposures
- Shading noise reduction improves shadow quality with lower render times
- Rendering up to 16,000 x 16,000 pixels
- 3 motion blur types: time stepped, vector based and hybrid
- 22 image / animation formats, including QuickTime
- QuickTime VR and VRML output
- True volumetric pixels for creation of fire, smoke, water and other organic effects
- Direct integration of HyperVoxels with particle system
- New render options panel
- Distant, area, linear, spot and point lights
- Comprehensive lens flare system
- 3D textured, animated volumetric lights
- Option to ray trace non-refractive transparency
- Infinite layers of images, sequences, procedurals, gradients, and video
- Infinite layers of UV maps
- Layers can feed into each other for texture blending and manipulation
- Animatable surface attributes
- Translucency
- Glossiness mapping
- Multiple specular highlights with user definable colors with BRDF
- Surface/object based light exclusion
- Gradient textures allow texture values to be based on distance to objects, slope, bump height, camera/light incidence, and more
- Anisotropic specular reflections
- Unlimited network rendering licenses (per platform)
- LWSN log file for debugging renders
- Expanded command list in LWSN for third party render controllers
- Render speed enhancements
- Render Arbitrary allows you to enter the specific frames you want to render, in any combination of individual frame numbers and ranges, delimited by commas. For example: 1,10,19-40,60-100,120 would be a valid entry.
- DirectShow filter allowing .flx images and animations to be displayed in Windows Media Player.

Layout Workflow & UI Enhancements:

- Many modeling plug-ins now operate in Layout
- Use Vertex Paint in Layout to modify vertex maps
- Create Text in Layout
- Much faster UI performance
- Preview Lighting scenarios within the UI
- Less need for preview renders
- Hardware shading of materials and textures
- Hardware shading of procedural textures
- the ability to change colors of almost any element; the ability to create special tabs with user defined commands
- the ability to change the colors of animation channels
- the ability to customize display and selection colors of points, edges and polygons
- the ability to control the display of polygon normals beyond what was previously available
- Create a Standalone Image viewer
- Create an Embedded Image viewer
- View texture images, renders, preview renders
- View as many images as you have memory for
- A new configuration preset called "Studio Production Style" is now available. This is based on menu configurations developed over the years by VFX artist Richard Morton, and used at Station X, Digital Domain and other studios and artists worldwide.
- Initial Configs are now created when the application is first run, instead of by the installer, including automatically scanning plugins.
- Added user option settings for scanning plugins automatically, and for setting the number of rendering threads upon first launch of Layout or Modeler if the config file doesn't exist.
- Customization changes now affect the config file without requiring a shutdown of the Hub.
- Improved logical grouping of elements
- New default options available for new and previously existing features.
- Path default options now available
- Reduced footprint with tabbed sections
- New Render Status Panel
- Render Globals Panel, consolidating features into one
- Layout Scene loading logic redesigned to improve loading time for scene
- Scene Editor loading logic redesigned to improve loading time for scenes using the Scene Editor
- VIPER (Versatile Interactive Preview Renderer) - users can utilize this new preview system to make rapid

changes to textures, lights, backdrops, volumetrics and HyperVoxels without performing a complete re-render of the scene; changes to these various parameters will automatically update the preview

- Visual preset manager for storing and retrieving volumetric lights, surfaces and HyperVoxel settings
- Schematic view - node-based viewing and editing of hierarchies and dependencies
- Schematic view tools to allow automatic organization of items and multiple view options.
- Favorite sets for camera settings
- Item Active flag in Scene Editor allows items to be quickly deactivated from rendering and other calculations
- Select hierarchy (Layout)
- Turn on/off XYZ, HPB (Layout)
- Non-modal windows
- Visual presets manager for storing and retrieving volumetric lights, surfaces and HyperVoxels settings graphically
- Multiple coordinate systems - World, Parent and Local axis editing, which resolves Gimbal lock and allows for item-relative editing
- OpenGL transparency, lens flares, reflectivity, safe areas, field charts and camera masking
- Targeting indicators in Layout views
- Representation for DOF in Layout views
- Weight shade mode (bone influence in GL?)
- Option to disable deformations. Improves interactive operation speed
- Item on/off mode in scene editor
- Center selected item as a button on viewport pane(s)
- Scene/ Preview frame ranges easily accessible
- Edit frame range easily accessible
- New render progress display
- More detailed memory use stats
- Recently opened files command
- Special top group for menu layouts
- General OpenGL optimizations
- Copy/paste in server panes
- New Scene Editor with integrated Spreadsheet and Dope Sheet allows for quick and easy viewing and editing of the item and surface properties in your scene, including fast and easy operations on multiple selections.
- Dope Track is primarily a tool for easy moving of keyframes for the new IK Booster, but with handy access to other keyframeable parameters as well. Baking keys, and Soft Applying are also possible.
- Node-based Expression Editor
- Envelope Contextual Menus allow faster access to edit operations.
- Move TCB allows direct manipulation of Tension, Continuity and Bias in the main Layout viewports.
- MultiMirror performs a Mirror operation on the selected items in the scene.
- Multi-selection of Texture Editor Layers

Modeling Tools:

- Phantom subpatch point selector allows users to click directly on the subpatch curve intersection for editing
- Airbrush between morphs
- Productivity Modeling tools: "Aligner", "Sizer", and "Dangle". These modeling tools are great for modeling to scale as well as relational modeling between multiple objects. These are particularly useful for industrial design application
- Rail Modeling tools allowing interactive scale, rotate and stretch based on new curve tool
- Simultaneous selection of up to four weight maps in the Vertex map window; represented in weight shade view style
- Real time subdivision surface modeling
- Convert between polygons and subdivision surfaces at any time during the modeling and animation process
- Intelligentities with Endomorphs, Skelegons and MultiMeshes
- Endomorphs allow morph data to be stored in the object file so changes can be made to the base model without disturbing targets
- Skelegons - radical new skeletal creation tools, allowing creation and editing of bones within geometry
- MultiMeshes provide a layered object format with unlimited layers
- Atlas mapping - automatically generated UV maps that virtually eliminate texture stretching
- Animatable Metaballs, Metafaces and Metaedges
- Direct control over polys, vertices and patches
- Color data can be painted, assigned or baked into each point of the model file (Vertex Shading)
- Symmetry tool for rapid creation of characters
- Export of wireframes to EPS format
- Export 3DS, DXF, OBJ, VRML
- Import EPS, 3DS, OBJ, DXF, FACT
- Face Collapse command
- Rounded edge box tool
- Snap rotations to 15 degrees from rotate mini-widget
- Color wireframes
- Orthogonal and perspective view modeling ports
- UV mapping controls with infinite layering
- VMAP symmetry editing
- Move/Rotate tool (Rove)
- Flatten layers
- Save layers as object(s)
- Star Sphere creates a cloud of one point polygons, with a variety of control options.
- Translate Plus allows you to use a point's normal, a segment, or a segment's normal to define how to move, rotate, scale a selection. You can even just use global X, Y, or Z. Each of these operations can also be done with a falloff.
- Move Plus adds translation along local normal or averaged normal using the right mouse button.
- Segment Scale allows users to move points along an edge.

- Point Normal Move allows you to select the points you want to move on their normals, then click and drag on the screen to move them in and out.
- Cut is a general-purpose, interactive cutting tool which cuts from edge to edge. A variety of special purpose variations with preset parameters have been made available to the user as well: Quick Cut 1,2, and 3, Quick Saw, Quick Saw Double, Quick Saw Term, Quick Saw Double Term.
- Divide will divide edges into two segments based on point selection. Also has polygon mode for splitting polygons.
- Make Pole triangulates all selected polygons with a pole at the center. Can be used with the Fix Pole tool to open up geometry for manipulation.
- Extender Plus allows you to select an unordered group of points, automatically reordering the polys it extends to face the proper normals and detects when it should loop and when it shouldn't (point mode). Performs a quick grouped polygon extrusion without providing an interactive interface (polygon mode).
- SuperShift is an interactive tool to smooth shift and bevel polygons. Can work with averaged normals when shifting or scaling.
- Bridge Tool easily joins selected sets of polygons to reshape a mesh with bridges or tunnels, or join meshes.
- Edge Tools are used to split and modify polygon edges. When the tools are activated, handles appear on polygon edges that can be drawn between and moved to create a set of polygon splits. Will also remove and reduce edges, healing the polygon splits. All tools have real-time feedback and numeric controls.
- Fix Poles will take a group of connected triangles which share a point, and create a bevel which will help smoothing.
- Fix 3-5 will turn each pentagon next to a triangle into two quads.
- Rotate Skelegons allows you to quickly adjust the bank handles of skelegons as well as preview rotational deformations (this includes the deformation of sub-patches).
- Create JointMorph works a lot like Rotate Skelegons but is helpful when creating endomorphs for joints.
- Improved Aligner, Sizer and Dangle tools.
- Vertex Map panel now has buttons for Color Map and Selection Sets, and a variety of other new controls. The ability to right-click and create a new Vmap has been added.
- Enhanced "Make Polygon" tool that works in Symmetry mode and will also close holes in geometry.
- Particle2Partigon turns selected particles into partigons.

Modeler Workflow & UI Enhancements:

- User customizable interface
- Contextual pop-ups
- Beginner, Intermediate and Expert modes for warnings and system messages
- Edge support
- Edge weighting for sharp corners without adding additional geometry
- N-sided polygons, or polygons with more than 4-sides
- Center Pivot tool
- Toggling of subpatch modes while maintaining selection
- New improvements to Multishift
- Non-modal windows
- Switch view modes only, using keys
- Revert Object command
- Alpha value for airbrush
- Intelligent Backdrop Image determination based on surface and textures
- Recently opened files commands
- Better 2D snap
- A new "-p<path>" command line option has been added to allow selecting a different plug-in database file. The path string can be either a directory or a complete filename
- Improved info window
- Point indices in info dialog
- Share rotations in focus
- Apply RGB maps to surface when creating
- Select Loop works like point belt selector or other point loop detecting plug-ins or like Bandsaw's selection when used in polygon mode.
- Select Poly will convert your point selection to polygons by retrieving all the polygons enclosed by the selected points.
- Select Points will convert your polygon selection to points by retrieving all the points making up the selected polygons.
- Select Outline gets rid of all the inner points in your selection and selects an outline bordering those inner points (point mode). Selects an outline of all the polygons you have selected, not selecting the inner points (polygon mode).
- Select Ring will select a pair of loops along two selected edge points.
- Invert Connected will only invert the geometry that is connected to the selected geometry.
- Clone2 Layer has the ability to place clones in multiple layers.
- Insert Layer inserts a layer in between two layers, shifting the layers down the layer list.
- Delete Layer deletes the selected layer and shifts the layers after it up the layer list.
- Object Collapser takes all selected layers and condenses it down into one.
- Min/Max widget for each viewport.
- Expanded view modes drop down menu.

SDK:

- Node Graph SDK, including the functions needed to add more shading models
- Access to information about new camera types
- Access to additional information from volumetrics
- The AnimUV, Camera and Nodes plug-in classes have been added to the support list of the LScript Object's server() method.
- Config files now allow loading and saving of double-precision integers (formerly only allowed floating-point)
- Modeler SDK updated with extensive list of new functions and improvements, including support for edge

information for plug-ins, and elimination of redundant scanning for successive edit operations

- Many more improvements
- LScript - Powerful integrated scripting system
 - Custom object class
 - LScript command window
 - Method for installing scripts as toolbar buttons
- More complete command set and globals
- Load and save commands for servers
- Context menus in panels
- Public Hub API so that third party applications can communicate directly with Layout and Modeler
- New SDK commands and options
- New LScript Commands and options
- Expanded command list in LWSN for third party render controllers
- New communication facilities for sharing data and parameters between Layout/Modeler and plugins, and between plugins.

General Workflow & UI Enhancements:

- Inline Help System links to the local Help Files that install with LightWave v9 - the complete reference manual in an easy to navigate HTML structure - or to NewTek's web site, offering tips, downloads, and tutorials, which are updated and extended regularly.
- Enhanced OpenGL with new modes and options and optimized speed.
- Speed and Workflow Optimizations including faster rendering, faster IK, faster dynamics calculations, faster OpenGL performance, new workflow oriented menu layout, and improved viewport manipulation.
- Incremental Saving and Autosaving for Modeler and Layout. Auto-saving of scene files via the Hub.

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