About the Cover

Building Terrain from Pebbles to Mountains

Gary Singh

Latvian artist Armands Auseklis swears by Pandromeda's MojoWorld fractal terrain-modeling software, not just because he's an employee, but because MojoWorld also lets his imagination take the reins. "The application has a completely different philosophy than other programs," explained Auseklis. "You can build your world. You can explore worlds built by other users. You can share your discoveries and made log files for others. In other 3D programs, you have to deal with a single patch of terrain and then build your scene. For example, you place a patch of grass in the foreground, then make a few not-so-detailed patches of boulders, stones, and cliffs a little further, and add big patches of terrain off in the distance. All that exists only in one certain direction, to where the camera is pointed."

Mojoworld lets Auseklis build not just a patch of terrain, but a whole globe in Earth scale. It gives him full control over the shapes of continents or grains of sand at beaches. "You can spend your whole life trying to catch your beach scene" he exclaims.

Fractals—the base functions for all textures in MojoWorld—make all this possible, whether it's a terrain, color, or material texture. It was this particular aspect of MojoWorld that sold Auseklis. "No more bad, triangular terrains, with unlimited details everywhere," he said. "That captured my mind. I can build my world from little pebbles to mountains, make my seasonal changes over time, and remove polar caps to the equator. I can create my own atmosphere model of multiple layers of fog and clouds—with three suns, if I wish."

1 *The Curve of Cold.*

Blues Machine III

Except for a little postprocessing in Adobe Photoshop, Auseklis created the cover image—*Blues Machine III*—entirely with MojoWorld. Working on a 1.4-GHz Pentium IV with 512 Kbytes of RAM, he played around with MojoWorld in his spare time at his previous job. He had been dissatisfied with other 3D programs, when Ken "Doc Mojo" Musgrave gave him a sample copy of the software and invited him to beta test it.

"*Blues Machine III* was the result of play and fun, and the chain reaction of changing, adding, and removing various parameters in Mojoworld Generator User Interface," recalled Auseklis. "It started by testing the capabilities of Mojoworld's material-displacement option—you know, when material can impact on an object's 3D shape. It's like bumpmapping, but not exactly. In this case, the object was terrain and the expected result was overhangs. Usually, you use displacements in Mojoworld to give a 3D look for materials, like boulders, sand grains, strata for terrain, waves for oceans, and so forth"

At first, Auseklis made the terrain as simple as possible with step-like walls, primarily because displacements will appear better that way, but also because he didn't want to spend time rendering artifacts. But the result's rendering speed was so good that Brian Sharpe, one of Pandromeda's engineers, even made a fly-by movie from it.

"The displacement texture was based on altitude—it was mapped vertically," said Auseklis. "This way, I got wave-like 3D texture on walls, pushed out or engraved terrain strata-like. My point was to get very large displacements without rendering artifacts, which usually appear in these cases. It was quite fun to torture the terrain with displacements that were larger than some features of the terrain itself."

Then came the Photoshop postprocessing. "Usually, I tweak the rendering and gamma levels, just playing to see what I can add to the image. For *Blues Machine III*, I adjusted the contrast with the help of levels to remove excessive haze in the original rendering, then added

more saturation and other things until I felt that nothing more could be changed."

Working the Mojo

Both *The Curve of Cold* (see Figure 1) and *The Final Mushroom* (see Figure 2) came from worlds created for MojoPack, a resource CD of world files, plants, and USGS Digital Elevation Models available from Pandromeda. Auseklis redid *The Curve of Cold* from an older snow and ice world titled *Point of Congelation*.

"I wanted to create a cold world filled with snow and ice canyons, shaped with some kind of curves for sky, terrain, terrain displacement, and ice. Actually, I spent a lot time for this world, because many times results didn't match my feelings about how such a world should look."

Auseklis then tweaked the lighting with Photoshop, adding sun flares with Corel's PhotoPaint. "Finally, it came out as a cold fantasy world with black ice and strange cliffs," he said.

The Final Mushroom, on the other hand, comes from a MojoPack world called SineWarriors, which is available free on Pandromeda's Web site (www.pandromeda.com). SineWarriors uses lots of textures based on sine functions, hence the title.

"I wanted to create rows of strangely shaped figures, sunken in a weird transparent ocean," Auseklis explained. "Again, it was fun to create large material displacements that actually forms these figures. There even are controls—sliders—built in, with which users can achieve mushroom-like shapes."

With *The Final Mushroom*, Auseklis wanted to spruce it up somewhat and make it sexier, so he looked for better point of view and lighting. "I found the final rendering meaningless, so I played around in Photoshop with KPT6's Materializer plug-in to achieve a drug-inspired look."

Minarets of Fallen Wizards (Figure 3) is yet another example of Auseklis' work with MojoWorld. For postprocessing, he used PhotoShop and PhotoImpact for gamma, lighting, clouds, and shining.

Current and future projects

A recent Pandromeda project found Auseklis working some 10-second-long animations for the National Science Foundation. In developing an instructional videotape about fractals for the classroom, he created a few short MojoWorld animations to show that fractals are a good language for describing nature. This is part of an NSF project to create a large Web site to teach fractal geometry—see http://classes.yale.edu/fractals/index.html. "Before then, I never did serious animation, so that was great experience," he said. "Currently, we have plug-ins that let you do some really cool things in MojoWorld, like camera paths and so forth. It's great that there are people who can use a SDK to write such tools!"
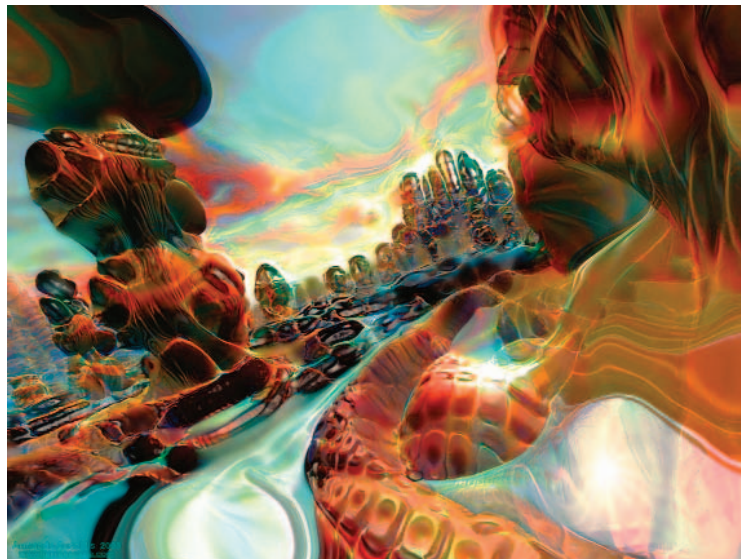
2 *The Final Mushroom.*

Auseklis is excitied about MojoWorld's possibilities. He plans to explore the power of 4D fractals—fractals that have a time dimension—to make animations. He explains that everything in MojoWorld can be animated and the simplest thing is a cloud combination. "A cloud layer moved by wind plus animated 4D fractal itself is a killer view! Satellites can be moved in orbits; waves can move to shore. You can make a movie about an upcoming snow age. The possibilities are endless!"

Right now, Auseklis is still working on the next version of MojoWorld, which he hopes will give him more time to create his next round of images. "MojoWorld is still for future processors. Also, there are some math-related problems in Mojoworld that I hope will be removed in further versions." ∎

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3 *Minarets of Fallen Wizards.*