Meet Autodesk

Kamal Mistry on XGen, a new tool to curb complexity for creating surfaces like hair, fur, and foliage.

Kamal Mistry is senior product manager for Autodesk® Maya® software. Kamal has worked as a technical director and artist at Pixar, working on films that included *The Incredibles*, *Cars*, and *Ratatouille*. For the past five years, Kamal has been leading a team of Autodesk product managers that drive innovation for Autodesk Media & Entertainment products. We recently interviewed him about XGen, a comprehensive system for generating arbitrary primitives on a surface.

XGen gives artists a solution that can create a lot of visual complexity very quickly. For things like forests and foliage or hair and fur—things that involve lots of objects—you don't have to create each object one by one. You can just paint along a surface, place locators, or set some rules, and XGen will very quickly generate all that complexity for you.

Can you tell us about the technology behind XGen?

XGen is able to quickly generate complexity through a technique known as render-time procedural generation. This technique uses algorithms to generate geometry only at render time. When you do this, only the area being rendered will load up geometry, reducing memory and computational load. In other terms, we defer the creation of scene complexity to the software renderer, as opposed to handling it in the DCC tool. When you want to create high levels of complexity, you need render-time procedural generation to get around the limits of what a computer can do. For this reason, high-end studios have been using the technology in XGen in movies like *Tangled*, *Bolt*, and *Toy Story 3*. We're really happy to bring this technology to our users.

How does XGen technology integrate into Autodesk Entertainment Creation Suite's production workflow? Is it a plug-in or is it fully integrated?

XGen is a plug-in that's integrated into Maya, so you do not need an Entertainment Creation Suite to be able to use it – though it can help. XGen is designed to interoperate with the software in the Entertainment Creation Suite. If you own the Suite, now you've got Autodesk® Mudbox® software and its sculpting and painting capabilities. For example, a

What is XGen technology? Can you give us a little background?

XGen is a set of tools for Autodesk Maya that generates arbitrary primitives along a surface. Those primitives can be hair strands, trees or even roof tiles. This can help expedite the creation of complex surfaces such as flowing hair, dense foliage and thickly forested hills—basically anything that repeats a given geometry along a surface. The technology was originally developed at Disney Feature Animation to solve the challenge of creating rich detail for movies like *Bolt* and *Tangled*.

What are the key challenges that XGen helps to address for artists?

The biggest challenge XGen solves is the efficient handling of massively complex scenes. In the past, if you had to create a massive, detailed forest, loading the scene into Maya (or another 3D software) might be cumbersome depending on your workflow. It could take a long time, and the scene might become slow to work with and manipulate. Then, when you needed to render, you might wait around a long time for the computer to finish, and sometimes, the computer would crash because it ran out of memory.

workflow where you start with Mudbox and sculpt some kind of cool alien tree and then you bring that tree into Maya and use XGen to assign it as something you want to instantiate along a surface and paint it in. When you hit Render, you get the final results.

Is XGen part of a larger initiative for Autodesk Media & Entertainment?
Yes. If you look at Hollywood films today, you really see this amazing visual complexity. Worlds are getting bigger and everything you see on the screen is much more complex. I think there's a lot more room for growth, where you'll require a lot more visual complexity to create every pixel of the big screen.

Autodesk tools need to be able to scale to handle that kind of visual complexity. For the last few years, we have been overhauling Maya and making it capable of doing just that. We've been chipping away at this problem, and XGen is yet another way that we would like artists to be able to generate these massive amounts of data. And this is a much bigger initiative than XGen itself.

Where do you see XGen technology being used in the future?
I think there's a great future for XGen because of its modular nature. XGen exists in Maya right now, but I could see the solution appearing in some of our other DCC software, as well as maybe AutoCAD® or Autodesk® Revit® software. Wherever people want grass and vegetation, they could use XGen. And I think that render-time procedural generation can be used in other sorts of tools as well.

Large film studios like Disney and Pixar are using XGen, but we think the solution can extend beyond film. For example, game studios can benefit from XGen as well. In fact we've been working with game studios very closely. XGen is a fundamental kind of tool that modern day artists need to create the visually complex imagery that audiences are beginning to expect.

Was it easy to take in-house production technology and make it into a tool everyone can use?
A lot of times, in-house tools are highly customized and deeply integrated into a production company's workflow. They often require access to specific file formats, store files in specific locations, or talk to specific implementations of asset management tools. So, we have to extract these dependencies. And often high-end studios are used to having experts on staff so tools can end up being highly technical and not very intuitive, whereas, we need to cater to a broad gamut of technical ability among our users. So, we need to make sure that our tool is usable by all.

Implementing any tool into Autodesk software and making it easy to use from a user interface and experience standpoint is always a challenge. We spent a lot of time and resources on the implementation of the XGen technology to make the workflows easy to use, while still keeping the power of XGen in place.