

# SpeedTree® In Avatar

Rarely has a movie studio been under more pressure to get the vegetation right.

It was late spring in 2009, and Industrial Light & Magic (ILM) had just been asked to get a planet's worth of virtual vegetation designed and rendered – quickly – for a science fiction film due in theaters in a short six months.

The customer? The famously exacting James Cameron, director of some of the biggest feature films of all time.

The movie? *Avatar*.



Richard Bluff, ILM Digital Matte department Supervisor, was in charge of getting Cameron the vegetation he wanted.

“James Cameron wasn’t going to settle for anything less than what he’d been envisioning,” Bluff said. “He would talk about specific twigs and branches not being there, he would want a certain branch moved up three inches.”

Cameron and his team had spent two years pre-visualizing Pandora, the lush planet where the movie takes place, and they’d asked ILM to help put their imagination on the big screen. Their vegetation designs were precise down nearly to the pixel, Bluff said, and they weren’t going to settle for anything less than perfect. “You guys better be able to match everything,” Bluff recalled being told.

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Matching Cameron’s requirements wasn’t going to be easy, Bluff knew. “Our old methodology of doing trees was never going to work,” he acknowledged. “We’d never been asked for such specific vegetation designs, and nothing we had on hand was up to the task.”

## Enter SpeedTree Cinema

As they scoured the Internet for vegetation software, Bluff’s team learned of SpeedTree Cinema, a product so new it hadn’t been formally announced yet. The team signed up for the trial version, downloaded it and opened it up.

“I knew within 15 minutes that this was what we were looking for,” Bluff said. “In the past, we had never been able to control down to a leaf or a twig, where with SpeedTree we could. We were able to grow and manipulate a tree to the exact specifications of a film where literally every scene had been meticulously pre-visualized by Mr. Cameron’s team.”

Once Bluff’s team knew SpeedTree was the tool they would use, they set to work, quickly churning out the trees they needed by the dozens. “Starting in the morning with five models from your library, one of our artists had 40 trees done by lunchtime,” Bluff said. “Those 40 trees comprised about 80 percent of the trees we needed for the entire film.”

Soon after, Bluff brought his work to Mr. Cameron, presenting a 23-second long flyover of the planet Pandora. “A hush fell over the screening room,” Bluff recalled. “The first thing Mr. Cameron wanted to know was ‘how are you doing your trees?’ He was shocked at the match to his original vision.”



The opening sequence to *Avatar*, featuring an entire landscape of SpeedTree models

That initial footage ended up comprising the first 23 seconds of *Avatar*, which was released in December 2009 and became the first movie to earn \$2 billion in box office revenue. The movie was nominated for nine Oscar® Awards from the Academy of Motion Picture Arts & Sciences, and won three, for Art Direction, Cinematography, and Visual Effects.

“SpeedTree was simply the best choice for our work on *Avatar*,” Bluff insisted. “It’s as simple as that.”

**Opposite:** Q&A with Richard Bluff

# Q&A with Richard Bluff, Digital Matte Supervisor on *Avatar*

## What challenges was ILM facing when you first considered using SpeedTree?

Avatar was due out in half a year and James Cameron needed us to create an exact match of the trees his team had spent two years pre-visualizing.

## How long did it take you to evaluate SpeedTree?

I knew within 15 minutes that this was what we were looking for. After that, the decision to use SpeedTree was never questioned.

## Did the decision to use SpeedTree facilitate the rapid development schedule?

SpeedTree was simply the best choice for our work on Avatar. It's as simple as that.

## Without SpeedTree, how would you have accomplished your trees "by hand?"

First, we would have had an entire team dedicated to the task. It would end up being tedious, expensive, and time consuming. Then, if any changes were necessary, it would take serious work to remodel them.



## Does your production pipeline include SpeedTree with any other 3D applications?

At the end of the day our department is simply responsible for providing only a single image per frame. On Avatar we have various teams bringing SpeedTree meshes into 3ds Max, Maya, and our in-house software. From there we were able to seamlessly composite together renderings from Brazil, mental ray, and RenderMan.

## Did you use any of the assets provided in the Tree Model Library, or did you create your own trees from scratch?

The range of species in the library were so close in character to nature that nothing else has come even close to that level. Nor has anything else been as easy to work with.

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## Can you provide any technical details on how SpeedTree fits into your workflow?

We were able to derive tons of simple background trees by randomizing the structure of a few base models. But SpeedTree wasn't only used in the background. We used it for hero trees, too.

For one scene, I rigged up a network of deformers on a single tree for animating heavy rotor wash. We put one of our junior guys on rigging the rest of them. The animation was a task that we originally weren't contracted to do, and that other contractors had to pass on due to the difficulty of the shot, but it turned out great.

*"We were able to manipulate our trees to the exact specifications of a film where every scene had been pre-visualized by Mr. Cameron's team."*

## Were there any other key features of SpeedTree that were crucial to development?

The ability to randomize a single model into infinite derivatives was the only way we were able to get enough variation to create a convincing Pandora. SpeedTree provided this with a simple button click.

## Were you supported by the SpeedTree staff during your evaluation?

At the time of our evaluation, a few of the key hero trees weren't yet available in the provided model library. However we were able to work with the SpeedTree art department to quickly get an exact match based on our concept photos.

## Do you expect to use SpeedTree again?

Yes, Lucasfilm Ltd. (the parent company of Industrial Light & Magic) has licensed SpeedTree for projects underway in both their San Francisco and Singapore studios.

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## About Richard Bluff

Richard Bluff joined Industrial Light & Magic (ILM) in 2003 as an artist in the digital matte department and has most recently taken on the supervision for the group.



Prior to joining ILM, Bluff served for three years as a digital artist and supervisor at Venice, California-based Blur Studio, where he worked on numerous projects including video game cinematics, 3D ride-films for theme park attractions, and the feature film *Bullet Proof Monk*. Bluff's career began in 1997 when he was hired at Revolution Software in the U.K. as a CG Trainer. A short time later he was promoted to Lead Artist overseeing the studio's work on a variety of video games such as *In Cold Blood*. Bluff is currently working as a digital matte supervisor on *Transformers: Dark Side of the Moon*. Bluff has worked on more than a dozen other feature films, including *Iron Man 2*, *Transformers: Revenge of the Fallen*, *Indiana Jones and the Kingdom of the Crystal Skull*, *Transformers*, *The Chronicles Of Narnia*, *Star Wars Episode III* and *Peter Pan*.