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Top pros in animation and vfx talk about the industry's hot topics at the eDIT Filmmaker's Festival



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SIGGRAPH '08: What the Tech Papers Reveal About the State of CGI

Ellen Wolff previews some of the presentations that may presage the hot tools of tomorrow.
By Ellen Wolff

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Believable bubbles, credible clones and cascading curls are just a few of the topics explored in the technical papers chosen for SIGGRAPH '08. While the halls of the annual ACM conference overflow with people selling all kinds of CG products, it is in the Papers presentation that one gets a glimpse of what next year's hot tools could be.



The Papers also provide an interesting benchmark for the growth of the industry as a whole, because this was a record-setting year. According to Papers Chair Greg Turk, "The number of submissions that we had -- 518 -- was a record. We've been knocking on 'the 500 door' for a year or two, but we've never had quite this many papers before." Ninety of those papers ultimately were chosen for the conference, and Turk notes that the relatively low acceptance rate of 16-20% reflects how high the bar is for SIGGRAPH. Despite the volume of submissions, he notes, "Every paper was reviewed by at least five people, which is more than most conferences. I had 65 primary reviewers, each of whom reviewed 18 to 20 papers each. We wanted to be thorough, and give good feedback to the authors."

The Technical Papers give the CGI community a glimpse of what next year's hot tools could be. There were a record number of submissions for 2008. Ninety papers were chosen for the conference.

Turk, who is from Georgia Tech University, led an international team of reviewers who determined this year's selected papers. His Papers Committee was comprised of Adam Finkelstein and Tom Funckhouser from Princeton University, Jessica Hodgins from Carnegie Mellon University and Markus Gross from ETH Zürich. They were joined by an extensive group of Area Coordinators that included experts from Autodesk, Microsoft, NVIDIA, Dreamworks, Disney and Pixar. As Turk explains, "It's an international committee. We usually have more academics, but we try to get a representation from industry; from hardware vendors to special effects."

Sims the Word

Perhaps not surprisingly in a year when the Academy of Motion Picture Arts and Sciences bestowed major Sci Tech honors on fluid simulation breakthroughs, several papers chosen for SIGGRAPH address this topic. "There are a lot of great papers in fluid simulation," says Turk, who's an expert in this area of research himself. "We had a ton of physically-based animation submissions, including fire and smoke, as well as water. I was also struck by how many papers we have about hair -- both in hair animation and in the realistic rendering of hair. Two papers are about the multiple scattering of light on hair. They show beautiful backlit hair that looks so natural, it itches up the realism. Those multiple scattering methods will eventually trickle into the digital visual effects world."

The viability of this type of investigation is a reflection of today's improved hardware and software, observes Turk. "Ten years ago, you couldn't think about doing something as complicated as these computations. Now that computers are a lot faster and algorithms are more sophisticated, you can consider doing multiple scattering of light for hair."

Cloth simulation was also a popular topic (and an essential aspect of creating believable digital doubles.) Turk singles out one paper in particular from Cornell University researchers called "Simulating Knitted Cloth At The Yarn Level," which demonstrates the simulation of a knitted scarf in exceptionally realistic detail. "People didn't think before that they'd need to simulate each strand. These guys did it. They found that cloth has different physical properties when you simulate each strand, rather than treating cloth like a stretchy sheet."



Greg Turk.

Character Matters

So the digital characters of the future may be well-dressed and well-coiffed, but will they appear more believable in close-ups than they do now? Turk considers the question, saying, "One of the things I thought was striking about this year's papers is that there are two pretty compelling papers about faces. If you'd asked me what would have been a fascinating topic this year, I wouldn't have been able to guess 'faces,' but two research groups, working completely independently (in New York and Israel) came up with very different takes on working with human faces."

"One of them, 'Data Driven Enhancement of Facial Attractiveness,' I think will be noticed and talked about and probably controversial. These researchers took photographs, and using training data from user studies, they tried to have the computer learn what a cross section of people consider attractive facial forms.

Then they applied that, using machine learning techniques, to semi-automatically recognize where the eyes and nose are in a photograph. Then -- in 2D -- they do a warping of those features and produce another face that looks as realistic, but has many of the characteristics that the 'more attractive' faces have, like a more symmetrical mouth. It's

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nothing new to try to beautify a face, but now there are more automated ways of doing it. A logical question will be 'Can we do it in 3D?'"

The other human face technique that caught Turk's eye was "Faces in Reflectance," which manipulated photos of people like Gwyneth Paltrow and Denzel Washington by replacing some of their features. "It's a bizarre thing to do," admits Turk, "but when you read the paper you find there is a reason to do this. For example, if you have a photograph of a street scene and you don't have permission to use the photo of a person in the scene -- you can 'de-identify' them, and the resulting photos look real. I think 'de-identify' is a word they made up for this paper!"

Techniques for creating diverse physical characteristics may become increasingly appealing to creators of digital crowds, especially since researchers at this year's SIGGRAPH have studied what attributes people notice when they watch digital clones. In a paper called 'Clone Attack -- Perception of Crowd Variety,' researchers from Dublin's Trinity College considered the ways in which an impression of variety can be created in crowd simulation. When the researchers tested people's perceptions, they found that cloned appearances are far easier to detect than cloned movements. They established that cloned models can be masked by color variation, random orientation, and motion, and they believe that their insights will help artists create more realistic, heterogeneous crowds.

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