Long Hair and Fur for "Van Helsing"

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Abstract

A cast of digital monsters and doubles in the Universal live-action film "Van Helsing" presented *Industrial Light & Magic* with the challenge of creating a variety of believable digital hair, ranging from the very long hair on the Vampire Brides to the full body fur on the Werewolves. The look of the hair had to match stylized art work and often the real actors' hair. The motion of the hair had to withstand the superhuman abilities of the characters. And the hair went along through many transformations of live actors into their digital alter egos and back to their human form.

We present techniques for placement, styling, simulation, and rendering of long hair and fur that were developed and used on "Van Helsing".

Overview

The extreme motion of the creatures and the transformations between human and fantastic forms, e.g. werewolves tearing out from inside the skin of their human characters and vice versa, were the two biggest challenges for digital hair in this movie. It was also the first time that we modeled very long curly human hair (figure 1) and simulated it through a full range of motion and well into the realm of humanly impossible.
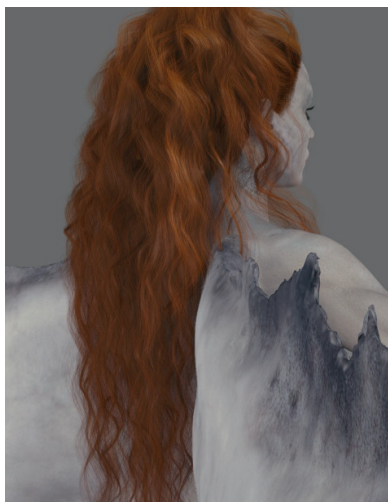

Figure 1: Aleera, one of the Vampire Brides

Modeling (styling) and simulation of hair was done on a smaller number of "guide" hairs – up to several hundred on a human head and almost nine thousand on the Werewolves. Before rendering, the full body of hair was created by a complex interpolation technique that also added irregularities and took care of tufting and fine wisping. These generated hairs, numbering in the mid tens of thousands for human hair and up to several million for the wolves (figure 2), were then passed to RenderMan for rendering as B-spline curves.

Figure 2: Concept art on the left and a 3D rendering of the Velkanwolf on the right

We relied heavily on numerical simulations to achieve a believable motion of hair. Slow-moving creatures and motion-captured humans presented very few problems. Fast moving werewolves and vampire brides were more difficult, particularly for long hair. The creatures were often animated to the camera and did not necessarily follow physically plausible 3D trajectories. In many cases the script just asked for the physically improbable. Consequently, our simulations also employed controls that were not based on physics. Particularly useful were those for matching the animation velocities in a simulation. Still, the animation sometimes had to be slowed down, re-timed, or edited to remove sharp accelerations. Wind sources with fractal variation were also invaluable for achieving realistic fast motion of hair and for matching live action footage.

Our proprietary hair pipeline was reimplemented for "Van Helsing" to allow for close integration of interactive hair placement and styling tools, hair simulation tools, and hair interpolation algorithms. The hair and (tearing) cloth dynamics systems were merged for the needs of Werewolf transformation shots in which the hair was simulated either on top of violently tearing skin, or just under it. This integration enabled the artists to style the hair, set up and run skin and hair simulations, and sculpt post-simulation corrective shapes in a single application framework.