New technology for animation film experts: Movie heroes to be transferred to virtual worlds more easily, realistically

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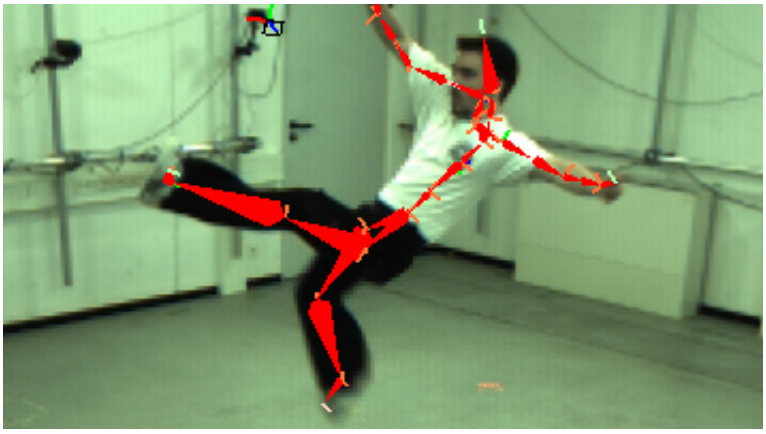

Actors in their normal clothing are filmed with ordinary cameras. The movements are then analysed with special computer software and transferred to a virtual character in the form of a skeleton. Credit: MPI for Informatics

Hollywood devotes great effort to chasing monsters through realistic-looking environments. Researchers at the Max Planck Institute for Informatics in Saarbrücken have now developed a technology that greatly simplifies the production of such scenes. Actors' movements are captured with a few cameras in a real scene and then transferred extremely realistically to virtual characters. This will not only simplify the work of cartoon makers, but also assist doctors and sportsmen with motion analysis.

The new technology will soon be marketed by a newly-established business and presented at the computer trade show CeBIT in Hanover from March 5 to March 9 in Hall 9, Booth F34.

Whenever computer-animated characters roam through wild landscapes, such a Gollum in *Lord of the Rings*, there were real actors at work. Film studios usually use a procedure called 'motion capture'. The actors wear skin-tight suits with markers attached to them reflecting beams of infrared light that are sent out and received by a special camera system. In this way, the movements of a real actor are recorded and can later be transferred to a virtual character, using animation software. "However, the suits are very uncomfortable for the actors, and the markers interfere with their movements", says Nils Hasler from the Max Planck Institute for Informatics in Saarbrücken. For this reason, the Computer Graphics researchers there have developed a method that eliminates the need for markers but captures the movements quickly and realistically.

This method allows actors in their normal clothing to be filmed with ordinary cameras. The movements are then analysed with special computer software and transferred to a virtual character in the form of a skeleton. "We require only a few cameras instead of the several dozen cameras needed for the special effects in Hollywood. The movements are computed so quickly that we can transfer them directly to the animated character without time delay," Hasler explains. The meanwhile patented computation method has been further refined in the past months. It can now deal with scenes in which several participants are simultaneously active and body parts overlap. "The system even detects a person's movements when they are covered up by other objects or when there are disturbances in the background. This will allow us to shoot visual effects outside of the studio in the future, for example, out in open nature," the Saarbrücken-based researcher reckons.

The computer scientists in Christian Theobalt's "Graphics, Vision &

Video" team were able to solve yet another problem in the past few months, as Hasler explains proudly: "It was difficult for our software to reconstruct the body movements of actors wearing big coats or women entering a scene in long ballroom dresses. Our new computation method enables us to capture surfaces in such precise detail that, e.g., the draping folds of clothing can be reproduced realistically." The new technology is also useful in areas outside the film and game industry. Athletes could use it to analyse specific, individual body movements without bothersome markers. Sports journalists would be able to comment on motion sequences, like in pole vault and discus competitions, in live television broadcasts.

"The field of medicine would also profit. It would be easier for doctors to depict and track the degree of recovery after operations on joints," Hasler explains. The researcher from the Max Planck Institute for Informatics wants to establish a company together with Professor Christian Theobalt and his research colleague, Carsten Stoll, in order to offer their software as a commercial product. "We have already had quite a few inquiries from companies in the film and sports marketing industries," Hasler reveals.

Technical background

The technology used in this method is quite affordable. Anywhere from five to twelve ordinary video cameras are needed. The computer scientists use their software to produce a 3-D model of the depicted person from a skeleton with 58 joints. In order to capture the movements, the computation method continuously works on overlaying the two-dimensional image from the video camera and the 3-D model as exactly as possible. The researchers can solve the necessary equations for this task efficiently and quickly. With this method, they capture filmed movements and visualize them in the virtual characters within just a few milliseconds.

More information: Elhayek, A. et al. Spatio-temporal Motion Tracking with Unsynchronized Cameras, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Providence, USA, 2012

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