Getting a feel for the fabric – virtually

08.11.2006

You can choose garment styles, colours and sizes on the internet – but how do you know what the fabric feels like? The team in one IST project – HAPTEX – are working on an answer.

Many people consider buying garments on the internet as a timesaving and hassle-free way to replenish their wardrobes. But it can be difficult to fully assess the final product before it arrives in your postbox. The HAPTEX project team has developed a preliminary demonstrator that could eventually help buyers get a 'virtual feel' for sweaters, suits, lingerie et al before they make an online purchase.

"We are investigating how far it is possible to provide a user with a completely reliable sense of fabric through a virtual experience," says project coordinator Nadia Magnenat-Thalmann of the University of Geneva.

The HAPTEX partners are working on multimodal perception of textiles in virtual environments. Their goal is to achieve, by project close in November 2007, a visual representation of virtual textiles with a haptic/tactile interface, which will allow users to 'feel' the virtual garment.

The word haptic comes from the Greek haptikos, which means 'able to touch'. Haptics is gaining widespread acceptance as a key component in virtual reality systems, adding the sense of touch to what was once a visual-only solution.

Most existing solutions use stylus-based haptic rendering, where the user interfaces with the virtual world using a tool or stylus, giving a form of interaction that is computationally realistic on today's computers. In HAPTEX, both the visual simulation and the haptic rendering are based on the real physical properties of the textile, as measured at the source.

The project team's final goal is to integrate two different haptic technologies: a device which can 'feel' the kinesthetic forces acting on the simulated virtual fabric, and tactile arrays on two fingertips to show the vibrotactile stimulations on the surface of the simulated fabric.

Currently, there is no comparable system either on the market or in the development stage. To integrate the visual and haptic/tactile interfaces, several significant advances in existing technology are necessary before the virtual experience can come close to simulating a real physical touch.

At IST 2006 the project will present its results so far. Visitors to the project stand will be able to see on a laptop a realistic simulation of a textile and interact with it through a haptic interface. This will provide them with a realistic simulation of touching the real textile. "They will feel the force-feedback of the fabric when interacting with it," Magnenat-Thalmann says.

Visitors will also have the opportunity to select different virtual textiles, modify their physical properties interactively, then "see and feel the effects of the changes". They will be able to discover haptic feedback, a highly innovative technology that has not yet reached the popular domain.

Those interested in finding out more are also invited to attend the IST 2006 networking workshop 'HAPTEX'06 - Advanced Haptics', which is being organised and chaired by Professor Magnenat-Thalmann.

The project is making progress, she says. "We have developed the methodology and a test bed. But we will need to conduct further research before we develop an actual product for the market."

HAPTEX provides a platform for experts working in a variety of disciplines, enabling them to work together to reach a common goal. Research issues include challenges such as simulating sensory feedback to imitate the behaviour of textiles, developing a realistic, virtual rendering of textiles, and integrating multiple sensory feedback (haptic and tactile) to produce a consistent and physically realistic sense of the real textile.

To give an idea of the challenges involved, witness the difficulties facing one project partner in developing an efficient simulation model. The task involves a physical simulation of the garment at very high frame rates to feed the haptic/tactile devices, yet while running the rendering algorithms at a lower frame rate (typically 30 Hz) in order to interact with other applications.

If successful, HAPTEX could have many potential applications for the textile industry. However the main impact will lie in significant advances for multimodal interaction tools, techniques and know-how.

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