Real-time simulation of textiles

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This Fraunhofer IGD solution simulates textiles through a grid structure. This permits use of extremely fast processes. Credit: Fraunhofer IGD

Fashion designers, pattern makers and tailors produce new collections using computer programs. The Fraunhofer Institute for Computer Graphics Research IGD in Darmstadt is working with partners on connecting both worlds so the design process can be virtually simulated. At the Hannover Messe Digital Factory, researchers will present a new software technology that depicts clothing samples in real time and highly realistic, from Apr. 7 to 11 (Hall 7, Booth B10). New collections can get to market faster, and customer preferences can be realized more flexibly.

It is very costly to present textiles interactively on a computer screen. Until recently, this process often took several days to weeks. Using recently engineered simulation software, now this process takes just seconds. Designers, pattern makers and tailors can create their clothes in real time. Just as they do in reality. Besides needle and thread, the computer mouse is increasingly turning into one of their most indispensable tools. A few clicks suffice to make just the right adjustments to color, material and cut pattern. Shadowing, optical and mechanical qualities of various materials, folds and pleats, diverse lighting and reflections can all be realistically displayed in 360º panorama images. Just like in the normal creative process – only faster. The simulation software retrieves design data and materials from conventional CAD programs.

Working in the virtual world makes the entire production process more flexible. Your own ideas can be implemented with one click, and individual customer preferences swiftly incorporated. "Virtualization is particularly well-suited for creative processes, where changes must be made swiftly and frequently. But it is also a precondition for the clothing production of tomorrow, in which the industry can assemble individual production components on a modular basis, as needed," says Martin Knuth, senior researcher at Fraunhofer IGD. In the future, virtual prototypes will be able to quickly present customers with additional options: The real article of clothing serves as the template as the customer chooses additional colors using an app on a tablet or smartphone.

For over eight years now, Fraunhofer IGD has been working on simulation systems for the apparel industry – ever since the topic began to play an increasingly significant role. In the process, a long-term collaboration evolved early on with the Assyst company, which specializes in CAD systems and virtual prototypes for clothing. This ultimately gave rise to the "Vidya" software, which is based on the

original work. It is the only program currently on the market that enables real-time changes to a design on the basis of a virtual prototype simulated by cut patterns.

Fraunhofer and Assyst are bringing their shared expertise as technology partners to bear on Future Fashion Design, a project sponsored by the European Union. Among the goals of the project is to incorporate the actual production of textiles as a virtual process, and to achieve better control over the individual process steps. "That is an important step toward complete virtualization of the design process. Designers, pattern makers and tailors can operate even more on the computer. The gaps between virtual and real creation are becoming fewer, and collections can be completed faster. Our goal is to map the stages leading up to the first real initial batch on the computer," explains Knuth. With Future Fashion Design, all software users are connected by one single platform: Both the technology and software suppliers as well as the end customers – the fashion companies. The project ends in September of this year and aims to make the European apparel industry even more competitive through modern IT technologies. "In the future, we will have tools at hand that enable a much stronger integration of the end customer's preferences through customized, flexible and quickly manufactured products," Knuth adds.

The conventional approach to the design of new collections is a cost-, time- and labor-intensive process that may last up to six months – and sometimes considerably longer. Yet here as well, nothing works without a computer. Using graphics programs, designers draw initial designs that pattern makers and tailors then convert to digital patterns. These are then manufactured in [real time](#) and adapted as long as it takes until the garment attains the desired appearance. This process may entail several dozen repetitions until all participants are satisfied.

At this year's Hannover Messe Digital Factory, researchers will display

their prototypes at the joint exhibition booth of the Fraunhofer Gesellschaft (Hall 7, Booth B10). Visitors can try out the software there, and at the same time step into the role of a fashion designer, load patterns or try on a variety of virtual clothing samples. The researchers will also be presenting examples for other applications. The engineered technology is suited not only for the clothing industry but wherever textiles are used. The range extends from consumer goods – like clothing, curtains or backpacks – to carbon fiber mats for airplane wings, and even to a car's convertible soft top or textiles for car washes.

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