Trying on clothes in a magic mirror

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(PhysOrg.com) -- Wouldn't it be nice if we could shop for clothes without constantly having to try them on in the fitting room? The vision could soon become a reality thanks to the "virtual mirror" presented by Fraunhofer researchers at the IFA consumer electronics show in Berlin from August 29 to September 3. This mirror-like display enables shoppers to see themselves wearing different items of clothing without having to undo a single button.

There is more than a grain of truth in the old cliché that men hate shopping for clothes. They find fitting rooms a nuisance and prefer to go on wearing the same things that they have always worn. Scientists at the Fraunhofer Institute for Telecommunications, Heinrich-Hertz-Institut HHI have developed a magic mirror that takes the stress out of trying on new clothes. You simply have to choose one T-shirt or shirt, and the virtual mirror will show you wearing a range of different designs, without having to take off one to try on another.

"The principle is similar to the virtual shoe-fitting mirror that we developed last year for the Adidas flagship store in Paris," says Anna Hilsmann of the HHI. "But it is somewhat more difficult to create a realistic impression of T-shirts, shirts or sweaters in a virtual mirror. These items of clothing develop folds that partially distort the image depending how the wearer moves about."

Textiles have elastic qualities, their structure is not always uniform, and there are innumerable details that give each material its special appeal. These characteristics represent a challenge for the virtual mirror.

Summing up the scientific work required, Anna Hilsmann explains: “To reproduce elastic deformations such as those in a woven or knitted fabric, we have to evaluate many different parameters and process them all simultaneously.” The research team has come up with a bright idea for demonstrating their technology to the public: At the IFA international consumer electronics show in Berlin, visitors can see how easy it is to display different logos or graphics on the same T-shirt.

So what does a stress-free fitting room look like? The customer stands in front of a display that has a camera mounted above it. By filming the person, the camera registers the way their clothing flows and moves. To change clothes, the logo on a T-shirt might be replaced with a different, virtual design, for example. The wearer then sees their own image in the display wearing the same T-shirt but with a blue Fraunhofer logo in place of the original green one. To make the image in the magic mirror appear as realistic as possible, the folds and creases in the clothes actually worn by the user are reproduced in the virtual representation, even when the user is moving about. The shadows and lighting effects seen in the virtual mirror are also identical to those on the real person.

As Anna Hilsmann explains, the ingenious part consists in “calculating the spatial parameters of the projected image on the basis of a two-dimensional model. This reduces the number of dimensions we need to simulate the image and allows us to rapidly evaluate any movements.” The 2-D model consists of a closely meshed network of triangular fields. This is sufficient to predict any changes. The system also knows the directions in which the fabric is capable of stretching or flowing – in other words its specific deformation behavior. To allow the virtual image to reflect these changes as realistically as possible, the apexes of the triangles can be displaced independently of one another.

The camera shoots frames at intervals of a few milliseconds and transmits them to a memory unit. Here, the images are analyzed to

determine what changes have taken place between successive frames. To do so, a triangular meshwork is superimposed on each frame, employing a technique commonly used in computer graphics. Since the content of the triangular fields doesn't necessarily change from one frame to the next, the system only compares those fields where changes have actually taken place. This information is used to create a new virtual image of the item of clothing, incorporating the new logo. The images are processed in real time. Consequently, users have the impression that the image reflected in the display follows every movement they make, including the way this affects the folds and creases in the clothes they are wearing, just like a real mirror. A touch screen allows shoppers to choose different styles and colors of the garment they have selected., helping them to decide which color or design suits them best. "Shoes and clothes are just the first stage," remarks Anna Hilsmann. "The virtual mirror could also be used to help customers select eyewear or jewelry." Many reluctant shoppers are likely to be relieved by the simplicity this brings to the arduous task of buying new clothes, and might even be persuaded to adopt a new look!

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