Virtual applications reach out to real world

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(PhysOrg.com) -- European researchers have developed a series of very clever tools to break through the bottlenecks stalling the widespread adoption of virtual reality. But the compelling applications designed for the system are the real stars.

Soon car designers will be able to see immediately the effects of their planned changes on a real car and architects will be able to perform a virtual tour in and around a planned building with a client. These are just two of the real-world applications promised by virtual and augmented reality.

But there are tremendous bottlenecks, in both hardware and software, to the deployment of advanced applications like these. Cost is one issue, and technical performance another, while many solutions are just too cumbersome for widespread use.

Reality, only better

The IMPROVE project was set up to break through these bottlenecks and foster acceptance of virtual reality in new business areas. The potential of augmented reality applications and tools is particularly promising.

Augmented reality consists of mixing real objects and landscapes with computer-generated images and designs, so an architect for example could see a virtual building on a real landscape, or auto designers could see how small changes could affect an existing car body design. It is

reality, only better.

“We worked on head-mounted displays, improved tiled displays, rendering and streaming software, colour calibration techniques, collaboration and networking, and novel interaction systems,” explains Pedro Santos, coordinator with the IMPROVE project. “It was quite a broad research agenda for a STREP project.” (See story ‘Virtuality’ gets real).

Tight budgets

The team fulfilled its ambitious work agenda and tested the hardware and software, and chose two design-intensive domains to test their platform: architecture and automotive design. The two are a good fit.

Car manufacturers have the budgets to invest in very expensive equipment and are quick to adopt improved systems, while architectural companies could really use VR and AR systems more widely, but have much tighter budgets.

The IMPROVE team carefully surveyed potential users to establish exactly what functionality they required.

“The architects, wanted to be able to review a virtual rendition of a proposed building collaboratively and to test the impact of shadows, while the automakers wanted very high-quality imaging for surface inspection,” notes Santos.

In the architectural test, IMPROVE chose two review scenarios: in-house and onsite.

Virtual Sun

The in-house review allows a team to work on a design together using a Head Mounted Display (HMD) designed by IMPROVE with a see-through lens that can overlay a virtual image onto a real object or landscape. The building appears in three dimensions on a table, and designers can modify elements of the design, change the materials used and attach comments to the plan.

They can also see the building at different times of the day and even look at the impact of interior lighting on the building's appearance.

Another application allows the client and an architect to walk around a real site and 'see' the virtual building from different angles. "The tests were successful, and the system performed well," remarks Santos.

Virtual reality gets in gear

For the automotive sector, IMPROVE developed surface quality and car restyling applications. The surface quality review uses a large, tiled display and HMDs to study a proposed car design at full scale.

The IMPROVE team developed colour calibration tools to ensure the tiled display rendered colour accurately across all screens. The rendering software also allows High Dynamic Range imaging, which is more faithful to the real world. The system can apply diagnostic tools to the quality of the car's surface, and add comments or simple sketches at critical points.

For restyling, the system uses a HMD with a real car to see the impact of virtual changes to the bodywork and styling. Materials can be changed, as can the lighting, to analyse the effect a new design element. The stylist can even sit inside a 'real' car and immediately see the impact of any changes, loading images of a new dashboard or even elements of a dashboard, for example. Finally, the stylist can annotate and comment on

the design.

In all in day's work

Innovative interface systems and sophisticated collaboration tools drive all these applications to make the overall system as flexible and adaptable as possible.

All of these systems can also be applied to other domains, and may lead to applications for video-gaming, consumer focus groups and many others.

It is an impressive list of achievements, and some of the work will be continued in two follow-on projects, Maximus and Cinespace. Many of the components developed within the project are already on their way to commercialisation.

"Most of the components will have direct commercial potential and many of them are a real advance on what is currently available," concludes Santos.

The upshot is that virtual technologies are ready for real-world applications.

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