

# The Virtual Table - a future CAD workspace

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## Abstract

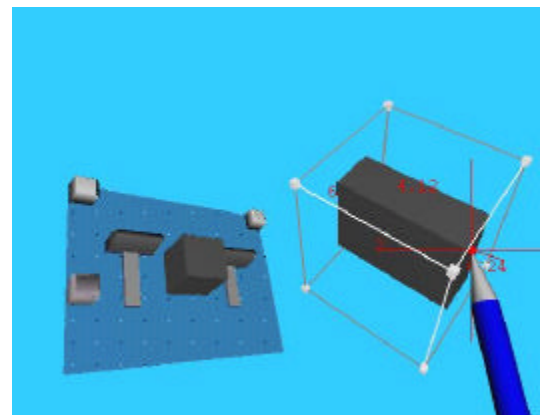
Large stereoscopic back-projection systems are currently in use by major corporations from the automotive and aircraft industry worldwide for the display of their VR application systems. A promising example of such devices is the workbench-like Virtual Table. The interaction with such a hardware setup is still limited to obtrusive devices such as data gloves and tethered tracking systems as well as non-intuitive interaction techniques such as awkward gestures and sole camera manipulation. The resulting exclusive employment of specific applications like those for design review cannot exploit the full potential of the Virtual Table.

Given effective user interactions and interfaces, we are convinced that the Virtual Table can replace the usual workplace of designers in the product development stage. To this end, seamless 2D and 3D interaction is required. While the desktop metaphor is well understood and represents an effective approach to human-computer interaction for document-oriented 2D tasks, its transformation to 3D reveals serious limitations. In contrast, interfaces that incorporate true 3D input and output technologies, e.g., six-degree-of-freedom (6DOF) sensors and stereoscopic displays, seem more promising. Taking these aspects into consideration, the Virtual Table serves well as an interactive 2D desktop and a 3-dimensional visualization, interaction and collaboration space for designing, discussing and modifying 3D CAD models and data.

In a joint effort we are developing the following technologies which are needed to realize the vision of real-world, interactive design for CAD. We integrated a software framework for 3D interaction in Augmented Reality and Virtual Environments with an advanced realism 3D CAD application system. The main goal for this research and development collaboration is the implementation of intuitive, multi-modal, seamless task fulfillment in design applications in order to take VR technology to a level where it becomes useful for every-day design tasks in industry.

The resulting prototype enabling computer-aided modeling in 3D with free-form modeling and cooperative applications is being developed towards:

- Static and dynamic 2D gestures for sketching
- 3D gestures for modeling
- Speech command input for mode changes and the setting of alphanumerical properties
- Video-based input for tracking
- Untethered input devices for intuitive 3D interaction within the virtual scene
- Personal Interaction Panels as remote controls and 2D interface containers
- Task-dependent one-handed and two-handed interaction



The full paper will present the possibilities of these technologies in more detail. It will elaborate on the different interaction techniques implemented as well as on the interaction technology employed together with the research involved in developing the system. The final paper will finally give an outlook on the future of Virtual Table based interaction in the CAD field as well as on its combination with other approaches to immersive 3D interaction such as surround-screen projection systems and desktop VR in tele-collaborative settings.

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