World First Technology

For the first time, multiple viewers can experience their own accurate perspectives in large scale virtual reality (VR) environments, improving decision making and creating spectacular experiences. Mechdyne Corporation and Digital Projection (DP) have joined forces to provide MultiView Immersive Solutions, a new generation of projection-based VR systems which enable up to six people to share highly realistic motion-tracked simulations, wearing light weight 3D shutter glasses.

Immersive virtual reality (IVR) systems built using projection technology have been available for more than two decades and have repeatedly proven their value. These systems range from wall-size displays to room-size reconfigurable environments, and walk-in CAVE™ systems. Now, the MultiView capability unlocks a new level of potential for collaborative review of complex datasets and models in these well-established immersive workspaces.

Based on advances in Digital Projection’s sophisticated projection technology, and Mechdyne’s integration of state-of-the-art sensors and software, MultiView systems provide a comfortable setting where teams can collaborate for hours to optimize designs, unlock insights, speed products to market, and inform decision makers. When each user has their own accurate perspective in a bright 4K resolution VR environment, it is possible to demonstrate new concepts with the precision to support critical decision making.

Enabling Multiple Simultaneous Views

While head mounted displays can be configured to allow multiple users to share one virtual model, each participant only sees the others as avatars. Projected VR systems allow users to directly see one another and interact very naturally. As a result, users in large scale environments typically feel more comfortable and can work for longer periods without feeling confined or isolated.

IVR systems use motion tracking cameras to monitor a user’s position, orientation, and interactions, which change the on-screen images in real-time to match the user’s perspective. When virtual images move in real-time response to motion, the user experiences an extremely convincing sense of presence.
While motion tracking systems are capable of tracking multiple participants, until now, projection technology has been a limiting factor. Before MultiView, projectors were only capable of presenting images for one tracked user, meaning that accurate 3D perspective was only available to the person wearing motion tracking markers. They controlled the viewpoint for everyone else so other participants had to look over the main user’s shoulder for an accurate perspective. To allow multiple perspectives in immersive environments, projection technology had to improve.

Now, the impact of multiple accurate perspectives is transformative. With MultiView, each viewer is completely immersed in the 3D environment and understands that other viewers are seeing the same visualization in the correct context of their differing positions. Not having to look over someone else’s shoulder allows participants to view and point out features more accurately and naturally.

Projector Improvements Enable New Perspectives

To create stereoscopic 3D images, a projector must present separate images for right eye and left eye perspectives in a rapidly alternating sequence. The images alternate so quickly, ideally at 60 frames per second (fps) per eye, that to the viewer they appear to be on the screen at the same time. Electronic LCD glasses are synchronized to shutter lenses on and off to block images so each eye receives its correct perspective. The viewer’s brain processes the rapidly alternating left and right eye images into one image that appears to have 3D depth. For multiple viewers to see their own perspectives, two images for each user must be on screen simultaneously with the others.’

Until now, stereoscopic projectors have been capable of 120 fps, sufficient for only one viewer at 60 fps per eye. With DP’s new high-performance projector, this barrier has been broken. The INSIGHT 4K HFR 360 projector can display 4K resolution images at an incredible 360 fps, fast enough for 60 fps for six eye-points (left eye and right eye for each of three viewers).
Presenting Multiple Perspectives

To create different perspectives for up to three viewers using electronic shutter glasses, the projector displays images to each viewer in rapid succession, as shown on the next page.

To generate different perspectives for up to six viewers, a second projector is added so each projector shows three viewpoints. The three additional viewers use glasses that separate images with polarization in addition to the mechanical shuttering.

The viewpoints from projectors one and two are separated through the use of polarizing filters (same as the filters used for non-electronic movie-style 3D glasses). Filters on the first projector and the first set of glasses will create light that moves in a counter-clockwise direction. The second projector will use light in a clockwise direction. Together with the electronic shuttering, complete separation between the projectors and individual viewers is achieved.

Improving Collaboration

When each viewer has their own tracked perspective of shared data, they don’t need to “shoulder huddle” or take time passing around tracked glasses. This freedom enables each user to work independently without having to follow a single tracked viewer and experience unexpected motion artifacts when that person moves. Imagine designers positioned around a car as if they were in a showroom, each moving freely to see from the angle they want. Building owners can look around the corner of a virtual building while colleagues gaze in the other direction. Molecular and medical researchers can stand inside models and have the advantage of their own perspective on the complex interplay of these structures.

Tracking each user in the same simulation greatly improves the user experience and ability to collaborate. Executive level and VIP demonstrations can be conveyed more accurately and professionally without the awkwardness of straining to see someone else’s perspective. Data can be experienced more naturally and quickly by each person, reducing the time needed for reviews and decision making. When time is money, users of the MultiView system will see a faster return on investment.
Making MultiView VR Perspective Work for You

Existing users of large-scale virtual reality systems can improve their collaborative environments with projector upgrades. Not only will they benefit by enabling three to six users with individually accurate perspectives in a single environment but laser-based illumination and 4K resolution may provide brighter, crisper imagery and more realistic colors compared to earlier technologies.

Those new to VR may want to consider the benefits of large-scale displays and truly collaborative environments like a MultiView FLEX, PowerWall, or CAVE. Every use case is unique and Mechdyne Corporation can help clarify objectives and review the trade-offs and benefits of a variety of immersive display systems. No matter how complex the datasets and problems, Mechdyne can guide customers step by step to the solution that helps an organization achieve its goals and realize return on investment. For researchers, designers, and mission planning, a MultiView Immersive Solution sets the stage for exceptional discoveries and next-generation insights.

About Mechdyne

Mechdyne is one of the world’s leading providers of innovative visual information technologies. Mechdyne bends technology to our will in ways that transform complex data into insights and ideas. To ensure our customers succeed, Mechdyne provides comprehensive, customized solutions that include consulting, software, technical services, and hardware integration.

About Digital Projection

A digital imaging pioneer and industry leader, Digital Projection International manufactures & distributes an extensive line of ultra-high-performance 3-chip & single-chip DLP® projectors, along with Radiance LED – direct-view, fine-pitch LED displays. These elite products are the reference standard for demanding applications including: large-venues, live-event staging, fortune 5000, education, medical & scientific research, command & control, digital cinema, commercial entertainment, digital signage, worship and elite home cinema.