Volumetric Video Capture: Overview and Potential Educational Uses

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What is volumetric video capture?

Volumetric video capture is a technique for filming a space that captures the entire three-dimensional volume of the space, creating an immersive visual experience that gives the viewer complete control over how they view the event being filmed.

Volumetric video is typically created in special studios in which multiple cameras are placed throughout the space. The camera arrays capture all movement from people and objects moving through the space from multiple angles. The result of the recording is a high-fidelity 3D video that allows the viewer to watch the movement from any position, location, and time they choose. The video can be viewed on traditional flat screens or on 3D or virtual reality (VR) devices.

How is volumetric capture used today?

Currently, the primary producers of volumetric video are the entertainment and sport industries.

- In 2019, three clubs from the English Premier League began using Intel TrueView, using an array of cameras encircling a stadium to capture football play in 3D and in real time. Fans could view game play from multiple angles and viewpoints, for example viewing game play from the viewpoint of one of the players on the pitch.
- The National Basketball Association recently began offering broadcasts of full games using volumetric video. In one recent game, 110 cameras were placed around the basketball court to build realistic, real-time 3D models of game play which can be shown from many different angles and viewpoints.
- Musical artists are using volumetric capture for music videos and fan interaction. For example, a recent music video collaboration between the bands Coldplay and BTS featured volumetrically-captured images of members of one band appearing with members of the other.

While this technology is currently focused on consumer technologies, there is significant potential for its use in teaching and learning.

What are the potential uses of volumetric capture for teaching and learning at GVSU?

As a particular focus of Reach Higher 2025, GVSU is committed to providing **active learning** experiences for our entire student population. “Active learning” refers to any learning activity that “involves students in doing things and thinking about the things they are doing” [Bonwell and Eison, 1991]. Active learning at its core requires no particular technology, but digital technology frequently

enables some activities that would be otherwise difficult or impossible, and extends the benefits of those activities to a wider audience, especially remote students. At GVSU, volumetric video might be used in the following ways:

- Many practicum activities in GVSU health sciences courses involve highly realistic mannequins to simulate the human body. Volumetric video might be used to create high-fidelity digital versions of these, making the activities accessible to remote students and lessening the need for physical maintenance.
- Social science activities involving direct human interaction (for example, role-playing case studies with live actors in a social work course) might use volumetric video to create a realistic, immersive experience in which the student could view their interactions from the other person's point of view.
- In mathematics, rather than using calculators to visualize and explore three-dimensional surfaces, volumetric video could be used to capture a fully manipulable digital version of a real surface, overlaid with graphical and numerical information visible to the user by actually interacting with the image.

Other potential applications of volumetric video include courseware development for in-person, hybrid, and online courses; content development for student support services; and esports broadcasts and live athletic events.

What are some potential partners for further work in this area?

- **Vizidef** is a local company with whom GVSU has connected on past projects. They recently announced ImagineLab, a volumetric video studio in Comstock Park which GVSU might use to create pilot applications.
- The IT Innovation and Research Team has already connected with **Cisco's Webex Hologram team**, which uses volumetric cameras for live meetings.
- **Meta** might be engaged via GVSU's involvement with **REP4** to assist us in combining a Volumetric Learning Lab with content development with potential delivery to 100,000+ learners across the network using their virtual reality technologies.
- **Steelcase** is a longtime partner with GVSU on learning spaces and would be an outstanding partner on further work in volumetric video spaces.

To learn more:

- Volumetric Capture [Wikipedia]
- Canon Free Viewpoint Tech Used for ESPN+ Full NBA Game Production [SVG News]
- What is Volumetric Video? [YouTube]
- Explained: What is volumetric video capture [in less than 5 minutes [4DR Studios]
- Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom.* 1991 ASHE-ERIC higher education reports. ERIC Clearinghouse on Higher Education, The George Washington University, One Dupont Circle, Suite 630, Washington, DC 20036-1183.