

ACS 2025 Surgeons and Engineers: A Dialogue on Surgical Simulation Meeting

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Research In-Progress

Virtual Reality Surgical Learning Environment Immersion

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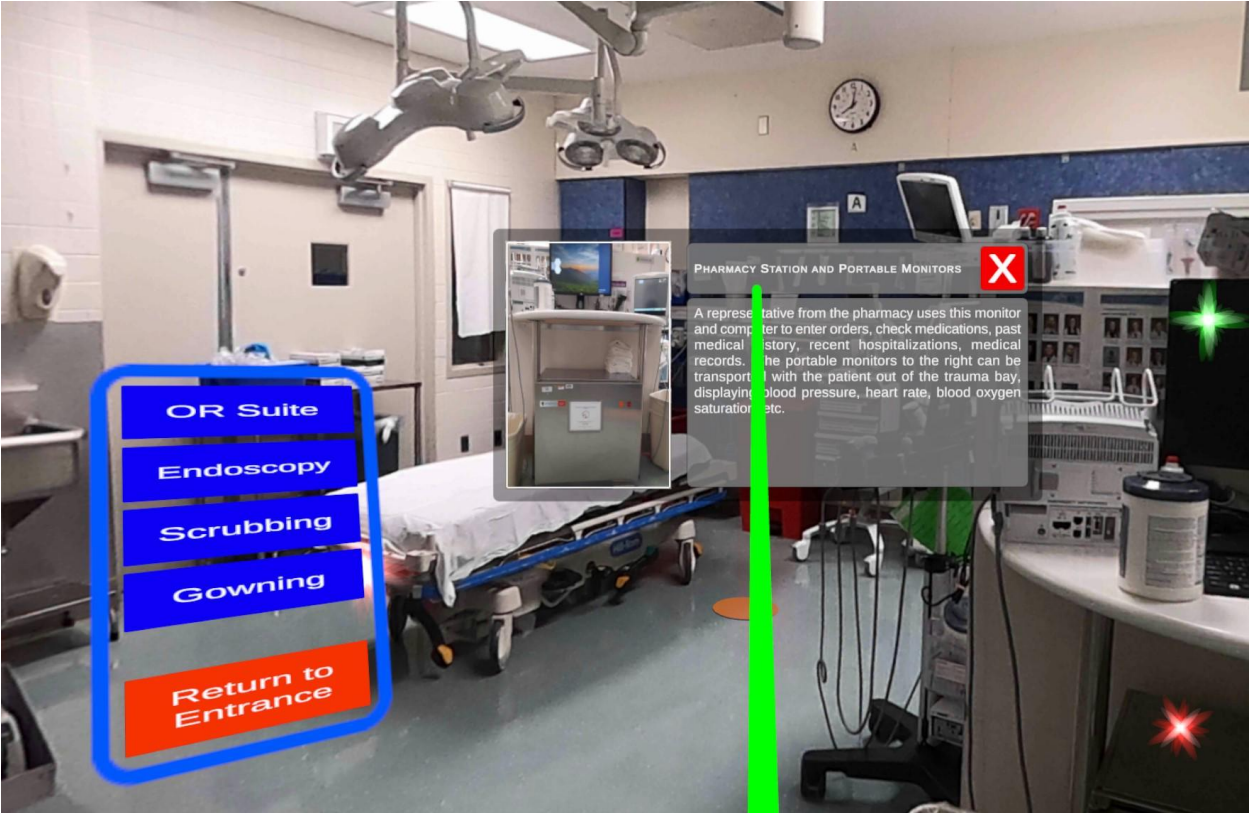
Virginia Tech Carilion School of Medicine, Roanoke, VA; Virginia Tech, Blacksburg, VA; Northeastern University, Boston, MA

Introduction: Familiarity with the clinical learning environment is critical to the training of medical personnel and biomedical engineers who design healthcare solutions. The surgical work environment can be overwhelming to trainees especially when they are expected to provide assistance during medical procedures. This can be particularly true in fast-paced settings such as the trauma bay and during emergency procedures. We developed a Virtual Reality (VR) experience to supplement trainee preparation before entering the surgical environment.

Methods: The 3D virtual environment developed consisted of both 360-degree static images and 360-degree videos of different clinical scenarios to introduce the surgical environment. The static images acclimated the trainee to the suite while the videos presented professionals performing activities integral in the surgical environment. These recordings were captured at Carilion Clinic facilities (Roanoke VA) using a 360-degree camera (GoPro Max, GoPro Inc., San Mateo CA). These images were imported into the software Unity (Unity Technologies, San Francisco CA) to create a VR environment of these suites and activities.

Preliminary Results: 360-degree images were captured at multiple locations in three different clinical suites (OR, endoscopy, trauma bay) to permit users to teleport to different locations and experience the suites from different vantage points. A description and close-up view of tools/equipment could be displayed to explain key usage (Figure). 360-degree videos of professionals performing two activities (scrubbing, gowning) were also captured at multiple locations to permit teleporting to different vantage points. The project was ported to a Quest 2 VR headset (Meta Platforms Inc., Menlo Park CA) to permit an untethered VR experience.

Next Steps: With IRB approval, medical students at Virginia Tech Carilion School of Medicine will be recruited to assess whether the VR Surgical Immersion experience is an effective supplement to increase confidence with the learning environment before starting their surgical clerkship.



- OR Suite
- Endoscopy
- Scrubbing
- Gowning
- Return to Entrance

PHARMACY STATION AND PORTABLE MONITORS

A representative from the pharmacy uses this monitor and computer to enter orders, check medications, past medical history, recent hospitalizations, medical records. The portable monitors to the right can be transported with the patient out of the trauma bay, displaying blood pressure, heart rate, blood oxygen saturation, etc.