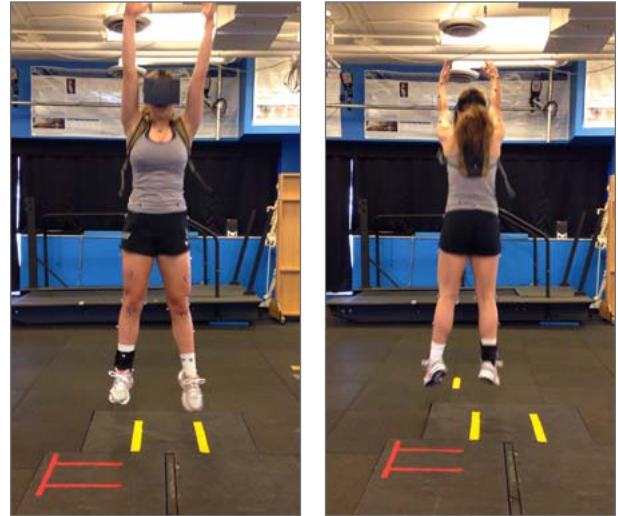


Cincinnati Children's Hospital Medical Center - Division of Sports Medicine Uses DI-Guy to Create Sport-Specific Scenarios for Training and Evaluation

It can take an athlete up to 18 months to return to sport after a torn ACL; even after surgical reconstruction and physical therapy, the athlete has up to a 30% chance of sustaining a second injury. Additionally, athletes have between a 50-100% chance of developing osteoarthritis within 20 years of their initial injury. Prevention of these types of injuries is key and it is especially important to know when it is safe for athletes to return to sport after such an injury.

The TEAM VR (Training Enhancement and Analysis of Movement Virtual Reality) Laboratory in the Division of Sports Medicine at Cincinnati Children's Hospital Medical Center is leading the development of virtual environments to objectively quantify the progress of injury prevention training and physical therapy so that adolescent athletes can perform at a high level. TEAM VR has chosen VT MÄK's DI-Guy human simulation software to help create sport-specific scenarios for training and evaluation.

TEAM VR's virtual environments aim to give physicians, physical therapists, athletic trainers, practitioners, and strength and conditioning specialists the tools to accurately measure the biomechanics of a child athlete (joint movements, strength, or flexibility for example) by actively engaging him/her in realistic, immersive sport scenarios; these scenarios are performed in a virtual environment that mimics competition on the field/court of play. The TEAM VR laboratory is equipped to utilize virtual environments for knee injuries, as well as concussion prevention. It can also be used as an education simulation center to help sideline first responders like athletic trainers and team physicians gain experience with sideline injury scenarios.



An athlete going up for a basketball rebound while in the TEAM VR system

The TEAM VR environment is different than computer assisted virtual environments (CAVE) in that the participants are not tethered to the equipment and are able to move naturally over ground without the use of a treadmill. It is fully integrated into the world-renowned Human Performance Laboratory and utilizes 35 motion capture cameras to detect the location of the athletes. Athletes wear a head-mounted display to transmit the virtual environment via a customized wireless video system that updates the display in close to real time. The virtual environment will use DI-Guys to represent opponents, teammates, and coaches/instructors. The goal is to get the athletes actively playing the sport so that clinicians can measure modifiable injury-risk biomechanics to enhance movement adaptations and provide feedback in a safe, controlled space.

Of course, the athletes are not actually kicking, throwing, or catching balls: the time lag of present VR systems does not allow for such things. Rather, unique scenarios are created to mimic portions of sport-specific maneuvers such as the approach, jump, and land during a basketball rebound. While the athlete

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does not actually experience the feedback of interacting with a physical ball, the athlete is immersed in such a way that he or she must respond and adapt to the movement patterns of teammates and opponents in the scenario, and even the flight of the ball. Thus the virtual environment provides a safe space for the athlete to push to a higher level, while simultaneously training him/her to better attend and react to the constant change of their surroundings.

MÄK's DI-Guy software provides the artificial intelligence (AI) engine to drive three key immersion components for athletes, patients and practitioners when inside the virtual environment: (1) Strategic immersion, (2) social immersion, and (3) narrative immersion. Strategic immersion is utilized to mentally engage the user in the simulation and is made up of

a combination of immediate, physical responses and more cerebral, cognitive decisions that underlie the overall strategies the user must adopt to complete sport-scenario tasks. Social immersion engages the user with other non-player characters that may be controlled by either AI or by another human that is sharing the virtual environment with the user. If it is difficult for the user to tell the difference between a human-driven or a computer driven character, the social immersion is high. Finally, the narrative immersion is used to build story that the user can become invested in and dictates how much he or she cares about the additional non-player characters and overall task goals. Together, these three components encourage real-world like performance that is transferable to the real world. 🌸

“DI-Guy supplements our own in-house customized environments and scenarios. The technology provides full scenario customization with drag-and-drop commands that also integrate into Unity 3D.”

*Adam KIEFER, PhD
Director, TEAM VR Laboratory*