

Biomotion Clinical Rehabilitation Lab and Athletic Training Center

Highlights

Location

Seoul, South Korea

Industry

Movement Sciences
Physical Therapy and
Rehabilitation

Application

Biomechanics

Biomotion Clinical Rehabilitation Lab and Athletic Training Center Advances Sports Science with OptiTrack

At Chung-Ang University in Seoul, South Korea, the Biomotion Clinical Rehabilitation Lab and Athletic Training Center (BICREB) is committed to applying biomechanical technologies to investigate the movements of physical activities. The center's focus is multifaceted—researchers leverage biomechanical analysis to study sports-related injuries and help athletes refine their techniques through customized training programs.

“Biomechanical data enables us to identify the mechanisms of injury and create targeted rehabilitation and physical therapy programs,” said Dr. Yongung Kwon, BICREB Director and associate professor of Sports Science at Chung-Ang University. “Likewise, we apply a similar approach to enhance athletic performance.”

The BICREB is equipped with an impressive array of technologies to facilitate research and study in the interdisciplinary field of movement sciences.

The set-up features an OptiTrack motion capture (mocap) system with 12 Prime^x 22 cameras and 8 Prime Color cameras, along with markerless motion capture software. Additionally, the facility contains four force plates for comprehensive gait, balance and performance analyses.

Examining the Biomechanics of Pitching

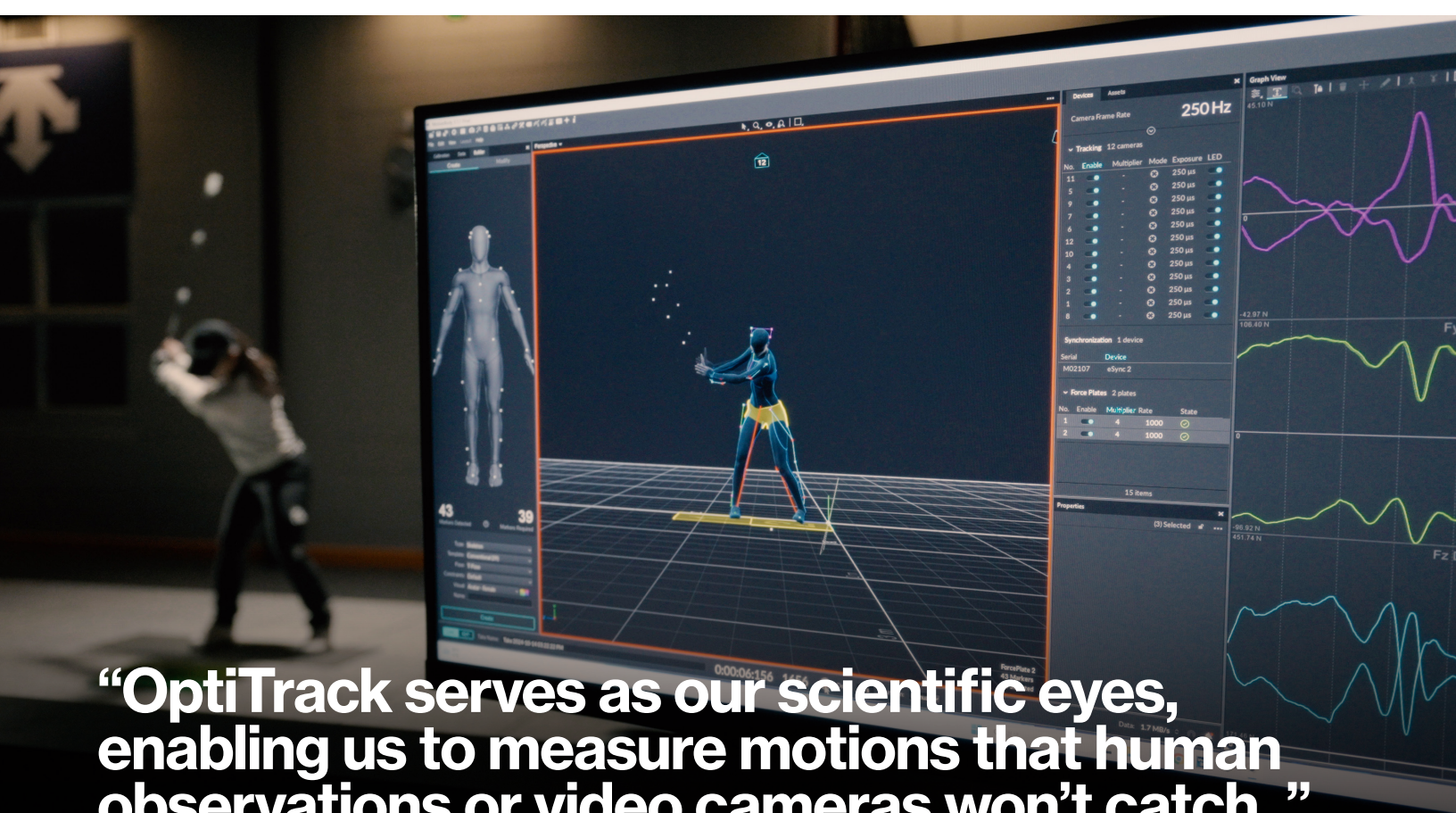
In one section of the lab is a pitcher's mound built to standard dimensions where researchers use the OptiTrack Prime Color cameras with markerless software to evaluate the mechanics of baseball pitchers. The objective, according to Kwon, is to enhance pitching performance and identify risk factors that can lead to injury.

Applying measurement data with visual 3D software, researchers conduct kinetic analyses to detect performance-limiting flaws in the throwing motion. With the discovery of key insights, pitchers can make slight mechanical adjustments that lead to big paybacks: more accuracy, higher consistency and greater ball speeds.

"If a pitcher wants to increase throwing velocity, data captured by the OptiTrack system can point to specific variables to improve, like elbow speed, stride length or ground reaction force," Kwon explained. "The data can also reveal when certain risk factors become apparent. For example, when the positioning of the elbow is lower than the shoulder, the pitcher is more susceptible to elbow injury."

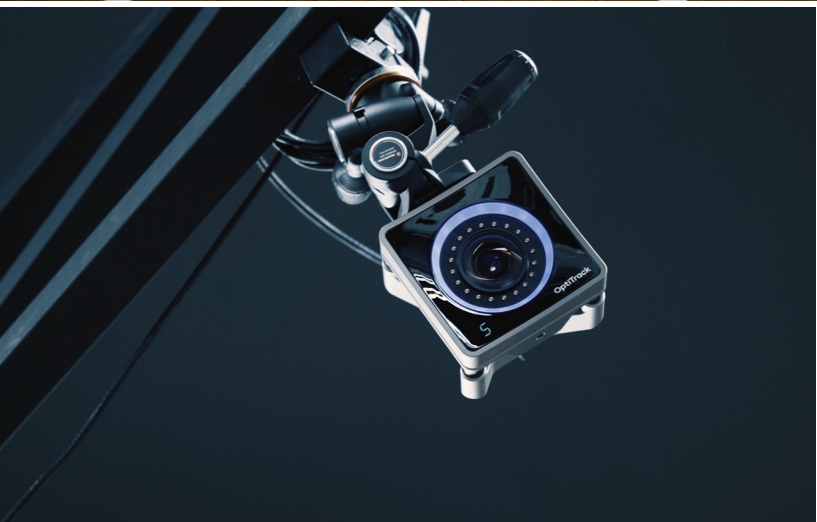
While Kwon emphasized that marker-based mocap technology is still the golden standard in terms of accuracy, precision and reliability, the markerless solution is the preferred system to use for measuring rotational motions like pitching because the athletes are free to move naturally, unencumbered by the presence of markers. "With nothing potentially impeding them, we can capture a true-to-life movement," he said.





“OptiTrack serves as our scientific eyes, enabling us to measure motions that human observations or video cameras won’t catch.”

**-Dr. Yongung Kwon,
BICREB Director and Associate Professor of Sports Science,
Chung-Ang University**



Injury Prevention in Running

The lab's work also centers on the kinetics of running and using biomotion analysis to facilitate proper mechanics. Applying OptiTrack Prime^x 22 cameras and passive markers on anatomical landmarks, researchers can identify motor patterns and the mechanical tendencies of runners that may be causing pain or contributing to injuries.

"The repetitive nature of running exerts significant strain on the body, potentially leading to problems in the knees, hips and lower back," Kwon said. "OptiTrack enables us to detect subtle movements, like pelvic or joint motions, which can pinpoint underlying issues like muscle tightness." The insights guide targeted rehabilitation programs and injury prevention exercises to address muscle imbalances or specific areas of weaknesses.

"OptiTrack serves as our scientific eyes, enabling us to measure motions that human observations or video cameras won't catch," Kwon said. "It's like an MRI for physical movement. The feedback we provide to athletes can make a huge impact on their lives."

