SUCCESS STORY PROFILE: INNOVATIVE SPORTS TRAINING (IST)

At the heart of Innovative Sports Training's remarkable success in the field of biomechanical studies lies The Motion Monitor™.

A real-time 3D motion capture system, The Motion Monitor was designed for use in medical research, clinical applications, sports medicine labs, and other studies calling for precise measurements of the body's movements and the forces acting on them. This totally integrated data collection system generates stunning 3D computer renderings, synchronized video, and rich data analysis.

To what end? Paired with the appropriate software module, The Motion Monitor teaches workers in a high-volume pick and pack warehouse how to lift properly. It helps golf pro's adjust their swings. It lets physical therapists track improvements in patients undergoing rehab for lower back injuries by measuring range of motion, angular velocity, and acceleration. It monitors the severity of tremors in MS patients, helps clinicians recommend therapies to treat balance disorders, and analyzes the movements of individual spinal vertebra.

The Motion Monitor's roster of research clients is impressive. Just a sampling of the list includes the University of Pittsburgh's Neuromuscular Lab, Ohio State's Biodynamics Lab, the Mayo Clinic's Orthopedic Surgery In-Vitro Lab, and the Hong Kong Polytechnic University's Nursing Department.

To gather the data required for analysis of complex motion, The Motion Monitor uses Ascension Technology motion trackers—the MotionStar, Flock of Birds, or miniBIRD. For in-vitro studies of spine motion or for monitoring thumb and index finger in grasping studies of stroke patients, the miniBIRD is IST's tracker of choice. The miniBIRD's small size also makes it a favorite for pediatric research. For The Swing Trainer™, The LiftTrainer™ and other behavior modification biofeedback programs, MotionStar is used.

In The Lift Trainer, for example, MotionStar tracks—in six degrees of freedom—the position and orientation of sensors attached to the head, arms, and trunk while the subject lifts a specific object. The system measures each of 7 sensors simultaneously up to 144 times per second. Weight and force data is captured at the same time, and 3D skeletons depicting the lift appear on an ordinary PC monitor. During the lifting exercise, a tone with a frequency proportional to the amount of torque on the spine sounds off. With this information and cues provided by a trainer, workers can develop lifting techniques that reduce spinal stress and minimize the risk of lower back injury without sacrificing productivity.

"We incorporate MotionStar cards into our chassis to provide tracking of subject body segments at the same time that we are collecting data from a variety of transducers," explains Lee E. Johnson, IST President. "The transducers might include small loadcells for measuring forces generated in the hands during grasping to forceplates located in the floor that record ground reaction forces as subjects walk, run, or jump. Ascension hardware is used almost exclusively in the LiftTrainer because if its higher measurement rate, greater range and accuracy, and less susceptibility to metallic distortion."

According to Johnson, most IST customers buy complete systems rather than individual components such as the motion tracker, forceplates, video devices, software, etc. "The advantage to having an integrated system is that it represents a total solution. IST does the configuration and integration of all hardware into a single package that is 'plug in the wall ready'. This allows our clients to begin collecting data on the day we do training."

The subsequent benefits are faster startup and less frustration which means more research can be accomplished in a shorter period of time. “This is particularly beneficial for new PhD’s that need to begin collecting data for grants and other sources of funding. They don’t have time to spend configuring hardware and writing software to process their data,” explains Johnson.

Based in Chicago, IST is committed to producing “only products with a thorough basis in science.” Certified ergonomists, electrical and software engineers with advanced bio-medical degrees, and physical therapists are among those contributing to IST’s product development. Although research is currently IST’s largest market, with new modules soon to be released the company anticipates their number of clinical and sports clients will quickly increase. This, in turn, will expand the ways in which studies made possible through the innovative technology of the Motion Monitor will lead to outcomes that enrich our lives.

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