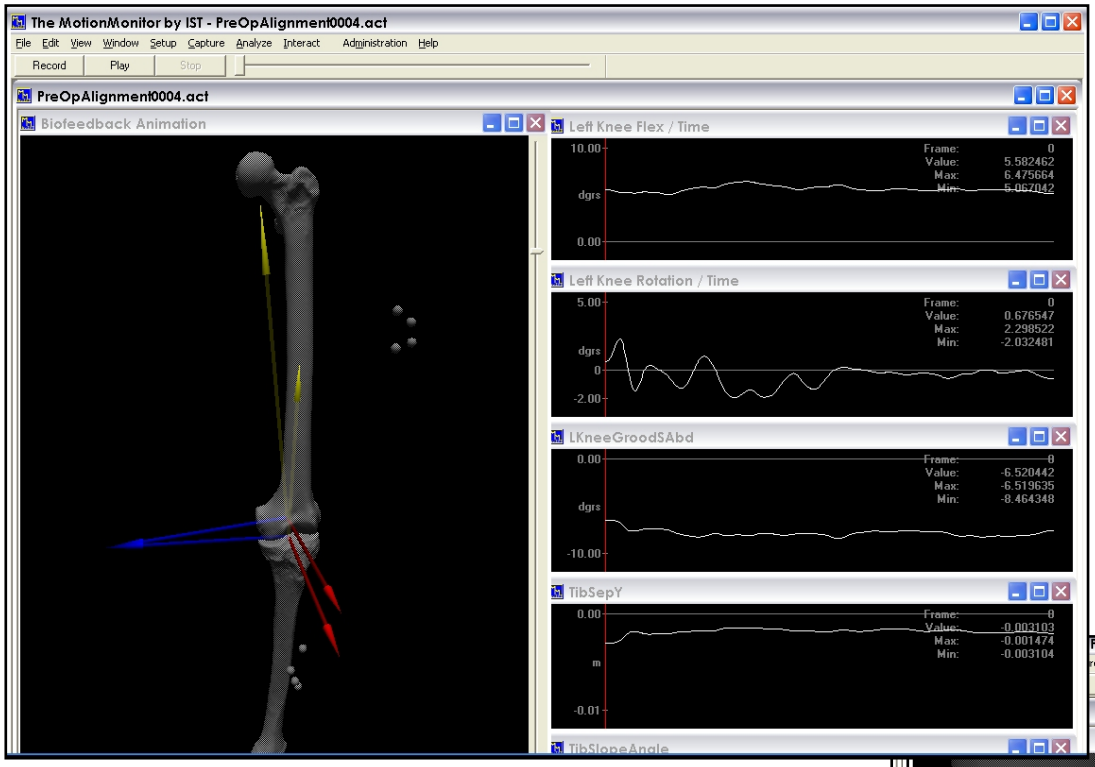
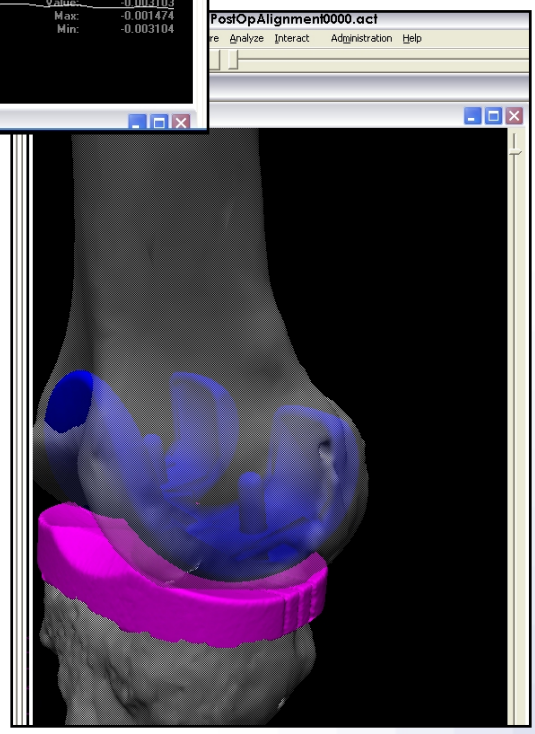
the most advanced data acquisition and analysis system in the market place
offers precise measurement of human motion for applications in…

Tracking Internal Landmarks

It is now possible to register CT-MRI scans for the tracking of internal landmarks both In-Vitro and In-Vivo during collection of activities. Use the data extracted from CT-MRI scans or digitized with The MotionMonitor's mesh file generator to define bone geometry; identify muscle and ligament insertion points; and to track bone separations during activity.





In the image above, a CT scan of an intact cadaveric specimen (it could have been a live subject) was made with a flag of reflective markers attached to the bones. The MotionMonitor software then extracted, in real-time, the important landmarks such as femoral head, condyle centers, long axis, mechanical axis, and joint center of rotation.

While tracking the specimen with a passive optical camera system the distal end of the femur and proximal end of the tibia were resected to receive components for a total knee replacement. The components also were instrumented with passive markers so that their precise location on the resected bone could be monitored. By making the CT scan of the bone transparent it was possible to view the component attachment (see image to the right) and monitor component alignment, full leg alignment and range of motion post procedure.

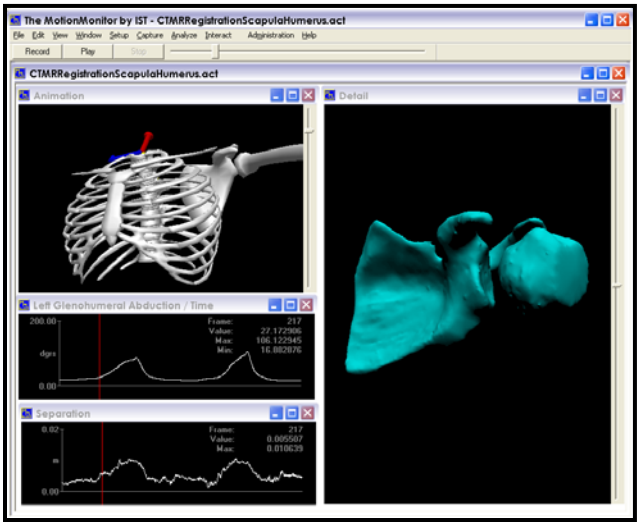
The Motion Monitor
...The Total Solution in Motion Capture

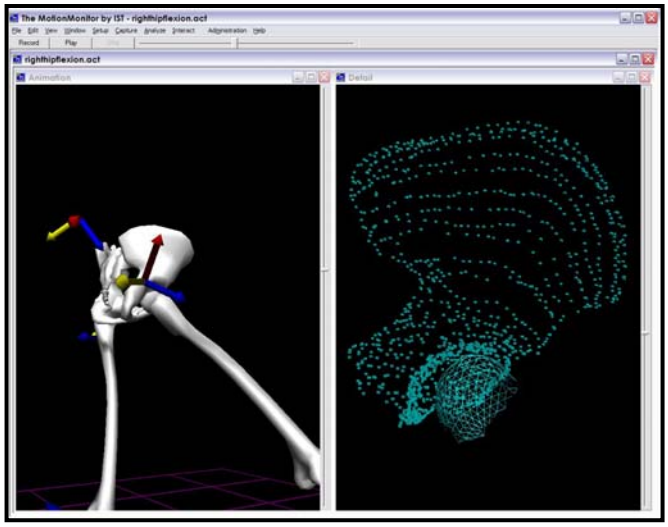
Real time **data** acquisition, analysis, and 3D visualization.
Turnkey **hardware** solutions. Upgradeable as your needs change.
Research Design & System Engineering **consultation**.

Innovative Sports Training, Inc. • 3711 North Ravenswood Avenue • Chicago, Illinois 60613 USA
www.innsport.com • Telephone: 773.244.6470 • email: support@innsport.com

In the image to the right, sensors were attached to a live subject's scapula and humerus, registration landmarks were identified and an activity was collected. CT scans were taken following collection of the activity and then digitized. Using these digitized points and the registration landmarks, a point cloud and then mesh file were created. The collected activity was then played displaying the reconstructed CT scan and the location of various internal landmarks.

In the series of images below, the femur and pelvis were instrumented and an activity was collected. The joint was then disarticulated to simulate an in-vitro experiment. The femoral head and pelvis were digitized using The MotionMontior's meshfile generator. The resultant point cloud and wireframe of the femoral head and pelvis were then played back synchronously with the previously collected activity. Then, the interaction of joint surfaces were observed during the activity.





The MotionMonitor is a totally integrated 3D data collection system for use in clinical, biomechanical, neuro-control, and sports medicine applications involving the analysis of complex motion. Data from Ascension magnetic trackers, NDI Optotrak optical sensors, Polhemus Fastrak / Liberty, SR Research's EyeLink© II, Motion Analysis Corp & Qualysis passive video sensors, EMG, forceplates, video, and other analogue devices are collected by The MotionMonitor, fully synchronized, and presented in real time with state-of-the-art computer renderings and graphic displays. Data output includes all kinematic and kinetic data including joint forces and moments computed with either a top-down or bottom-up inverse dynamics model. Angle data is available as quaternions, cosine matrices, Euler angles, Grood & Suntay angles or projection angles. The user can specify the reference frame, rotation sequence, and axes layout in post-processing. User-defined data can be generated using standard math notation. Data can be reported in either the time or frequency domains and includes filtering functionality. Full body biomechanical computer renderings include stick figures, skeletons, and humanoids. Detail renderings include high resolution images of hand, foot, and spine as well as user-generated mesh files.

The MotionMonitor support team offers a comprehensive package of services designed to meet the unique requirements of each client's research. Services include turn-key systems design, integration of existing client hardware, maintenance, warranty protection, training, and support following installation. Worldwide, IST has built a dedicated following among university researchers.