

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



The MotionMonitor base unit shown here with Ascension magnetic trackers, Extended Range Transmitter and Bertec non-conductive forceplates.

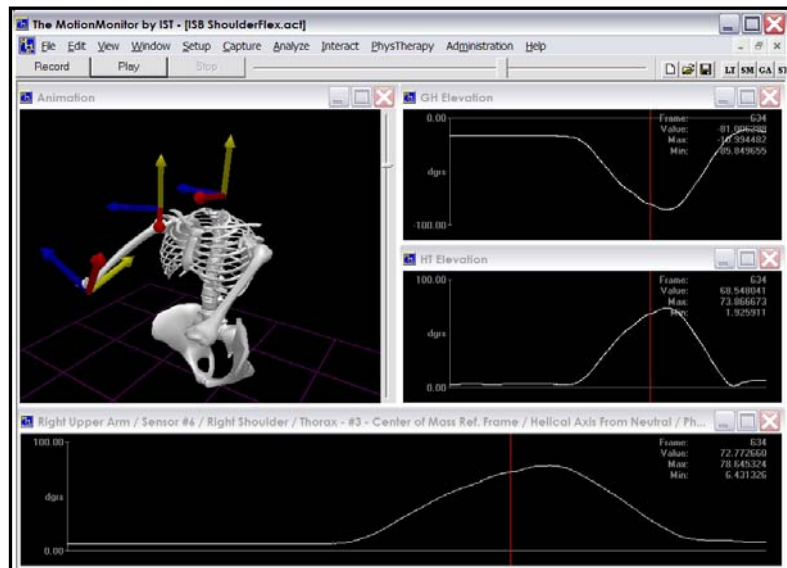
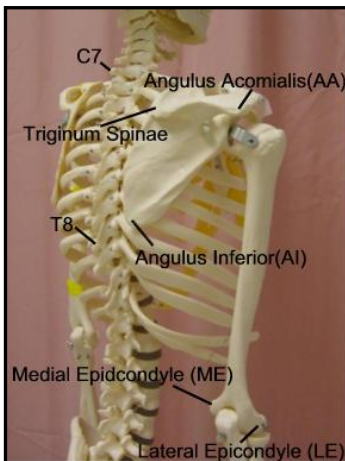


The MotionMonitor base unit shown here with Qualisys Oqus camera system

ISB Shoulder Protocol

The ISB, the International Shoulder Group and the Delft University have proposed a protocol for the study of shoulder mechanics. The protocol provides a definition of local coordinates systems for each of the relevant body segments including trunk, clavicle, scapula and humerus. It also identifies alternative methods for determining the location of the gleno-humeral joint center of rotation. Finally, it suggests Euler angle rotation sequences to be used when reporting the movement of segments.

- ❑ ***NEW*** Provides support of passive optical markers utilizing the C3D Model Builder or real-time stream of a fixed marker set
- ❑ Eases implementation of the protocol with a series of drop down menus that guide the user through each step of the protocol.
- ❑ Permits attachment of sensors to trunk, clavicle, scapula and humerus using surface markers, bone pins, or "scapula locators" as suggested by the protocol.
- ❑ Provides for digitization of local coordinate axes for each segment using the landmarks specified by the protocol or alternatives as determined by the researcher.
- ❑ Supports location of the gleno-humeral joint center by digitization of a centroid, rotation of the humerus, or by offset from scapular landmarks determined by the regression analysis of Meskers et. al.
- ❑ Reports Euler angles relative to any reference frame including the world and each of the other segments and allows the user to specify any Euler angle rotation sequence.



This image on the left shows each of the anatomical landmarks associated with the ISB recommendations. The screen capture on the right shows an activity where a subject was instrumented with sensors on the thorax, right scapula and right humerus. The graphs on the right show the proposed Euler angle sequence for elevation relative to scapula and thorax as well as the helical axis relative to thorax.



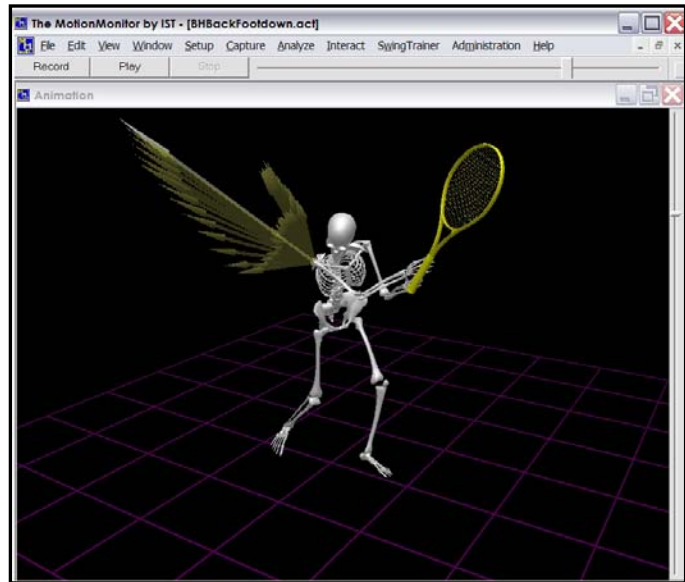
...The Total Solution in Motion Capture®

The MotionMonitor™ is a trademark of Innovative Sports Training, Inc

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

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- ❑ Subject setup protocols now permit naming of landmarks and specification of number of readings to be taken during setup resulting in better quality control.
- ❑ Collection protocols can be defined, randomized or announced to ensure proper sequencing of data collection in conditioned trials.
- ❑ Visualization tools available during setup, collection and post processing result in faster and more accurate data collection.
- ❑ Auto Event Marking and Data Reduction functions speed the post processing of data.



The image above is an example of The MotionMonitor's enhanced visualization tools. View|Helical Axis has been set to display the helical axis at the shoulder with a trail during the previous 100 frames.

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.