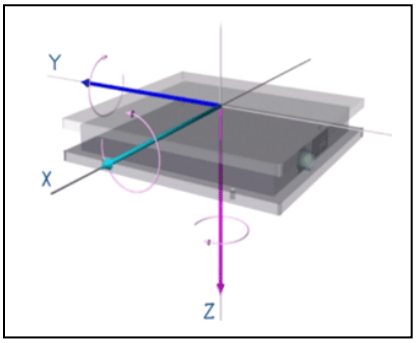
UTA Kinesiology Department Biomechanics Laboratory

The UTA Biomechanics Laboratory is equipped with:

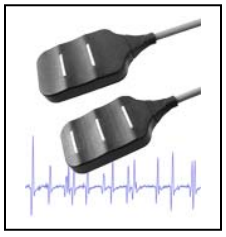
- A 6 camera (MCam2) VICON™ 460 motion analysis system.
- An AMTI, Model OR6-7-1000 force plate.
- A 16 channel Bagnoli™ Desktop EMG System.
- A Biodex System 3 isokinetic testing system.
- A Biopac MP150 is modular laboratory system.
- A variety of load cells, accelerometers and goniometers.

The 6 camera (MCam2) VICON™ 460 motion is used for characterizing human movement. The MCam2 cameras have a resolution of 1.3 megapixels (1280x1024 pixel) and they are capable of running at a frame rate of 1000 Hz. The VICON™ 460 workstation can be used to collect signals synchronized using a 32 channel 16-bit analog to digital conversion board from various analog inputs including: an AMTI force plate, a 16 channel Bagnoli™ Desktop EMG System EMG system and a Biopac MP150 for monitoring skeletal muscle activity, load cells, and Biometrics™ goniometers and torsiometers for joint angles.

The AMTI, Model OR6-7-1000 force plate simultaneously measures three force components Fx, Fy, and Fz and three moment components Mx, My, and Mz. The forces and moments are measured by strain gauges attached to load cells at the four corners of the platform. The output of the force plate are then sent to a high-gain amplifier, which provides excitation and amplification for each channel of the force plate. The output from the amplifier can then be fed into an analog to digital converter (A/D converter). The AMTI OR6-7-1000 has a 4450 N (1000 lb) capacity for Fz and a 2225 N (500 lb) capacity for Fx and Fy. The Fz channel has a natural frequency of 480 Hz and Fx and Fy have a natural frequency of 300 Hz.



The 16 channel Bagnoli™ Desktop EMG System EMG system is used to monitor muscle signals during human movement, exercise and rehabilitation. The Bagnoli system has an EMG bandwidth of 20-450 Hz and is equipped with single differential and double differential surface electrodes. The EMG signal is used to quantify the neural input to the muscles. The amplitude and frequency of the EMG signal can be used to quantify muscle activation under isometric and dynamic exercise conditions.



The Biopac MP150 is modular laboratory system equipped with 16 analog input channels which can be used to monitor a variety of devices (EMG, torque, goniometers, accelerometers). The MP150 has an Ethernet (10Mbit/sec) interface which allows the MP150 to record data, continuously to either PC memory, straight to hard disk or using the MP150's own internal memory (6 million sample / 12MB RAM) at speeds of up to 400,000 samples per second (aggregate). The MP150 uses Biopac's AcqKnowledge for data acquisition, analysis and display.

The Biodex System 3 is used to test muscle strength both statically and dynamically. In Isokinetic mode the Biodex System 3 can be used to test concentric and eccentric contractions. In concentric mode tests can be performed at speeds up to 500 d/s with a maximum torque of 500 ft-lb (680 Nm). In eccentric mode, tests can be performed up to 300 d/s with a maximum torque of 400 ft-lb (542 Nm). The Biodex System 3 can also be used to test joint strength in isometric, isotonic and passive modes. Passive speeds can be set as low as .25 d/s and as fast as 300 d/s. The very slow speeds allow for overcoming the natural stretch reflex. Ideal for proprioceptive testing in early stages of rehabilitation.

The Biometrics™ goniometers "SG" series twin axis goniometers simultaneously measure angles in up to two planes of movement. For example, to measure wrist movements, the endblocks of the SG65 goniometer are attached on the dorsal surface using double sided tape,(type. No. T10), one end over the third metacarpal, the other over the midline of the forearm, with the wrist in the neutral position. The goniometer has two separate output connectors, one measures flexion/extension, the other radial/ulnar deviation.

The Biometrics™ "Q" series single axis torsiometers are designed for measurement of rotations in one plane, e.g. forearm pronation/supination or neck axial rotation. If the torsiometer is bent in planes X-X or Y-Y the output remains constant.