A comprehensive setup

The laboratory can include multiple synchronized devices to provide a full assessment of the patient’s movement:

[1] The Clinical 3DMA system by STT Systems aims at performing a 3D biomechanical study. This system allows observing the whole body or just certain limbs with great precision, at high speed and in a three-dimensional space, as well as to extract the most relevant biomechanical parameters. Clinical 3DMA operates as the master application and supervises the data acquisition from the other devices.

[2] The Trigno Lab surface electromyography from Delsys allows analyzing the electrical activity of the muscles during the movement, and this data can be synchronized with that of the capture system.

[3] Additional devices like force platforms (to record the ground reaction force) or high-speed video cameras (to record high-speed footage of the actions performed).

A single interface

These systems work in an integrated way, which means that the data acquisition is carried out synchronously and also that the information can be studied and evaluated in a single interface. The Clinical 3DMA application allows collecting data from other devices and displaying it to the user. In this way, the playback of a recording covers all the data sources at the same time.

Also, each system remains able to operate autonomously, meaning that the devices can be managed individually if the user wishes to.

Report generation

From the practical point of view, it is very helpful to obtain quick results and conclusions from the analysis performed. Clinical 3DMA allows generating reports automatically including integrated data from devices, making the task significantly easier. The templates can be modified at will by the user.

Use in research

The possibility of analyzing curves and raw data is often very useful for the researcher.

In Clinical 3DMA it is very easy to export integrated data from all devices to CSV or ASCII files for simple import and processing in third-party software packages.
Clinical 3DMA is a 3D motion capture and analysis system developed by STT Systems, with visualization tools, calculation of biomechanical parameters, reporting, biofeedback, etc. Some of its main features are:

**Analysis of gait and other protocols:** It specializes in the analysis of gait but also offers a wide range of analysis protocols: 25 standard protocols expandable with any of the 425 available.

**Event detection:** Some of the protocols include algorithms for automatic detection of events: initial contact, takeoff, etc. Events can also be added manually.

**Representation of biomechanical parameters:** Through real-time temporal graphs, numerical tables, protocol-specific dialogues, etc.

**Automated generation of reports** including analysis results. The templates of these reports are customizable. They can include raw data, tables, images, logos, fixed text, custom covers and back covers...

**Export of capture data** (trajectories) in ASCII format (for example for import into Matlab), as well as biomechanical curves in CSV format (eg for MS Excel import).

**Languages:** Spanish and English available.

**New protocols:** Clinical 3DMA allows loading new analysis protocols.
Delsys Trigno Lab EMG

The Trigno wireless system is a high-performance device for the detection of EMG signals. The sensors have a long transmission range and a rechargeable battery for up to 8 hours. The system transmits data to proprietary EMGworks software, as well as to Clinical 3DMA.

**Number of channels:** 8, 12, 16, 32, 48, 64.

**Data:** 16-bit resolution, EMG sampling frequency of 1926 Hz.

**Quality of data:** Patented Parallel-Bar technology and proprietary noise reduction algorithm ensure a high quality signal as well as quality and latencies between sensors <500us.

**Range:** Maximum 40m.

**Sensor dimensions:** 37 mm x 26 mm x 15 mm.

**Battery:** 8 hours of operation in full-transmission mode. Charging time 2 hours. Real-time information on signal strength and battery status.

**Accelerometer:** In addition, each sensor incorporates a triaxial accelerometer, with selectable range ± 1.5g, ± 4g, ± 6g and ± 9g.

**Software:** EMGworks / STT Clinical 3DMA.

**Charge and sync base:** USB to PC connection (laptop or desktop).

Other devices

**AMTI and other force plates**

Force plates allow measuring the ground reaction force during the period of foot contact. The resulting force can be given as a single component (Fz) or in the three components (Fx, Fy, Fz).

**Number of plates:** 1, 2 or 4.

**Technology:** Extensometric gauges on four tighteners with patented proprietary design.

**Software:** AMTI / STT Clinical 3DMA.

**Optionally:** Walkway may be included.

**iSen: Inertial sensor system**

*iSen is an inertial motion analysis system developed by STT.*

**Wireless:** The operating range is 20 to 40 m.

**Frequency:** STT-IWS sensors collect data at extremely high speeds, up to 400Hz.

**Compatible:** Data can be collected directly from the Clinical 3DMA system synchronized with data from optical systems and external devices.

**Protocols:** Any motions involving single limbs to full-body.
STT Clinical 3DMA

Clinical 3DMA includes:
- Permanent software license, installer, documentation.
- Capture cameras.
- Synchronization Hub / s.
- Data and synchronization cabling.
- Adjustable wall mounts.
- Complete set of markers for protocols included.
- Calibration tool.
- Carrying case.
- High-adherence stickers.

Optionally:
- Tripods for portability.
- Workstation (computer).
- External television screen.
- Additional markers.

Delsys Trigno Lab EMG

Delsys Trigno Lab EMG includes:
- Trigno base station.
- Sensors Trigno.
- Adhesive for Trigno sensor.
- Power supply with adapter kit.
- Delsys Software DVD
- 1.5m USB cable.
- Trigno open end output cable.
- Trigno User’s Guide.
- Wireless EMG system of N channels Trigno.

Third-party device integration

AMTI Plates
- Power plates of the chosen size.
- Hardware mounting kit
- 9 meter cable to connect the force plates with a USB amplifier.
- Mounting rail.
- Customized platform to build a walkway.

Real Video
- High-speed video camera (50FPS, 100FPS, 120FPS or higher), with built-in lens and tripod.
- HD resolution webcam for quick connection, with a tripod.

iSen System
- STT-IWS Inertial sensors.
- Carrying case for sensors and accessories.
- Charger and cabling.
- Neoprene straps for fixing sensors placement.
- Dual-band WiFi router.