3D Full Body Portable Kinematic System

Wireless Internal Sensor Technology

- "Camera free" portable system
- Full body model with 13 wireless transmitters
- Light weight and easy to mount sensors
- 100 Hz sampling frequency
- Wireless data transmission up to 20 meters
- Optional data logging via memory card
- Integrated weight distribution insole
- Real time angle, velocity, and work calculations
- Real time animation via selectable Avatars
The FAB System (Functional Assessment of Biomechanics ™) developed by BIOSYN SYSTEMS INC. is the world’s first full body wireless motion capture system based on “camera free” inertial sensor technology.

This innovative technology allows completely free movement without the need to stay in view of cameras. Inertial sensors combine accelerometers, gyros and earth’s magnetic field sensors and allow a real time detection of any angular displacement within biomechanical bodies. Powerful user-friendly software displays and calculates kinematic and kinetic data in real time and animates body motion with selectable graphical models.

- Combined real time measurement and analysis screen with free rotational model animation window
- Synchronize all data and models with real time video.
Operation of the system

Up to 13 small, light weight sensors (4x7x2.4 cm) are attached to user selectable body segments including head, upper/lower arm, thoracic trunk, pelvis, thigh/shank and weight/force sole sensor. Elastic straps guarantee a stable fixation. The sensors can be attached under or above clothes. An auto-calibration routine guarantees quick and easy use even for the novice. The system is ready to start within 5 minutes.

Signal transmission and real time display

In wireless real time mode all data are collected at 100 Hz sampling rate and transmitted to small receiver system with USB PC connection. The transmission range is 20 meters in any direction (50 to 100 feet). All kinematic and kinetic data are processed and optionally displayed in real time. Skeleton or male/female models visualize the motion patterns from up to 3 different views.

Data logger option

The small receiver box can also be used as a belt datalogger. An onboard control panel allows to setup the whole system in the field and without a PC. After calibration it stores data on a commercial SD flash card. Depending on the card size it allows you to record numerous hours in the field without any range limitation.
Easy to use software

The software consists of a basic set-up system, a setup menu for test activities/motions, a signal and motion animation screen and data that is easily exported via excel format. The motion capture data are processed automatically. The following categories of analysis parameters are supported for all detected body segments and can be selected for signal review:

- **3D Angle Series**
- **Anatomical Angles (Range of Motion)**
- **Force Data**
- **Torque Data**
- **Velocity**
- **Acceleration**
- **Power**
- **Foot sole - Pressure**
- **Foot Sole Weight**

The angle data are based on the pitch, roll and yaw systems for each detected segment, the kinetic data are based on an optimized rigid body model, the weight and pressure data are calculated from the force in-shoe sole.

A re-play function allows you to review each recording and activity. Virtual tools allow you to visualize the range of motion, force vectors and moments and motion patterns of each segment relative to center of the model. All parameters/signals can directly be exported to Excel compatible software for customized analysis and statistics.
- **FAB wireless 3D motion sensors**
- **Real Time Receiver**
- **FAB carrying case with sensors, receiver, & hypoallergenic straps**
- **All sensors fit neatly inside carrying case**
- **Foot sensors with weight bearing insoles**
- **LEDs display sensor battery status**
Technical specifications

Weight/Size of extremity sensors: 4x7x2.4 cm/68g
Radio Frequency: 900 MHz (US/Can) or 850 MHz (EU)
Transmission distance: Up to 20 Meters
Sensor operation time: 12 hours
Charging time: 8 hours
Data logging capacity: 24 hours on a 512 MB SD memory card
Real time display latency: between 40 and 120 ms

6g Sensor Parameters

Following are the current specifications for 6g FAB systems:

Measurement Range (each axis):
- Acceleration
- Angular Velocity

Static Accuracy (RMS error):
- Attitude
  - Min 0.1°
  - Typ 0.4°
  - Max 1.1°
- Heading
  - Min 0.4°
  - Typ 1.6°
  - Max 3.6°

Relative Rotational Accuracy
- Min 0.1°
  - Typ 0.4°
  - Max 1.1°

Magnetic Distortion Drift Rate (1 s apart)
- Typ 1.0°/s

Gyroscopes Sampling Rate
- Typ 100 Hz

Accelerometers Sampling Rate
- Typ 100 Hz

Magnetometers Sampling Rate
- Typ 25 Hz

Wireless Packet Transmission Rate
- Typ 25 Hz

Latency
- Min 4 ms
  - Typ 8 ms
  - Max 12 ms

19g Sensor Parameters

Following are the current specifications for 6g FAB systems:

Measurement Range (each axis):
- Acceleration
- Angular Velocity

Static Accuracy (RMS error):
- Attitude
  - Min 0.1°
  - Typ 0.4°
  - Max 1.1°
- Heading
  - Min 0.4°
  - Typ 1.6°
  - Max 3.6°

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- Min 0.1°
  - Typ 0.4°
  - Max 1.1°

Magnetic Distortion Drift Rate (1 s apart)
- Typ 1.0°/s

Gyroscopes Sampling Rate
- Typ 100 Hz

Accelerometers Sampling Rate
- Typ 100 Hz

Magnetometers Sampling Rate
- Typ 25 Hz

Wireless Packet Transmission Rate
- Typ 25 Hz

Latency
- Min 4 ms
  - Typ 8 ms
  - Max 12 ms
Minimum Computer System Specifications for FAB System

Following are the current specifications for computer systems required for the Functional Assessment of Biomechanics FAB™ Systems, upon which quotes may be based. These specifications are subject to change without notice due to the volatility of the computer industry. It may be assumed that systems shipped by Biosyn Systems will meet or exceed these specifications. Systems quoted with these specifications are good for three months after the date of the quotation.

- **Processor:** Intel Pentium Core 2 duo (dual core) processor
- **Memory:** 2.0 GB RAM
- **Hard Drive:** 160 GB
- **CD-ROM Drive:** CD-R/W
- **Graphics board:** NVIDIA GeForce or equivalent, 256MB separate video card (non-integrated card and memory)
  - 512MB is optimal
- **Monitor:** 15” TFT or external monitor with 1024x768 resolution (or higher)
- **Keyboard:** Standard PC Keyboard
- **Mouse:** Microsoft Compatible Mouse
- **Ports:** 2 USB Ports, FireWire/I-Link (Integrated)
- **O/S:** Windows XP Home/Professional

For additional information, please visit Biosyn's website at [www.biosynsystems.com](http://www.biosynsystems.com)