

**Ultra-wideband technology will enable game developers to capture real-time motion from multiple actors; future applications include health care.**

By Laurie Sullivan

Aug. 25, 2009—Ultra-wideband (UWB) RFID technology could advance video game development and special effects in the motion picture industry, by allowing companies to capture real-time motion information from several actors at once. This is being made possible thanks to [Xsens Technologies](#), a Netherlands-based firm that designs three-dimensional tracking applications.

Xsens has incorporated UWB real-time location technology from [Time Domain](#) to advance its full-body cameraless motion-capture system. The new tracking application, dubbed MVN, aims to make it easier for companies such as Electronic Arts, Industrial Light and Magic, Sony Pictures Imageworks, THQ and other video game and entertainment industry firms to digitally reproduce realistic movements of actors.

MVN employs a distributed network of 17 inertial sensors, which use accelerometers and rate gyroscopes to track motions in 3-D (inertial sensors are used in the Nintendo Wii remote control unit, as well as the Wii MotionPlus, to determine players' movements). The inertial sensors, affixed to a suit worn by actors under their clothes, form a distributed wireless network.

An actor portraying a character in a video game dons a sensor-lined suit. The sensors enable visual effects developers to track and capture joint, head, hand, leg and full-body movements, in real time, to re-create scenes in a video game. The sensors, which communicate to a hub worn on the body—which then sends the data wirelessly to a receiver connected to a PC or laptop, using Xsens's proprietary protocol—eliminate line-of-sight restrictions associated with existing camera systems.

The sensor data is processed in Xsens' MVN Studio software, which provides real-time motion capture visualization, playback and editing. From the MVN Studio application, a user can choose to stream real-time data to other applications, such as Autodesk Maya and 3DS Max, or to export files in various file formats.

The Xsens MVN system can be utilized without using UWB tags, but the company integrated Time Domain's PLUS tags and real-time location system (RTLS) technology to add accurate and absolute positioning data, enabling the simultaneous use of MVN suits by several actors. This, the company reports, eliminates the need to record each actor's movements separately, and then integrate the virtual actors digitally into a single scene.

TimeDomain's PLUS system provides time-of-arrival measurements that signify the amount of time it takes for the UWB signal to travel from a tag to the PLUS readers installed in the room or surrounding area. Xsens integrates those measurements with data from the inertial sensors to improve the sensors' accuracy and update rates, as well as provide the exact position of the body being tracked in 3-D.

The PLUS network can provide indoor location information at accuracy levels previously unavailable from Wi-Fi or other RTLS technologies, according to Greg Clawson, Time Domain' senior VP. "Sensors are placed on the feet or body," he says, "depending on the scene, or the movement they are trying to capture for a particular scene."

Xsens relies on Time Domain's standard PLUS battery-powered tags, as well as readers and antenna housings. The company paints them black so they can blend in with other equipment on video game and movie sets. Time Domain's synchronization port provides timing and power to the system. Xsens wrote a set of algorithms to pull location data into the software application.

The sensor system built from the PLUS battery-powered tags transmits a UWB signal and unique ID. The signal is received by both reader and antenna. At least three interrogators are required to triangulate the tag in order to determine its precise location. A synchronization and distribution panel provides a time signal to all connected UWB PLUS readers, in order to synchronize them, and links the readers with a PC or laptop through a local area network.

Xsens' founder and CTO, Per Slycke, says Time Domain's technology provides the one component the Xsens system had been missing. Historically, the application could track an object, but not register the "absolute position in space," he says. "Now, we don't need a camera system to track human motion. EA could use our MVN technology to create games for the Microsoft Xbox 360 or Sony PlayStation."

And while MVN supports animation efforts, Xsens is also marketing the technology to the health-care industry, because doctors can employ the same application to assess knee or shoulder movements before and after surgery. Many medical conditions, including sports injuries and strokes, involve some form of movement impairment. Doctors can monitor the movement of post-surgery patients using inertial sensors in 3-D, Slycke says.