Phoenix Technologies Incorporated

High Performance Real–Time 3D Motion Capture Systems For Professionals

www.ptiphoenix.com

Scientific Advantages

Fully Automatic Calibration

By using the recently released VZAutoCal™, even a multi-tracker Visualeyez™ system is now fully automatically calibrated. No manual user calibration effort is required at all. Should any tracker gets bumped or moved during a capture, just wait for a second or two, and the system will recover the accurate calibration by itself!

Continuous Adaptive Calibration

VZAutoCal™ will also update the system calibration continuously if the user so chooses. It will make use of the data captured during a session and optimize the system calibration at intervals chosen by the user. The updating can be stopped at any time by the user if desired.

Reliable High Accuracy Data

Every individual Visualeyez™ tracker is factory-calibrated by instruments with 3D accuracies traceable to international standards. All data filters can be turned on or off. You can fully control the system and trust the data you get with absolute confidence.

Reliable Real-Time Operation

Visualeyez™ system can output the captured data within 0.5 milliseconds (< 0.0005s) from the time the marker light reaches the tracker. Since no marker identification problem will ever occur, the user can depend on receiving a correct marker's data within this timing for implementing autonomous real-time applications reliably.

Zero Wrong Data Probability

Wrong data is worse than no data. An optical marker can be partially occluded and yield inaccurate position data as a result. The larger a marker is the more likely it can be partially occluded, and the larger the introduced inaccuracy will be. Visualeyez™ system uses tiny LEDs as markers which are nearly impossible to occlude partially. Should partial occlusion ever occur, the introduced inaccuracy will still be very small. Hence there is practically zero probability of generating wrong data.

Setup Anyway You Like

Visualeyez™ systems do not require any illuminators to sense the marker positions. The trackers can face each other without causing any blinding problem. Hence they can be laid out and oriented in any way to capture the desired motions. For example, the chest motions can be captured directly even when a person is bending down by simply laying a tracker on the ground and pointing up at the chest area.

Huge Capture Space

Each Visualeyez™ system tracker can capture over a huge 190m³ space. This is due to its exceedingly wide 90 degree angle operation. Therefore even a single- or two-tracker system is good enough for innumerable scientific applications.

Unique Multi-Rate Sampling

Sampling slow motions at high frequency would result in large amount of useless data, wasting storage space and any processing efforts. Visualeyez™ system allows different markers to be sampled at different frequencies to capture motions of very different speeds (e.g., the club head and the golfer's body) at about the same spatial resolution.
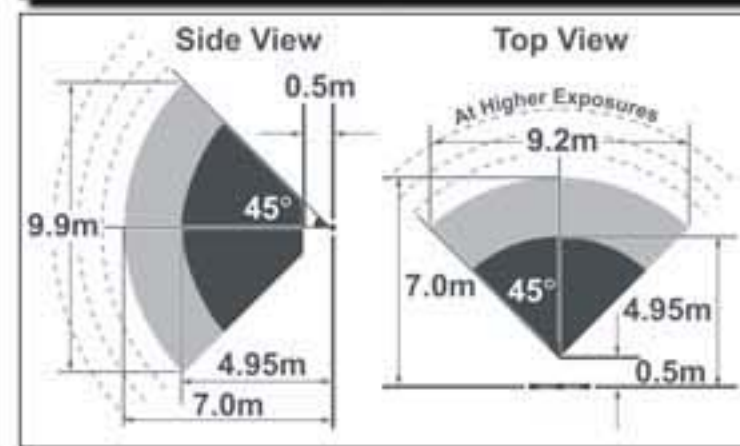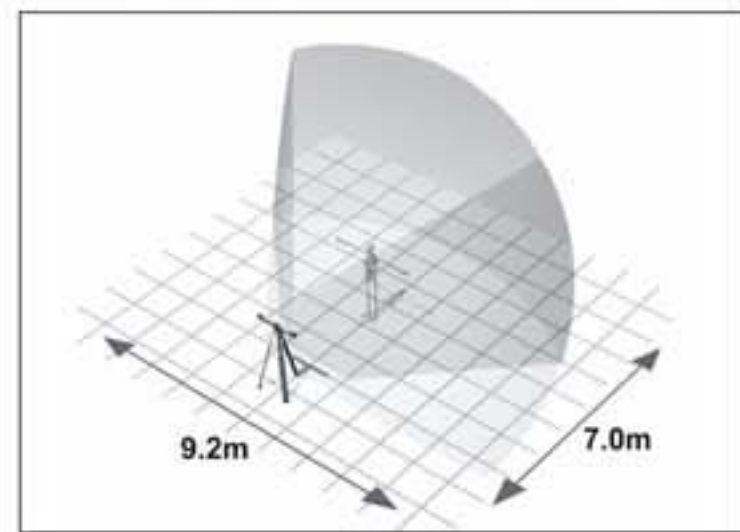
Scientific Advantages

Two-Way Synchronization with Other Equipment

The capture process of a Visualeyez™ system can be started and stopped by an external equipment (or device) in several ways. The system can also generate signals for triggering other equipment to operate synchronously.

Technical Specifications

Sensing Volume:	~ 190 m³ of useful space, over 7m radius (at min. exposure)
Minimum Sensing Distance:	0.5 m
Position Resolution:	0.015 mm at 1.2m distance
Number of Markers:	512 max (no 'swapping' problems)
Number of Subjects:	512 maximum
Calibration:	Not required for an individual tracker Not required for multi-tracker systems either, if VZAutoCal™ is applied
Scalability:	Unlimited, 1~24 trackers tested
Accuracy (3D combined, nominal):	<0.5mm rms (H-series) 0.5~0.7mm rms (E-series) Calibration data range: 0.6~2.5m distance, +/-40° yaw, +/- 30° pitch
Operation Angle:	90° (+/- 45°) in both pitch and yaw; 107° diagonally
Sensing Rate:	4348 3D data points per second (single sampling) 4167 3D data points per second (double sampling)
Data Latency:	< 0.0005s at maximum sample rate
Computer Communication:	Serial RS232/RS422 (921.6kbps)
Mounting Orientation:	Any (no 'blinding' problems)
Ruggedness:	Can operate with up to 15G acceleration applied to the tracker (optional)
Tracker Bar Weight:	3 Kg

9.2m   7.0m

Side View   Top View
0.5m
At Higher Exposures
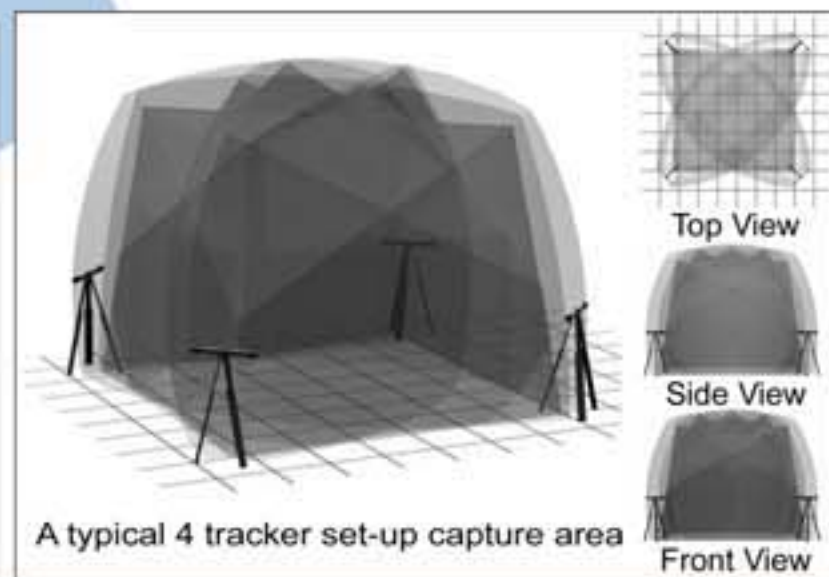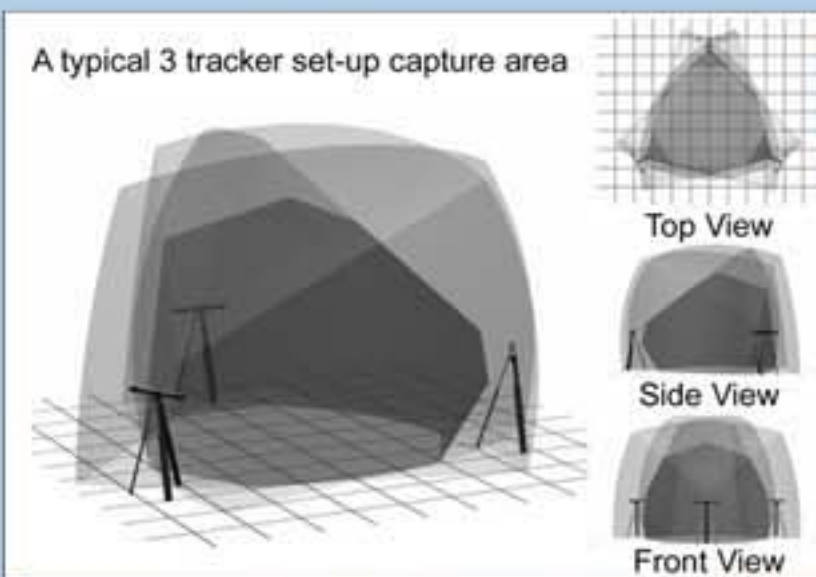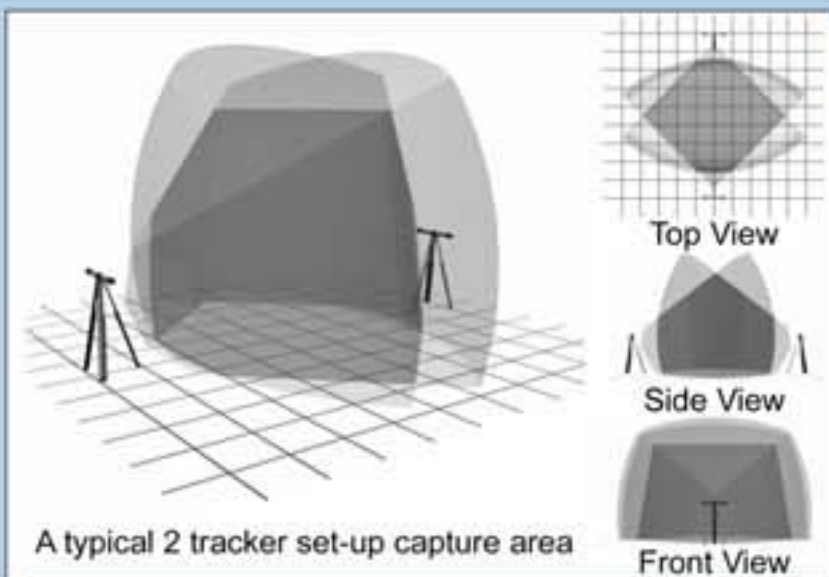9.2m
9.9m   45°
7.0m   45°   4.95m
4.95m   0.5m
7.0m

Single Tracker System

Consisting one single tracker, this simplest Visualeyez™ system is good for tracking 3D object motions with little rotational components (which are the main causes of occlusion). Example applications include walk studies, gait analysis, facial motion capture, machine vibration research, 3D digitization, etc.

Multi-Tracker System

For large range and/or complex motions with large rotation components, you may require a multi-tracker system to capture from different directions. An extra software, the VZAutoCal™, is now provided for operating such a system without requiring the user to do any manual calibration. VZAutoCal™ makes the multi-tracker system appear as if it were a more sophisticated single-tracker system. The advantages of a multi-tracker system include:
  -Increased capture space
  -Multi-directional capture of the markers to reduce occlusion and improve data quality
  -Flexible capture space design as only one tracker needs to sense a marker to determine its 3D position

A typical 2 tracker set-up capture area
Top View
Side View
Front View

A typical 3 tracker set-up capture area
Top View
Side View
Front View

A typical 4 tracker set-up capture area
Top View
Side View
Front View