

Docket #: S05-433

A New Accurate Method of 3D Full Body Motion Capture for Animation

Stanford researchers have patented a unique approach for accurate and precise unencumbered 3D movement analysis for full motion 3D animation.

The system architecture is modular and includes:

1. Multiple synchronized cameras acquisition
2. Foreground/Background segmentation
3. 3D representation reconstruction
4. Tracking of the representation through a model
5. Kinematics extraction and outputting

This invention works with the model generation methods and software described in Stanford docket **S07-254**, **S07-086**, and **US Patent 8,180,714**.

This markerless motion capture system is accurate enough for biomechanical, clinical, sports, animation, video gaming, design, ergonomics, and surveillance applications.

[Video of Markerless Motion Capture](#)

Related Markerless Motion Capture Technologies also available for license:

[S06-193](#)- US Patent 8,139,067 & S06-193B -software associated with Stanford docket S06-193

[S07-254](#)- US Patent 8,180,714 & S07-086 -software associated with Stanford docket S07-254

[S08-122](#)- US Patent 8,384,714

Applications

- Initially developed for **biomechanical and clinical** uses but can also be used for:
 - Sports performance evaluation or sports medicine

- Animation and computer graphics
- Digital movies
- Interactive gaming and video games industry
- Biofeedback and rehabilitation
- Design and engineering
- Ergonomics
- Visual arts and any art using biological signals as an input or output
- Robotics - development of biomimetic robots
- Surveillance

Advantages

- **Accurately and precisely measures** three-dimensional kinematics of the dynamically moving object or human.
- **Simple and time-efficient**
- **Markerless** - No requirement for the placement of any device or object on the subject's body
- **Low cost** - uses off the shelf cameras, no custom hardware required
- **Many data points** - Synchronizes video streams from different views that maximize the amount of information made available by the system
- **Can operate in outdoor conditions** and does not require a specific controlled environment
- **Does not require a specific protocol set up**
- Provides straightforward full body kinematics
- Broad applications

Publications

- Corazza S, Mündermann L, Chaudhari A, Demattio T, Cobelli C, Andriacchi T: [A markerless motion capture system to study musculoskeletal biomechanics: visual hull and simulated annealing approach](#), Annals of Biomedical Engineering, 2006,34(6):1019-29.
- Mündermann L, Corazza, S, Andriacchi, T: [The Evolution of methods for the capture of human movement leading to markerless motion capture for biomechanical applications](#). Journal of NeuroEngineering and Rehabilitation, 3(1), 2006.

- Corazza S., Mündermann L., Andriacchi T., [A Framework For The Functional Identification Of Joint Centers Using Markerless Motion Capture, Validation For The Hip Joint](#), Journal of Biomechanics, 2007.
- Mündermann L., Corazza S., Andriacchi T., [Accurately measuring human movement using articulated ICP with soft-joint constraints and a repository of articulated models](#), CVPR 2007.
- Mündermann L, Corazza S, Anguelov D, and Andriacchi TP: Estimation of the accuracy and precision of 3D human body kinematics using markerless motion capture and articulated ICP, ASME Summer Bioengineering Conference, Vail, CO, June 22-26, 2005.

Patents

- Published Application: [20080031512](#)
- Issued: [7,804,998 \(USA\)](#)

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