



“SIMI® is the leading company in image based Markerless 3D motion capture technology with experience since 1992.

With offices in Germany, USA and China, Simi delivers the best solutions, support and education to over 1000 partners and clients around the world”

HARDWARE TECHNOLOGY



Industrial Highspeed-Camera Setup

Our outstanding camera systems give the best flexibility and accuracy for using markerless and markerbased 3D Motion Capture Systems in any environment.

All Camera Systems are able to stream Raw-Colour-videos at HD/Full HD with over 100fps-1000fps framerate.

SiMi Camera Systems allow hybrid tracking without changing camera mode. Markerless and Marker-Based Algorithms can run at the same time.

- Real Hybrid (Markerless and Marker-Based Motion Capture without changing camera-mode)

Different Resolution and Framerates

- 2MP @ 150 fps
- 2MP @ 100 fps
- 1MP @ 100fps

Different Connections

- GigE, Dual GigE, USB3, Fiberglass



Markerless Tracking

No sensors, just capture in real situations



Hybrid Tracking

Use the largest range of Motion tracking possibilities for the best outcome.



Accurate

Guaranteed scientific accuracy with a validated submillimeter precision.



2MP 150fps



2MP 100fps



1MP 100fps

Video Specifications	1MP @ 300fps 0.5MP @600fps	1MP @ 200fps 0.5MP @ 400fps	0.5MP @ 200fps
Sensor Size	1'	1'	2/3'
Lens	C-Mount	C-Mount	C-Mount
Ring-Light	LED	LED	LED
Raw Video Data	Yes	Yes	yes
Compression	PC	PC	PC
Colour	Yes	Yes	Yes
Exposure	Fix/Auto	Fix/Auto	Fix/Auto
Connection	USB3/Fiberglass	Dual GigE /Fiberglass	Single GigE
Camera Housing	Available on request	Available on Request	Available on Request



The only Wireless 3D Markerless Capture Technology

Our outstanding camera systems give the best flexibility and accuracy for using markerless and markerbased 3D Motion Capture Systems in any environment.

All Camera Systems are able to stream Raw-Colour-videos at HD/Full HD with over 100fps-1000fps framerate.

SiMi Camera Systems allow hybrid tracking without changing camera mode. Markerless and Marker-Based Algorithms can run at the same time.

- Markerless Motion Capture without using Cables

Different Resolution and Framerates

- 2MP @ 150 fps



Markerless Tracking
No sensors, just capture in real situations



Wireless
Wireless, Easy Setup



App-Based
System is can be controlled my remote app



Video Specifications	1MP @ 300fps 0.5MP @600fps
Sensor Size	1'
Lens	C-Mount
Ring-Light	No
Raw Video Data	Compressed Real Time
Compression	On-Board
Colour	Yes
Exposure	Fix/Auto
Connection	Wireless
Camera Housing	Outdoor



Stadium Installation, Outdoor, Weather Resistant

Markerless Motion Capture offers the possibility to move out of the Lab to any Environment (Stadium, Training Pitch, Under Water) to Perform Accurate Human Motion Analysis. Therefore individual Camera-Systems are needed

SiMi offers special designed and individual Camera-Technology Service:

- 1) Special Lenses (Manuel Zoom, Automated Zoom, Fix)
- 2) Housings (Weather Resistant, Under Water)
- 3) Camera Wall Mounts (Pan/Tilt/Zoom, Fix)
- 4) Cable length (longer then 100m)

- Stadium Installation
- Weather Resistant Housings
- Under Water Housing
- Pan/Tilt/Zoom Housings
- Automatic Lens Control

Wide Angle



Normal Angle

Flexibility

Changeable lenses will give you the possibility to capture in either small, medium-sized or big areas.

Camera Distance to object
>100m



Zoom



DISCOVER NEW AREAS



Pan-Tilt-Zoom
Move, Zoom, Rotate the
Camera to any spot



Stadium Installations
Track 1000 of movements
during actual competitions

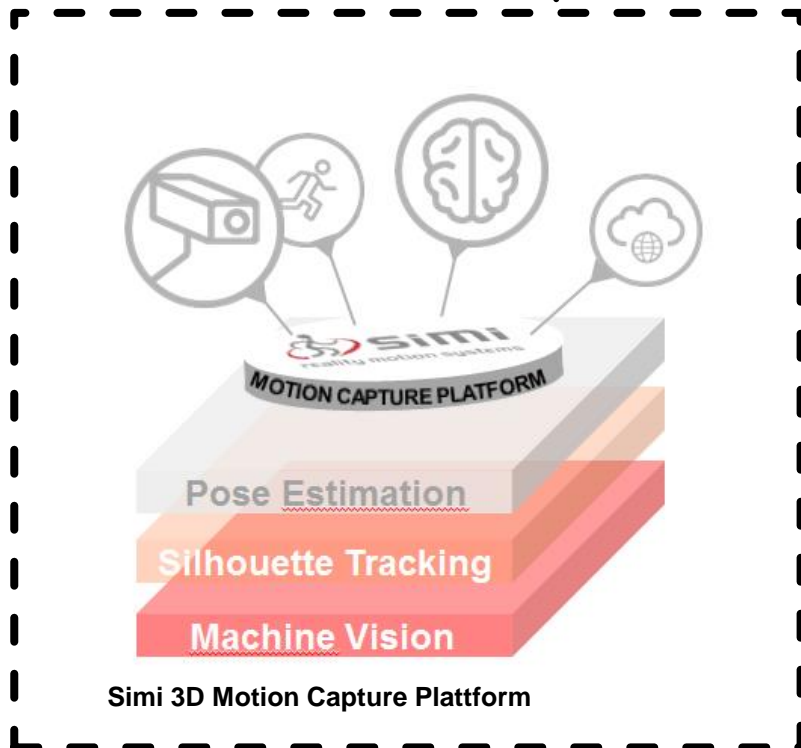
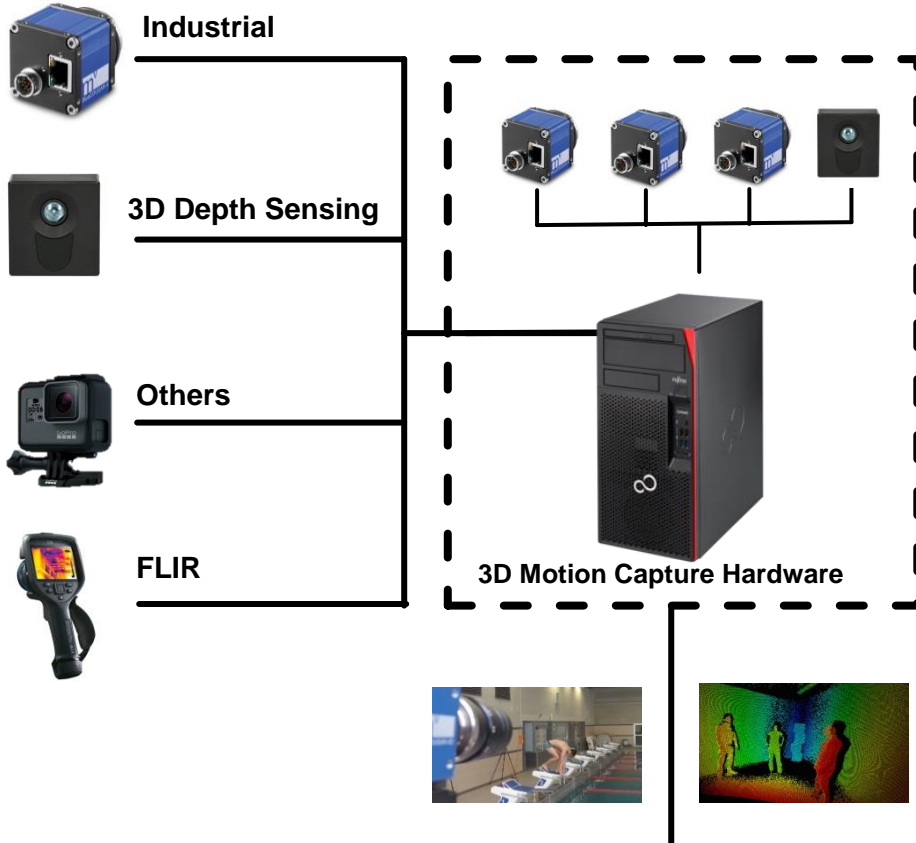


Weather Proven
Resistant against Rain, Snow,
High and low temperature



Under Water
Capture under Water





3D MOTION CAPTURE TECHNOLOGY



Advanced 3D Motion Capture Software

SIMI® Reality Motion Systems is using **Machine Vision** and **Artificial Intelligence** methods to deliver state of the art Markerless 3D Motion Capture Data. With leading technology, Simi brings complex and accurate 3D Movement Analysis to the mass. Enhance your own analysis or include markerless 3D human tracking to your own services or products.

SIMI® is the leading company in image based markerless motion capture technology with experience since 1992. With offices in Germany, USA and China, Simi delivers the best solutions, support and education to over 1000 partners and clients around the world.

Let our superior motion capture technology be the foundation of your success!

- Real Hybrid (Markerless and Marker-Based Motion Capture without changing camera-mode)

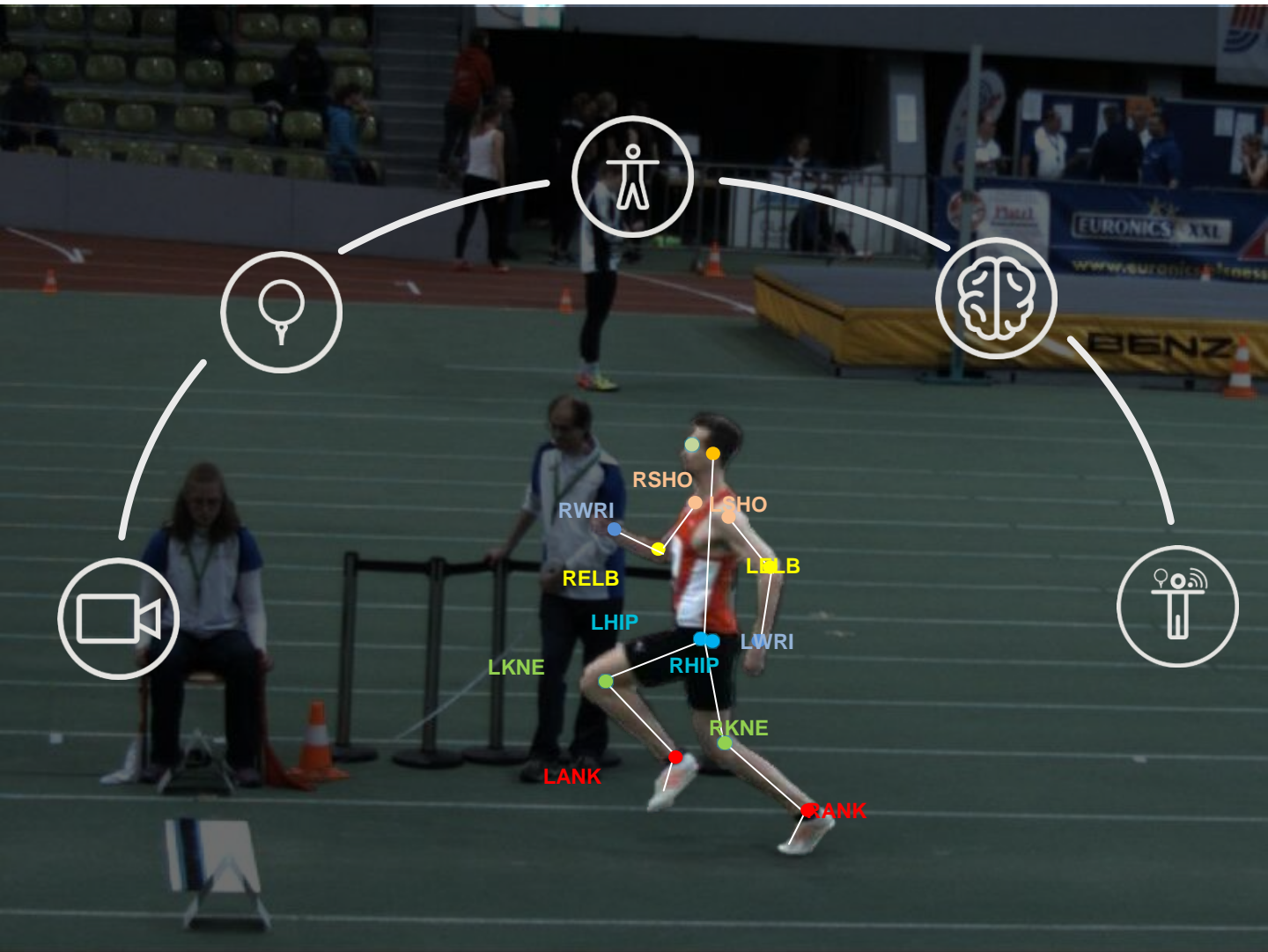
Markerless Tracking

- Silhouette Pose Estimation Multicam
- Silhouette Pose Estimation 3D Camera (Depth)
- CNN Pose Estimation
- Hybrid (Marker, IMU, CNN)

Markerbased Tracking

- Passive Reflective
- Active (LED)

WHY MARKERLESS MOTION CAPTURE?

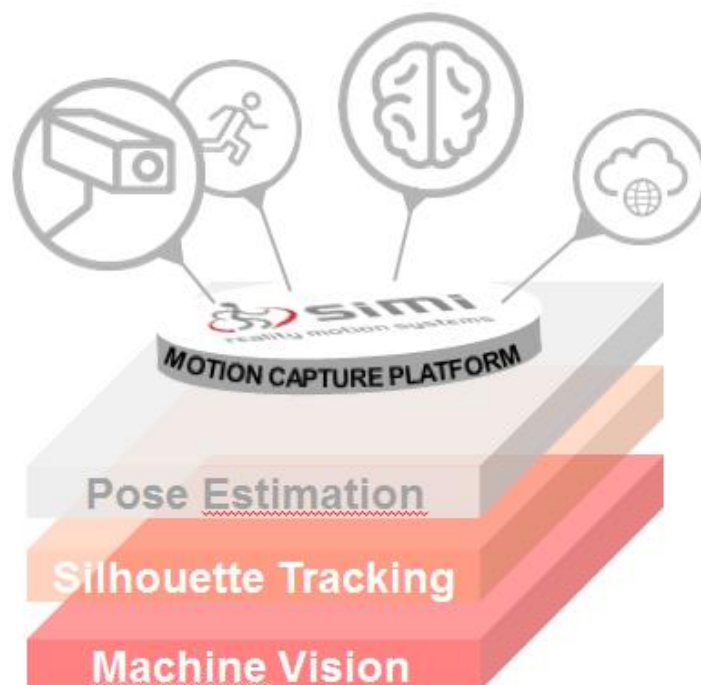


“Markerless Motion Capture opens the Opportunity to bring Human Motion Analysis from the Lab to the wild. 3D Biomechanics Data can be captured in game and competitions enabling Big Data Analysis”

WHY SIMI SHAPE?

*“**Simi** is the only company providing traditional and state of the Art **Markerless** and **Marker-Based** Motion Tracking Technology in **one System**”*

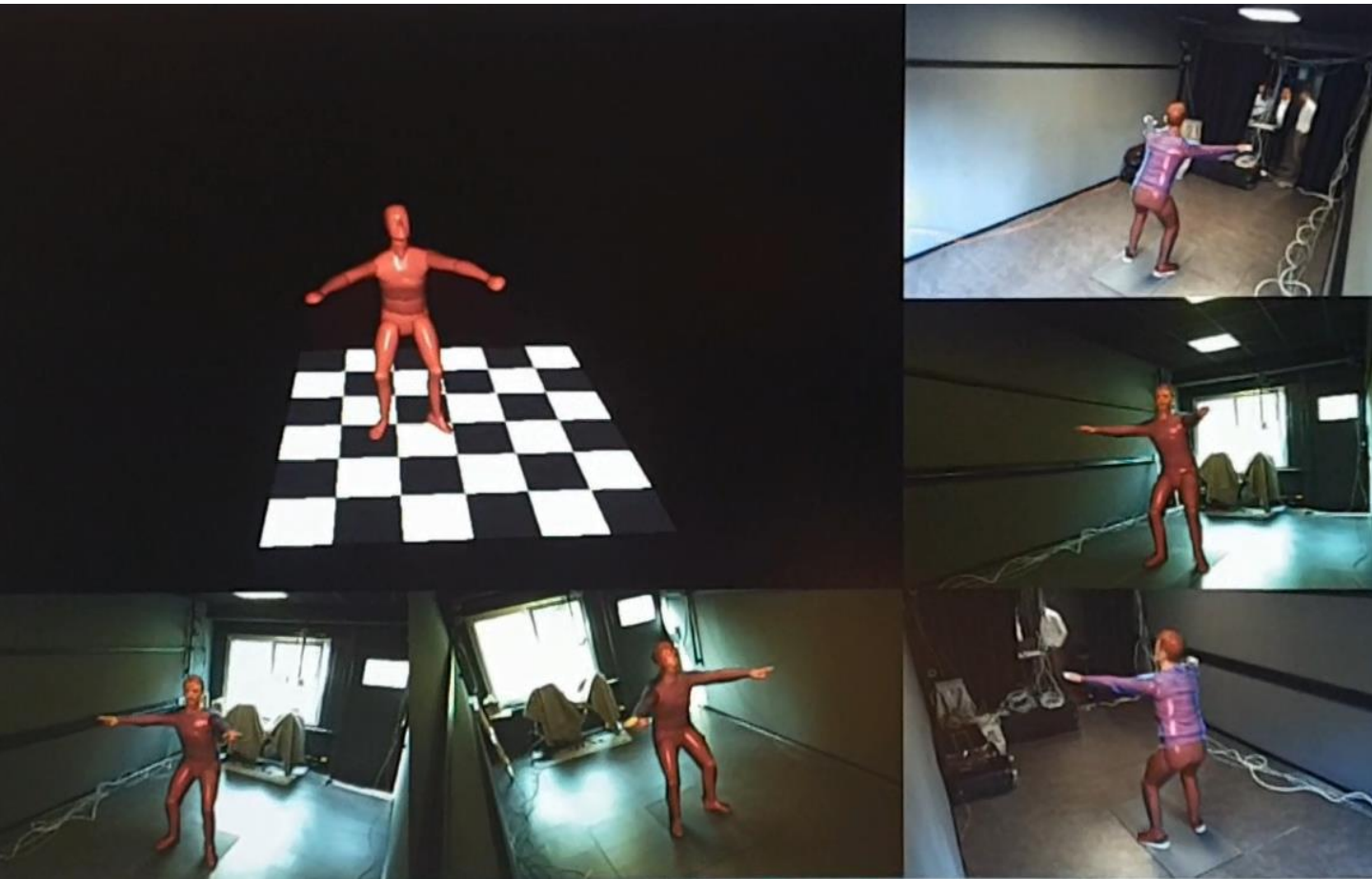
*“Beside other Markerless Systems **Simi** provides best data quality by **combining latest AI Pose Estimation** and **3D Pose Estimation Methods** using Neuronal Networks and 2D/3D Silhouette Carving Methods in a **Hybrid System**”*



MARKERLESS MOTION CAPTURE METHODS

Silhouette 3D Pose Estimation

Hardware: Multi-2D-Camera



The Most Robust 3D Motion Markerless Tracking

SIMI® Reality Motion Systems is the only company providing a multi-camera 3D Silhouette-bases Pose Estimation Technology. Our System is using latest Image Processing Algorithm to extract accurate model based 3D Inverse Kinematics in Any Environment.

Simi attaches great importance to a biomechanically precise modelling of the human body. This includes the correct representation of local joint rotations and correct joint constraints.

*Use For AI-Training Data

*Based on Submillimeter Calibration

* Batch Processing

Inverse Kinematic Model

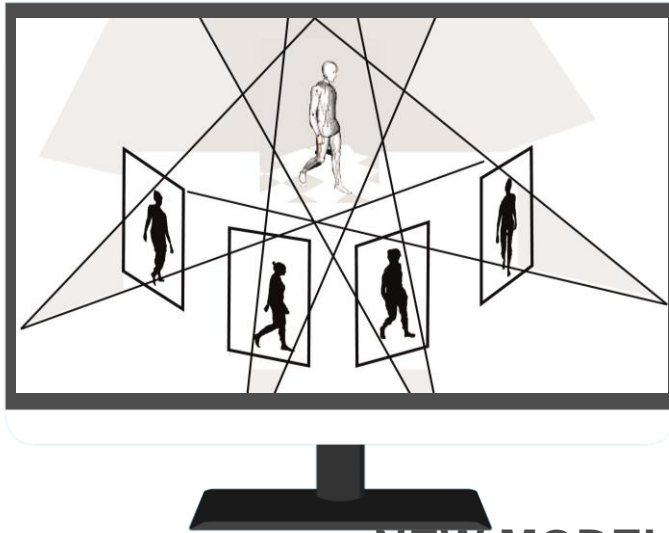
- Inverse Kinematics including 21 Joints (local and global Joint Rotations)
- Tracking of Sports Equipment

Hardware

- Calibrated High-speed-Multi-Camera System

Capture Volume

- Up to 20x20m (Scalable by adding cameras)



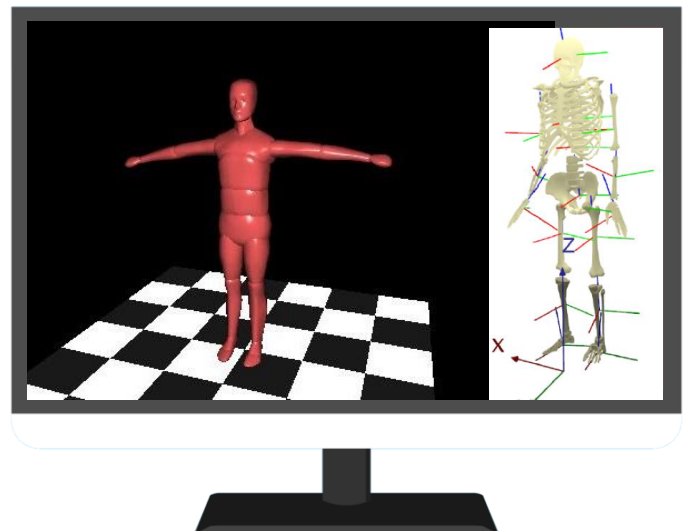
3D Silhouette Extraction

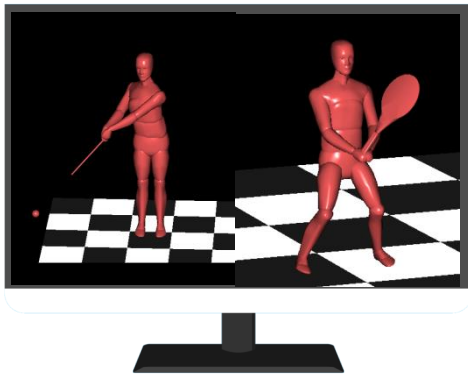
Simi 3D Silhouette Pose Estimation is based on latest 2D and 3D Image Segmentation Methods.

NEW MODELS

3D Silhouette Tracking

Different to other methods using visual hull Simi provides more robust tracking using 2D/3D Correspondence and advanced human modelling.





SPORTS EQUIPMENT MODELS

- * Golf-Club
- * Rackets
- * More are coming

TRACKING ROBUSTNESS

*Several changes to optimize tracking stability



Virtual Marker

- *It is now possible to use alternative marker sets like Plug in Gait or Helen Hayes in shape

*Ask Simi for more information

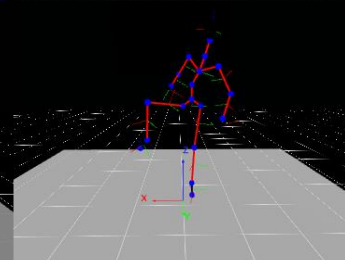
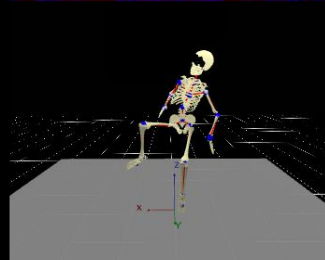
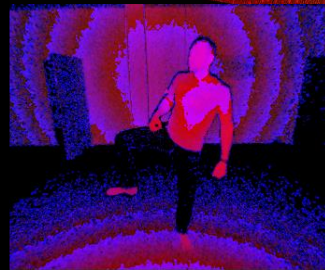
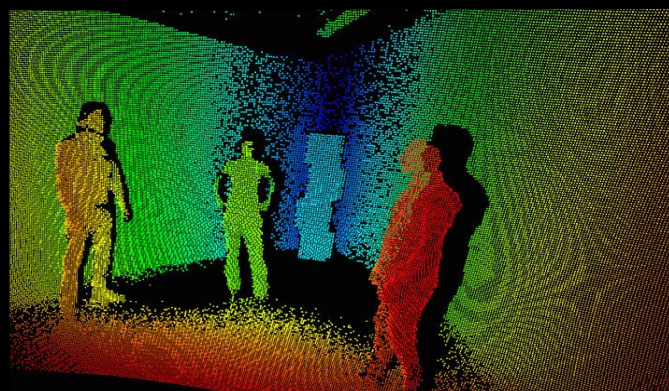
Silhouette 3D Pose Estimation

Single or Multi 3D-Camera



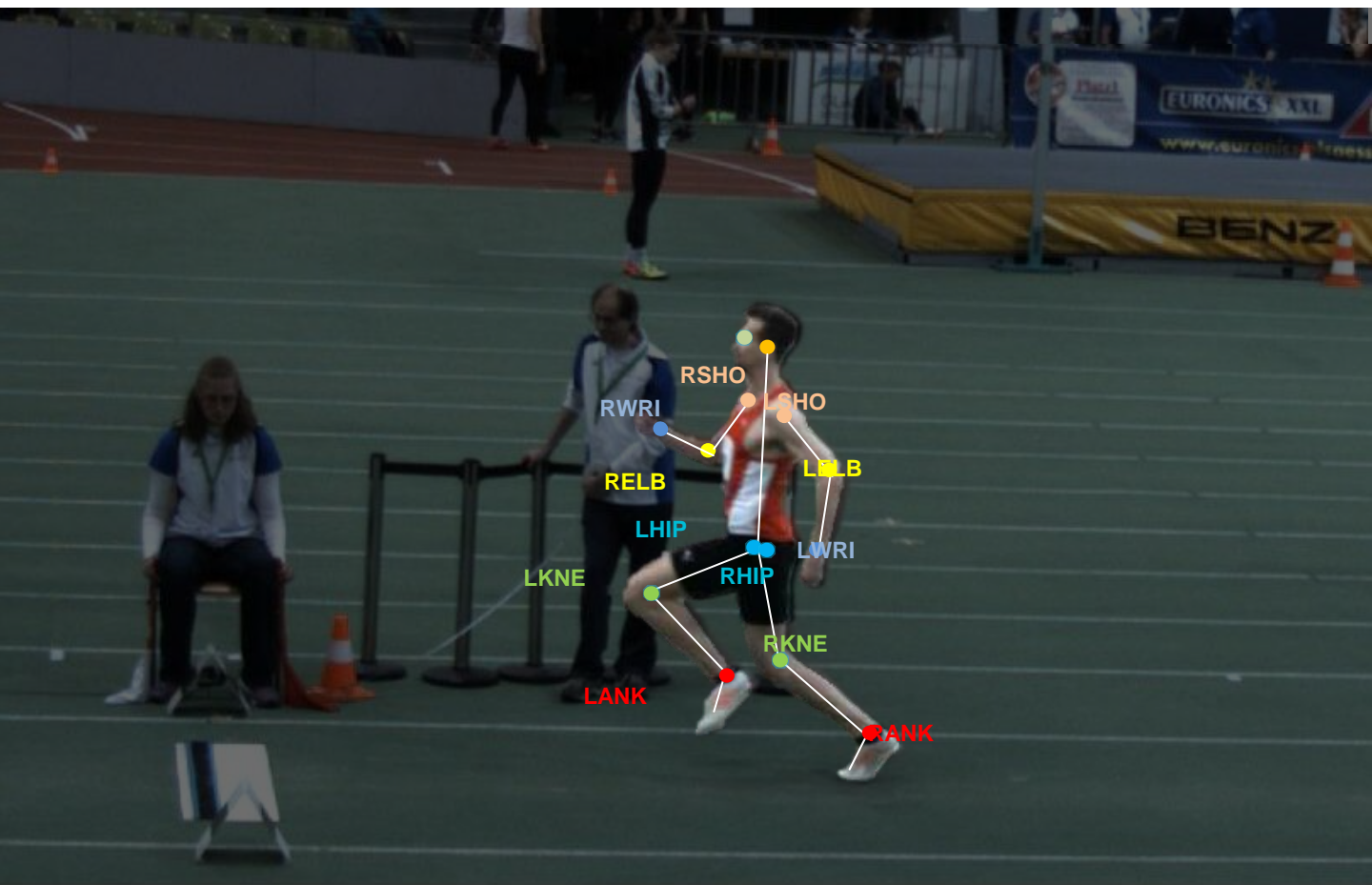
3D Cameras provide direct depth information for each individual camera. Together with the **SiMi** technology depth information can be used to perform precise and robust 3D body tracking.

For this purpose the 3D cameras can be used individually, in combination with other 3D cameras or 2D cameras.



AI-Based Pose Estimation

Welcome to the Future



Artificial Intelligence - Key Point Detection

Latest **Artificial Intelligence Methods** based on manually or automatic labelled 2D Images (**only with Simi**) are trained to find Body Key Points automatically

- Multi-Person
- Batch Processing
- Combine with other Markerless Methods to archive better accuracy
- Enhance tracking speed

Inverse Kinematic Model

- Included 3D Biomechanical Model
- Automatic model Initialization and Scaling
- Sports Equipment

Hardware

- Calibrated High-speed-Multi-Camera System
- Single 2D or 3D Camera

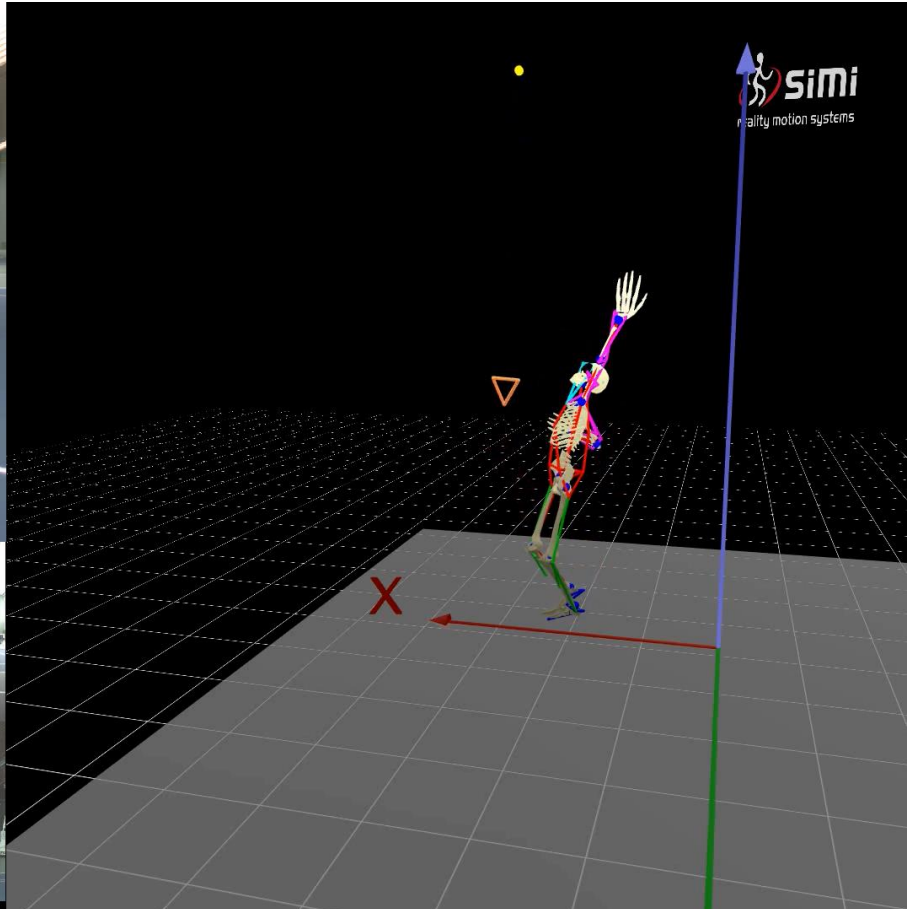
Individual Training Service

- Optimized to your application!

MARKER-BASED MOTION CAPTURE

Marker-Based 3D Tracking

Marker-Model Based Inverse Kinematics (Reflective, Active)



Traditional Gold Standard Methods

Simi Motion Capture Technology offers the “**Gold Standard**” in **3D Motion Capture Method** using either passive reflective or active Markers in a single or hybrid use-case.

Therefore different predefined Marker-Models (Inverse Kinematics or Direct Kinematics, easy or complex) can be used to track 3D kinematic data.

- *Based on Submillimeter Calibration Accuracy
- *Automated Model Initialization
- *Hybrid Use reduces the amount of Markers about 50%

Models and Tracking

- Different Models Available
- Full Body or Single Body Parts
- Hybrid Models
- Automated Model Initialization

Hardware

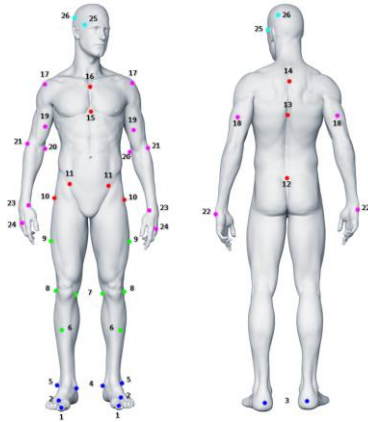
- Calibrated High-speed-Multi-Camera System

Capture Volume

- Up to 20x20m (Scalable by adding cameras)

Marker-Based 3D Tracking

Marker-Model Based Inverse Kinematics (Reflective, Active)



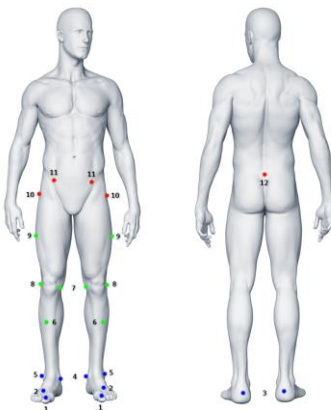
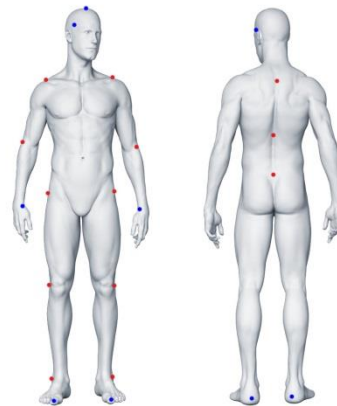
Inverse Kinematics

* Full Body Inverse Kinematics

Clinical Inverse Full Body

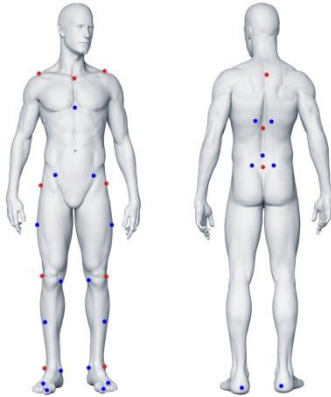
* Full Body

* Less Markers



Inverse Kinematics Clinical

* Lower Extremities only

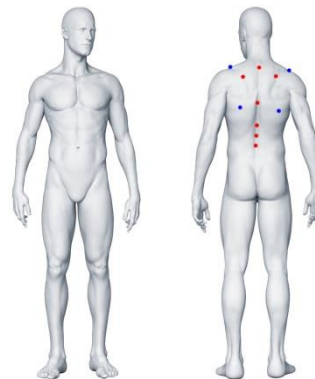


Inverse Kinematics Spine Extended

- * Full Body Inverse Kinematics
- * Spine Extension

Spine Complex

- * Complex Spine Marker Model



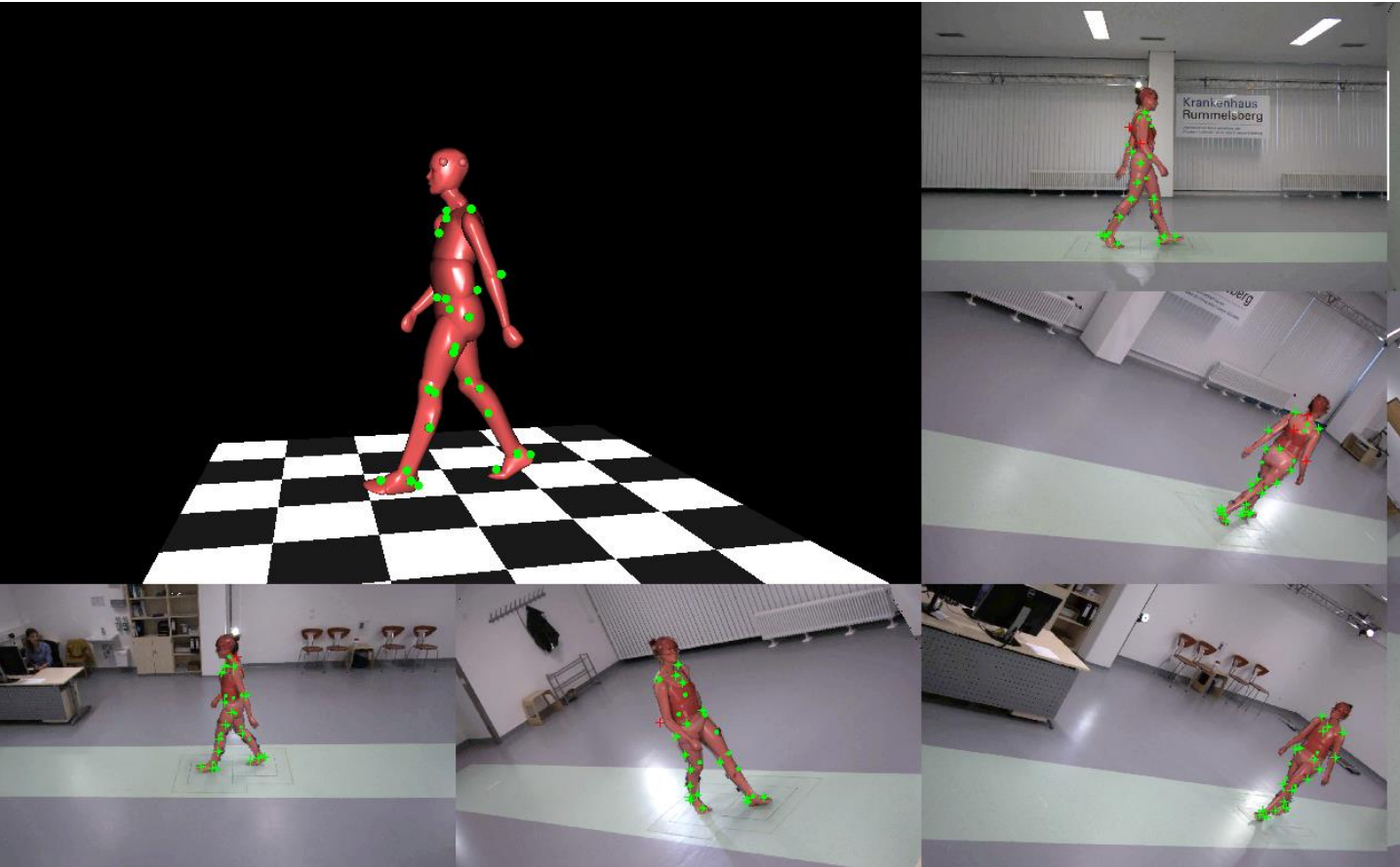
Individual Markersets

- * Create you own models
- * Direct Kinematics
- * Inverse kinematics
- * Complex Foot Models (e.g. oxford)
 - Plug in Gait, Helen Hayes and others
- * Sports Equipment
- * Medical Equipment

HYBRID 3D MOTION CAPTURE

Hybrid 3D Tracking

Marker-Model Based Inverse Kinematics (Reflective, Active)



The Hybrid Tracking (Combine all Benefits)

Hybrid Tracking is a combination of markerless and markerbased-tracking in a single tracking algorithm

- *Marker-Based
- *Silhouette Tracking
- *Artificial Intelligence Key Point Estimation

Why Hybrid?

- Advanced Tracking Stability
- Reduce failures caused by marker-movement on skin
- Less markers needed
- Combine (e.g. Marker-Foot Model, Markerless Full Body)
- improve the time Efficiency

Models and Tracking

- Flexible predefined Models
- Automated Model Initialization in every pose

Hardware

- Calibrated High-speed-Multi-Camera System

Capture Volume

- Up to 20x20m (Scalable by adding cameras)

SIMI REMOTE CONSOLE



Enhanced Movement Analysis in Sport & Life-Science

The new app will join **SiMi's** leading image based Markerless Motion Analysis Technology, offering new level of 3D Movement Analysis with the highest quality of slow-motion video feedback combined with completely automated 3D Markerless Tracking possibility.

Speed Up your Capture Process!

- *Markerless Tracking Batch Processing
- *Immediate Feedback
- *Handle big data projects easily

- Slow Motion Video Feedback
- Video-Delay Feedback
- Tablet App
- Real Time Slow-Motion Video Feedback
- Compare & Analyze
- Including Force-Vector Feedback



Portable capture
Control Simi Motion remotely
on the field



Movement Analysis
Enables Automated 3D Markerless
Motion Tracking



Video-Feedack
High-Quality Video Feedback
with one click



Intelligent Movement Analysis

In clinical environments and high-class sports, 3D Markerless Motion Capture allows detailed biomechanical analysis. With these results the mechanics of movements can be improved to allow better sports performance and/or less injury risk. Sports and Clinical biomechanics are often confronted with very special requirements:

- Analysis often has to be done at the place of sports performance (on the field) in a very short amount of time (daily routine)
- Results have to be communicated and understood by the athletes/coaches and patients/doctors to make use out of them in training and clinical treatment

→ The New Simi® Feedback and Analytics App was created to bring biomechanical analysis into daily training and analysis routines

→ Simi® Feedback and Analytics App will make 3D Motion Capture easy as never before

3rd Party Hardware Integration

SiMi Hardware Integration

Create your own package!



EMG
Analog or Digital
Integration



FORCE
Analog & Digital
Integration



INDIVIDUAL
Capture Analog Data
from any device



DATA REPORTING/EXPORTING AND VIZALISATION OPTIONS



Visualize your Data!

In clinical or sport analysis it's important to deliver a perfect feedback for the patients, doctors or athlete.

SiMi Systems will give you an ideal tool, to structure and visualize your data, find data over 1000 of Patient or Athletes or easily compare them.

Beside easy **interactive SiMi Reports**, **PDF** or **video reports** SiMi delivers custom **cloud reporting** possibilities.

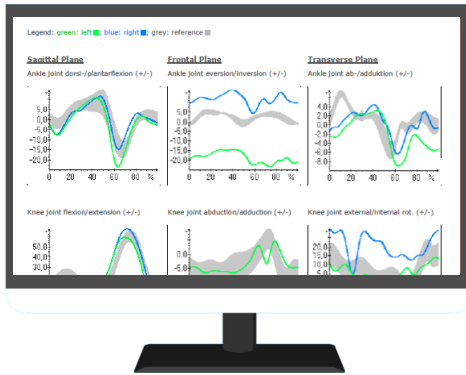
Report Options

- PDF
- Video
- Cloud

Export Options

- .TXT, .CSV
- .C3d
- .Fbx

→ Ask for more

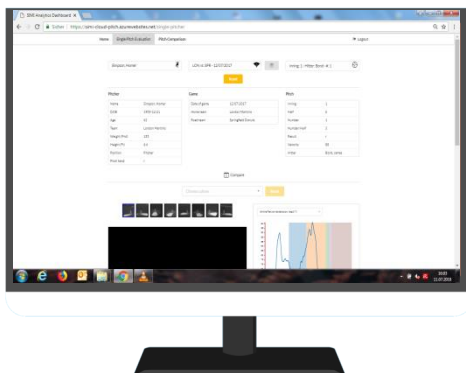


PFD Reports

- * e.g. Gait Analysis
- * Individual Reports on request

VIDEO REPORT

- *Data Overlay
- *Viewing Templates
- *3D Animation

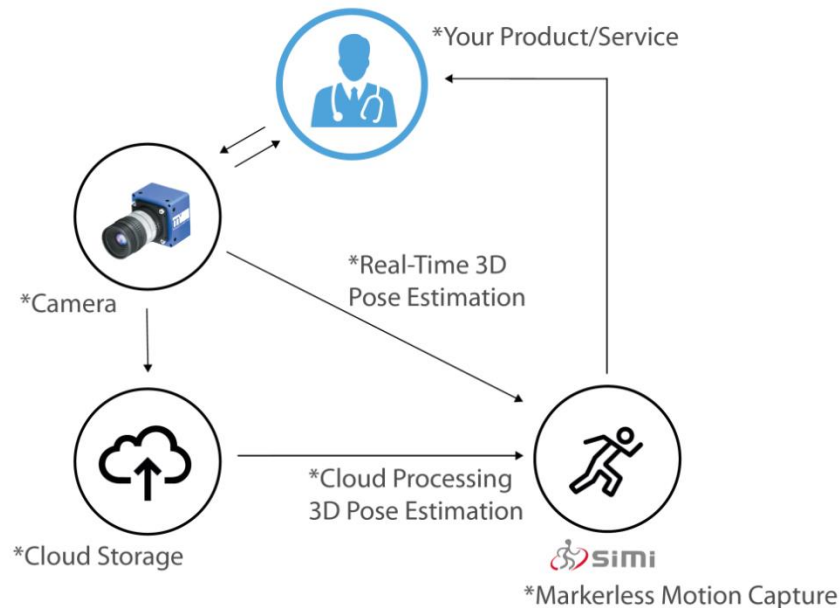


CLOUD REPORT

- *Individual Cloud Reporting
- *Including Patient/Athlete Database
- *On Request

DEVELOPMENT PROJECTS

Use Simi Markerless Tracking
in own Products



Enhance your product with Artificial Intelligence

SiMi® the markerless 3D motion capture technology expert in sport and life science announced the launch of their new Feedback and Analytics App.

The new app will join **SiMi's** leading image based Markerless Motion Analysis Technology, offering new level of 3D Movement Analysis with the highest quality of slow-motion video feedback combined with completely automated 3D Markerless Tracking.

SiMi® is a motion analysis company with experience since 1992. We are the leading video based motion capture company using the state of art technology to deliver the best solution for your application

!.

- Individual Consulting
- 2D or 3D
- Individual Data-Formats
- Unity SDK

Individual Add-Ons

- Reporting (Cloud)
- Phase and Event Detection

SiMi Software Dev. Kit

Add SiMi Markerless Tracking to out Application



Industry
Use in Human
Machine Interaction



Movement Analysis
Add to your Sport or Medical
Application



VR/AR
Animate your 3D Character
In Real-Time

