Partner Integrations

Whether you're using Visual3D or SIFT, HAS-Motion offers documented integrations with a variety of partners, including camera manufacturers, motion capture systems, force plates, EMG, and IMU providers. The companies listed are grouped based on the specific products or technologies we integrate with, even if they offer additional solutions outside the scope of our platform. Below is more information on our current integrations.

Camera Manufacturers

Natural Point (Optitrack)

NaturalPoint's OptiTrack produces motion capture cameras designed to work with its Motive software, enabling the capture and export of motion data in C3D format. A wide range of OptiTrack cameras can be integrated for real-time streaming into Visual3D. The camera capture software included with AMASS (ADTech Motion Analysis Software System) that leverages the NaturalPoint SDK for data acquisition, while AMASS itself generates the resulting C3D files[1)].

An overview of Natural Point can be seen here, Natural Point (Optitrack) Overview

Supported Integrations
OptiTrack Biomech 57 Marker Set
Real-Time Plugin NP OptiTrack
Real-Time Plugin Motive

Qualisys

Qualisys motion capture systems offer a range of high-speed cameras designed for different motion capture environments, from small lab spaces to larger scale outdoor setups. Qualisys systems support data exported in C3D format for integration with Visual3D [2)].

If using Qualisys QTM, the data is being streamed as its received and is processed. Visual3D can save the streamed frames out to a C3D file, or directly capture a static trial from the data streaming in. QTM must be running and streaming out identified target data, then Visual3D can connect to the active QTM stream to access that data. More information about Qualisys QTM can be found on this page.

Vicon

Vicon offers motion capture cameras and systems widely used in film, gaming, sports, and biomechanics. Its technology enables precise motion tracking and real-time performance capture. Vicon’s Nexus software allows users to capture, process, and analyze motion data, with C3D files exportable directly into Visual3D [3)].

Vicon Nexus is Vicon's software for motion capture used for modeling and processing, more information can be found here, Vicon Nexus Processing Steps or Vicon Nexus Real Time.

Vicon Models
Plug-In Gait Full-Body
Plug-In Gait Lower Limb
Oxford Foot Model

Motion Capture Systems

BTS

BTS Bioengineering provides a range of motion capture solutions that export C3D files, which are compatible with both Visual3D and SIFT.

Fujitsu

Fujitsu Human Motion Analytics is an AI-powered, markerless motion capture platform that enables the analysis and visualization of movement from video footage. The solution integrates with Visual3D and SIFT, as Fujitsu's .bvh file format is supported[4].

An overview of how Fujitsu integrates with our solutions is available here: Fujitsu Overview.

KinaTrax

KinaTrax's multi-camera system and deep learning technology allows 3D tracking of joint and bone movements in both game and lab environments [5]. KinaTrax's C3D files are supported in Visual3D and Sift.

When a KinaTrax C3D file is imported into Visual3D, ROTATION and KINETIC_KINEMATIC signals are created. The joint rotations are extracted and converted into 4×4 ROTATION matrices, representing each segment's full pose (orientation and position) for each frame stored in the data tree. The model is automatically built with each segment's data stored as KINETIC_KINEMATIC signals.

Theia Markerless

Theia uses motion capture technology to track key points and generate 3D skeletal models. The captured data can be exported in various formats, including .c3d, which is compatible with Visual3D for processing and analysis[6].

An overview of Theia, including commonly used commands and supported integrations, can be found here: Theia Overview.

Visual3D Pipeline Commands	Sift Console Commands
Manage_File_Merge	-RunTheiaBatch

OpenSim

OpenSim is a freely available software system that lets users develop models of musculoskeletal structures and create dynamic simulations of movement[7].

An Opensim overview page with common pipeline commands and supported integrations can be found here, Opensim Overview.

Supported Integrations
Modeling Requirements
Visual3D-to-OpenSim Exports
Manual OpenSim Tutorial
Virtual Lab for OpenSim

Matlab

MATLAB is a programming and numeric computing platform that can be used to analyze data, develop algorithms and create models that can interface with programs such as Visual3D and Sift[8].

A MATLAB overview page with common commands and supported integrations are outlined here, MATLAB Overview.

Visual3D Pipeline Commands	Supported Integrations
Export_Data_To_Matfile	Integrating Matlab dlls
Import_Data_From_Matfile	Transferring Information between Visual3D and MATLAB
Eval_In_Matlab	FIR and IRR Filter Design and Analysis
Get_From_Matlab	Using the Matlab FDA tool for Designing a Notch Filter
Put_To_Matlab	Matlab Read V3D Text

A MATLAB FAQ can be found here for commonly asked questions.

PhaseSpace

PhaseSpace motion capture systems uses LED markers and high-speed cameras to capture 3D motion data in real time. Designed for applications in biomechanics, animation, and robotics, PhaseSpace systems support integration with Visual3D through the import of their C3D files[9] from either Master Client or Recap.

Jiku

Jiku's Power1D can be used by drag and dropping CSV files with processed waveform signals to run automated post-hoc power analysis. Power1D integrates with Sift by being able to drag-and-drop signals from the Explore tab into Power1D [10].

Groups, subgroups, workspaces, or individual traces can be selected by ctrl-shift clicking on desired signal(s) and dragging and dropping into Power1D. Additionally, signals can be drag-and-dropped into empty txt files.

Force Plates

Common force plate processing steps can be found on our Force Plate Overview page.

The following includes information on types of force platforms from our various force platform partners:

1. Verify Force Platform Parameters
2. Calculating Force Signals
3. Filtering Force Signals
4. Force Assignment
5. C3D Parameters
6. Computing Force, COP, and Free Moment

Each force platform type's analog channels and calibration matrices can be seen here, FP_Type. Along with the process of Transforming the GRF into the Laboratory Coordinate System.

More information on how to collect data from treadmills with embedded force plates can be found here, Treadmills Overview, along with how to process data from instrumented treadmills. Additionally, an overview page on our partner's types of Instrumented Treadmills.

Some force platforms are capable of moving during a trial. However, the C3D file format is designed to only accommodate static force platforms, making it difficult to incorporate dynamic platforms. This page provides guidance on how to handle a moving force platform within Visual3D, see here Dynamic Force Platforms.

AMTI

AMTI offers force plate systems that integrate with Visual3D through support for C3D files. When collecting force plate data alongside motion capture, the force signals are embedded in the C3D file exported by the motion capture system, allowing Visual3D to read the data directly[11)].

AMTI's data acquisition software also supports direct export of raw 3D force and moment data (Fx, Fy, Fz, Mx, My, Mz per plate) as a comma-separated .txt file. These files can be imported into Visual3D using the pipeline command Import Analog Signals From AMTI Ascii File.

In most workflows, motion capture software works in tandem with force plates, allowing for synchronized data collection and export of force signals within the C3D file, which can simplify the analysis process in Visual3D.

Bertec

Bertec force plates provide ground reaction force data for gait, balance, and performance analysis. Through integration with Visual3D, users can access force plate signals directly within Visual3D to further process data for a variety of research and clinical applications[12)].

Refer to the Bertec Overview for more information about Bertec's force plates and treadmill dimensions and coordinate systems.

TreadMetrix

Treadmetrix treadmills are instrumented systems designed for biomechanical analysis. They have both single-belt and split-belt force plate embedded treadmills, they offer flexible speed range, acceleration, pitch/translation control, and measurement accuracy. Treadmetrix can export C3D files that are compatible with Visual3D and Sift[13)].

Treadmetrix common commands and supported integrations are outlined here:

Visual3D Pipeline Commands	Supported Integrations
Metric_Compute_Temporal_Distance	Temporal Distance Calculations for Gait Analysis
	Treadmetrix Client
	Gait Events using Kinematic Data
	Mimicking Temporal Distance

EMG

Electromyography (EMG) measures electrical signals generated by muscles during contraction, providing a physiological view of movement.

More information about EMG signals can be found here, EMG Overview.

The following links will redirect you to pages detailing the use of Visual3D pipeline commands that are commonly used in the general processing of EMG data:

- High Pass Filter (Removing DC Bias)
- Lowpass Filter
- Rectify
- Moving RMS
- Teager Kaiser Energy Operator
- Assign Tags To File

Note: To import EMG signals into a motion C3D file using Import_Signals_From_C3D_File: if the ANALOG signal rate from the EMG file is inconsistent with the C3D file, Visual3D will resample the data to match the data rate of the ANALOG data in the c3d file format and/or resample the data as an integer multiple of the POINT rate.

Delsys

Delsys is a electromyography technology that can integrate with Visal3D and Sift. Delsys applications can export EMG signals in the C3D file format, allowing them to be imported directly into motion files within Visual3D.

Visual3D has the following pipeline command that could be used to import EMG signals Import_Analog_Signals_From_Delsys_Ascii_File, although Delsys has the ability to export raw EMG signals in C3D format which easily integrates into the Visual3D workflow. To import the EMG signals contained in a C3D to a motion file use Import_Signals_from_C3D_File.

Noraxon

Noraxon collects EMG signals independent of a motion capture system. These ANALOG signals can be imported into a C3D file that contains motion capture or force platform data. Noraxon also exports C3D files that can be imported into a Visual3D workspace.

Signals from these files can be imported into Visual3D using the Import_Signals_From_C3D_File command.

IMU

Movella (Xsens)

Movella's Xsens uses IMU's to track motion, and processes the information in MVN, resulting in an MVNX file or a C3D file. Visual3D and Sift support MVNX files, this file type can be imported via the pipeline command or opened manually . For more information, Movella Xsens Overview.

Xsens provides both female and male anatomical models, the exported C3D and/or MVNX files are fully compatible with Visual3D. No model-specific adjustments are required during import into Visual3D or Sift.

Supported Integrations
Opening MVNX Files
Exporting Xsens Data from MVN Studio
Xsens Prop

AiQ Synertial

Synertial manufactures IMUs designed for real-time human motion tracking. Their technology is widely used in biomechanics, animation, sports science, ergonomics, and VR/AR applications. Synertial data can be imported into Visual3D using the MVNX format, this file type can be imported via the pipeline command or opened manually[14)].

1)
Optitrack: https://www.optitrack.com/
2)
Qualisys: https://www.qualisys.com/
3)
Vicon: https://www.vicon.com/
4)
Fujitsu: https://mkt-europe.global.fujitsu.com/human-motion-analytics-en_reg
5)
KinaTrax: https://www.kinatrax.com/
6)
Theia: https://www.theiamarkerless.com/about#how
7)
Opensim: https://simtk.org/projects/opensim
8)

Matlab: https://www.mathworks.com/products/matlab.html
9)

PhaseSpace: https://www.phasespace.com/
10)

Jiku: https://jiku.pro/
11)

AMTI: https://www.amti.biz/
12)

Bertec: https://www.bertec.com/
13)

TreadMetrix: https://treadmetrix.com/
14)

AiQ Synertial: https://www.synertial.com/