Interfaces and compatible Software

To be able to use ART's **DTRACK tracking systems** in VR or AR applications, one needs an interface. Lots of VR systems have developed a direct interface using ART's SDK. Basically, DTRACK uses ethernet (UDP/IP datagrams) to send data to these applications directly. **CAPTA** uses the same format. Many applications also feature more generalized interfaces to interpret our tracking data, such as VRPN or trackd™. For some software one can also use ART's plugins (e.g., game engines Unreal and Unity) or middleware by 3rd parties (e.g., TechViz).

For our products in connection the software **VERPOSE**, we provide a VERPOSE®-specific interface, the **VERPOSE® API**. It is a TCP/IP-based interface for direct communication with VERPOSE® and can be obtained free of charge from ART.

If you feel like information is missing or that assignments of interfaces should be corrected, then please let us know by writing an email to contact@ar-tracking.de.

Content

Interfaces and compatible Software

| Connectivity for products in connection with the software DTRACK

We distinguish between MIDDLEWARE, SOFTWARE APPLICATIONS and GAME ENGINES that need to be compatible with our tracking data.
If you feel like information is missing or that assignments should be made differently, then please let us know by writing an email to contact@ar-tracking.de.

The symbols used in the following tables shall be interpreted as follows:
"**-**" .. not compatible; no interface available yet
"**?**" .. most likely possible but not yet confirmed by ART or supplier

MIDDLEWARE

Software	Company	Standard target (6dof)	Full HMD support	Flystick	Motion Capture (6dof)	Finger-tracking	ART Human (skeleton model)
TechViz XL	TechViz	direct	LPVR	direct	-	direct	direct
moreViz	More 3D	VRPN	LPVR	VRPN	-	-	-
MiddleVR	I'm in VR	VRPN	?	VRPN	-	-	-

SOFTWARE APPLICATIONS

Software	Company	Standard target (6dof)	Full HMD support	Flystick	Motion Capture (6dof)	Finger-tracking	ART Human (skeleton model)
3DVIA Studio	Dassault Systèmes	VRPN	-	VRPN	-	-	VRPN
alaska / Dynamicus	IFM Chemnitz	direct	-	-	direct	-	-
AnyBody	AnyBody Technology A/S	ART-Human?	-	-	-	ART-Human?	offline (support via C3D or BVH)
Blender	Stichting Blender Foundation	VRPN?	OpenXR?	VRPN?	-	-	-
Cadmium	Softvise	direct	-	direct	-	-	-
Catia	Dassault Systèmes	trackd™	-	trackd™	-	-	-
COVISE / OpenCOVER	HLRS	trackd™	-	trackd™	-	-	-
DCS	Eagle Dynamics	-	LPVR	-	-	-	-

Interfaces and compatible Software

ART
Advanced Realtime Tracking

Software	Company	Standard target (6dof)	Full HMD support	Flystick	Motion Capture (6dof)	Finger-tracking	ART Human (skeleton model)
Delmia	Dassault Systèmes	trackd™	-	trackd™	-	-	-
DIVISION MockUp	PTC	Techviz	Techviz	Techviz	-	-	-
ema	imk automotive GmbH	-	-	-	-	-	offline (support via BVH)
Human Solutions	RAMSIS	-	-	-	-	-	offline (support via CSV)
IC.IDO	ESI Group	direct	-	direct	?	direct	?
iPHYSICS	Machineering GmbH & Co. KG	?	-	?	-	-	-
Lifecycle Visualisation Concept	Siemens PLM Software	trackd™	-	trackd™	-	-	-
MASTVR	V360 Energy	direct	-	direct	-	-	-
PiXYZ Review	Unity Technologies	?	-	?	-	-	-
SCANeR	AV Simulation	OpenXR, Head tracker module	OpenXR, Head tracker module	-	-	-	-
SkyReal	SkyReal	VRPN	-	VRPN	VRPN	-	-
Teamcenter Visualisation with Concept Showroom	Siemens PLM Software	direct, trackd™	-	direct, trackd™	-	-	-
Tecnomatix Jack and Process Simulate Human	Siemens PLM Software	ART-Human	-	-	-	ART-Human	direct
Unigine RE	Unigine Corporation	direct	-	direct	-	-	-
Virtual Sight	Lumiscaphe	VRPN	-	VRPN	-	-	-
Visionary Render	Virtalis	direct	-	direct	-	direct	-
VR Concept	VE-Group	VRPN	-	VRPN	-	?	?
VRED	Autodesk®	VRPN	LPVR	VRPN	-	Techviz / Bertrandt driver[1]	-
VRXPERIENCE	ANSYS, Inc.	?		?	-	-	-
X-Plane	Laminar Research	-	LPVR	-	-	-	-

[1] Please reach out to ART in order to learn more: contact@ar-tracking.de

Interfaces and compatible Software

ART
Advanced Realtime Tracking

SOFTWARE DEVELOPMENT / GAME ENGINES

Software	Company	Standard target (6dof)	Full HMD. support	Flystick	Motion Capture (6dof)	Finger-tracking	ART Human (skeleton model)
Unity	Unity Technologies	Plugin	-	Plugin	-	Plugin	-
Unreal Engine 4/5	Epic Games	Plugin	-	Plugin	-	Plugin	-
Vizard	WorldViz	direct, VRPN	-	direct, VRPN	-	-	-
FreeVR	FreeVR Homepage (Freeware)	VRPN	-	VRPN	-	-	-
OpenScenegraph	OpenScene Graph (Freeware)	VRPN	-	VRPN	-	-	-
World Toolkit IDO	Sense8	trackd™	?	trackd™	-	-	-
Open Inventor®	Visualization Sciences Group	trackd™	-	trackd™	-	-	-

| Compatible interfaces at a glance

	Game Engines		Interfaces				
ART products	**Unreal Engine 4/5**	**Unity**	**OpenVR****	**OpenXR****	**LPVR**	**trackd™**	**VRPN**
Standard Targets (6DOF)	x	x	?	?		x	x
Full HMD support							
Flysticks	x	x	?	?		x	x
Measurement Tool	-	-	?	?		x	-
3DOF Markers	-	-	?	?		-	x
Fingertracking	x	x	-	-		-	-
ART-Human (Skeleton model)	-	-					
Full-body tracking (6DOF only!! Skeleton model must be created on your own)	-	-					x
Tactile Feedback (Flystick2+, Fingertracking2)	planned	planned					

ADDITIONAL INFORMATION AND DESCRIPTION

HMD support

In many application cases such as head mounted displays (HMD) conventional tracking methods lack the accuracy or the fast signal routing and thus image processing necessary to provide the best possible immersive experience and responsive behavior to the user.
Therefore, it makes sense to join the capabilities of multiple sensor data sources by combining optical position data with sub-millimeter accuracy with high data-rate information from an inertial measurement unit (IMU) located on the HMD.
LP-Research's LPVR-CAD middleware implements an optical-inertial sensor fusion algorithm for integration with ART tracking systems.

HMD support in non-stationary environments

For any application of VR or AR in a moving environment (such as a vehicle or motion simulators), de-coupling of the user's head motion from the motion of the vehicle itself is essential to provide an immersive experience to the user.
The tracking backend of the LPVR-DUO middleware solution is especially advanced in this aspect that it allows the flexible combination of optical systems and multiple inertial measurement units (IMUs) for combined position and orientation tracking.
LPVR-DUO is using a fusion of HMD IMU data, vehicle-fixed inertial measurements and outside-in optical tracking information. This way the interior of a vehicle can be displayed as static relative to the user, while the scenery in the environment of the vehicle moves with vehicle motion.

LPVR by LP-Research

LP-RESEARCH is the industry leader for providing customized sensor fusion solutions for augmented and virtual reality.
Building on the technology developed for IMU sensors and large-scale VR tracking systems, LP-Research has created a full motion tracking and rendering pipeline for virtual reality (VR) and augmented reality (AR) applications with their LPVR middleware.
Both LPVR middleware (LPVR-CAD + LPVR-DUO) offer the following benefits compared to pure optical tracking:

- Flexible zero-latency tracking adaptable to any combination of IMU and optical tracking
- Low-latency rendering pipeline with motion prediction, late latching and asynchronous timewarp functionality
- Full integration in commonly used driver frameworks like OpenVR and OpenXR

Where consumer VR products are limited to tracking areas below 5 x 5 m sufficient for single users their technology combined with ART's experience in optical tracking offers the best VR experience possible even for large volumes / large room scales suitable for multi-user applications such as arcade-style game setups.
Additionally, LPVR middleware allows any existing SteamVR-based (e.g., Unity, Unreal, VRED) virtual reality software to seamlessly use most HMDs (HTC Vive, Valve Index, Varjo VR/XR-3, etc.) in combination with ART tracking systems. It enables easy configuration and fits into the SteamVR framework minimizing the effort needed to port applications.

direct
Our SDK can be downloaded for free in order to directly implement data connectivity in applications. Ask a representative for more information.

Plugin
The DTRACK **Unity plugin** is available in the Unity Asset Store as well as on the OpenUPM portal, while the DTRACK **Unreal plugin** can be downloaded from our ART GitHub page.

trackd™
trackd™, provided by Mechdyne, is a "daemon" application, that acts like a standard interface for tracking and input devices. A variety of VR and motion tracking software applications already support trackd. It is available for several operating systems (e.g., Linux, Windows).

VRPN (Virtual-Reality Peripheral Network)
VRPN is a set of classes within a library, provided by the NIH National Research Resource in Molecular Graphics and Microscopy at the University of North Carolina at Chapel Hill. It can be implemented into application programs to get a network-transparent interface to a set of trackers and other devices.

| (Rich) Applications that are not regularly reviewed

***Disclaimer**: Information given here is based on information that ART has been provided with in the past. We don't keep track of the further development of the following applications and we are not in closer contact with the companies providing the respective application.*

Software	Company	Connection via
3DEXCITE DeltaGen	Dassault Systems	trackd™, direct
AVS Express	Advanced Visual Systems	trackd™
Opticore	Autodesk	trackd™
Showcase®	Autodesk®	trackd™
EnSight Gold	CEI Munich Office	trackd™
Virtools Dev	Dassault Systèmes	VRPN
EON Icube 8	EON Reality	trackd™, direct
Lightning	Fraunhofer IAO	VRPN, direct
FreeVR	FreeVR HomePage (Freeware)	VRPN
Cave5D	Freeware	trackd™
VRFx	Fraunhofer IAO	VRPN, direct
FlowVR	Freeware	VRPN
Maverik	Freeware	VRPN
Ogre3D	Freeware	VRPN
DART	Georgia Inst. of Technology	VRPN
DIVERSE	GPL / OpenTech Inc.	trackd™, VRPN
OpenVIBE	Inria	VRPN
VR Juggler	Iowa State University	trackd™, VRPN, direct
LS-PrePost-VR	LSTC (Livermore Software Technology Corp.) via Inv3rsion	VR Juggler
Unifeye SDK	metaio	direct
Panda3D	Panda3D Development Team (Freeware)	VRPN
Vega Prime Immersive	Presagis	trackd™
Quest3D	Quest3D	direct
SARA	SARA	trackd™
Petrel	Schlumberger	trackd™
Inside Reality	Schlumberger	trackd™
DIVE	SICS	trackd™, VRPN
VRscape	SOUVR INTERNATIONAL	trackd™
VR4MAX	Tree C Technology	trackd™
RapidVRM	Visual Advantage	trackd™
Go2VR	VSP-Technology	trackd™
IPSI scripting	Haption	trackd™, direct
IPSI Server	Haption	trackd™, direct

Interfaces and compatible Software

| Connectivity for products in connection with the software CAPTA

Tracking without tagging the objects

CAPTA technology is a markerless deep-learning based detection and robust tracking of objects in camera images, for recognition and tracking of workpieces or complete vehicle bodies, support at assembly maintenance tasks and tracking of products during marketing demonstrations.

CAPTA uses the same format as our DTRACK Software and can thus be used with the same applications without further adjustments.

Please contact ART for more information.

| Connectivity for products in connection with the software VERPOSE

Camera-based localization system for hand-held assembly tools.

ART provides a VERPOSE®-specific interface, the **VERPOSE®-API**. It is a TCP/IP-based interface for direct communication with VERPOSE® and can be obtained free of charge from ART.

Several communications have been realized based on the API, e.g.

- Alfing Montagetechnik AMT
- APEX Cleco
- Atlas Copco
- Marco SDOK
- Remes ASCOT
- Ubisense SmartSpace

VERPOSE® supports the following **industrial protocols** via gateway modules (as slave-to-slave connection):

- Modbus-TCP
- PROFINET IRT
- Ethernet/IP
- POWERLINK
- EtherCAT
- Modbus RTU
- Sercos III
- PROFIBUS
- Serial
- DMX
- DeviceNet
- CANopen

Please contact ART for more information.