DTrack Plugin for the Unity Game Engine 2019.x

This is a component for Unity 2019.1 or later with the purpose of native integration of the Advanded Realtime Tracking (ART) DTrack (versions 2 and 3) tracking solutions. This Unity Asset provides access to DTrack tracking data, that is send over network using UDP/IP datagrams. Each UDP packet contains one frame of tracking data including all outputs activated via the DTrack software (see Section **DTrack**). This package currently supports the DTrack body `6d` and flystick `6df2` data formats.

Download

You can download or clone sources for this Asset package at GitHub

Prerequisites

To use this Asset the following components are required.

- Unity Editor 2019.1 or later
- Windows 64 bit, Linux 64 bit
- ART Tracking system and DTrack2/DTrack3
- UnityDTrackPlugin package (Asset)
- DTrack User's Guide (*optional*)
- DTrack Programmer's Guide (*optional*)

Creating the Unity DTrack Plugin package from sources

In order to create a Unity package from the provided sources, follow the steps below.

1. Download or clone sources for this Asset package (see **Download**)
2. Launch Unity
3. Create new Unity project (e.g., "MyUnityProject")
4. Extract the asset package, if applicable
5. Copy the directory *UnityDTrackPlugin* to your projects asset directory (/path/to/unity/projects/*MyUnityProject*/Assets/**DTrack**)
6. Export package (right-click on DTrack in the **Project** window and select **Export Package...**)

Importing Unity package

1. Launch Unity
2. Create/Open Unity project
3. Import package (*Assets → Import Package... → Custom Package...*)

DTrack Configuration

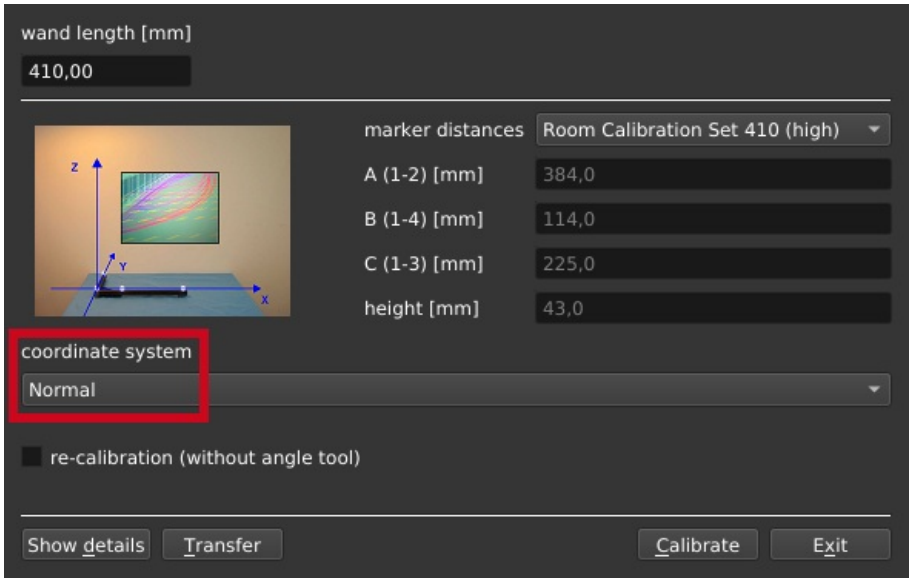
Find here a quick-start guide to DTrack. For details, please, refer to your DTrack User's Guide and DTrack Programmer's Guide, that is shipped with the DTrack distribution. In this section we assume that the ART tracking system is properly set up and a room calibration was done. Further, a set of 6DOF targets and flysticks are calibrated.

Room Calibration

For general information about the DTrack room calibration and room adjustment see the DTrack User's Guide. Here we discuss details relevant for use with the Unity Engine.

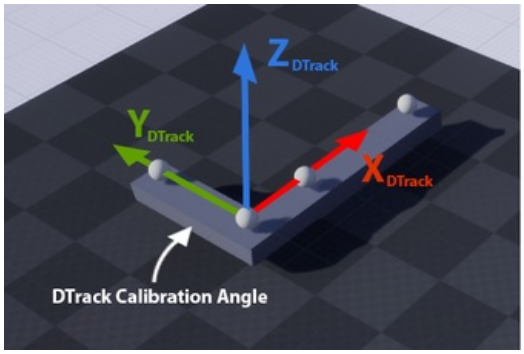
The calibration angle which comes with your ART tracking system defines the coordinate system layout in your tracking area. It consists of four retroreflective or active markers mounted onto an L-shaped frame.

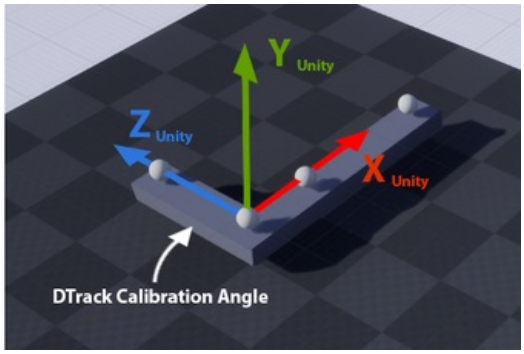
The marker on top of the edge of this L-shape by default designates the origin of the DTrack coordinate system. When using the *Normal* calibration mode (see Figure below), the long arm of this L-shape corresponds to the X axis and the short arm to the Y axis. DTrack coordinates refer to a right-handed coordinate system, so when the angle is placed flat on the ground with the markers pointing up the Z axis points upwards.



The plugin transforms a right-handed position of a DTrack 6DOF measurement to a left-handed Unity position by switching the Y and Z axes, i.e.,

$$(X_{\text{Unity}} , Y_{\text{Unity}} , Z_{\text{Unity}}) = (X_{\text{DTrack}} , Z_{\text{DTrack}}, Y_{\text{DTrack}}).$$



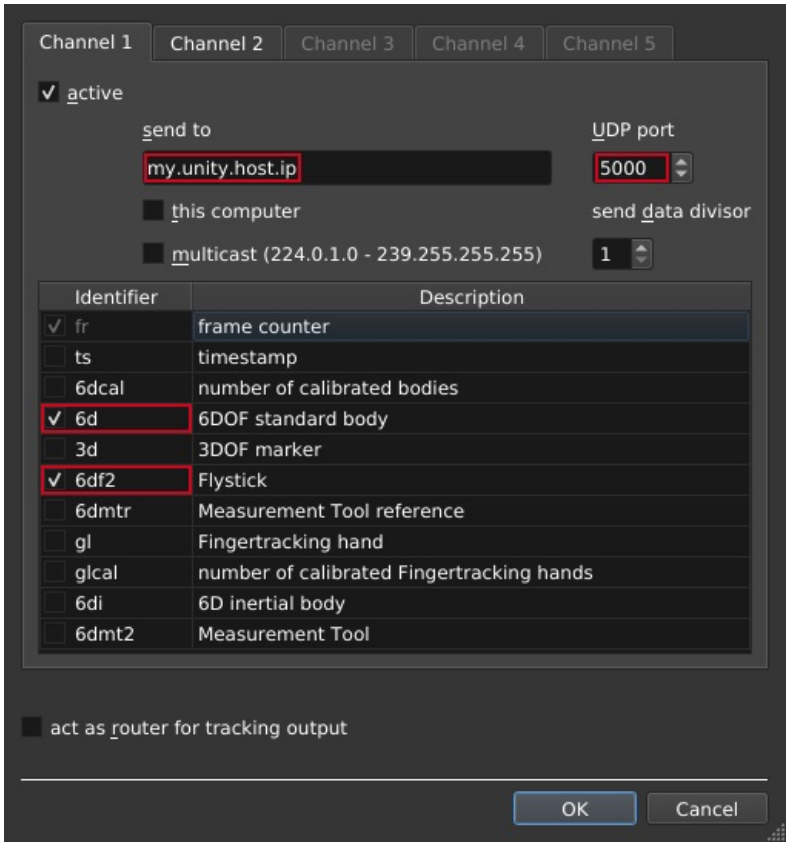


DTrack offers a multitude of ways to adjust coordinate systems for room and bodies, e.g., offsets, scaling, additional rotations, or shifting the origin of bodies. Consult your manual for details on *Room adjustment* and *Body adjustment*.

Setting outputs

To configure the tracking data stream generated by DTrack, execute these steps:

1. Activate a channel if needed
2. Fill in the IP/Port of the device receiving tracking data
3. Select outputs you are interested in (i.e., currently frame counter `fr`, time stamp `ts`, 6DOF standard body `6d` and flystick `6df2` are supported) via the menu *Tracking → Output* (DTrack3) or *Settings → Output* (DTrack2), respectively.



Data display (6DOF)

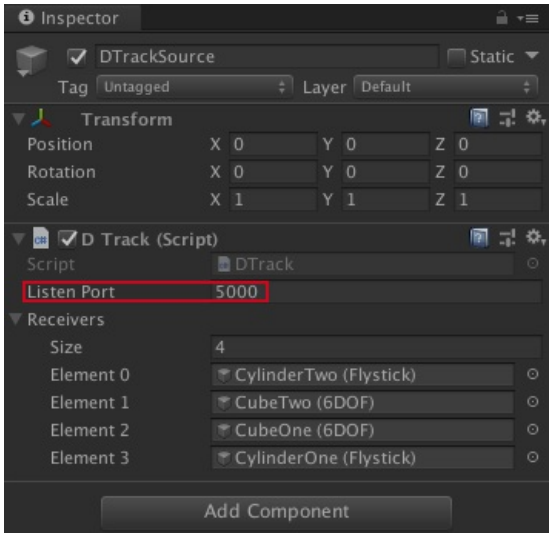
Enable the *data display* view (*View → Data*) to find assigned body IDs. In this table, both position and rotation for standard bodies can be observed while moving the target inside the tracking volume.

Data display (Flystick)

Enable the *flystick* view (*View → Flystick*) to find assigned flystick IDs. Listed flystick IDs are prefixed with a capital `F`. When referencing flysticks from within Unity in the `DTrackReceiverFlystick` mask, this prefix must be removed. In addition to position and rotation data, button presses (*b1*,...,*b6*), joystick movement (*jx*,*jy*) are illustrated in the table.

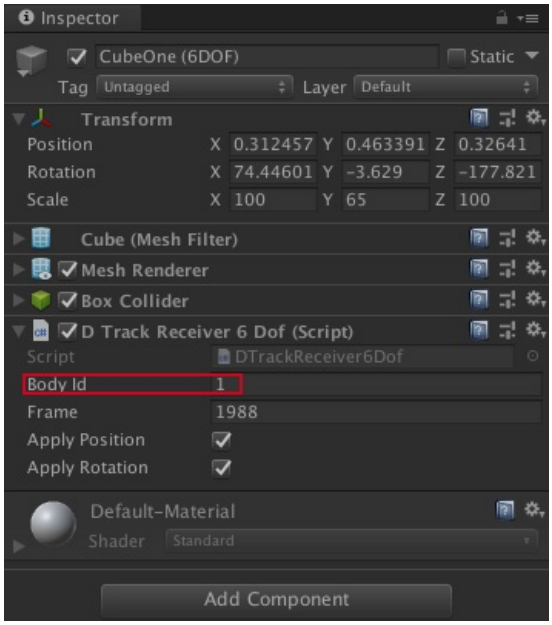
Plugin Configuration

Streaming position, rotation and button events data from DTrack tracking systems to objects in your scene, requires appropriate network settings. In your scene add an *Empty* game object and give it a name, e.g., **DTrackSource**. To this object attach the **DTrack** script via *Add Component → Scripts → DTrack → DTrack*. Set *Listen Port* number matching the setting for DTrack (see Section **Setting outputs** below). Note that 3D position data in the DTrack output stream have unit millimeters. The DTrack Unity Plugin converts such values to unit meter.



Applying 6DOF Body data

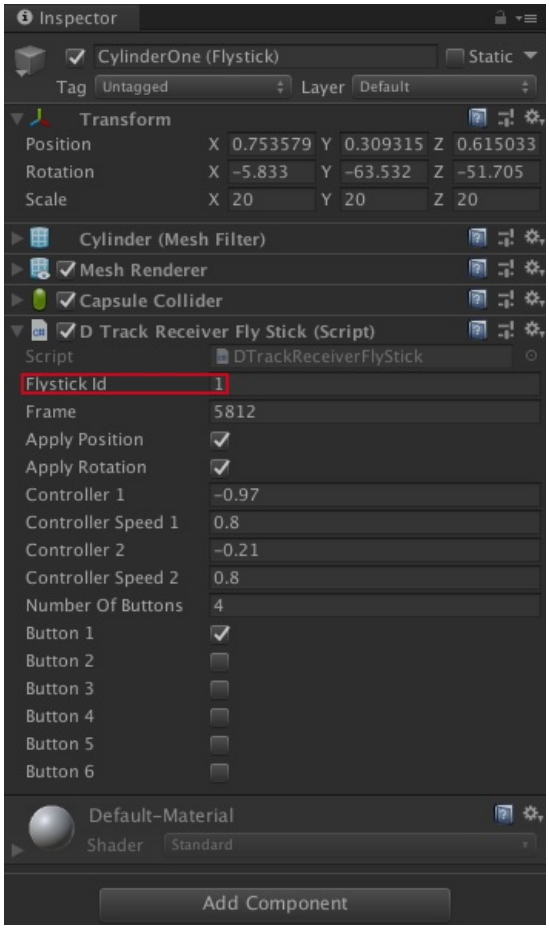
In your scene attach via *Add Component* the DTrack script `DTrackReceiver6Dof` to an object you want to receive positional and rotational data. In the `DTrackReceiver6Dof` mask type in the ID that was assigned to the body by DTrack (see Section **Data display (6DOF)**).



When the ART tracking system is running, you should now be able to see *Position* and *Rotation* data in the **Transform** box, as soon as you switch to *Play* mode.

Applying Flystick data

In your scene attach via *Add Component* the DTrack script `DTrackReceiverFlystick` to an object you want to receive positional and rotational data as well as interactive button and joystick events. In the `DTrackReceiverFlystick` mask type in the ID that was assigned to the flystick by DTrack (see Section **Data display (Flysticks)**).



Attaching 6DOF Targets to Camera

For non-static, point-of-view cameras, you can attach a DTrack Receiver with positional and rotational data, e.g., 6DOF body or flystick.