

zSpace Coordinate Systems

This document describes the zSpace coordinate systems. You need to understand these systems in order to translate data from one system to another. For example, the zSpace system reports the location of the stylus in Tracker Space, not your application's World Space. Tracker Space and World Space align the x, y, and z axes differently.

You should read this document if you are developing for zSpace, regardless of your development platform.

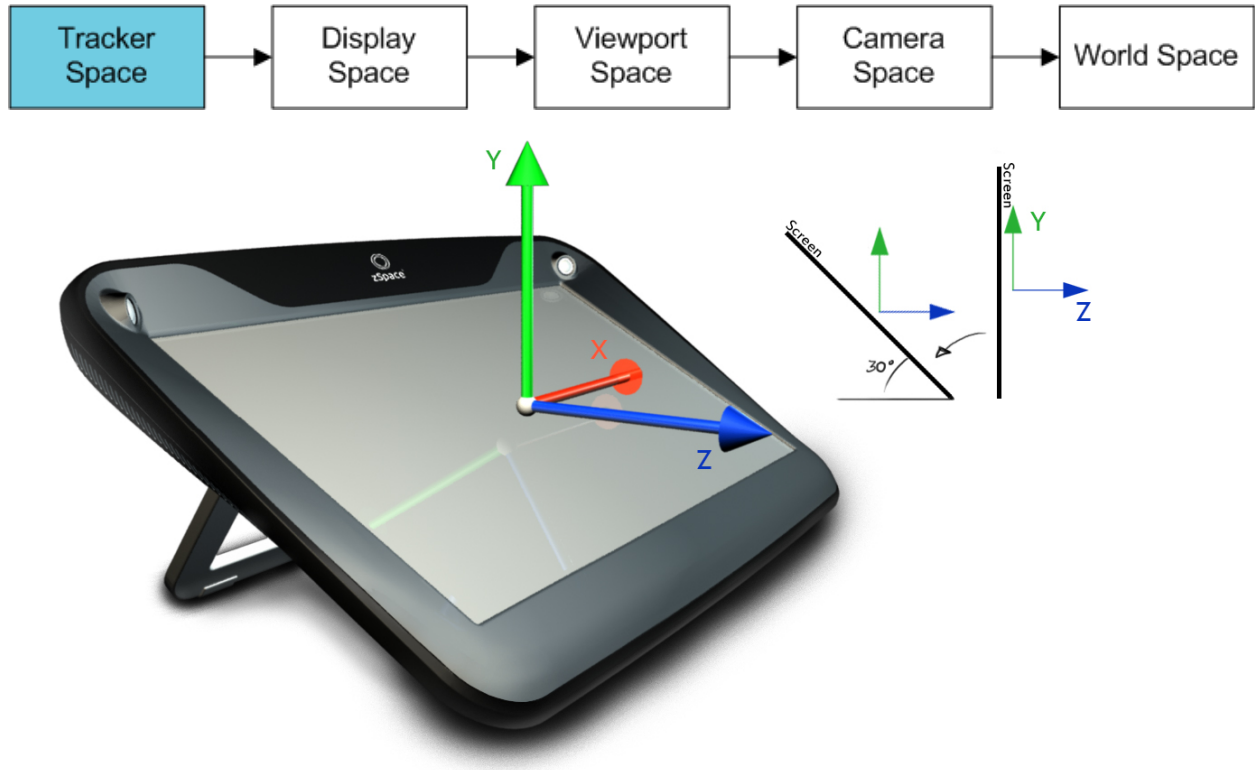
The following diagram shows the relationship between the zSpace coordinate systems. All zSpace coordinate systems are right handed, and all units of measure are in meters.



Note: World Space is not a zSpace coordinate system.

Tracker Space

Tracker Space is the coordinate system where targets such as the zSpace glasses and stylus are tracked. This system is based on the real world, with reference to the physical ground.



Origin

The origin is the center of the zSpace display's surface.

Orientation

- +X axis is parallel to the ground and points to the right of the zSpace display
- +Y axis is perpendicular to the ground and points straight up
- +Z axis is parallel to the ground and points away from the zSpace display
- XZ plane is coplanar with the physical ground

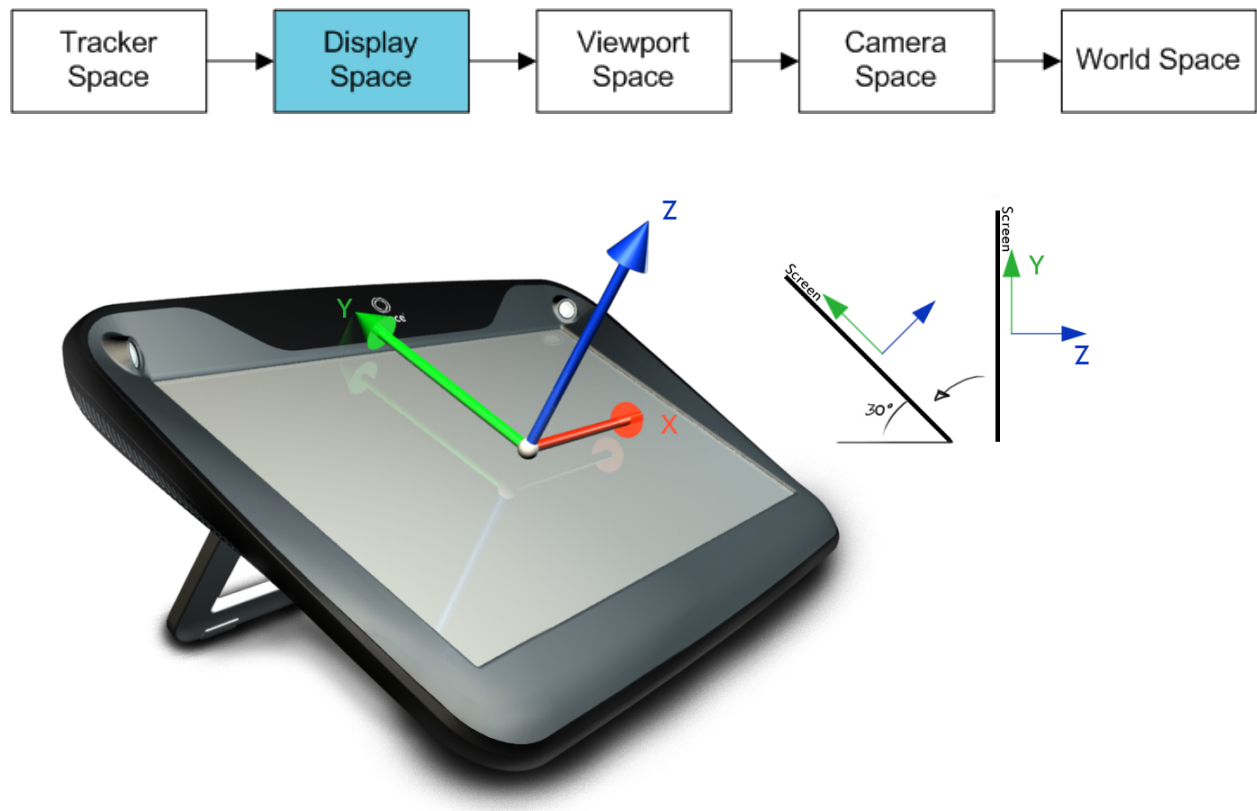
Scale

The uniform scale is 1.0f.

Display Space

Display Space is centered around the surface of the display. This system is based on the real world, with reference to the surface of the display.

As an example, the zSpace SDK transforms the stylus pose from Tracker Space to Display Space in order to perform intersection tests.



Origin

The origin is the center of the zSpace display's surface.

Orientation

- +X axis points right along the surface of the display
- +Y axis points up along the surface of the display
- +Z axis is perpendicular to and points away from the surface of the display
- XY plane is coplanar with the display's surface

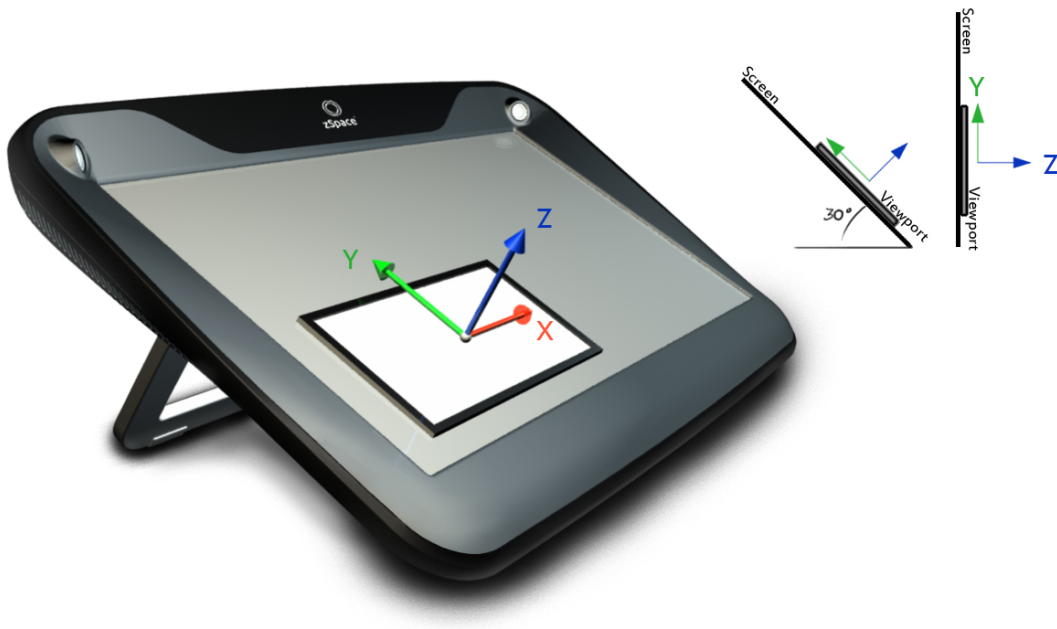
Scale

The uniform scale is 1.0f.

Viewport Space

Viewport Space is centered around the application's viewport. This differs from Display Space by an XY translation that represents the offset between the center of the display and the center of the viewport.

As an example, the zSpace SDK calculates frustum bounds and projection matrices in Viewport Space.



Origin

The origin is the center of the application's viewport.

Orientation

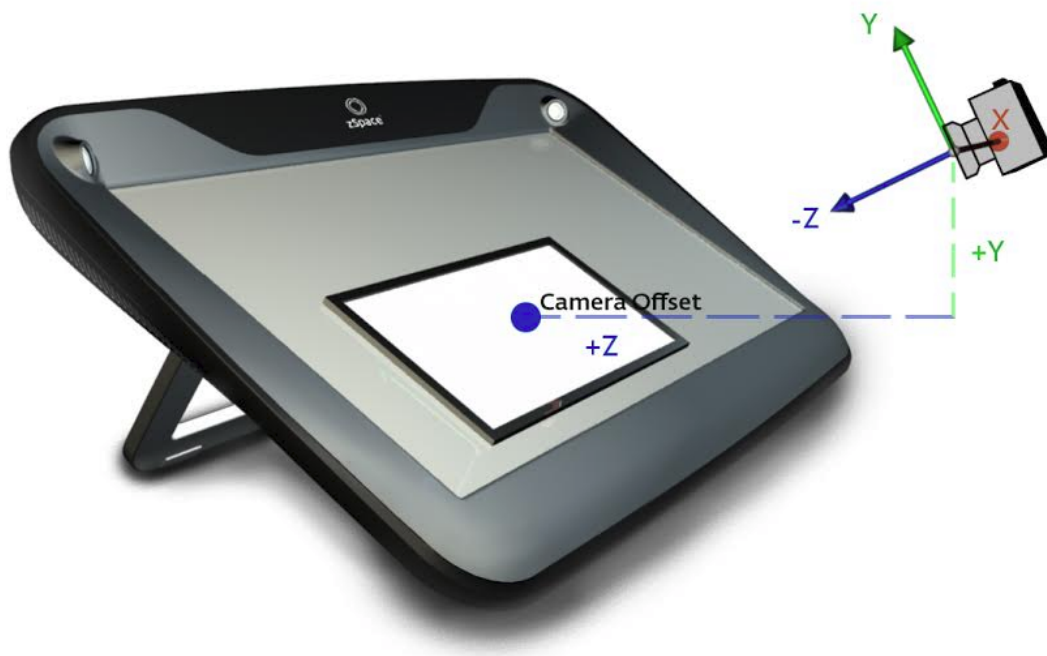
- +X axis points right along the surface of the display
- +Y axis points up along the surface of the display
- +Z axis is perpendicular to and points away from the surface of the display
- XY plane is coplanar with the display's surface

Scale

The uniform scale is 1.0f.

Camera Space

Camera Space provides a common mapping between the physical and virtual world.



Origin

The origin is camera offset meters away from the center of the application's viewport.

Orientation

- +X axis points to the right of the display
- -Z axis points to the center of the application's viewport

Scale

The uniform scale is equal to the stereo frustum's viewer scale. Viewer scale is also called world scale.

Note: The default viewer scale is 1.0f. Thus, if the stereo frustum's viewer scale is unchanged, then the camera space's uniform scale is the same as the other coordinate systems.