

# Local Coordinate System Algorithms

The LCS algorithms are implemented in a dll plugin framework, so it is possible to write your own and plug it into Orient3D. The currently implemented algorithms are:

1. **Vertebra [Anderst]** *Anderst, W., personal communication.* This algorithm is designed for vertebral disks, and puts the LCS in the middle of the disk with Y pointing superiorly and Z anteriorly. It requires placement of eight landmarks, four around the perimeter of the superior surface of the disk, and four around the perimeter of the inferior surface of the disk.
2. **Distal Femur [Miranda]** *Miranda, D., et al. J Biomech 43(8), pp. 1623-26, 2010.* This algorithm does not require any landmarks, but supports the use of four optional ones. If *HipCenter* is defined, then after the LCS is found using the Miranda algorithm and other [optional] landmarks, the LCS is rotated so that the Z axis passes through *HipCenter*. It is recommended that you first try the algorithm without defining any of the other landmarks. If the LCS is not calculated properly (which can happen if the femoral shaft is too short), try adding *Anterior*, which can go anywhere on the anterior side of the femur. If the LCS is still not correct, try adding *ShaftProximal* and *ShaftDistal*, which are used to define the long axis of the femoral shaft.
3. **Proximal Tibia [Miranda]** *Miranda, D., et al. J Biomech 43(8), pp. 1623-26, 2010.* This algorithm does not require any landmarks, but supports the use of four optional ones. If *AnkleCenter* is defined, then after the LCS is found using the Miranda algorithm and other [optional] landmarks, the LCS is rotated so that the -Z axis passes through *AnkleCenter*. It is recommended that you first try the algorithm without any of the other landmarks. If the LCS is not calculated properly (which can happen if the tibial shaft is too short), try adding *Anterior*, which can go anywhere on the anterior side of the tibia. If the LCS is still not correct, try adding *ShaftProximal* and *ShaftDistal*, which are used to define the long axis of the tibial shaft.

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