**Pelvis:**

Using Visual 3D software (C-Motion Inc., Germantown, MD, USA), a CODA pelvis was used to define the pelvic coordinate system. The origin was located at the midpoint of the right and left anterior superior iliac spines (ASIS). A transverse plane was defined using the left and right ASIS and posterior superior iliac spine (PSIS) markers. The medio-lateral (X) axis was defined from the origin towards the right PSIS. The vertical (Z) axis was orthogonal to the plane formed by the ASIS and PSIS markers with its positive direction proximal. The antero-posterior (Y) axis was defined as the cross-product of the Z-axis and X-axis with its positive direction anterior.

# Thigh:

The origin was the virtual hip joint center defined by the CODA pelvis. The vertical axis (Z) was oriented as the vector passing through the hip joint center and the midpoint of the medial and lateral femoral epicondyles with its positive direction being proximal.A plane was defined using the hip joint center and the right medial and lateral knee markers. The antero-posterior axis (Y) was orthogonal to the plane formed by femoral epicondyles and the hip joint center with its positive direction anterior. The medio-lateral axis (X) was orthogonal to the YZ plane with its positive direction to the right. The tracking markers consisted of rigid clusters of 4-5 markers placed on the lateral and posterior side of the distal thigh.

**Spine:**

The marker set and model of the lumbar spine allowed the calculation of a two-dimensional projection angle in the sagittal plane based on three points: the T7 vertebrae, L4 vertebrae, and the midpoint of the left and right PSIS markers. Two lines, one connecting the T7 and L4 vertebrae and one connecting the L4 vertebrae and midpoint of the left and right PSIS, indicated lumbar spine extension when the angle formed was negative.