Dirty and Simplistic Write Up of the CalcAnatomicalCoordSystem.m Script

(much nicer writeup will be in the whole instructional manual)

1. All the labelling and constant variables are initialized
2. The UI to let the data analyst pick all the subjects to be processed is brought up
3. For each subject picked, the following happens:
   1. The subject has their kinematic data files loaded
   2. More variables are initialized
   3. Checks for invalid data
   4. Kinematic stats are checked to get labelling data
   5. For every level of support available, the following happens:
      1. More variables and output locations are initialized
      2. The level of support’s rotational matrix data is retrieved
      3. The reach onset times in data points are retrieved for each of the reaching hand types
      4. Center Base of Support data is loaded and Z is inverted
      5. Mark data is loaded and Z is inverted
      6. Marks 3 and 7 are isolated from the Mark data and isolated into their positional and rotation matrix data
      7. **The script begins calculating the ACS of the Head**
      8. The Origin Position of the Head is calculated by adding together the inverted position vectors of the third and fourth bird sensors from the mark 3 data, and dividing the sum of these vectors by 2.
      9. The iVector of the head is calculated by subtracting the origin position of the head by from the inverted position vector of the third bird sensor.
      10. The iUnitVector is caculated by dividing the iVector by the norm of the iVector.
      11. The virtual Position of the Head Top is calculated by joining together the X and Y components of the calculated Origin Position of the Head with the Z component of Sensor 1 from the Position Data of Mark 3.
      12. The Vector of the Head Top is calculated by subtracting the Origin Position of the Head from the virtual Position of the Head Top.
      13. The jVector of the head is then calculated by taking the cross product of the iVector of the head and the Vector of the Head Top (iVec x VecHeadTop)
      14. The jUnitVector is then calculated by dividing the jVector by its Norm.
      15. The kUnitVector is then calculated by taking the cross product of the iUnitVector and the jUnitVector (iUnitVec x jUnitVec)
      16. The Anatomical Coordinate System of the Head is constructed by concatenating the inverses of each of the i, j, and k unit vectors.
      17. **The Script begins calculating the ACS of the Trunk**
      18. The midpoint of the neck is calculated by adding the inverted position vectors of the second and fourth senses from the mark 7 data, and then dividing this sum by 2.
      19. The origin position of the trunk is calculated by adding together the CBOS position and the midpoint of the neck and dividing by 2.
      20. The position of the translated sternal notch mark is created by concatenating the X and Y position data from sensor 4 from mark 7 to the Z position of the origin position of the trunk.
      21. The jVector of the trunk is calculated by subtracting the translated sternal notch from the inverted position vector of sensor 4 from mark 7.
      22. The jUnitVector of the trunk is calculated by dividing the jVector of the trunk by its norm
      23. An additional kVector is calculated by subtracting the origin position of the trunk from the CBOS position in order to help properly align the iVector.
      24. The iUnitVector is calculated by dividing the cross product of the jVector and the additional kVector by the norm of that cross product (jVec x addKVec).
      25. The kUnitVector is calculated by taking the cross product of the iUnitVector and the jUnitVector.
      26. The anatomical coordinate system of the trunk