INSTRUCTIONS FOR USE:

* The Six\_DOF\_ROM\_Analyzer application is a MATLAB executable, which requires [MATLAB runtime 2018b](https://www.mathworks.com/products/compiler/matlab-runtime.html) to be downloaded onto the computer.
* **CRITICAL: before running the program, ensure cal files are in alphanumeric order. On windows, the files within a folder are not always alphanumeric. Tips to put files into alphanumeric order:** 
  + Typical case
    - If testing was done in proper sequence (i.e., the last 3 digits are in ascending order), just ensure that the file name before the last 3 digits are the same.
  + Less common cases
    - When testing was done out of order, or the beginning of the filenames (before the last 3 digits) are not the same, place an **additional letter** in the beginning of each filename where appropriate to overwrite the alphanumeric order. Remove the letters after data analysis is completed. DO NOT CHANGE THE 3 DIGIT NUMBER for any filename since they should correspond to the lab notebook.
* The signs for each motion are according to the file: “[Operation of Universal Spine Tester (6DOF) and Optotrak](file:///R:\Research\Training_Biomech_BasicScience\--%20New%20Hire%20Program%20--\Current%20Binder%207-7-20\Educational%20Material%20(orig%20from%20ASRF)\1.%20Universal%20Spine%20Tester%20(6DOF)\PPT)”. When looking at the generated graphs:
  + FE
    - Flexion occurs first and is positive – local max values
    - Extension occurs second and is negative – local min values
  + LB
    - Right lateral bending occurs first and is positive – local max values
    - Left lateral bending occurs second and is negative – local min values
  + AR
    - Axial rotation left occurs first and is positive– local max values
    - Axial rotation right occurs second and is negative – local min values
  + **NOTE: if specimen is not facing the cameras, Flexion and extension as well as left and right lateral bending values and signs should be switched! (Axial rotation values and signage remains the same.)**
  + (The program applies a negative to both the LB and AR raw data so that the positive direction occurs first.)

POTENTIAL MODES OF FAILURE

* The program uses the first cal file to determine the number of relatives. If the code fails, remove the extra relative columns that are not of interest and that were collected by accident. This may happen if unused rigid body markers are registered/collected by the OPTOTRAK system by accident.
* The program only accepts cal files in xls (not txt) format. Ensure proper format.

FUTURE EDITING:

* The original MATLAB script is also provided in this folder for future editing. If the code is edited, it will need to be recompiled into a MATLAB executable to run on computers without MATLAB. To run on Windows, the code must be compiled on a windows computer. Ensure that the MATLAB runtime is the same version as the MATLAB version the code is compiled on.

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