Shriners Gait Model Setup (Currently Vicon Use Only)

1. **Moving VST files to correct location for Vicon (Vicon Skeletal Models)**
    a. Copy the .vst files from the vsts folder in the GitHub project (ViconClinicalGait/vsts/)
        i. Current vsts included with the project are:
            1. SMACNet no KAD.vst (Standard Model)
    b. Paste into your Vicon ModelTemplates folder
        i. Example filepath C:\Users\Public\Documents\Vicon\Nexus2.x\ModelTemplates

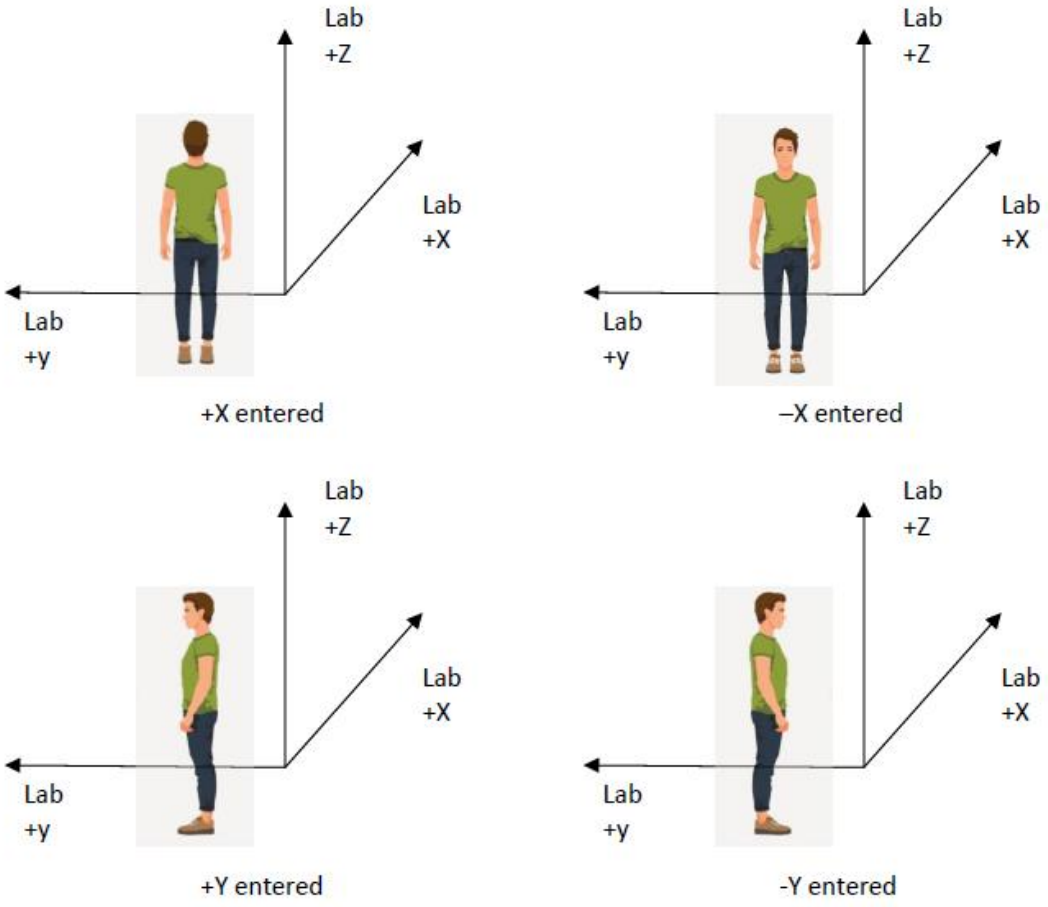
2. **Moving Pipeline files to correct location for Vicon**
    a. Copy the .Pipeline files from the Utils folder in the GitHub project (ViconClinicalGait/Utils/Pipeline)
        i. Current Pipelines included with the project are:
            1. Py3_Static
            2. Py3_Dynamic
    b. Paste into your Vicon Pipelines folder
        i. Example filepath C:\Users\Public\Documents\Vicon\Nexus2.x\Configurations\Pipelines

3. **Moving Python Code to the correct location for Vicon**
    a. Copy the .py files from the Py3_ShrineGaitModel folder in the GitHub project (ViconClinicalGait/Py3_ShrineGaitModel)
        i. Current Python files included with the project are:
            1. Py3_CreateGCD
            2. Py3_DynamicMain
            3. Py3_GaitModules
            4. Py3_MathModules
            5. Py3_StaticMain
            6. Py3_UserPreferences
    b. Paste into a Vicon Python folder
        i. Example filepath: C:\Users\Public\Documents\Vicon\Python
    c. Possible errors in where these files are placed could impact their use
    d. Make sure that the **UserPreferencesFileName** variable in the static main function is set to the correct filepath to find your Py3UserPreferences file

4. **Updating the User Preferences File:** Several items need to be reviewed in “UserPreferences.py” for each individual lab, these are the contained in the first 7 lines of code
    a. The marker diameter needs to be entered for your lab
        i. Most likely the diameter will be 9.5 mm
        ii. If you don’t use a base that adds thickness the values entered will be:
            1. self.MarkerDiameter = 9.5

iii. If you use a base, add the thickness of the base and multiply by 2. For example if you use a 2 mm base add the value of 4 as follows:
    1. self.MarkerDiameter = 9.5+4

b. For the next line of code (self.StaticForwardDirection =) you will need to know the global axis coordinate system for you lab.
    i. Determine the global axis coordinate system
    ii. Determine the direction that participants stand during the static trial (+X, -X, +Y, -Y). Enter the direction the participant stands with respect to the lab coordinate system:
    iii. Here are 4 examples:



    iv. Enter the correct '+X' or '-X' or '+Y' or '-Y' for your lab and data collection protocol: e.g. self.StaticForwardDirection = '-X'

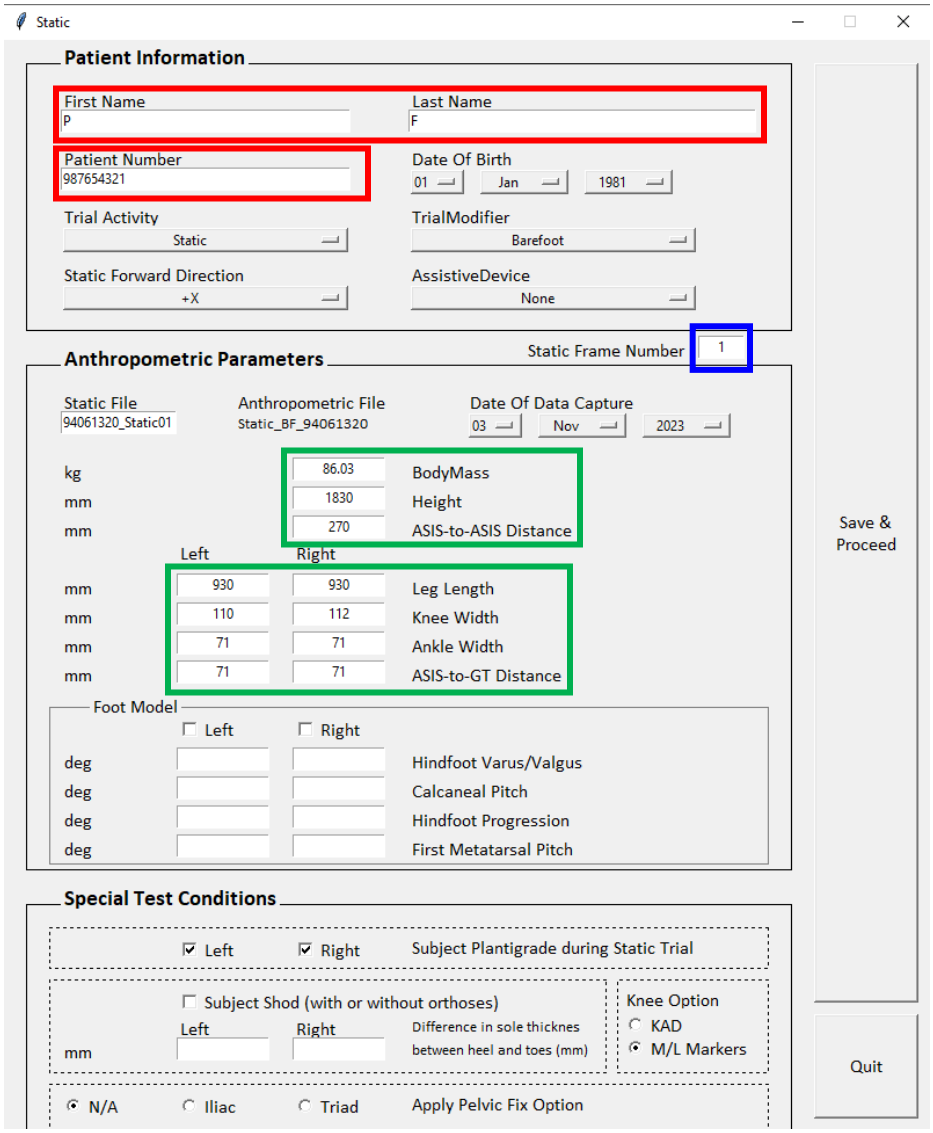
c. The 3rd line of code is related to the selection of the hip model implementation (self.HipModelName)
    i. The default for clinical gait analysis for Shriners Childrens's is 'Harrington2'
    ii. 'Harrington2' uses the full set of equations to determine the x,y,z coordinates of the hip joint centers. The full set of equations use Pelvic

Width (measured distance between ASIS during physical exam), Pelvic Depth (distance between Midpoint of ASIS markers and Midpoint of PSIS markers), and Leg Length from physical exam. BOTTOM LINE: leg length and ASIS-width need to be measured on physical exam and used.

d. The 4th and 5th lines establish the rotation sequence for the pelvis and trunk. The 2 options are the orders ROT (Rotation-Obliquity-Tilt) or TOR (Tilt-Obliquity-Rotation). **'ROT' is the setting that should be used.**
    i. self.TrunkRotationSequence = 'ROT'
    ii. self.PelvisRotationSequence = 'ROT'
e. The 6th line sets the shank coordinate system as Distal or Proximal. **The setting of 'Distal' should be used**. NOTE: Distal or Proximal must start with capital letter
    i. self.ShankCoordinateSystem = Distal
f. Lines 7 to 70 establish the marker labels used in the VST files. The labels in the py3_UserPreferences.py file match these labels as needed, so this part of the file does not need to be updated unless you decide to change the marker labels.

5. **Static Trial**
    a. In session folder, create subject and attach the appropriate SMACNet no KAD.vst
        i. Under Subject Properties, enter all required anthropometrics (outlined in red)
    b. Record a static trial
        i. Open static
        ii. Run "Reconstruct and Label" pipeline. Check marker labels

c. Run “Py_3 Static” pipeline
    i. On the following screen:
        1. Fill out required patient/subject information (outlined in red)
        2. Match Static Frame Number to the selected frame number of the static trial (outlined in blue)
        3. Check that all required anthropometric measures are filled in (outlined in green)
        4. We are currently only offering information for our standard model
            a. Under “Foot Model”, leave boxes blank and unchecked



        5. Under “Special Test Conditions”, select appropriate boxes to indicate whether subject is plantigrade and whether subject is shod. If shod, enter sole delta in mm (change in height of shoe sole between toe box and heel (positive number or 0))
        6. Do not change “Knee Option” setting

7. Do not change “Apply Pelvic Fix Option” setting
8. Click “Save & Proceed”

ii. Compare marker measurements to clinical measurements (The Shriners Gait Model uses clinical measurements to calculate joint centers and virtual markers). Click “Proceed”

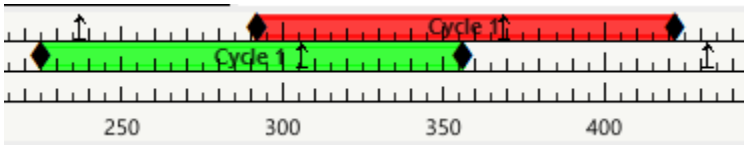
iii. Check Standing Posture measurements. Since you are using the Standard Model, the Foot Segment measurements will be empty. Click “Save Results”. Click “Quit”

6. Dynamic Trials

a. Medial knee and medial malleoli markers can be removed for the dynamic trials
b. Record dynamic walking trials in your capture volume

7. Processing Dynamic Trials

a. Open dynamic walking trial
b. Run “Reconstruct & Label” pipeline
    i. Check marker labels and gap fill as needed
    ii. Crop trial as needed. The Shriners Gait Model requires all markers to be present on the first frame of the trial
c. Add in gait events
    i. Label at least one full gait cycle as shown below



d. This model does support kinetics requiring force plates to be integrated with Vicon
    i. Assign each force plate based on which foot strikes the plate (right or left)
e. Run “Py3_Dynamic” pipeline

8. Outputs

a. The Py3_Dynamic pipeline will complete the calculations and save the results (kinematics, kinetics, etc.) as model outputs
b. These outputs can be found in Vicon by:
    i. clicking on the Subjects Tab
    ii. clicking the drop down menu to the left of the subject name
    iii. clicking the drop down menu to the left of Model Outputs
    iv. and clicking the drop down menu to the left of the model output you are interested in
c. The pipeline will also output a .GCD file
    i. This is a type of text file that contains each model output time normalized to be represented as percentage of the gait cycle (101 points 0-100%)
    ii. This text file can be used as a coding input to visualize the data
    iii. No visualization code has been provided