USERGUIDE

AXISNEURON

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Welcome to Perception Neuron

PERCEPTION NEURON is the world's most versatile, adaptable and affordable motion capture system offering user-friendly technology for various applications.

PERCEPTION NEURON could be used for different applications in the fields of VFX, game interaction, virtual reality, sport analysis, medical analysis and real-time stage performance among others.

1. VFX: Motion recording and replaying; BVH and FBX format output supported for Maya, MotionBuilder, Blender, etc.

2. VR / Game interaction: Seamless integration with HMD with opensource game engine demos; Gesture control library included; Bring 'yourself' into the virtual world.

3. Sport / Medical Analysis: Get all orientation, position, and raw acc and gyro data flow in real-time; free 'Data-Visualizer' for data plotting and recording/comparison.

4. Stage performance: Real-time data stream output; Wireless data transmission.

2. QuickStart

Perception Neuron motion capture system needs to communicate with with the Axis Neuron software. Axis Neuron can receive and process the motion data and export the data to a third-party software. It is also possible to do synchronous broadcasting with a third-party software. In addition, you could get the high-quality motion data which is compatible with most professional movie effect and game development tools.

Are you ready? The following content is designed to quickly get you up and running with Axis Neuron.

2.1 Equipment Brief Introduction

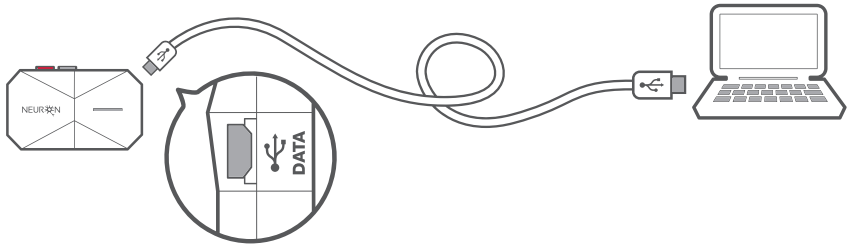
PERCEPTION NEURON SENSOR	HUB	STRAP
Perception Neuron uses an IMU sensor (Inertial Measurement Unit) composed of accelerometer, gyroscope and magnetometer.	The HUB compiles and synchronizes all motion data and broadcasts it to the computer via USB or Wifi.	The strap is worn on the body and contains the Perception Neuron sensor. The back label tells you where it should be worn.
		

2.2 Capture Motion Data

After properly fitting the straps and sensors, launch Axis Neuron. Lets begin recording our first motion data.

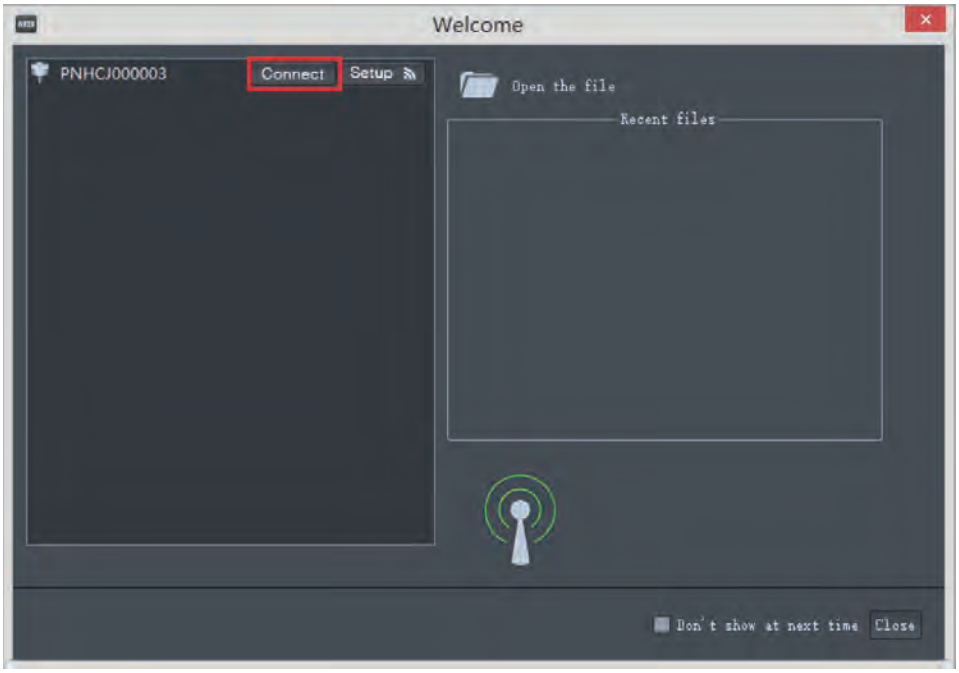
1.

Connect the Hub to the computer with the USB data cable (Black). One side of the USB cable connects to the Hub's data port and the other side connects to an open USB port on the computer



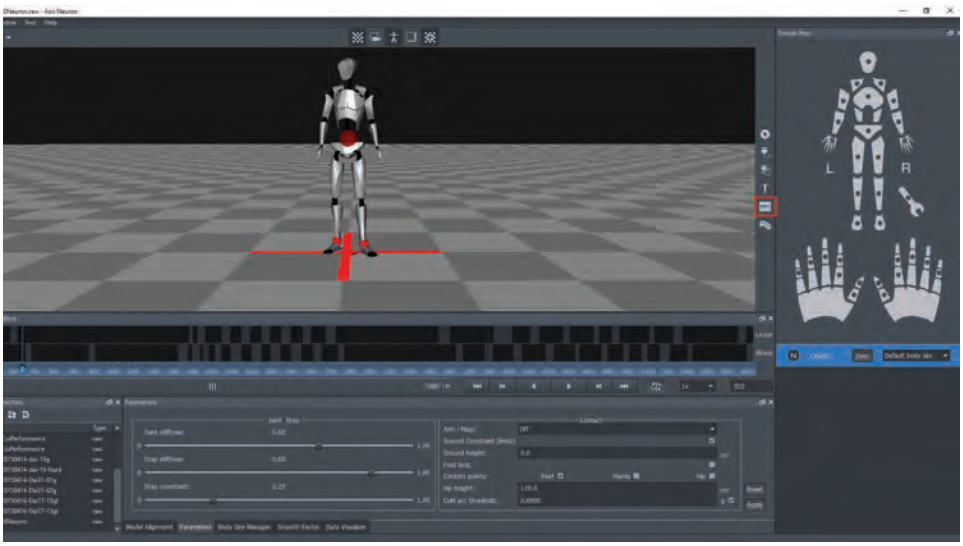
2.

If the hub was recognized successfully, the HUB id will be shown in the device list in the left panel of the Welcome window. Click the Connect button to connect the hub with the computer.



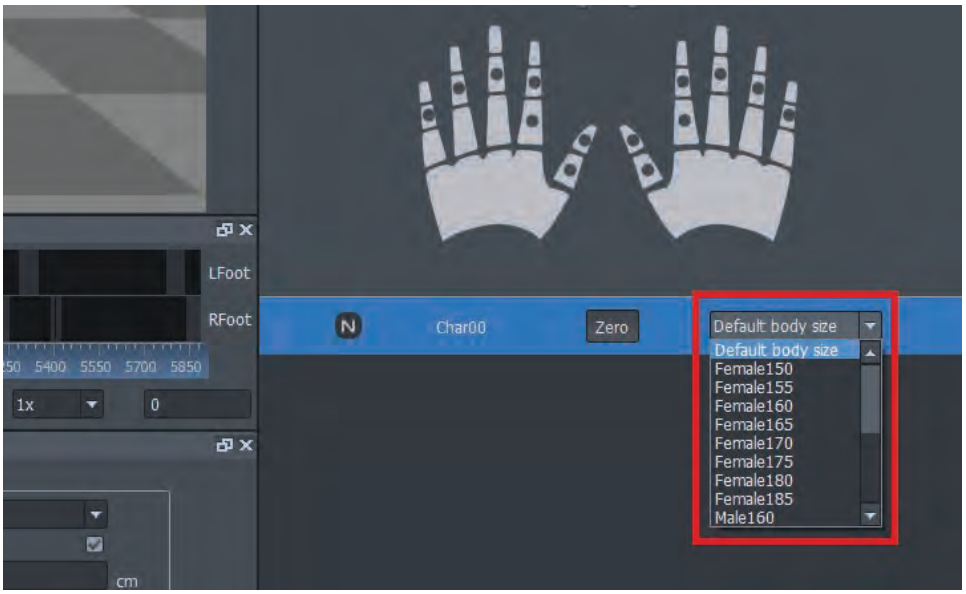
3.

After establishing a connection with hub successfully, click the zero button to move the model to the origin of the coordinate system (keep steady and do not move during this procedure.)



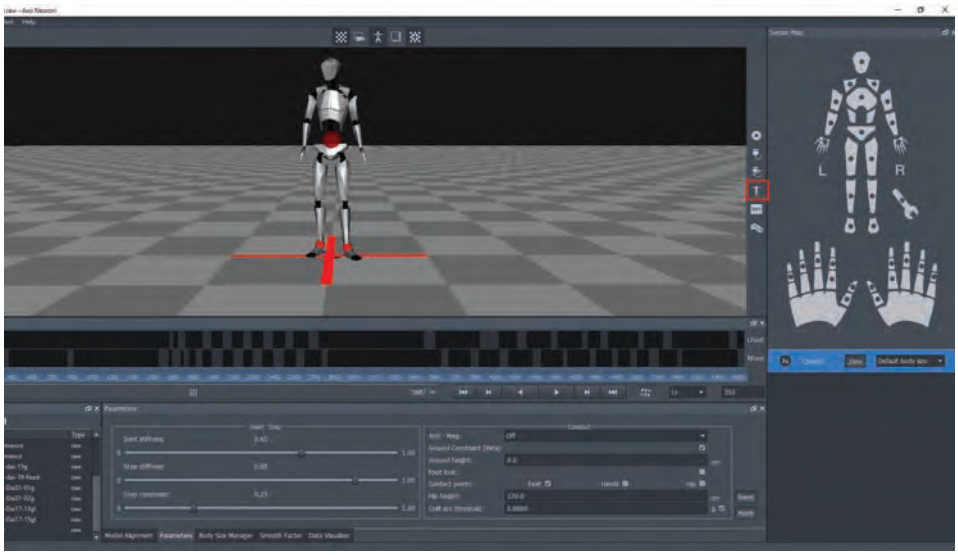
4.

Choose a body size for the model in the Body Dimension list to ensure a more accurate capture.



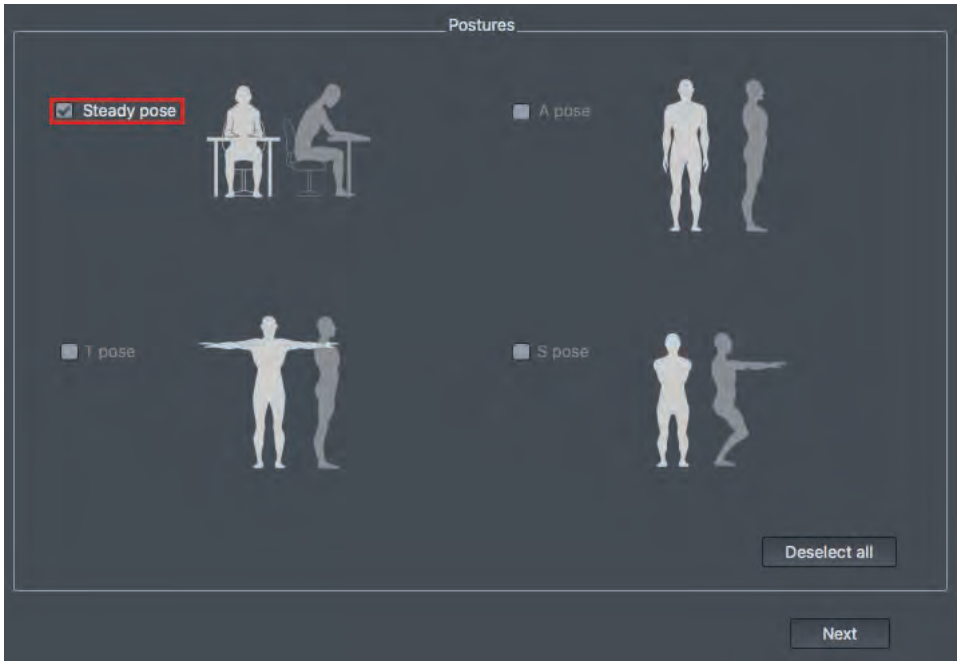
5.

Click Calibrate button to do the pose calibration. Calibration helps orient the sensors to more accurately capture the motion data.



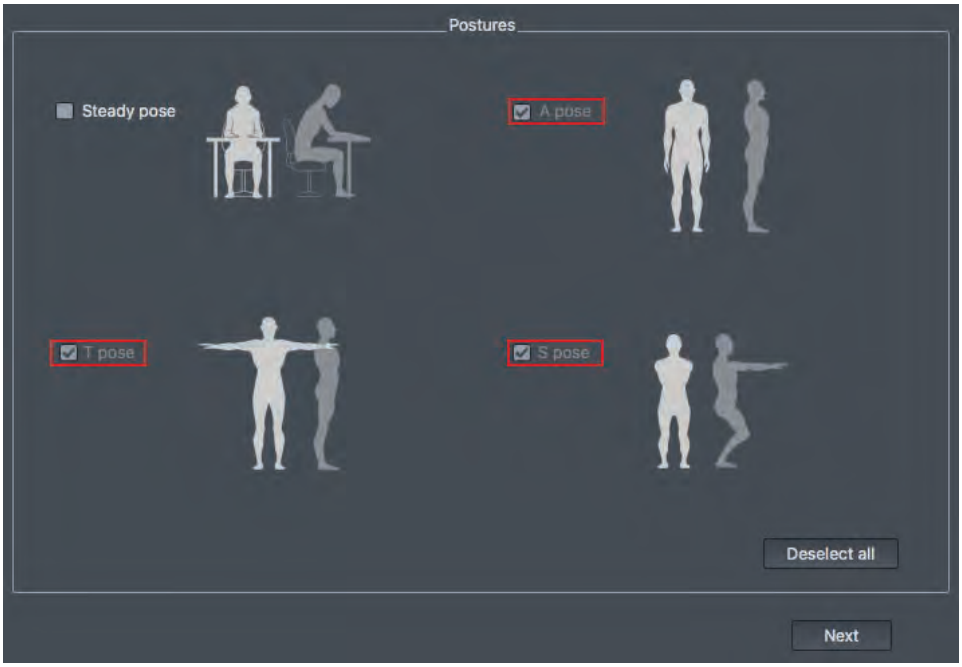
6.

Click Deselect all and select only the Steady Pose option. You must keep all sensors and straps steady (no special requirement to the posture). Try to Sit down, put your hands on a table and then click Next. This calibration removes bias errors brought by the connection between Perception Neuron Sensors and the socket.
Perform this pose only once until you reposition the Perception Neuron sensor, or introduce new sensors.



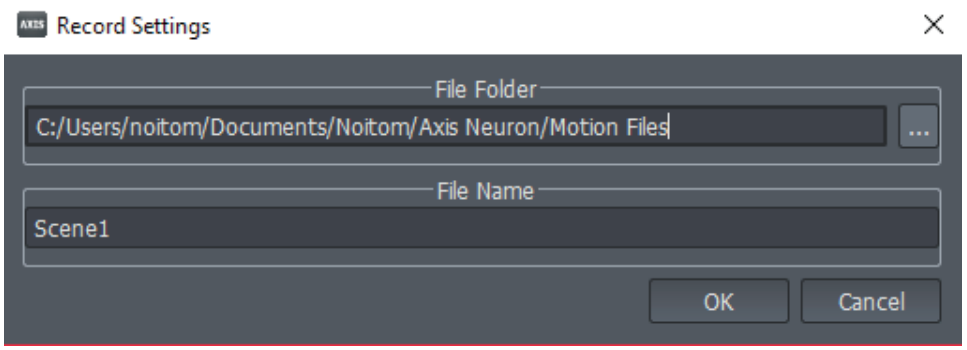
7.

After succcesfully completing the Steady Pose, reopen the Calibrate window and check the pose(s) that need to be calibrated then click Next to start calibration. (Available poses depend on the working mode selected in the Sensor Map)



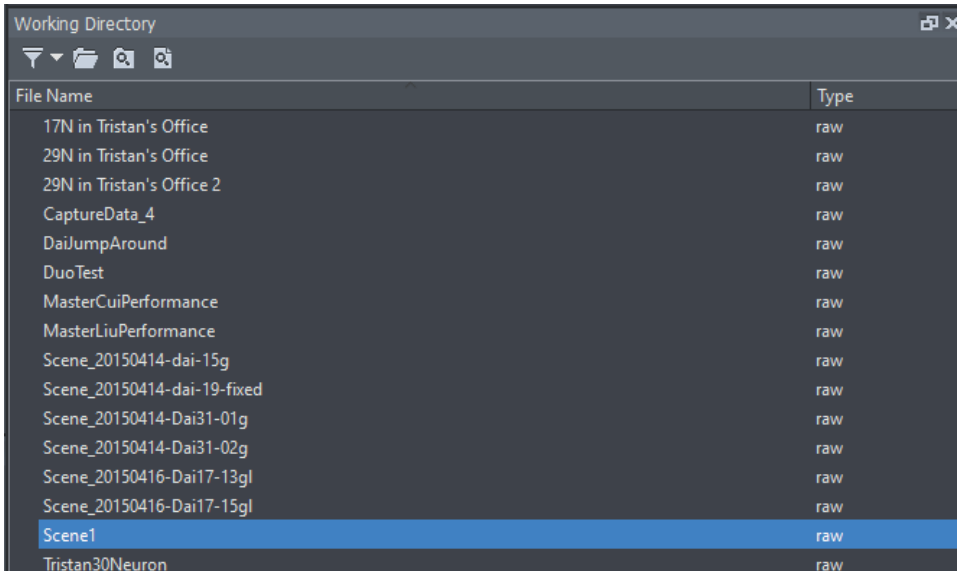
8.

You can start recording after pose calibration is complete. Click the Record button then choose a path for saving the recorded data and the record File Name in the pop up window.
(The motion data is then recorded when the Record button blinks)



9.

To stop recording click on the Record button again. The recorded file will now appear in the Working Directory window.



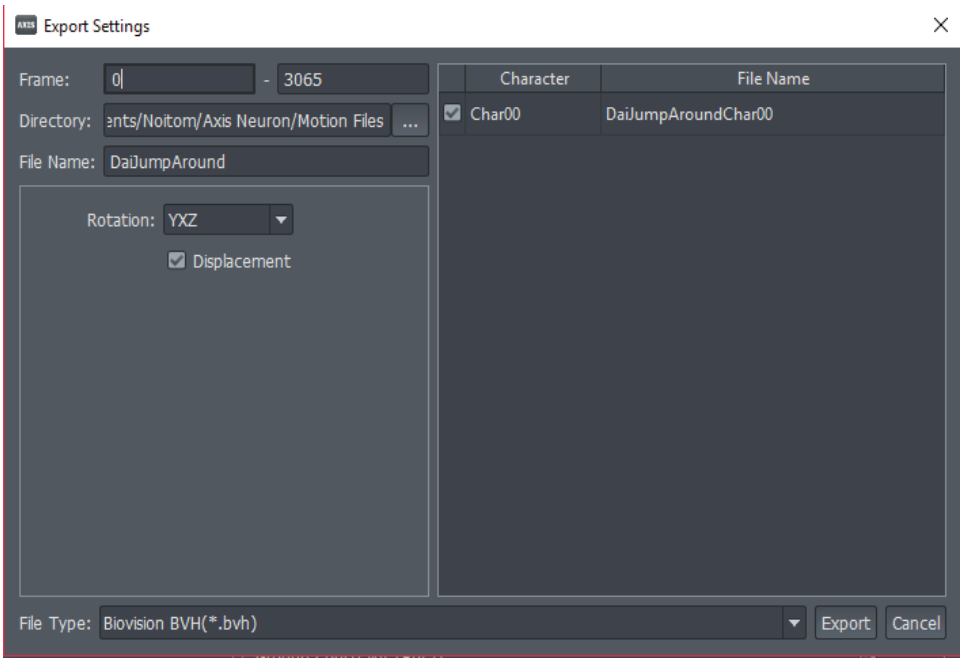
10.

Let's review our recorded capture. Select the recorded file generated in the Working Directory window and click the Play button. You will see the motion you recorded on the Axis Neuron viewport.



11.

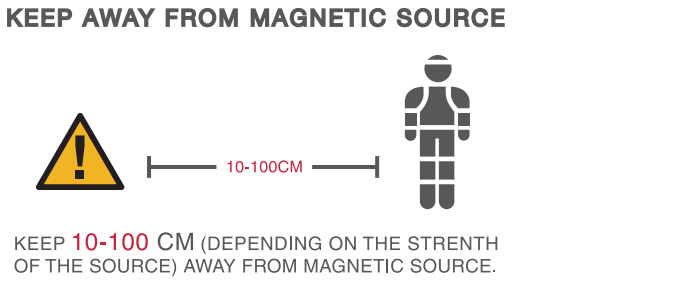
Export your motion data by clicking File>Export . On the Export settings window click Export after you have selected the desired file format. For this example we chose the default recorded file <bvh> format.

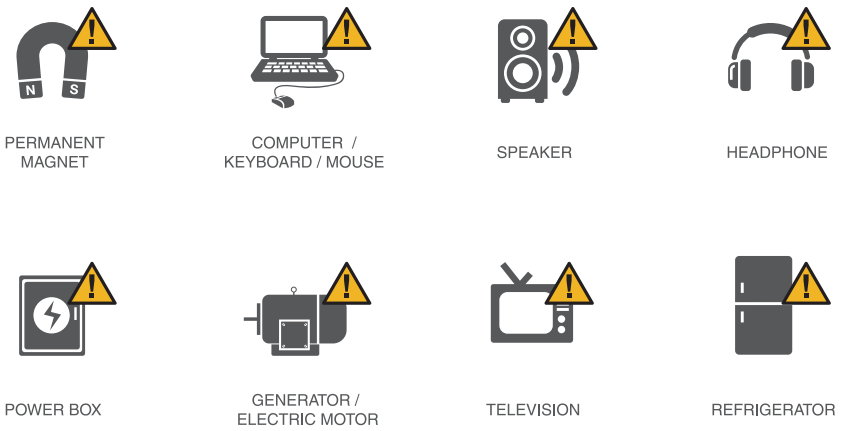


2.3 Caution & Tips

1. Environment

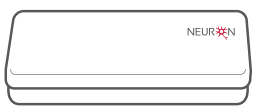
It is strongly suggested to use your Perception Neuron system in an enviroment with little to no magnetic field. Otherwise the sensors will be adversely influenced making the motion captured data extremely imprecise. Avoid electric motors, loudspeakers, transformers, and furniture.





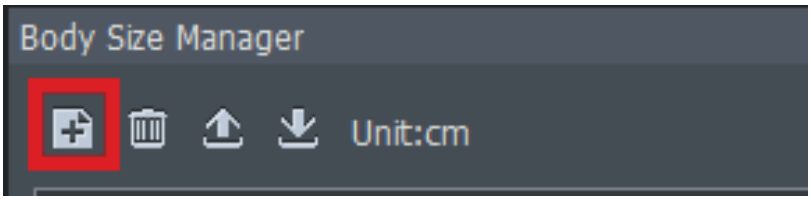
Perception Neuron system should NOT be used in an environment with strong magnetic interferences. Using the system in such environment introduces significant errors to the motion capture results. Exposing Neurons to such an environment for a long time will cause sensor magnetization.

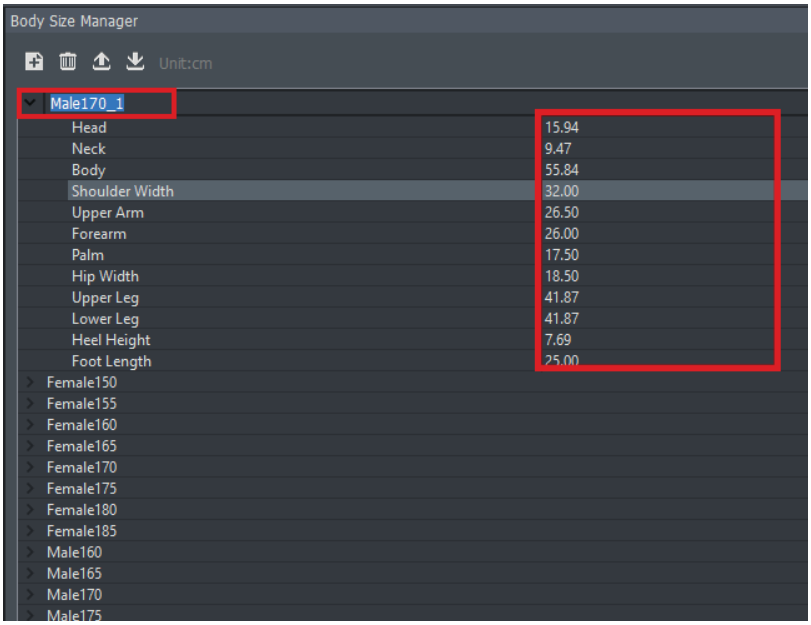
The container that comes with the Neurons is made of special material which can effectively isolate magnetic field and therefore prevent sensor magnetization. Neurons should be placed in this container during transportation, long-term storage, or when situated in any environment with magnetic interferences.



2. Improving precision

Accurate skeletal measurement and size can improve the precision of the motion data. If you want acheive more accurate data, measure your actor's specified body parts and input this data into the Body Size Manager before recording. The measuring will be introduced in a later chapter.



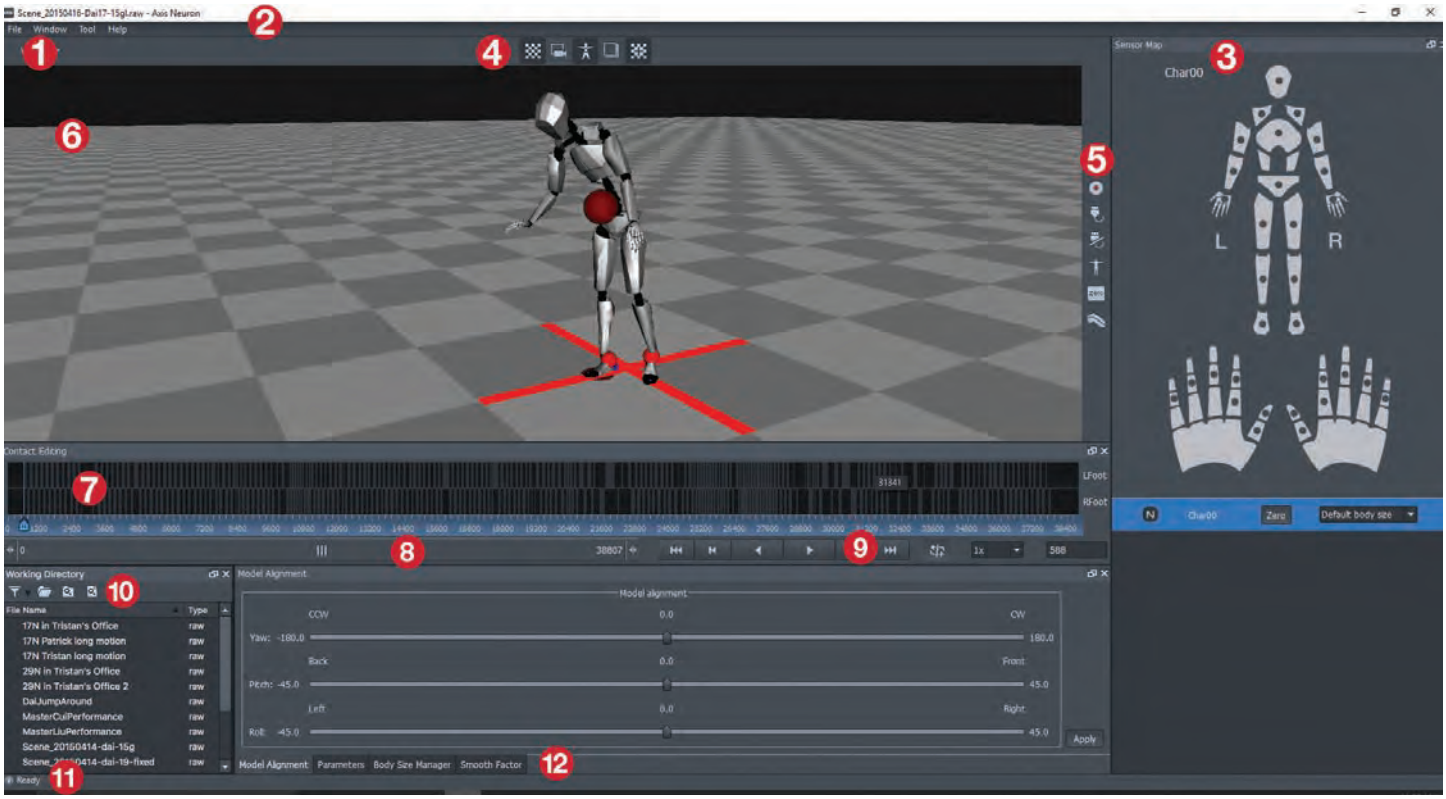


3. High accuracy

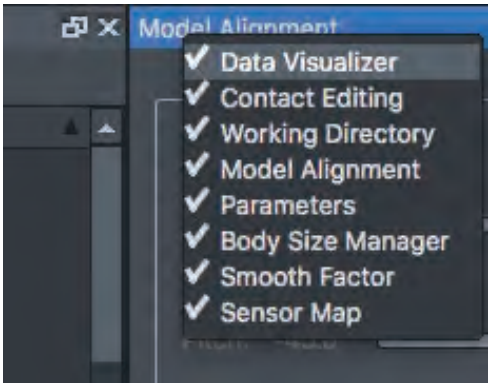
Highly accurate body size can improve the quality of motion data. You can find the method of body measurement in 6.7 Body Size Measurement .

3. Software Interface Introduction

3.1 Guide



1. Menu Bar - File, Window, Tools, and Help access .
2. Title - Display name of the current active file.
3. Sensor Map - Displays the data transmission signal strength from the sensors.
4. Scene View Navigation - Toggle view for the grid, center of gravity, shadow, origin reference. Parent camera to the actor.
5. Motion Catpure Bar - Record, Connect, Disconnect, Calibrate, Zero.
6. Viewport - View playback or live motion data on this window.
7. Contact Editing - This area contains tools to clean up contact points.
8. Range Settings - You can set the frame range of the animation.
9. Play Controller - Basic control of playing.
10. Working Directory - Displays a list of captured files from a user specified folder.
11. Status Bar - Show status.
12. Editing Panel - The parameters and other functional settings panel.



Interface Tips:

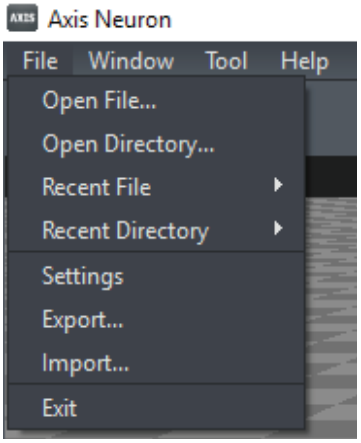
1. You could show or hide any panel in Window –> Panels or right click the title bar of any panel and then check the one you want to see.

2. You could reset current layout in Window –>Layout and there are several default layouts available.

3. You could move the panel to anywhere you want by dragging the title bar of the panel. And You could double click the title bar of the panel to switch the panel view between the floating mode and docking mode.

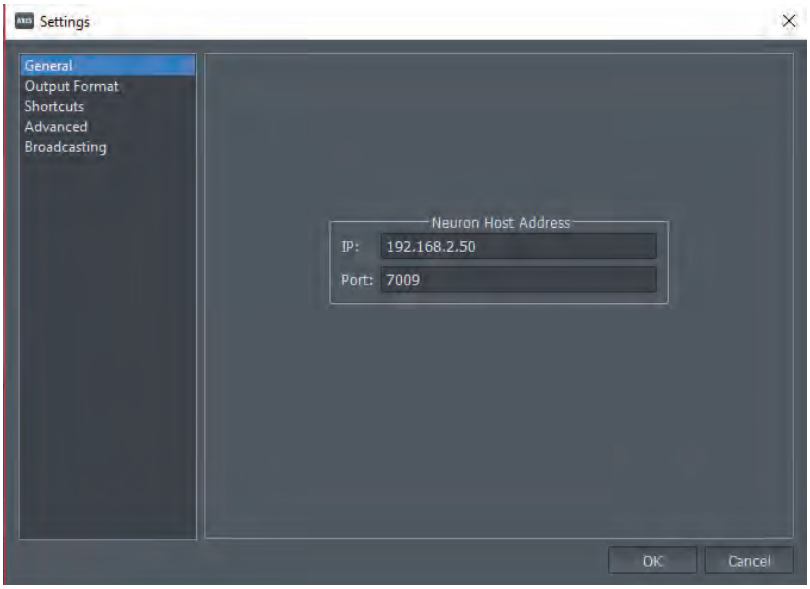
3.2 Menu Bar
3.2.1 File

Options availabe include Open File, Open Directory, Settings, Export and Exit

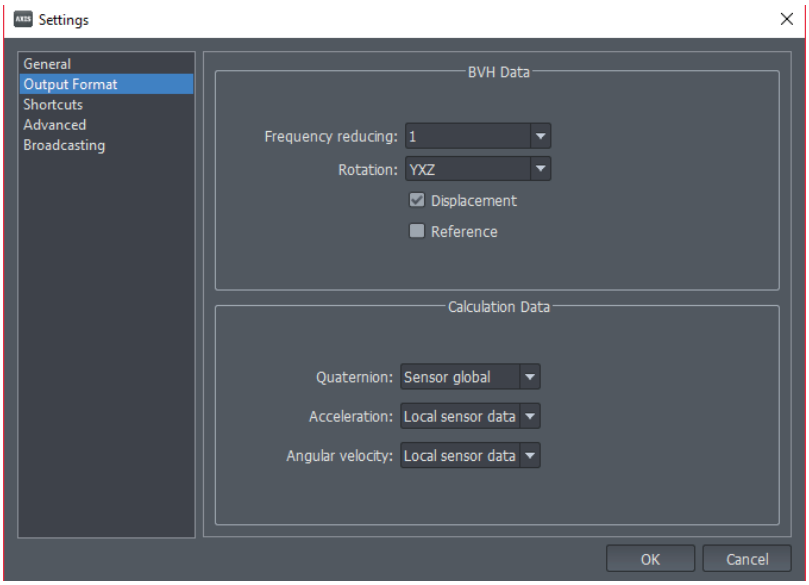


1. Open File: Open an existing file (.raw format)
2. Open Directory: Displays files from a folder location.
3. Recent File & Recent Directory display recently opened files and folders.

2. Settings
2.A General:
Displays the Host IP and Port.



2.B Output Format (important setting):
Displacement : Checking this box will affect the real-time model, the Data Visualizer panel, and the real-time data broadcast. There are some third-party softwares (e.g 3ds Max) that do not support bone displacement. In order to play the data in this kind of software, you have to uncheck the Displacement option before export. However, the legs will not be straight because no displacement data is exported.



Any information on "Reference" and "Calculation Data" section

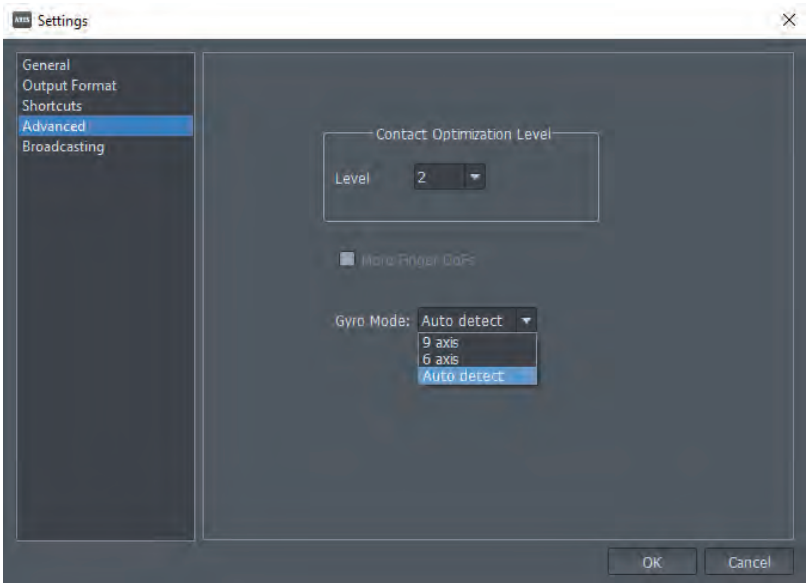
2.C Advanced :

Contact Optimization Level : The system calculates auto-optimization on the original contact relationship data. The default value is 2.

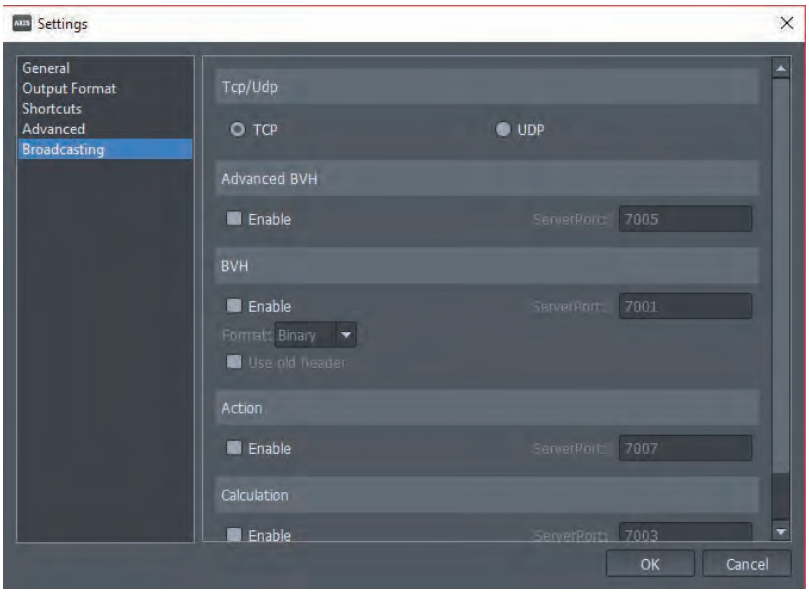
Gyro Mode :

Auto detect : According to different magnetic field enviroments, this option will automatically adust the working mode (9-Axis or 6-Axis). When the system detects a high-intensity magnetic field, the LEDs of the sensors will always be on and the gyro will switch to 6-Axis mode. It will not calculate the magnetic data to assure that the motion capture data won't be influenced by the high-intensity magnetic field. When the actor moves to a low-intensity magnetic field enviroment, the gyro will switch back to 9-Axis mode and the LEDs of the Perception Neuron Sensors will be in their normal state again.

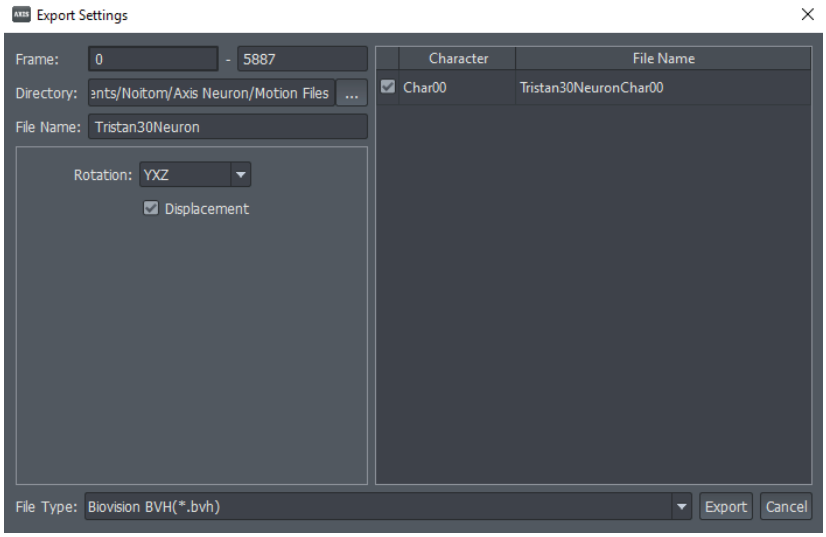
9 axis/6 axis: If you want to adjust the gyro mode manually you can do so here.



2.D Broadcasting:
Choose the Internet Protocol and the file format.



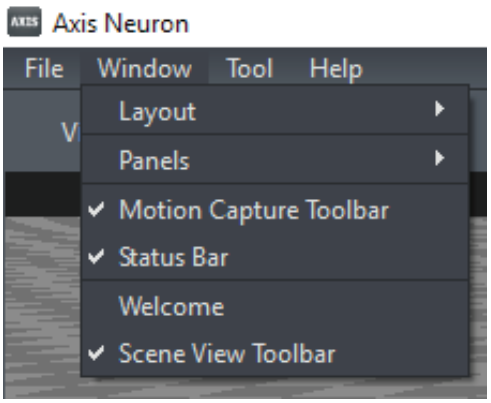
3. Export: Provides options for exporting data from Axis Neuron.



- Rotation: The rotation order of Euler angle based on the 3D software. The default order is YXZ. This is only for BVH or 3ds max format exporting.
- Displacement: Determines if the exported file contains displacement data.
- Character List: You can choose which character to export when working in Multiplay Mode.

3.2.2 Window

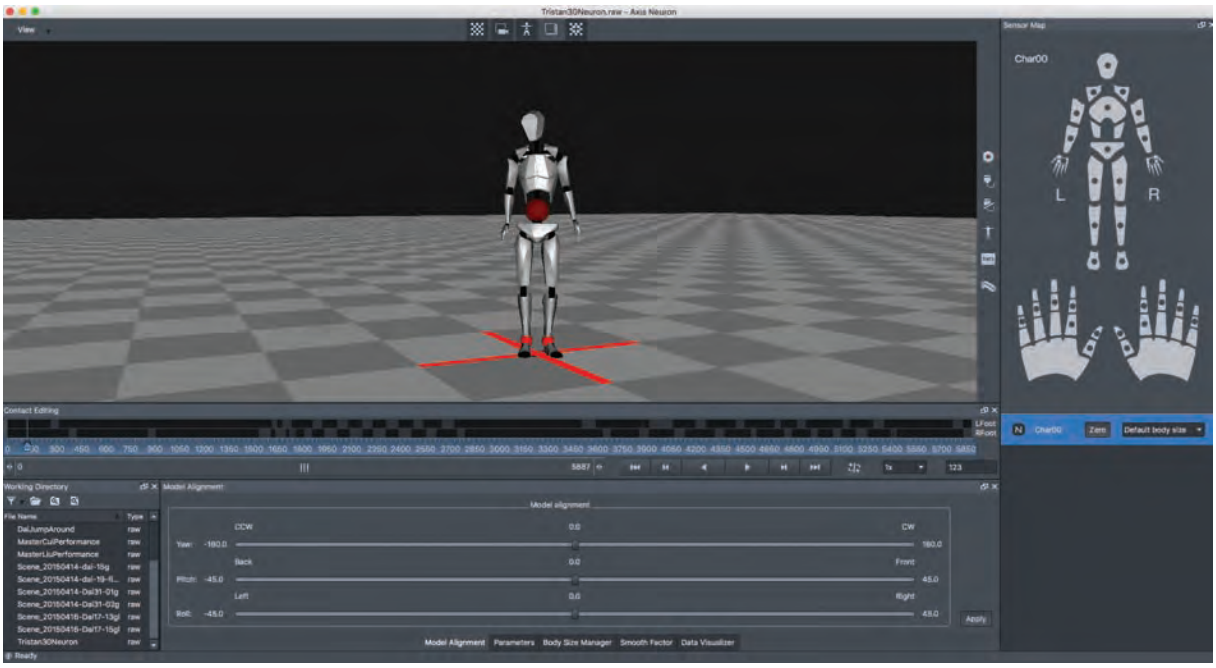
The layout can be adjusted through this menu and panels can be shown or hidden.



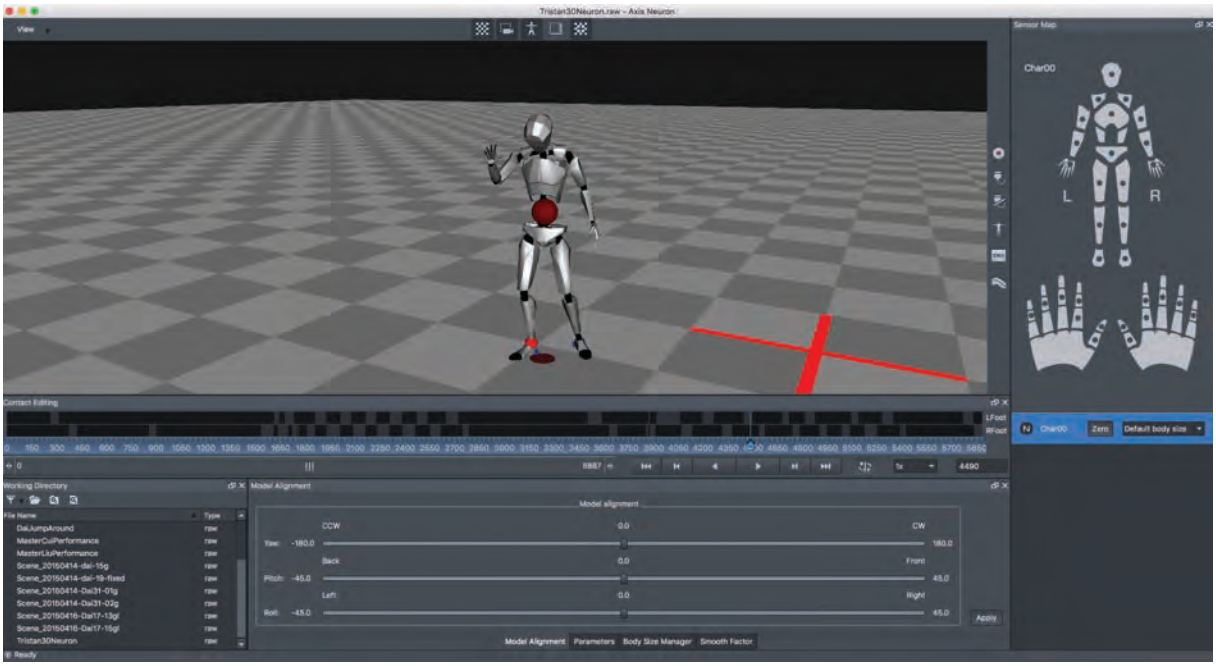
1. Layout

There are several layouts that you can choose. They are Full Fuction mode, Editing mode, Capture mode, Replay and Demo mode . Additionally, you can make a custom layout by choosing New Layout .

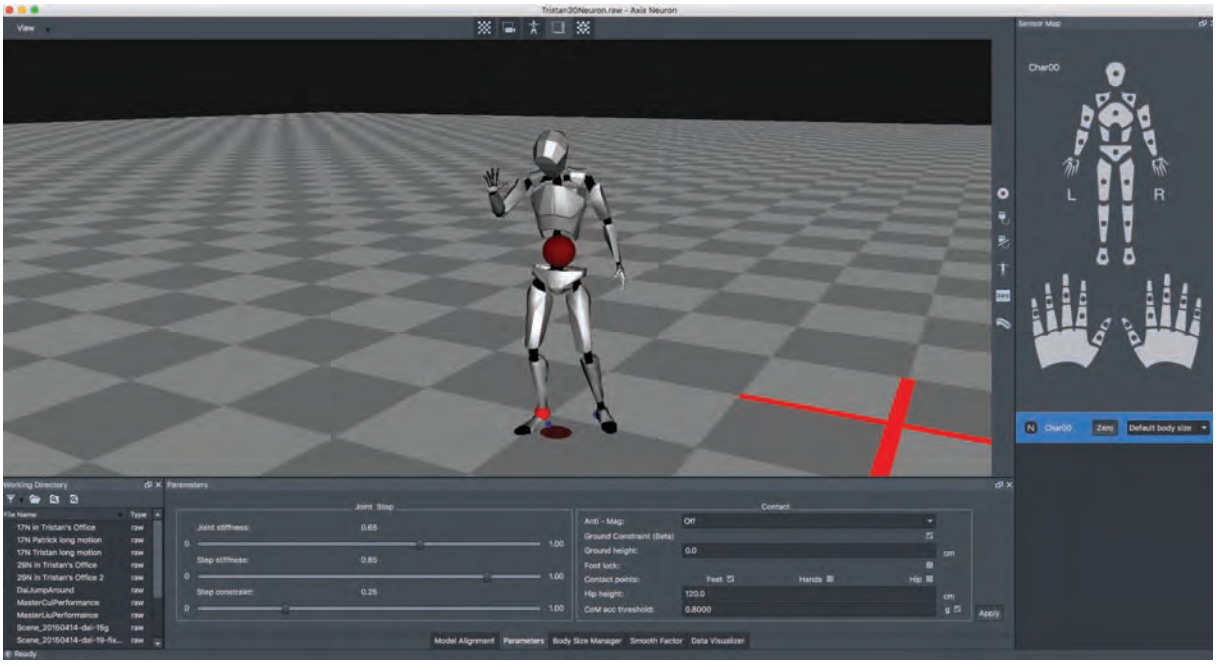
- Full Function - Displays all windows needed for recording and editing.



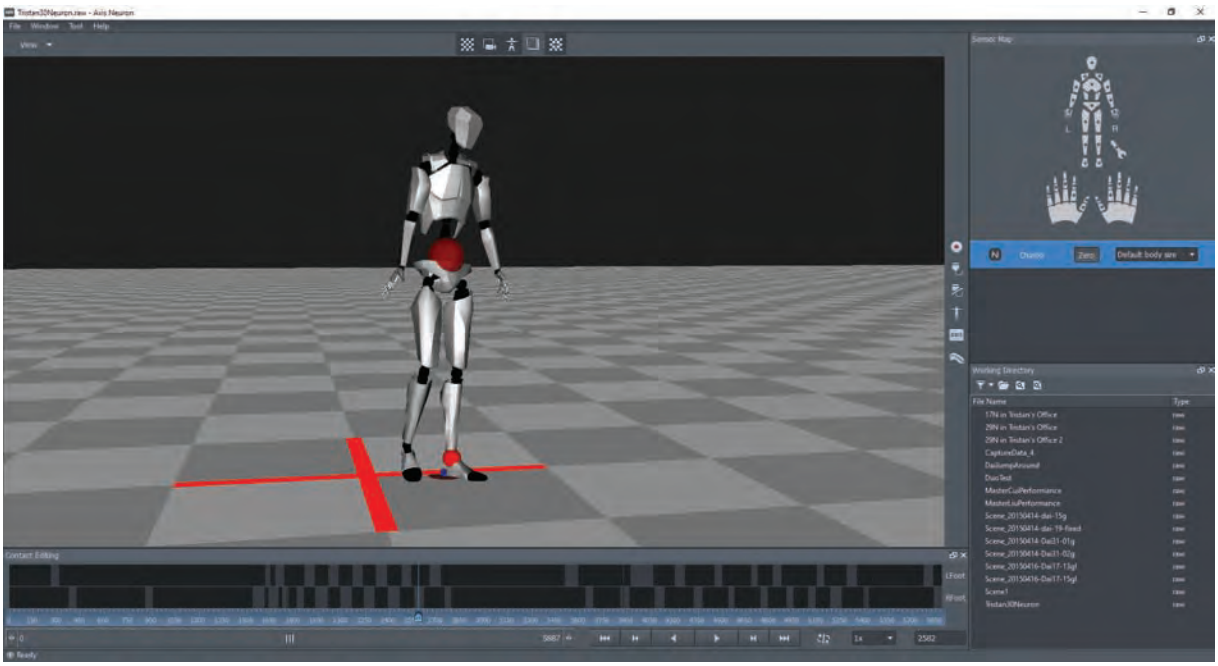
- Editing layout - Similar to Full Function with slightly different window space configuration.



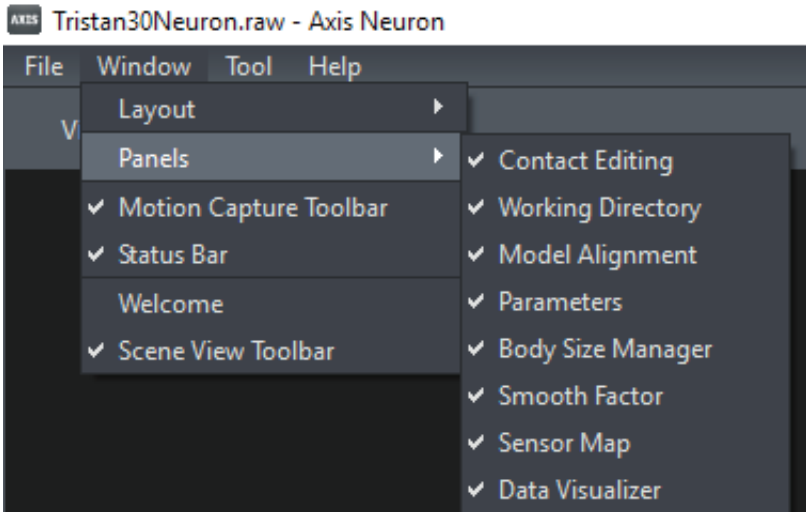
- Capture layout - Closes the Contact editing window as this is not needed during the capture phase.



- Replay and Demo - Maximizes the Workspace window screen space.



2. Panels
   Show or hide specific panel.



3. Motion Capture Toolbar:
Show or hide the Motion Capture Toolbar. Following are the descriptions of the operations shown the Motion Capture Toolbar.

TIPS

The Introduction of Scene View Toolbar



- Record: When this button is clicked, the Record settings dialog will popup. You can change the storage path and file name here. When you click “ok”, the red light will blink and Recording will start. Click “Record” again and the recording will stop. The new raw file will show in the Working Directory.



- Connect: Before you start recording, you need to connect the suit to the Axis Neuron software. Once you click this button, you can choose the device you want to connect from the equipment list. Multiple devices (suits) will be available if you are using more than one suit.



- Disconnect: Clicking this button will disconnect the device(s) from Axis Neuron.



- Calibrate: This button will start the pose calibration process to improve capture accuracy.



- Eliminate error: This button will align the actor with the origin of the Workspace. When the sensors capture a lot of out-of-range motions, the sensor accuracy may become imprecise. Click Zero to minimize these errors. After clicking the button, the Keep Steady radar will display and the actor should remain steady during this period.



- Shutter: The Shutter is the remote controller. Clicking this button will open the shutter function. Clicking it again will close this function. Before using the Shutter, please plug the receiver into an open USB port.

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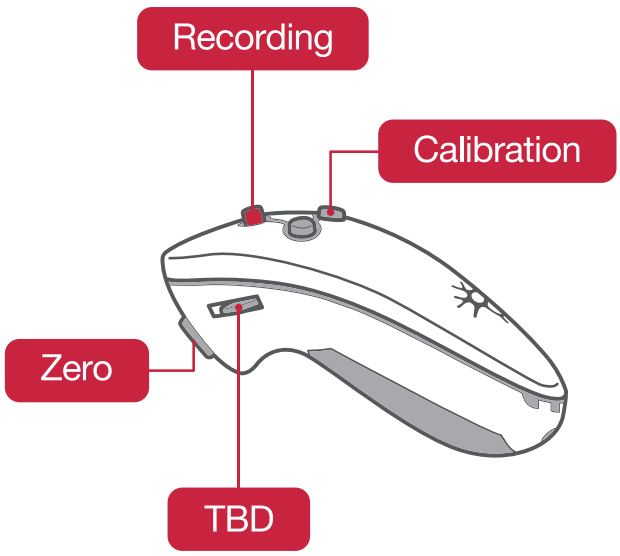
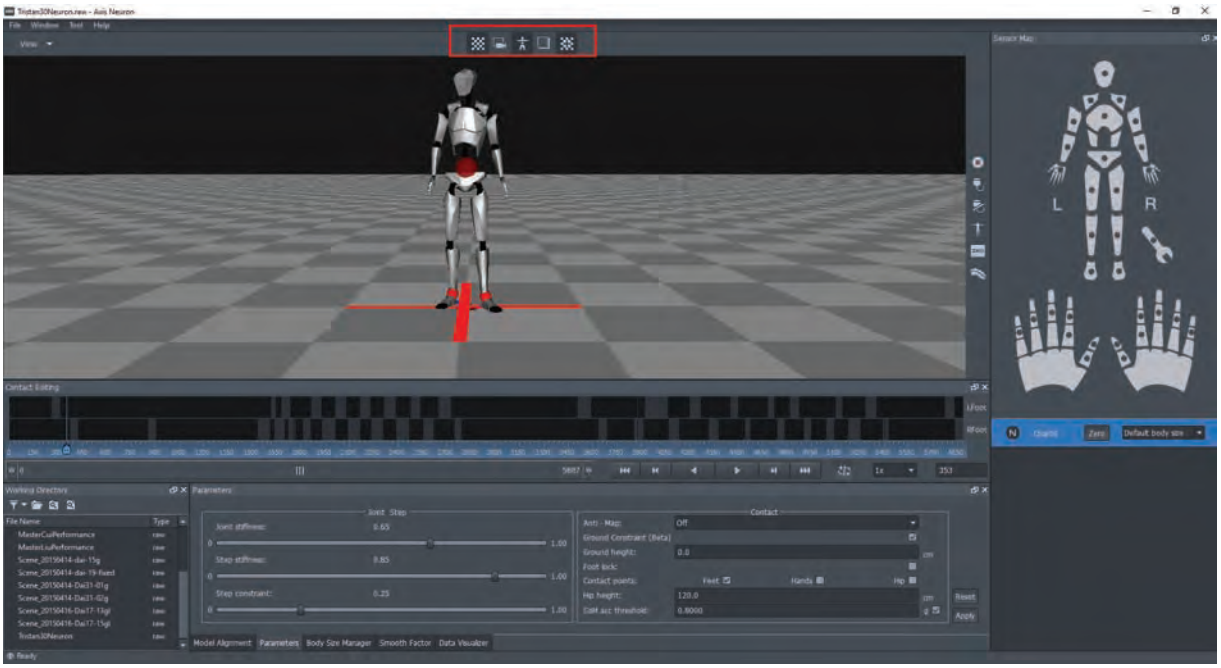


- The red button means Record.
- The R button means Calibrate.
- The L button means Eliminate error.

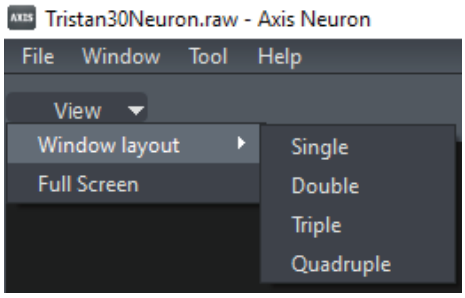
4. Scene View Toolbar: To switch the scene view.

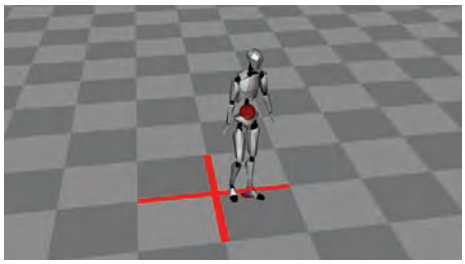


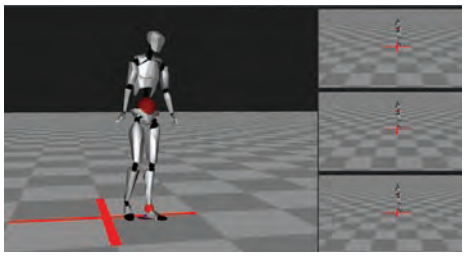
TIPS

The introduction of Scene View Toolbar

- View - Various viewport layouts can be chosen from here. Each view can show any angle of the model. When setting multiple views, you can drag the separation line of the two views to resize them.
- The shortcut of full screen is Ctrl+F. Quit full screen is Ctrl+F or Esc.
- Click with the left mouse button on the view that you want to be active. Pressing and holding the left mouse button will move the camera view (pan). Pressing and holding the right mouse button will rotate the camera view (orbit). Rolling the mouse wheel will adjust the distanace between the camera and the model (dolly).







TIPS



- Background: Shows the floor.



- Camera Track: Makes the Camera follow the model. With this button active, the model will always stay centered on the screen.



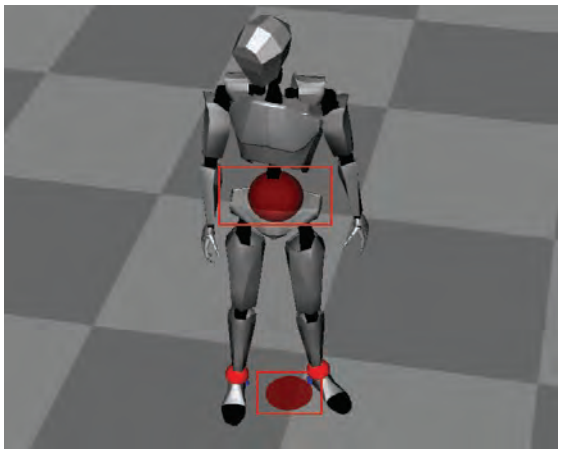
- Center of Mass : Shows or hides the center-of-mass for the model.



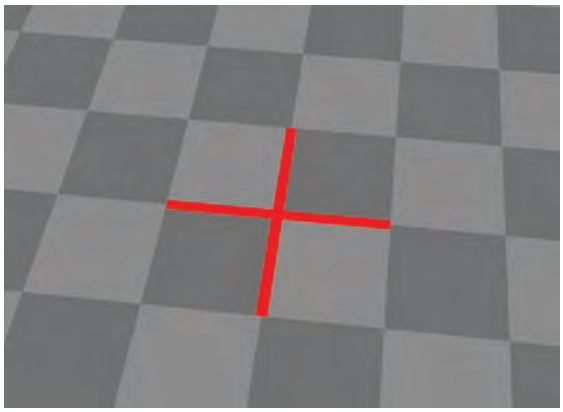
- Shadow : Show or hides the shadow of model.



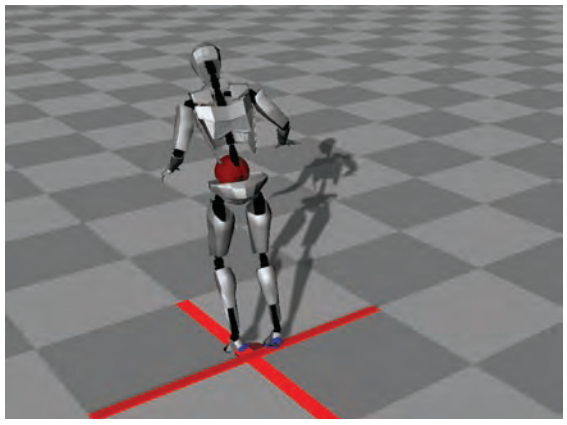
- Origin Marker: Shows or hides the red cross marker indicating the origin of scene.



Center of mass

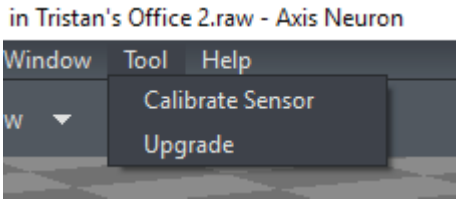


Origin Marker



Shadow

3.2.3 Tools



Calibrate Sensor: Calibrates the magnetized Perception Neuron Sensors to elimate accumalated errors. This operation requires that the tool cable is plugged into the hub and the hub is connected to the computer via USB.

Upgrade: Firmware upgrade. You can manually upgrade the HUB app, HUB Boot, Perception Neuron app, or Perception Neuron boot to the latest version. The software will always auto check the version of the firmware as well.

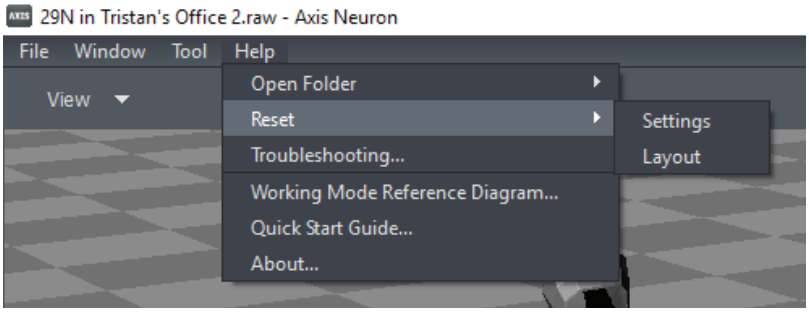
TIPS

- Details on the calibration process can be found in 10.2 Perception Neuron Calibration.
- The difference between Pose Calibration and Sensor Calibration:

Pose Calibration: This calibration is for holistic posture when an actor is wearing the equipment.
Sensor Calibration: This calibration is for eliminating the accumulated error of the single magnetized sensor.

3.2.4 Help

Open Folder: Opens the Body Size Files or Demo File Folder.

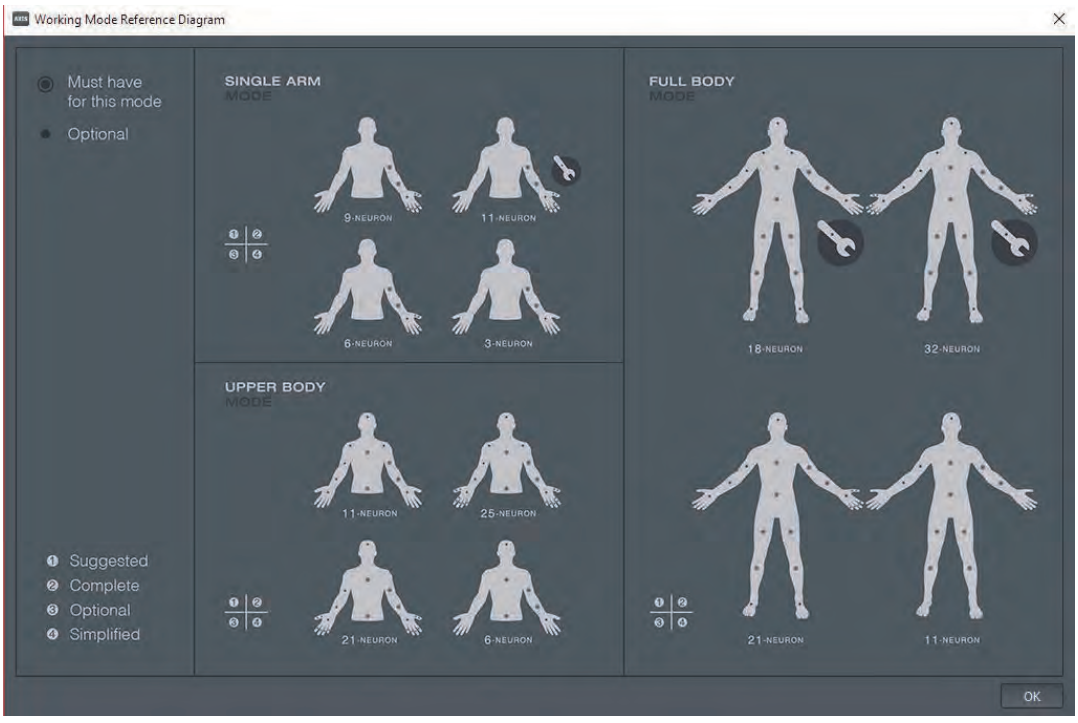


3. Working Mode Reference Diagram: Introduction on the motion capture wearing modes.

Reset: Contains options for resetting various parameter categories

- Settings: Resets all settings to their default.
- Current Character: Resets the Data parameters of the current character (including model alightment, Parameter, Body Size Manager, Smooth Factor, and Data Visualizer).
- Layout: Reset the layout.

Working Mode Reference Diagram: Provides reference to the motion capture wearing modes.



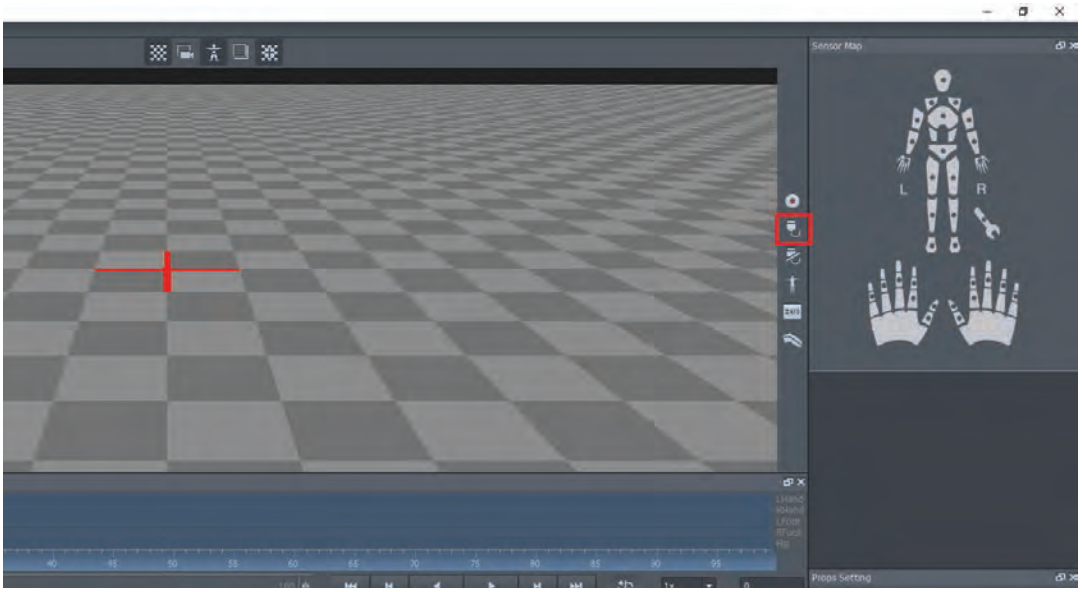
4. Connection & Calibration

The Perception Neuron Sensors are capable of 60/120 fps sampling rate. All of the sensors will send the data to the HUB and the Hub will send the data to the computer via USB or wireless connectivity. This chapter will outline these two methods of connection and pose calibration.

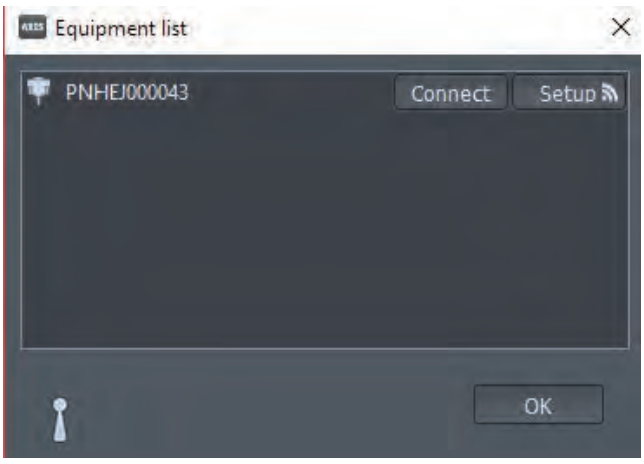
4.1 USB connection

There are 2 ways to establish a connection via USB.

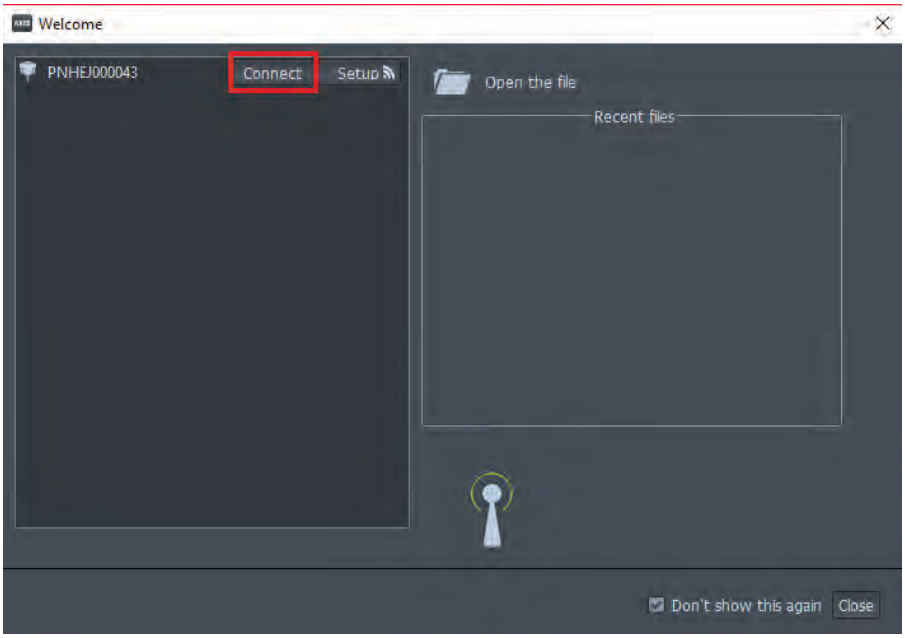
Method One: Using the Connect button in the Motion Capture toolbar and choosing the device from the Equipment List window.
1. Plug the USB cable into the HUB using the data port connection and connect the other side of the USB cable into an available USB port on the computer.
2. Click the Connect button in the Motion Capture toolbar.



3. Click Connect in the Equipment list popup Window.

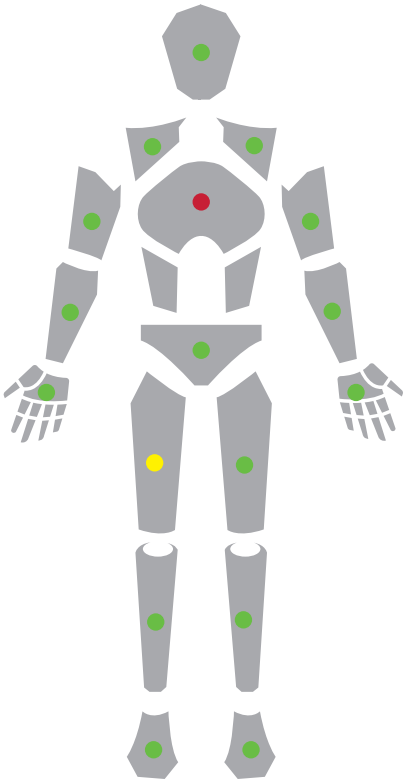


Method Two: Using the Connect button in the Welcome window.
1. Plug the USB cable into the HUB using the Data port connection and connect the other side of the USB cable into an available USB port on the computer.
2. Click Window -> Welcome, and click Connect on the left side of the screen.



TIPS

- When you create a real-time connection, the sensor map will show the transmission quality of the data.



BEST QUALITY

MID QUALITY

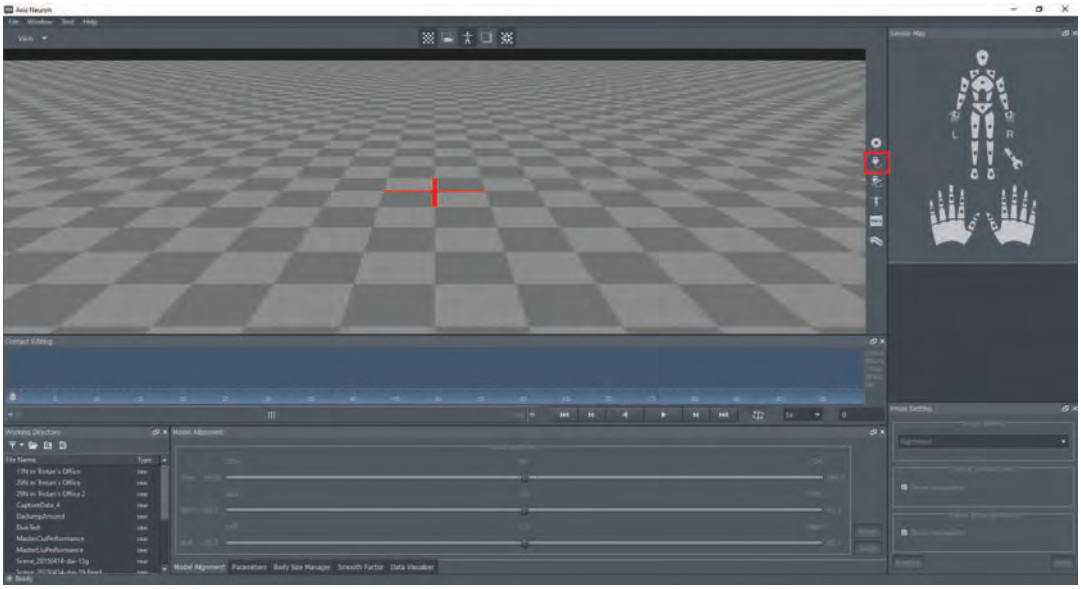
BAD QUALITY

NO SIGNAL: NO DATA

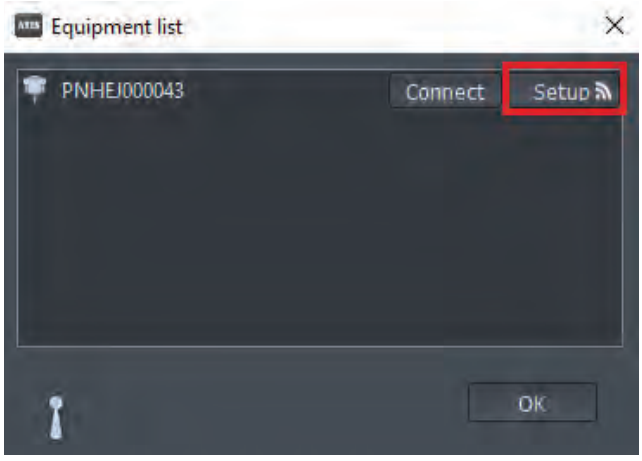
4.2 Wireless Connection

Axis Neuron uses the Hub to establish a connection with the router. Perception Neuron supports any standard 2.4G router.

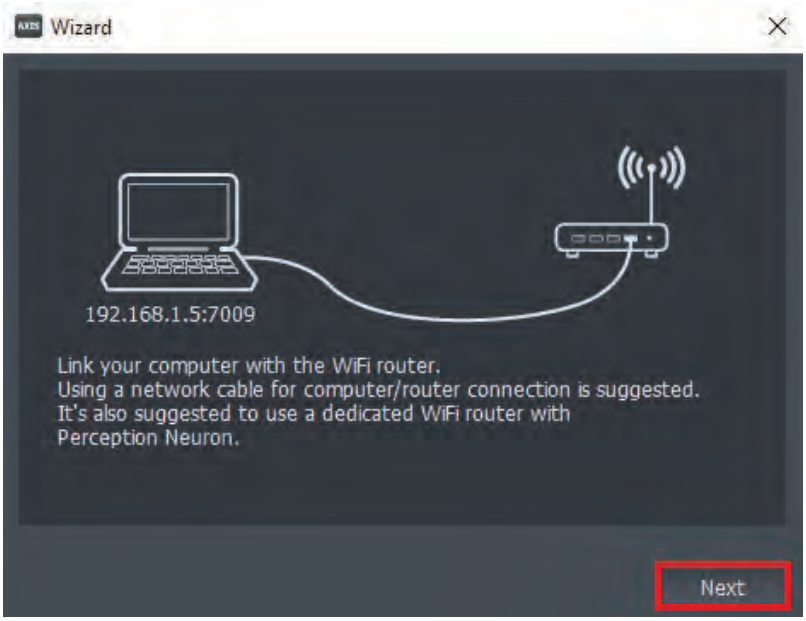
- Set up your router: Set the router's SSID and password. (The lengh of SSID needs to less than 26 characters. The length of the password needs to be less than 17 characters.)
- Connect the computer to the router via an ethernet cable.
- Plug the USB cable into the Hub using the data port connection and connect the other side of the USB cable into an available USB port on the computer.
- Click the Connect button in the Motion Capture toolbar.



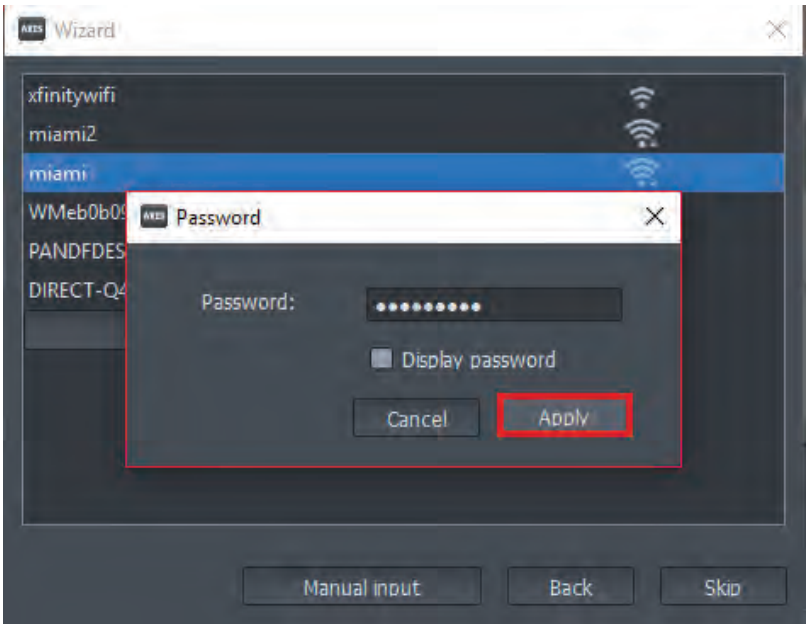
- Click Setup in the Equipment list



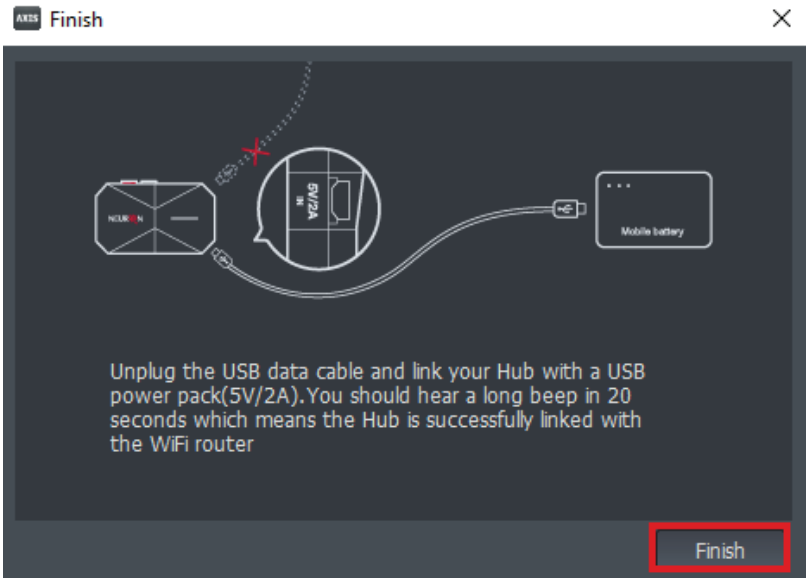
- Click Next.



- Click the SSID you want to connect and input the password.



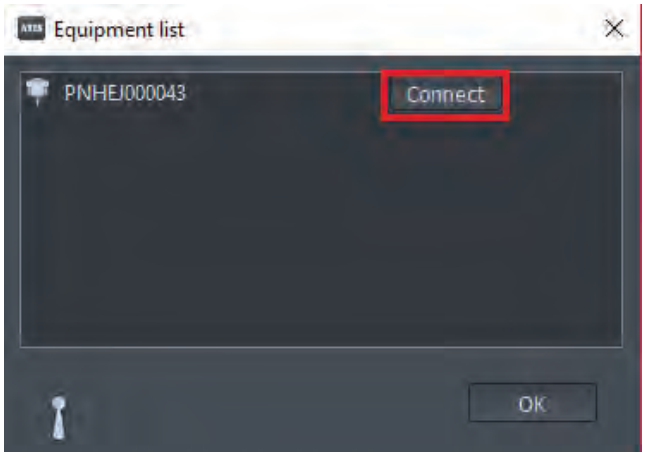
7. Unplug the USB data cable from the computer. Switch the USB cable attached to the hub from the data port on the hub to the 5V/2A IN port on the hub then connect the other end of the USB cable to a portable USB power supply. Click Finish to close dialog. Wait until the hub establishes a connection with the router. This should not take more than 20 seconds. The hub will send out a buzzing sound one time to show successful connection.



8. Click Connect button.

TIPS

- If the SSID you want to connect is not on the list, You can also click the Manual input to to refresh the SSID manually.
- The hub will store the SSID and password you set. So, if the Host IP doesn't change, you can skip setting the password step by clicking the Skip button



4.3 Multiple Equipment Connection

Axis Neuron supports up to five Perception Neuron suits connected simultaniously. The method of connection is the same as the single equipment connection. They just need to be connected one by one.

4.4 Model Posture Calibration

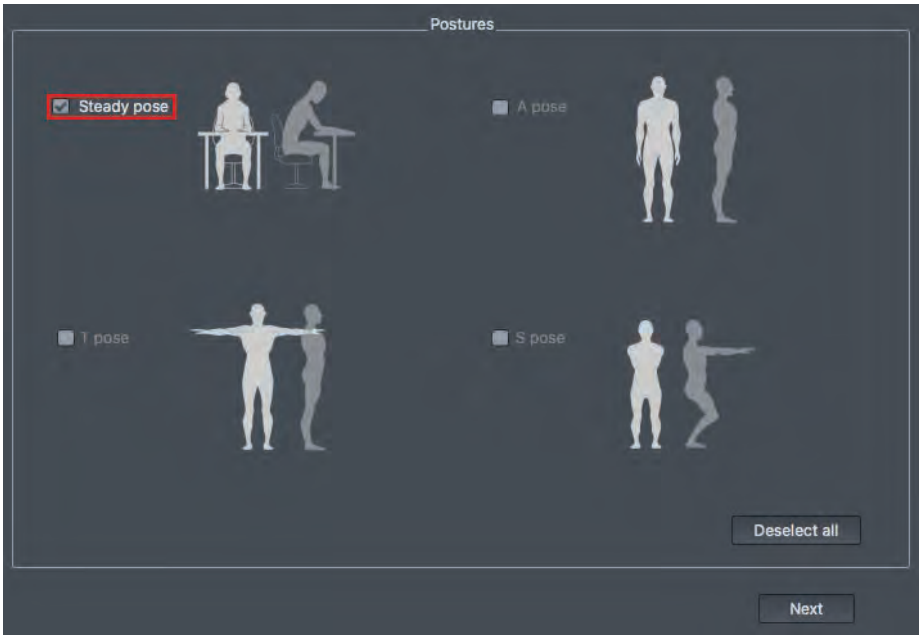
This four-step calibration process is required before you start to record motion data. Please read the following introduction about calibration carefully. You can also find it in the Quick Start guide.



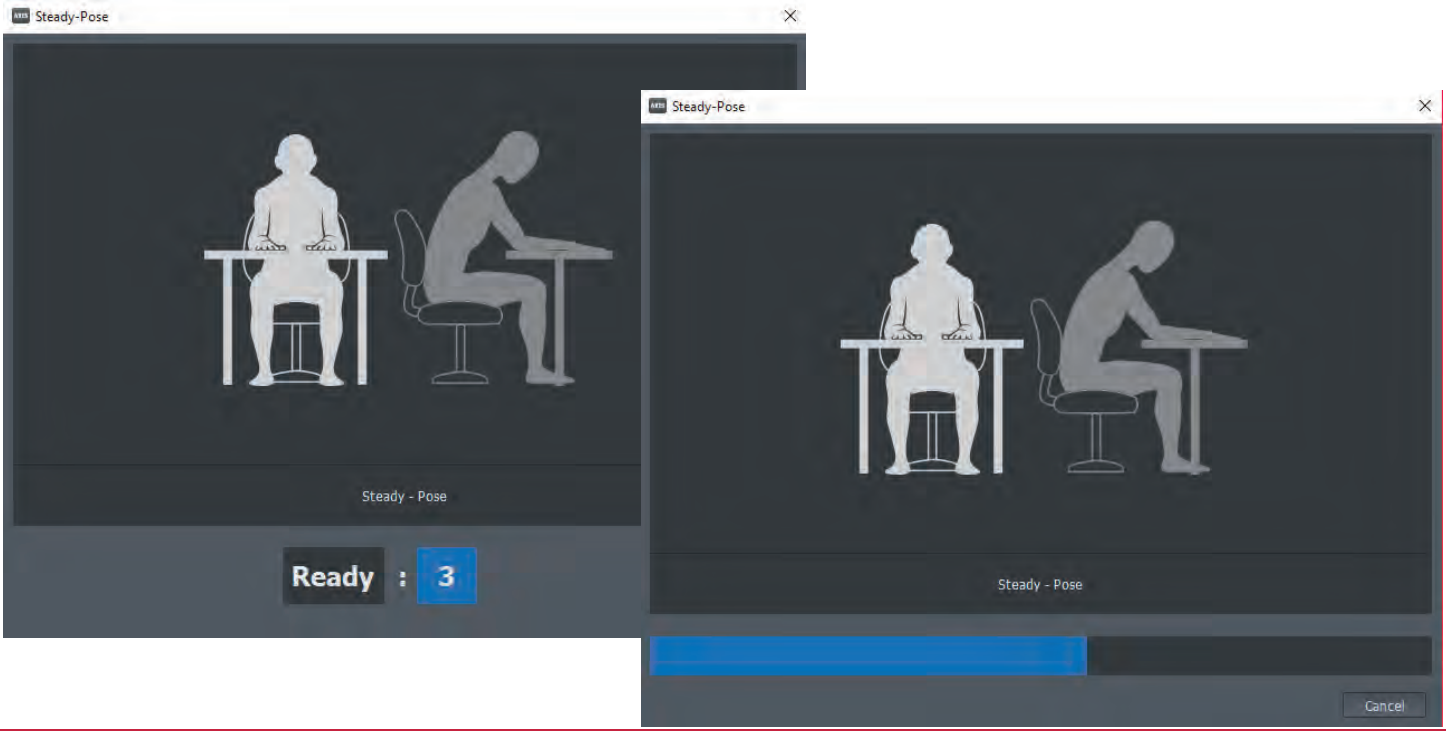
Steps:

1. After connecting successfully, click the Calibrate button in Motion Capture toolbar.

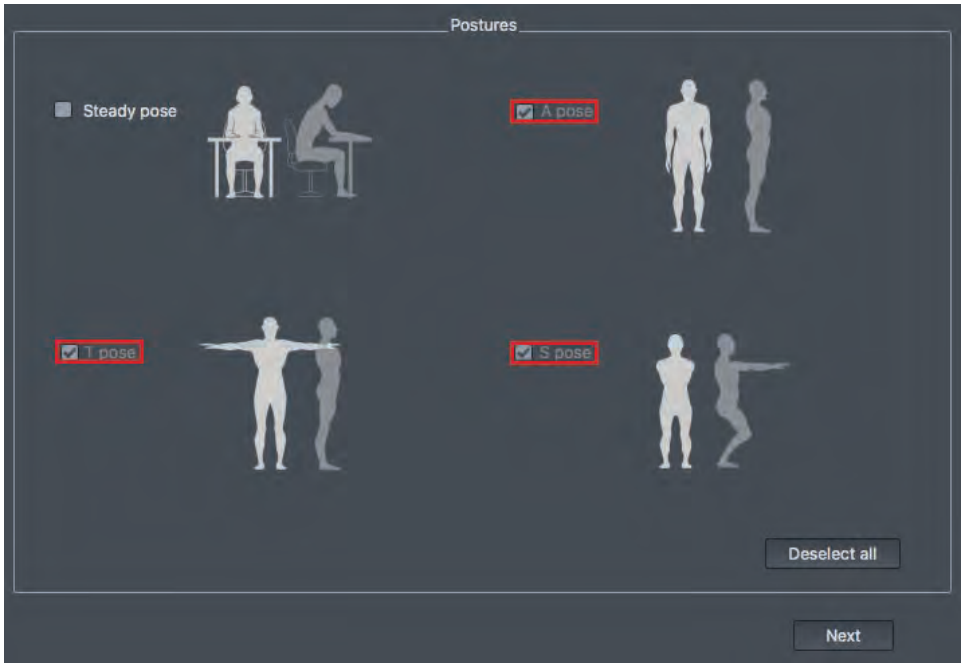
2. Click Next in the posture selection dialog then perform theSteady pose. A (3) second countdown will begin followed by 15 consecutive beeps during the calibration. (You only need to do this calibration once until you re-allocate the Perception Neuron sensors on your body straps/gloves as this calibration removes the bias error brought by the connection between the sensors and the socket).



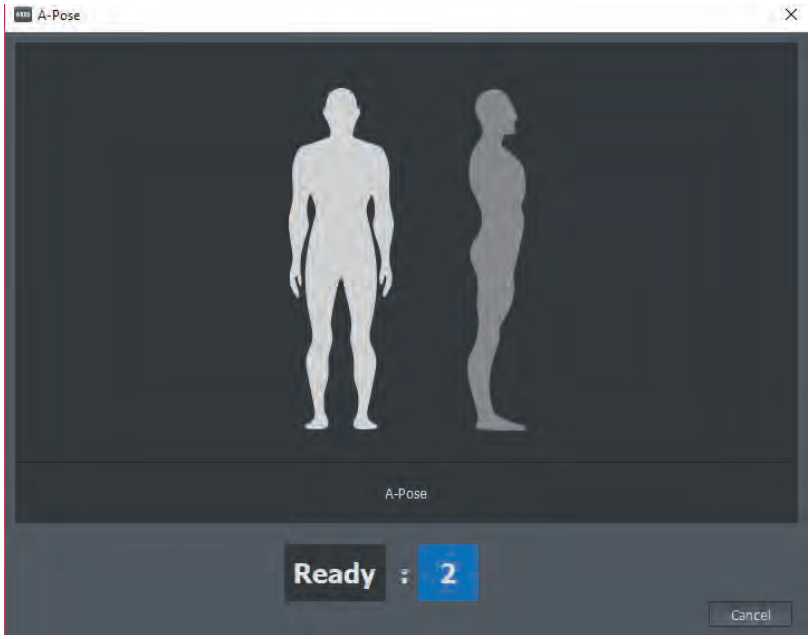
3. When Steady-Pose calibrating, the actor needs to be still. The sitting position is recommended.



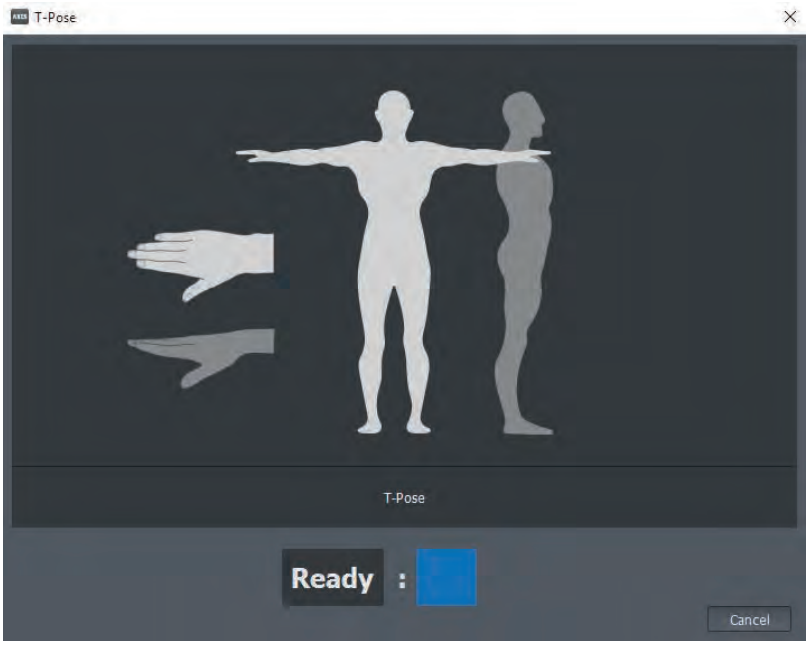
4. Reopen the posture calibration window and select A, T, S pose. (Available pose will depend on the working mode.)



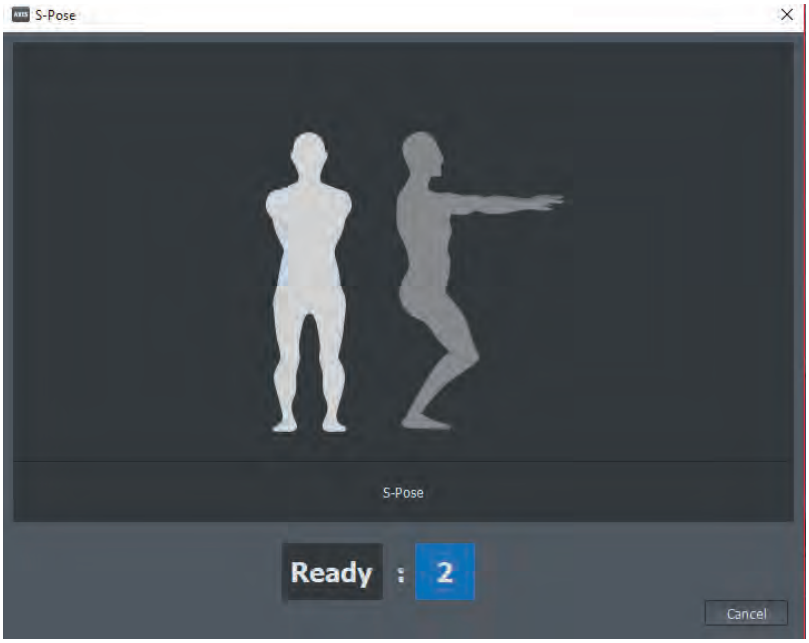
5. A-Pose calibration - During the countdown, the actor will have time to postion his/her body for the correct posture. Place hands on the side of the thigh and keep feet parallel. The Upper Arm Strap should be parallel to the palm sensor in a single line chain.



5. T-Pose calibration - Arms need to be extended out parallel to the floor. Feet continue to be in the same position as the previous A Pose, do not shuffle. Hands should be a little over - extended with the thumb facing 45 degrees out and 45 degrees down (see image).



6. S-pose calibration - Bend the knees and position your body in the letter 'S'. Maintain your back upright perpendicular to the floor. Move your arms in front of you and position them parallel to the floor.

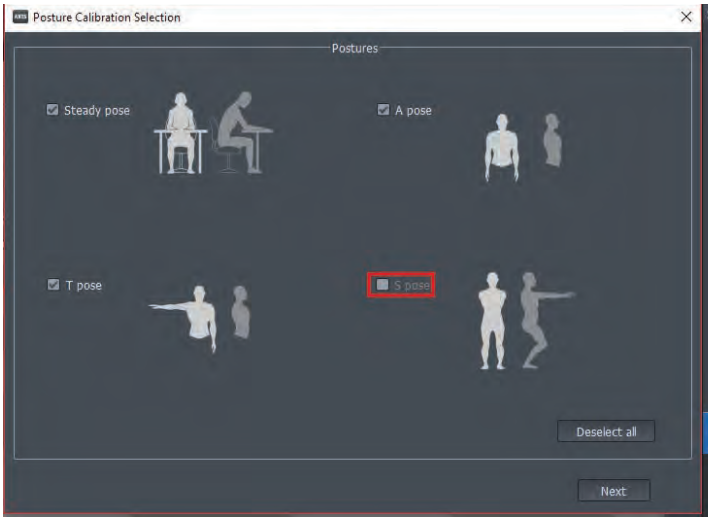


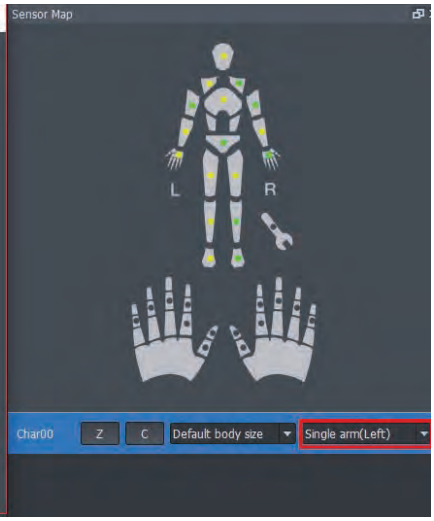
TIPS

- Having a second person supervise your calibration poses is needed.
- Feet must remain parallel, do not shuffle your feet during all posture calibrations.
- Knees on the S-Pose are to be parallel to your feet.
- If after your calibration you find issues with your hand closing or opening, we suggest flexing your hand open a bit more during the T-Pose.

Notes:

1. When the working mode is set to Single arm or Upper Body mode, the S-pose is not required. When the mode is set to Lower body, the T-pose calibration is not required.





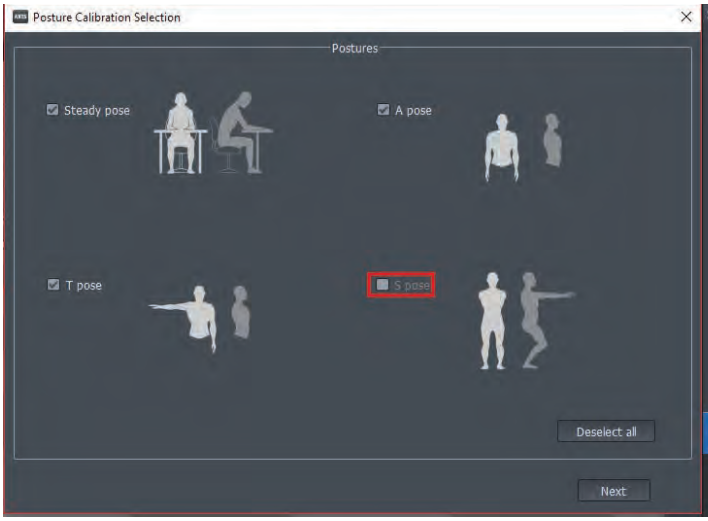
SINGLE ARM MODE

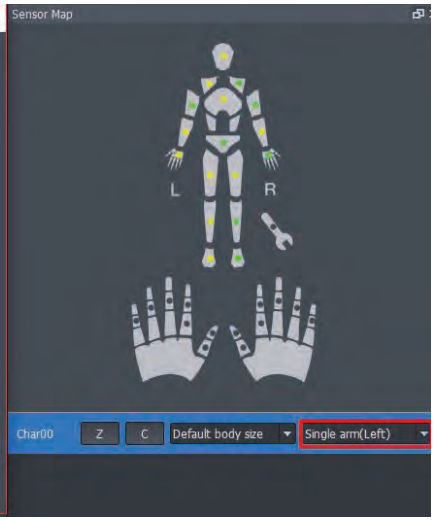
TIPS

- Having a second person supervise your calibration poses is needed.
- Feet must remain parallel, do not shuffle your feet during all posture calibrations.
- Knees on the S-Pose are to be parallel to your feet.
- If after your calibration you find issues with your hand closing or opening, we suggest flexing your hand open a bit more during the T-Pose.

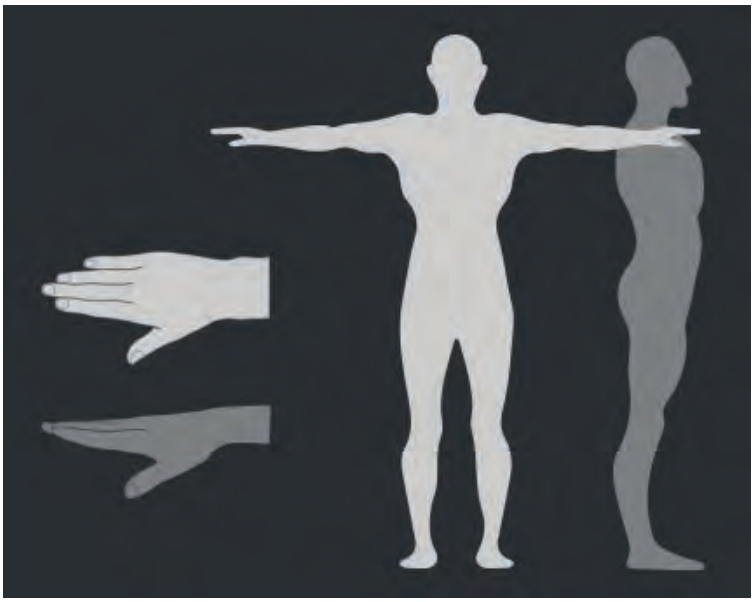
Notes:

1. When the working mode is set to Single arm or Upper Body mode, the S-pose is not required. When the mode is set to Lower body, the T-pose calibration is not required.

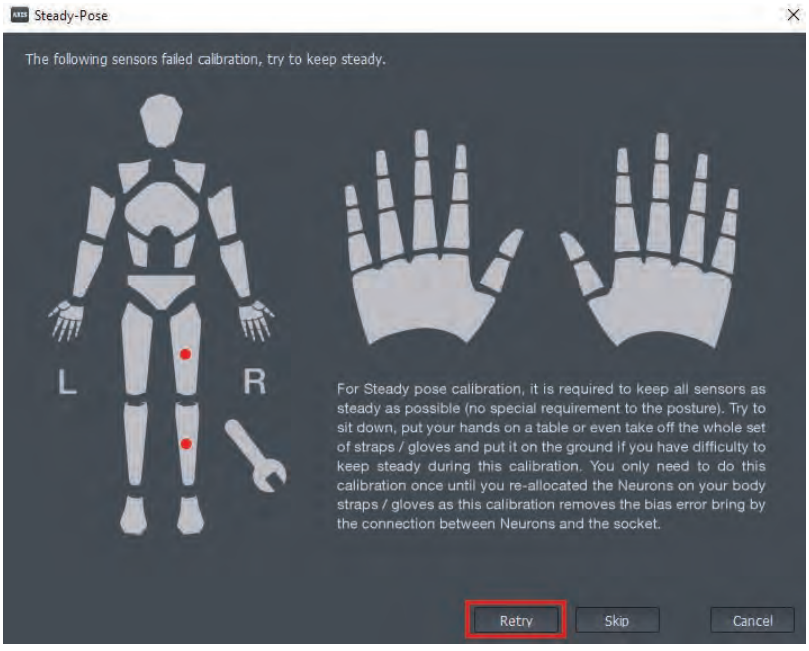




SINGLE ARM MODE



4. During the steady pose calibration it is not necessary to wear the Perception Neuron suit on the actor. It is important to keep the Perception Neuron sensors stable as much as possible otherwise Axis Neuron will show an error hint. If you see a red spot, this means that Perception Neuron's steady pose calibration failed. You can click Retry to recalibrate it.

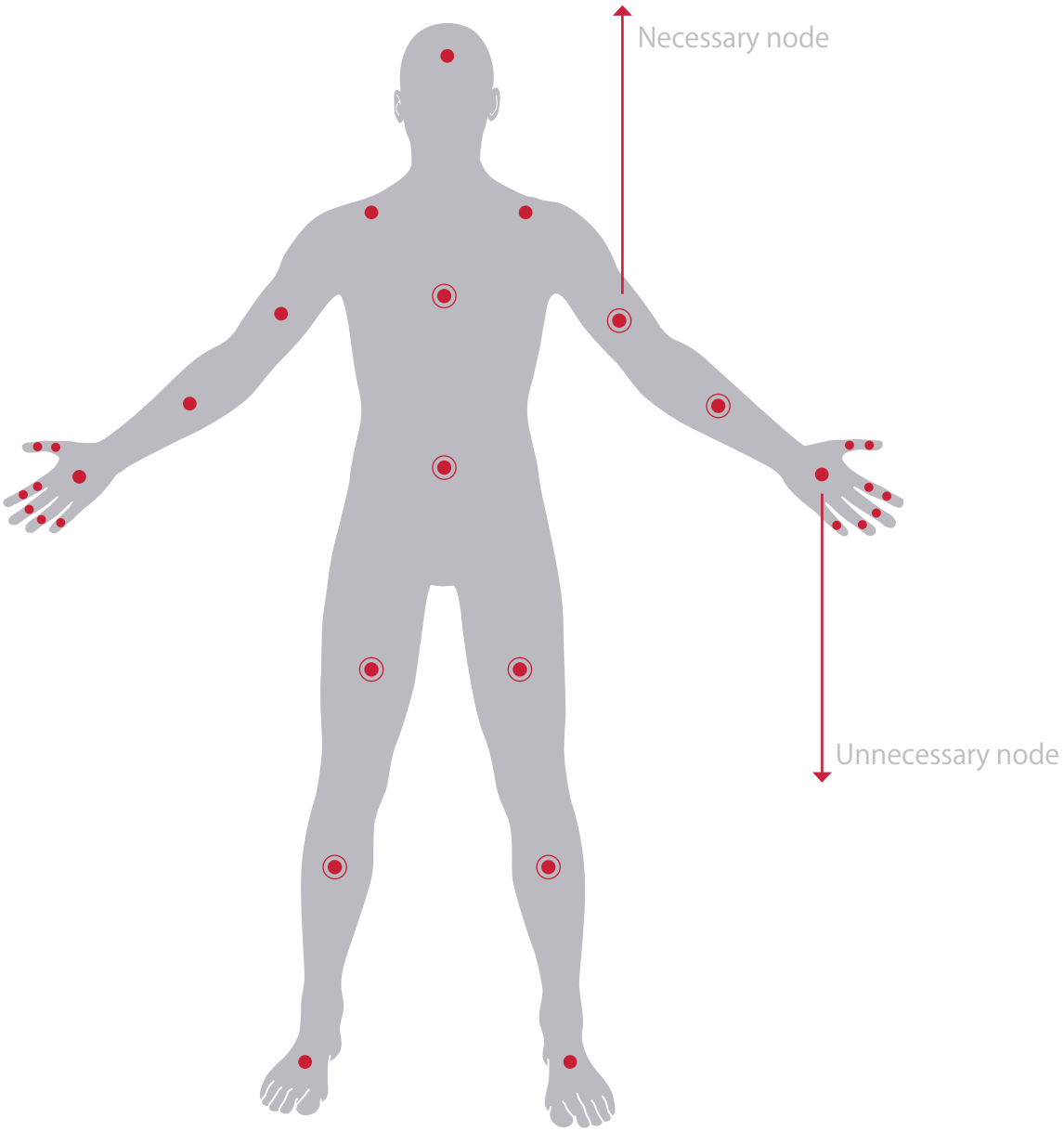


5. If the enviroment causes interference after the Posture Calibration has been performed, you may consider elevating the actor with the suit off the ground during the calibration to improve capture accuracy. This will elimate feet sliding and finger curling which is caused by ground or enviroment interference.

5. Sensor Wear Combination Mode

5.1 Working Mode Introduction

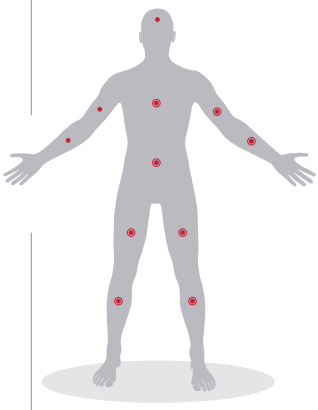
Perception Neuron allows you to change working mode based on body segments needed. If accuracy is not essential, users have the flexibility to connect the most necessary sensors allow. The image below shows an example of how to read the different working mode diagrams.



5.1.1 Full Body Mode

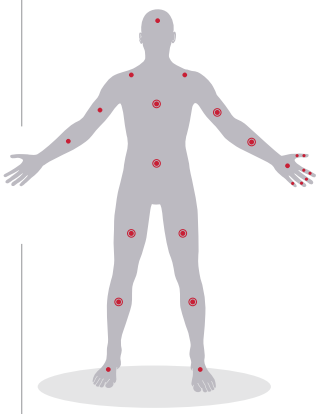
Full body (Necessary Sensors: Both L/R - Upper Arm and Lower Arm, Hip, Spine, Upper Leg and Lower Leg.)

FULL BODY
(NO PALM)



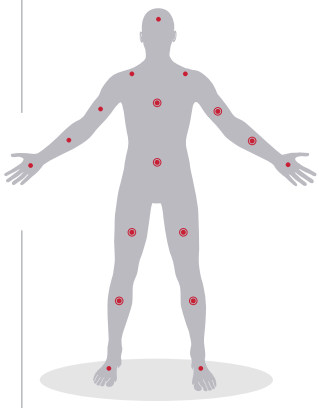
- 11-NEURON
- HUB
- USB
- BODY STRAPS
- GLOVES

FULL BODY
(SINGLE HAND ALL FINGERS)



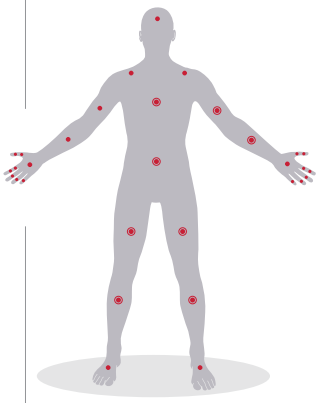
- 21-NEURON
- HUB
- USB
- BODY STRAPS
- GLOVES

FULL BODY



- 17-NEURON
- HUB
- USB
- BODY STRAPS
- GLOVES

FULL BODY
(DOUBLE HANDS AND FINGERS)



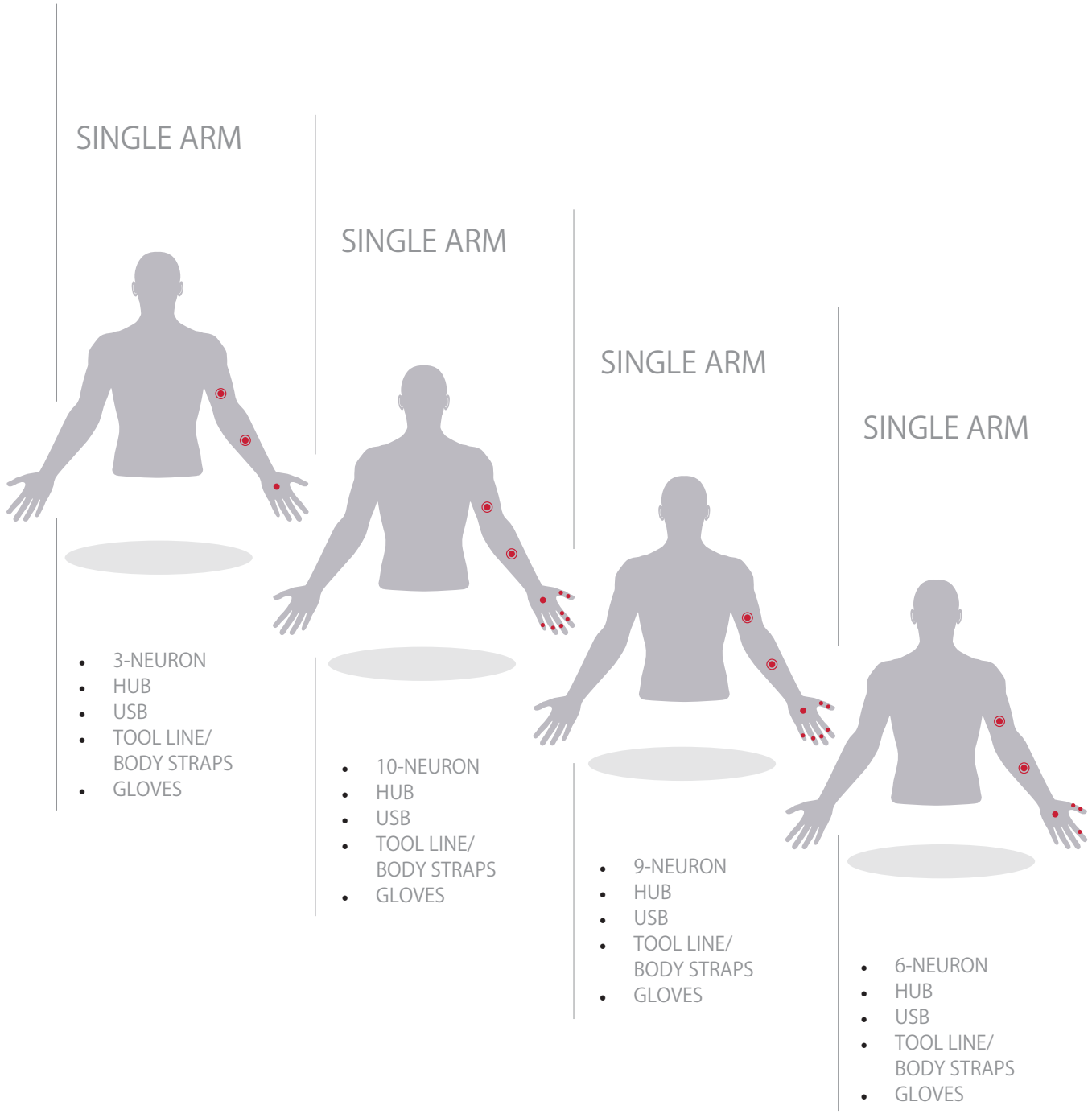
- 31-NEURON
- HUB
- USB
- BODY STRAPS
- GLOVES





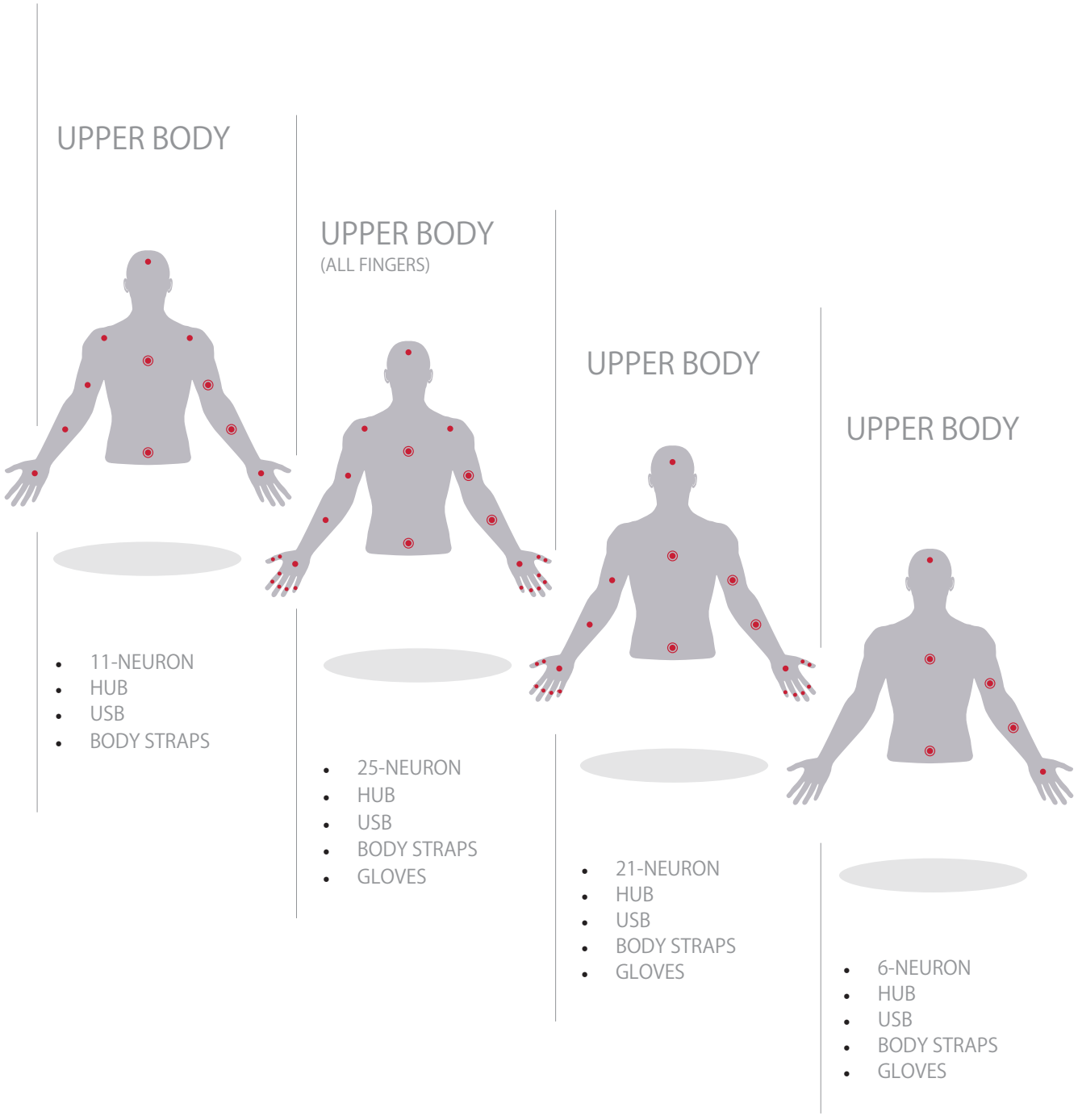
5.1.2 Single Arm Mode

Single Arm (Necessary mode: Both L/R - Upper Arm and Lower Arm.)



5.1.3 Upper Body Mode

Upper Body (Necessary mode: Both L/R - Upper Arm + Lower Arm, Hip, Spine.)



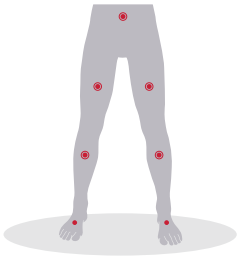




5.1.4 Lower Body Mode

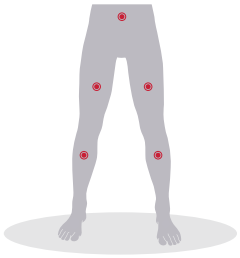
Lower Body (Necessary mode: Hip, both L/R Upper Leg and Lower Leg.)

LOWER BODY



- 7-NEURON
- HUB
- USB
- BODY STRAPS

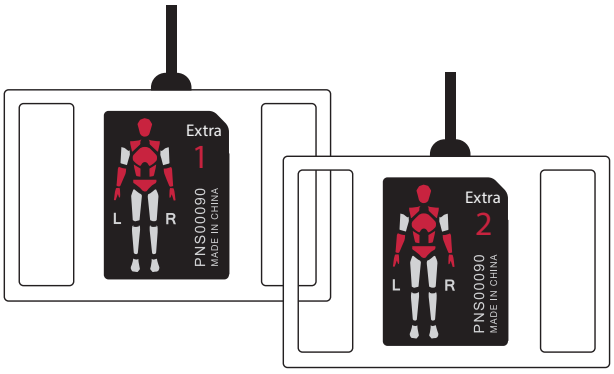
LOWER BODY



- 5-NEURON
- HUB
- USB
- BODY STRAPS

5.2 Universal Straps

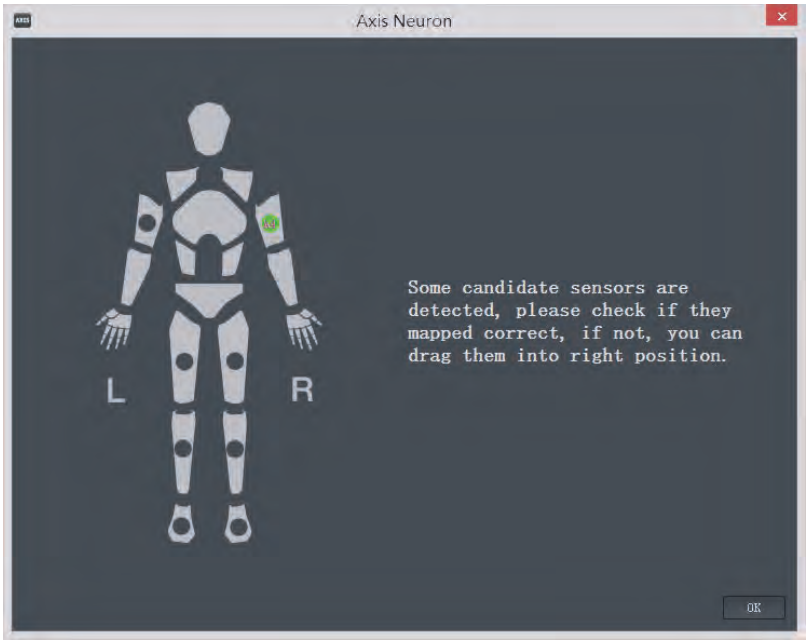
The socket straps with the label Extra 1 and Extra 2 are known as universal straps. If a body strap on the suit is found to have a connection problem you may use one of the universal straps to replace the bad strap. A universal strap cannot replace any of the UPPER BODY STRAPS, GLOVES, or the HEAD STRAP. Both Extra 1 and Extra 2 can be used simultaneously.



FAQs:

1. Condition: Using the extra device as right upper arm in a 3-Neuron single arm mode.

When establishing the connection with Axis Neuron, the software will check the position of the universal strap sensor and prompt you whether the placement of the device was mapped correctly. If the universal strap was mapped incorrectly by the software, then the user has the option to drag the node to the correct position by using the diagram.





2. Condition: Extra 1 and Extra 2 used together in a 28-Neuron upper body mode with positions at right upper arm and left upper arm.

This scenario will generate the same prompt dialog.

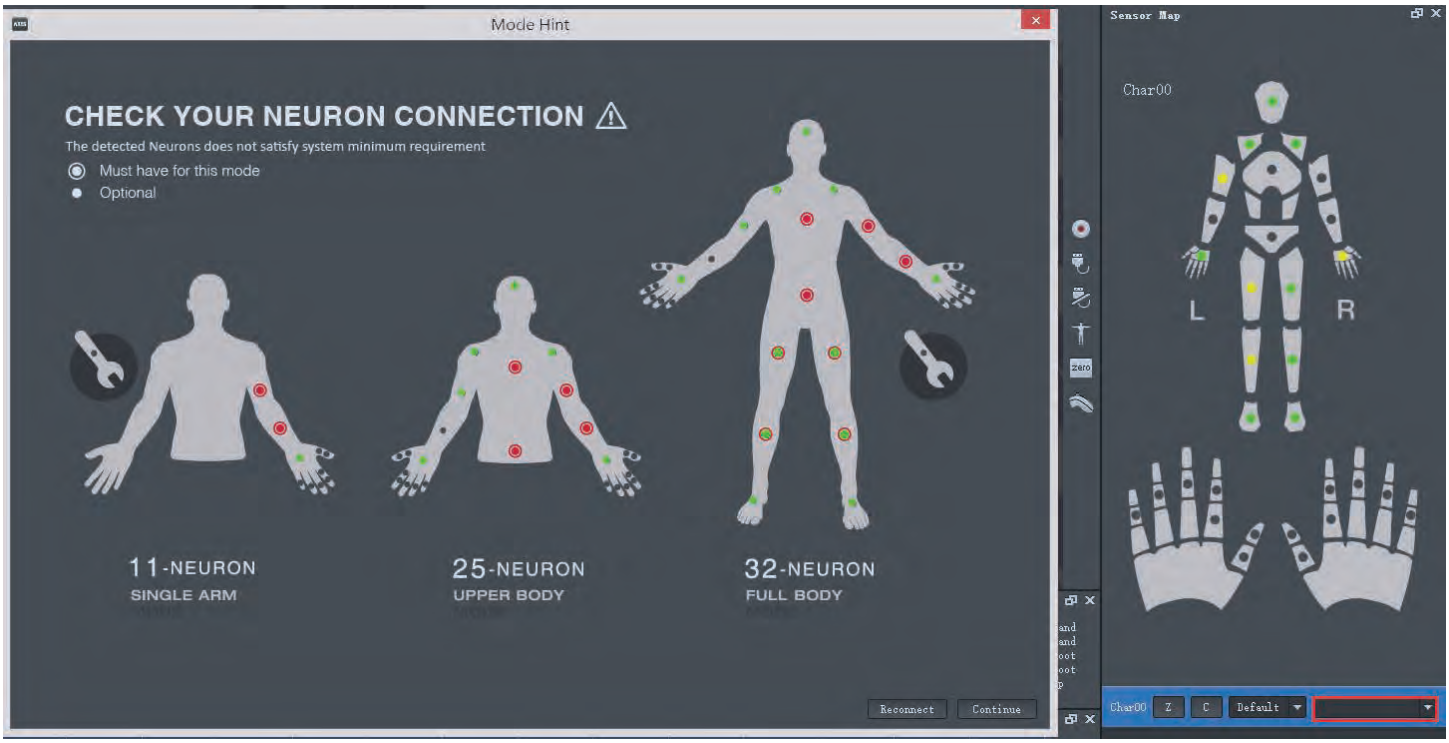


3. Condition: Using the extra device as the left upper arm in a 30-Neuron Single Arm/ Upper Body Zzmode and no sensor at right upper leg. In this scenario, the software will automatically detect the extra device on the right upper leg to match Full Body Mode and you will need to drag it to the right position manually.



5.3 Attention

If the sensors that are detected by the system can not satisfy the necessary nodes of the corresponding working mode, the system will automatically set the working mode to any qualified working mode. If there is no matching working mode found, the system will inform you which necessary nodes are lacking sensors. The red spots show the positions that require a sensor for the necessary nodes.

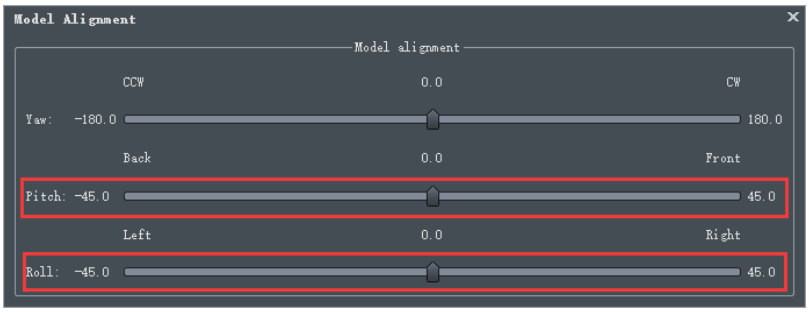


6. Data Editing

6.1 Model Alignment

You can adjust the following posture angle to accurately capture an actor's motion and optimize 3D Effect of the motion capture.

1. Yaw: Direction settings. This parameter is used for adjusting model direction. The default value is 0. The clockwise direction is positive and the counterclockwise direction is negative. The range is -180 degrees to +180 degrees.
2. Pitch: This parameter is the included angle between the sensor and the ground in vertical direction. Front is postive and back is negative. The range is -45 degrees to +45 degrees.
    a) Application: Optimizes the contact effect. After posture calibration the contact effect may be inaccurate. So you can use Pitch to adjust model's posture.
3. Roll: This parameter is the included angle between the sensor and the ground in horizontal direction. Rightward is positive and leftward is negative. The range is -45 degrees to + 45 degrees.



TIPS

- After completed the 4-steps posture calibration, if the model in the Workspace still has angle problems, you can adjust Pitch and Roll to cor - rect the posture.

Some Common Issues:

- If the model always has front-back incline after calibration, adjust the pitch before recording. (human shape and posture problem).

- When doing real-time recording, not enough time is spent doing posture calibration carefully.

Operation Examples:

- If the model leans back and the feet are not contacting the ground when walking forward.
  Solution: increase the Pitch value to make the model incline forward.

- If the model leans forward when the actor walks backwards and the feet have difficulty contacting the ground.
  Solution: decrease the Pitch value to make the model incline backward.

- If the model leans right and the left foot is not contacting the ground.
  Solution: decrease the Roll value.

- If the model leans left and the right foot is not contacting the ground.
  Solution: increase the Roll value.

6.2 Body Size Manager

You could improve the data accuracy by adjusting the body size. In the Body Size Manager, you can create, store, import, export or edit the body size data. There are some default body size files in Help-> Open Folder-> Body Size. You can choose from them or input the accurate body size data by yourself. For real-time capturing, you should choose a body size that matches the actor's real size before posture calibration.

1. Measure the actor's dimensions: Reference 6.7 Body Size Measure.

2. Click Add Body Size.



3. Name the new body size. Then input the bone data that you just measured.



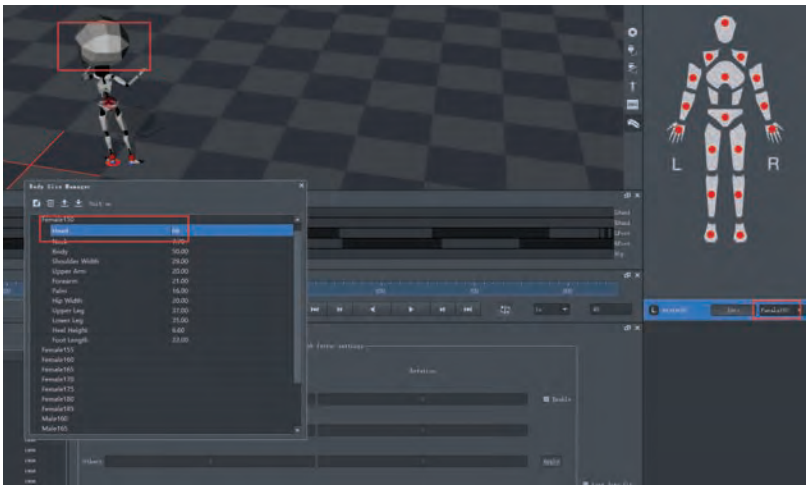
4. After establishing real-time connection, the default body size is Male 170.

5. Click Body Dimension in Sensor Map. Then choose the body size that you just made.



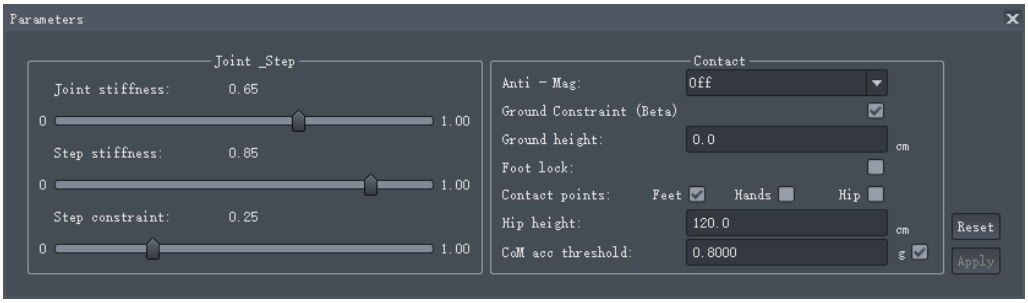
Additional:

- You can change the body size when you replay the file, however, this operation is not suggested. You will get better results by establishing proper body size settings before calibration.



- If you change the Body Size after calibration, you will need to calibrate again.
- Import Body Size: Click in Body Size Manager. You can import the existed Body Size file into Axis Neuron for use, however, the Body Size format needs to match the existing format for optimum accuracy.
- Export Body Size: Click in Body Size Manager to export a Body Size for later use.

6.3 Parameters



1. Joint stiffness: Setting higher values makes the jointed bodies more difficult to be separated. The default value is 0.65 and if the Body Size is accurate, you can make it higher. If the Body Size is not accurate, lowering this value can add some leeway.

2. Step stiffness: When the model is walking, the system will use a pattern recognition algorithm to determine the contact between the feet and ground. The step stiffness value affects the speed of this status change. Larger values will plant the feet more firmly on the ground. Conversely, smaller values will allow the feet to slide easily while contacting the ground.

3. Step constraint: The contact sensitivity between feet and ground. The bigger the value, the more likely the feet are to contact the ground. The smaller the value, the less likely the feet are to contact the floor. For example, if the actors feet are 0.5 cm higher than the floor, when the factor is 0.2, Axis Neuron may not consider the feet to have a step on the floor, but when the factor is 0.4, Axis Neuron may already consider the actors feet have a step on the floor.

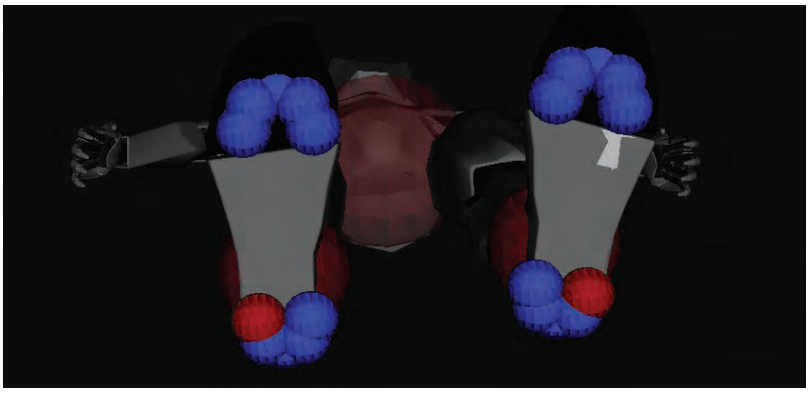
4. Anti-Mag: If there are high magnetic fields present, the feet may experience rotational drift. Check this box to minimize this result.

5. Ground constraint: Check this when parts of the actor's body is contacting the ground.

6. Ground height: This parameter is used to avoid the skeleton from penetrating into the ground when the actor goes upstairs or downstairs.

7. Foot lock: If you are not satisfied with the Step stiffness effect, you can check this. Then when the algorithm determines that the feet are contacting the ground, the displacement of the Z direction will be locked which can facilitate the feet becoming stuck on the ground.

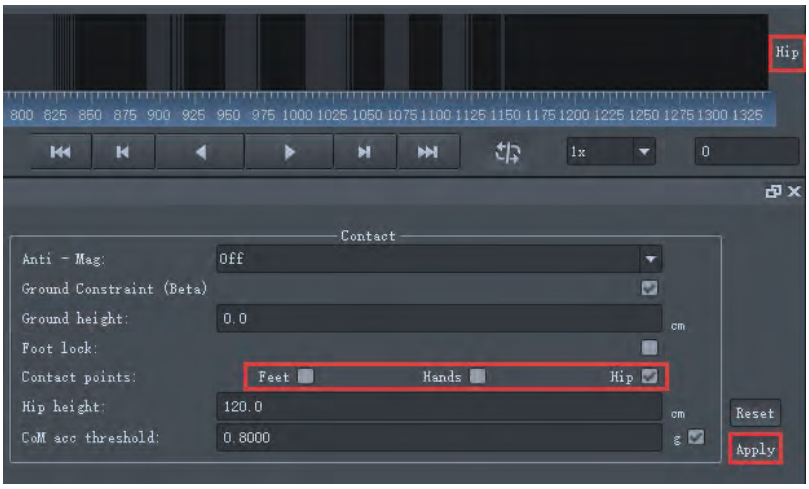
8. Contact points: Can be applied to the feet, hands, or hips.



- Feet contact: Ten contact points: 5 at Ball of the foot and 5 at the back of the foot.
- Hands contact: Contact points are at palm.
- Hip contact: Contact points are at the caudal vertebra.

TIPS

When the motion requires the feet to leave the ground, you need to uncheck the Feet contact points, then apply the Hip contact points. Set an appropriate fixed height for the Hip. Only posture is captured in this kind of condition, no displacement (translation of the skeleton). If you need a result that has both Feet and Hip contact posture, you can check Hip Contact and then uncheck Feet Contact . Then choose the interval from for the hip contact and click Recalculate Selected Frame.



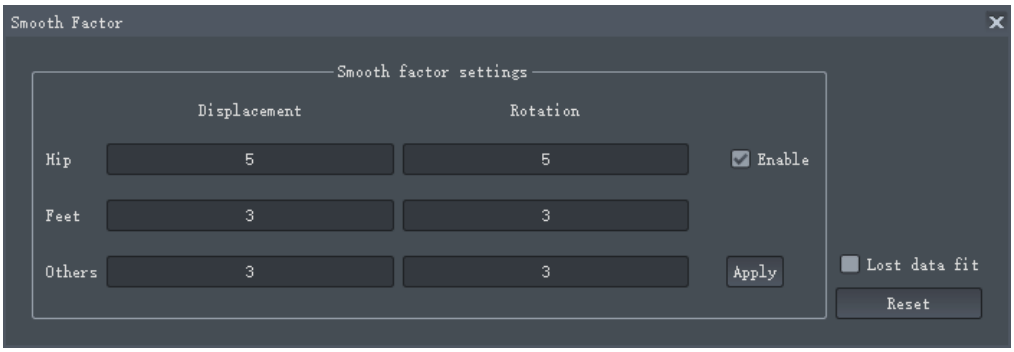
- Hip height: The heightfrom the hip to ground.
- CoM acc threshold: The default value is 0.8g. This is a threshold value. This value judges whether the body is contacting the ground by the body's center of gravity.

6.4 Smooth Factor

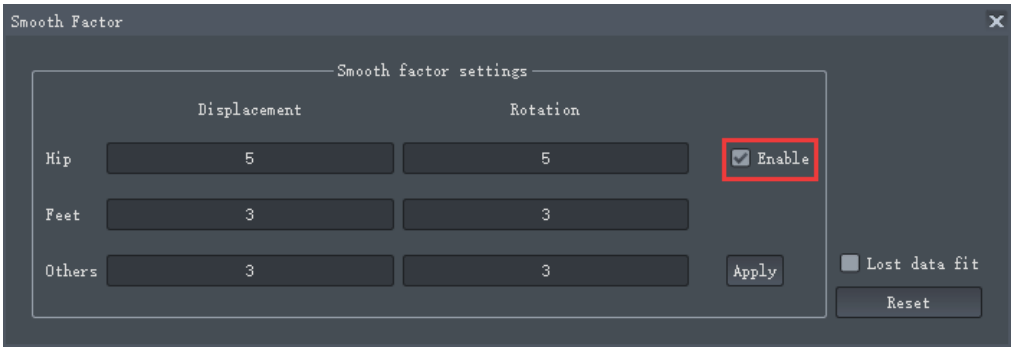
Usually, there are factors that influence the accelerated speed and acceleration of gravity when an actor wears the equipment sensors:

- Body shaking (yourself or some external factor).
- Sensor measurement error.
- Straps slack (straps and body have relative displacement).

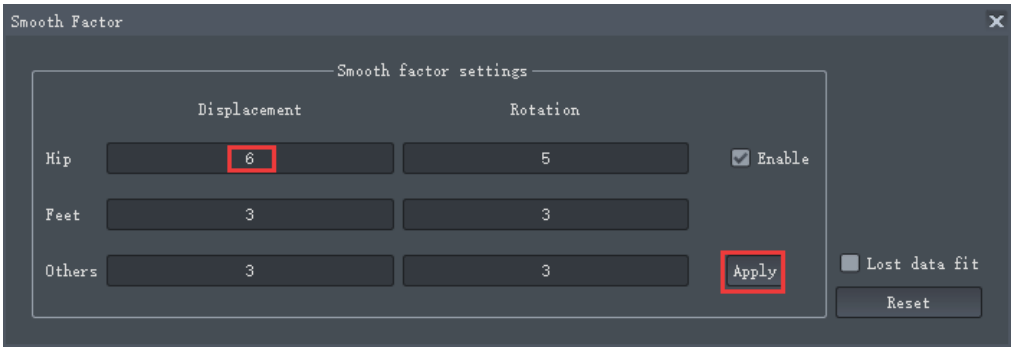
Those effects can be countered by the Smooth Factor function.



1. Open raw file.
2. Check Enable in Smooth Factor .



3. After you change the value in Smooth Factor settings, click Apply button.

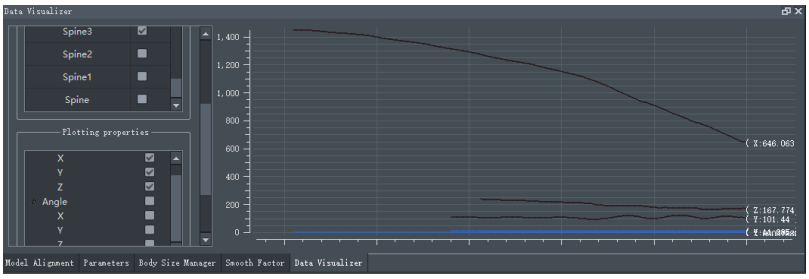


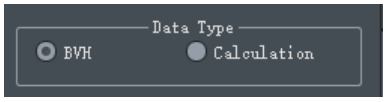
(Calculate the average hip displacement value of adjacent 5 frames).

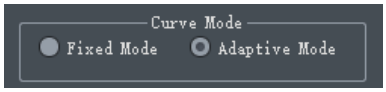
4. Export the data.

6.5 Data Visualizer

You can visualize real-time-changing displacement and angle data for the body in this panel.









Operations:

1. Choose the data type.
2. Set the Curve mode.
3. Choose the joints you want to visualize.
4. Choose the displacement or angle in plotting properties.
5. Play the raw file, you can check the real-time data's change.

6.6 Contact Editing

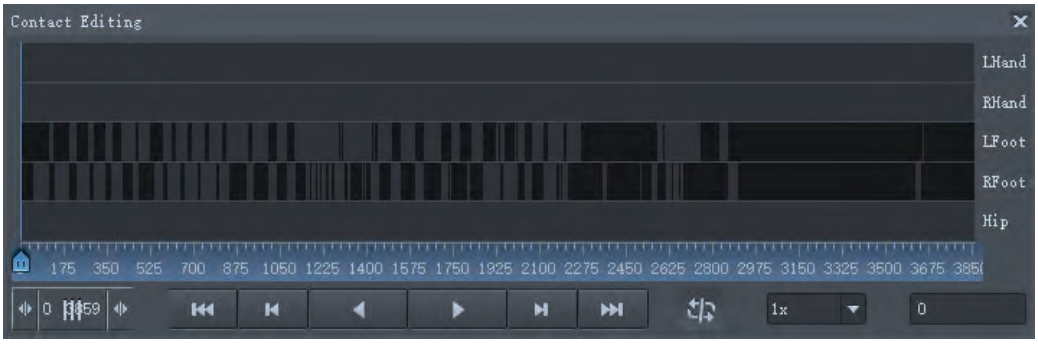
The Perception Neuron system has abundance of optimized algorithms. You can use them to achieve an ideal contact result. You can adjust the effect by single frames or by interval frame values.

Caution:

- Once you start contact editing, do not adjust these parameters otherwise the previous contact editing operations will be invalid.
  a) Model Alignment: Yaw, Pitch, Roll.
  b) Parameters: Joint stiffness, Step stiffness, Step constraint, Contact points.
- When you are editing the Nth frame, it will influence all frames after N. But it won't influence the frames before N. Avoid editing frames that come before any edited frame.

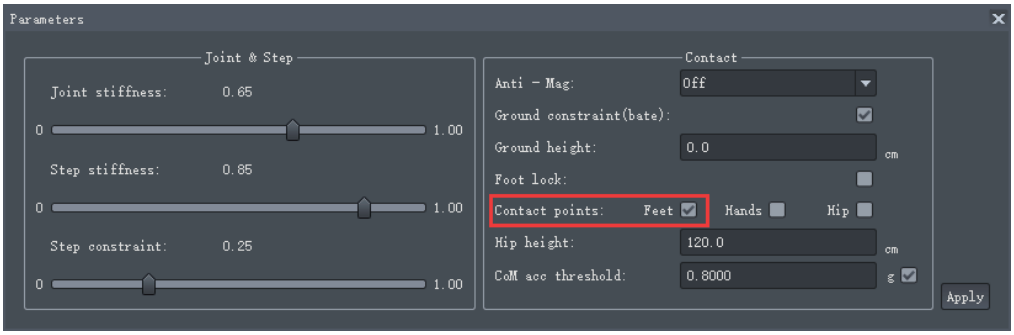
1. System auto optimization - There are 10 levels of optimization, the default value is 2. When you turn it to 0, the system will cancel optimization.
   a) If you didn't change the status of optimization, the status will default to a value of 2. (The auto optimization will take effect before you open the raw file.) If you change the value after you open a raw file, you need to recalculate all frames. (Right-click Contact Editing module, then click Recalculate all frames .)

2. Contact Editing Window



- Black means the body is touching the ground, if the frame is grey it means the body is not touching.
- L Hand: Left hand contact editing area.
- R Hand: Right hand contact editing area.
- L Foot: Left foot contact editing area.
- R Foot: Right foot contact editing area.
- Hip: Hip contact editing area.

- When the red ball on the ankles display, this indicates the foot is touching the ground. When you are editing contact status, you need to check Feet Contact point.

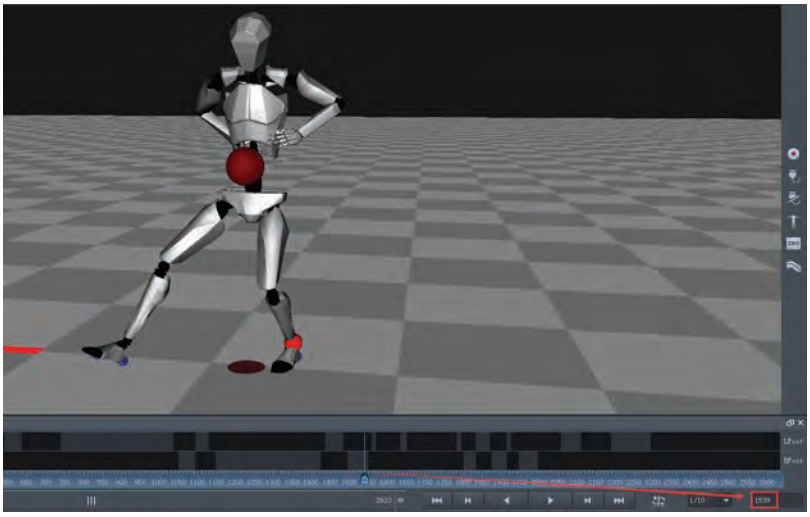


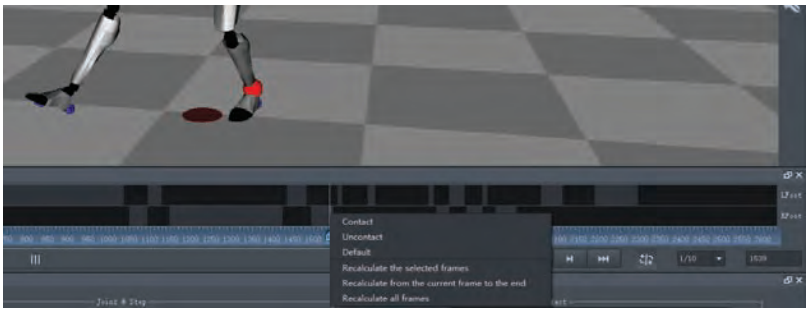
3. Single frame editing

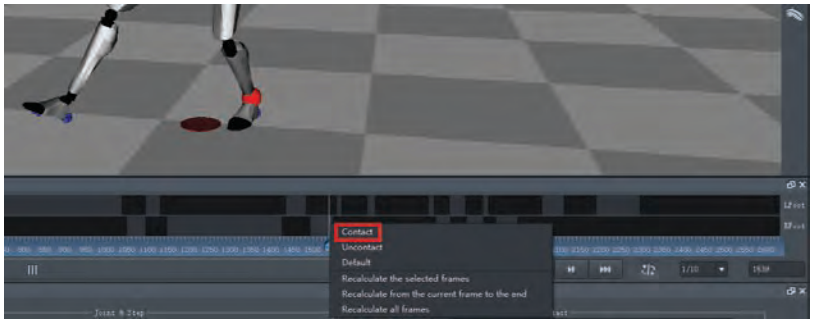
Eg: Make the 1539 frame right foot status from uncontacting to contacting.

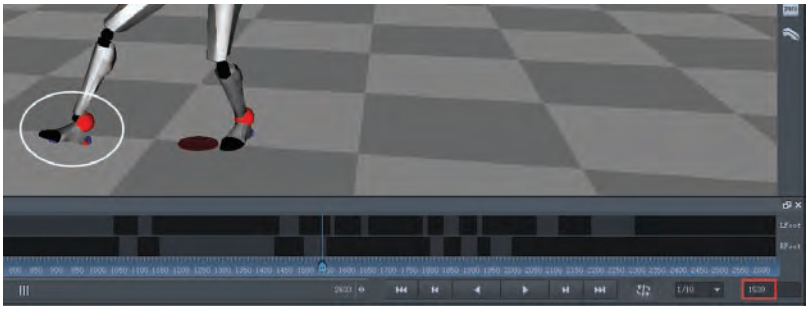
Method 1: Right click 1539 frame and choose Contact.

Method 2: Use shortcut key. Move the pointer to 1539 frame and click W.









TIPS

- When you are contact editing, you can widen the contact editing panel to alleviate errors. When you locate a frame you want to edit, you need to make sure that the pointer is still at the frame you want to edit after you right-click.

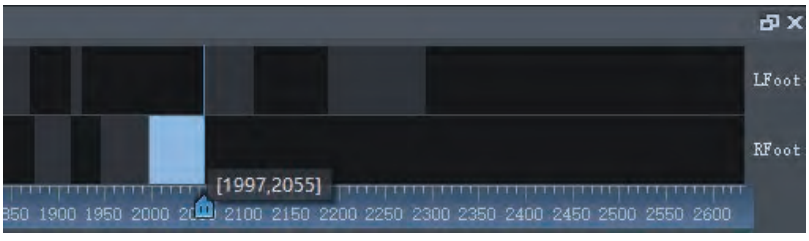
4. Interval frame editing

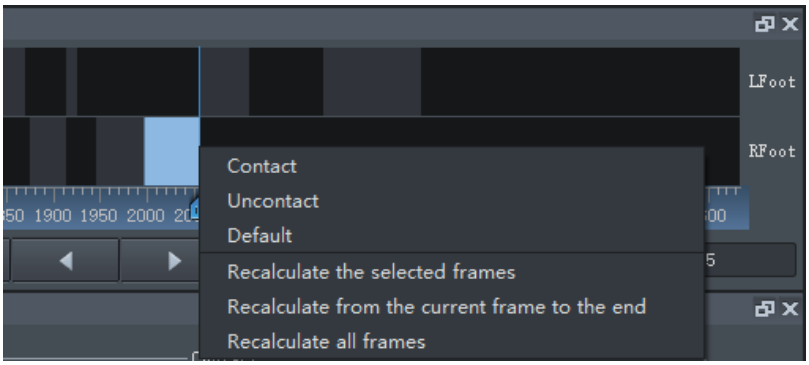
a) Eg: Change the interval frame's right foot status from uncontacting to contacting.

b)Right-mouse drag the frames area you want to modify, then click Contact .

Caution:

This operation has no shortcut keys.





5. Combine Step stiffness to optimize feet contacting.
Precondition: Contact Optimization Level is default value: 2.

Steps:

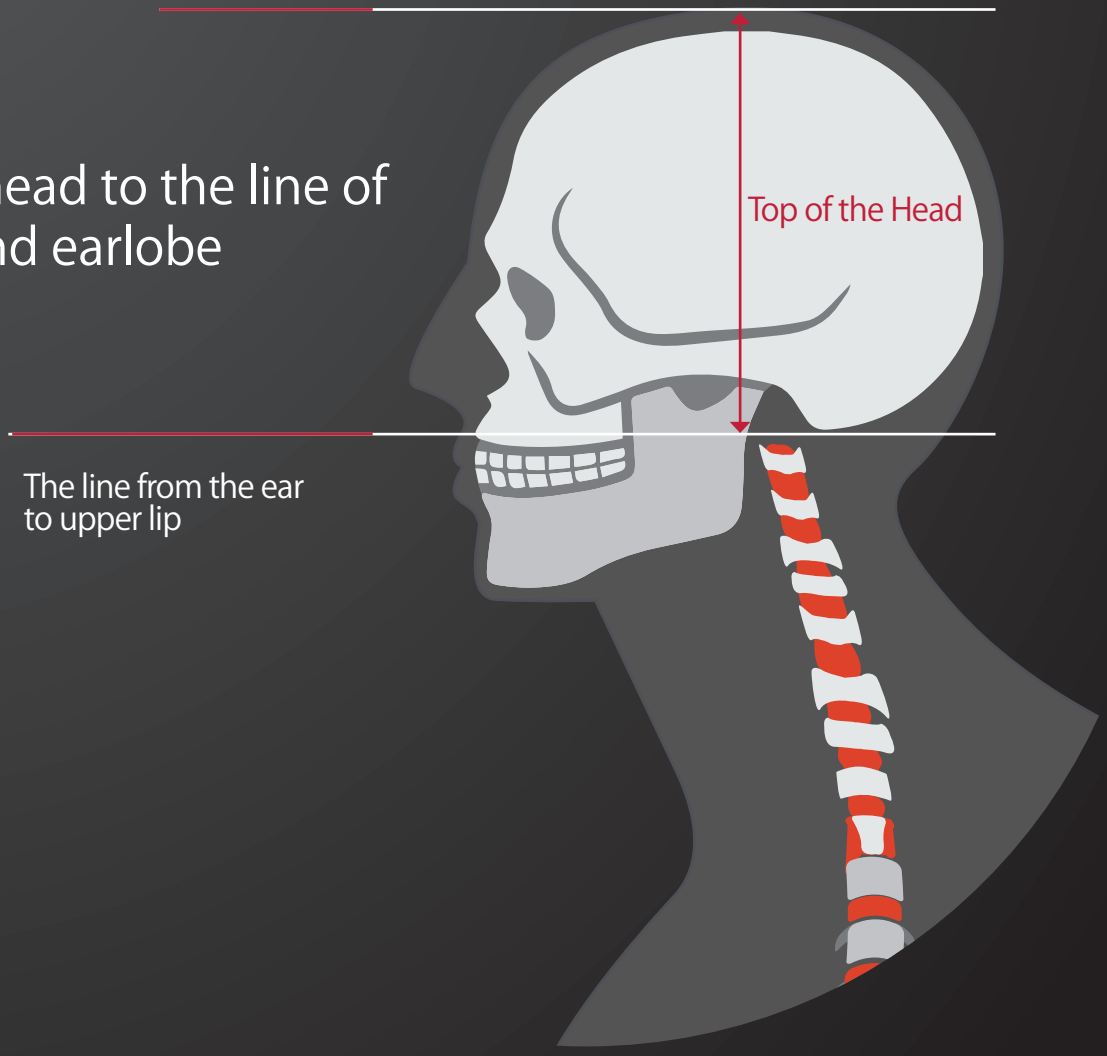
- Open raw file.
- Adjust step stiffness. Keep in mind that this step must be completed ahead of manually adjusting contact status. Reference in 6.3 Parameters.
- Recalculate all frames in contact editing panel.
- Then you can adjust contact status of any frame and you don't need to recalculate.

6.7 Body Size Measure

The closer the Body Size data is in Axis Neuron to the actor's body size, the more accurate the motion capture data will be. You can add a new body size in the Body Size Manager. Then input the values you measure.
Tips: the unit of measurement is in centimeters.

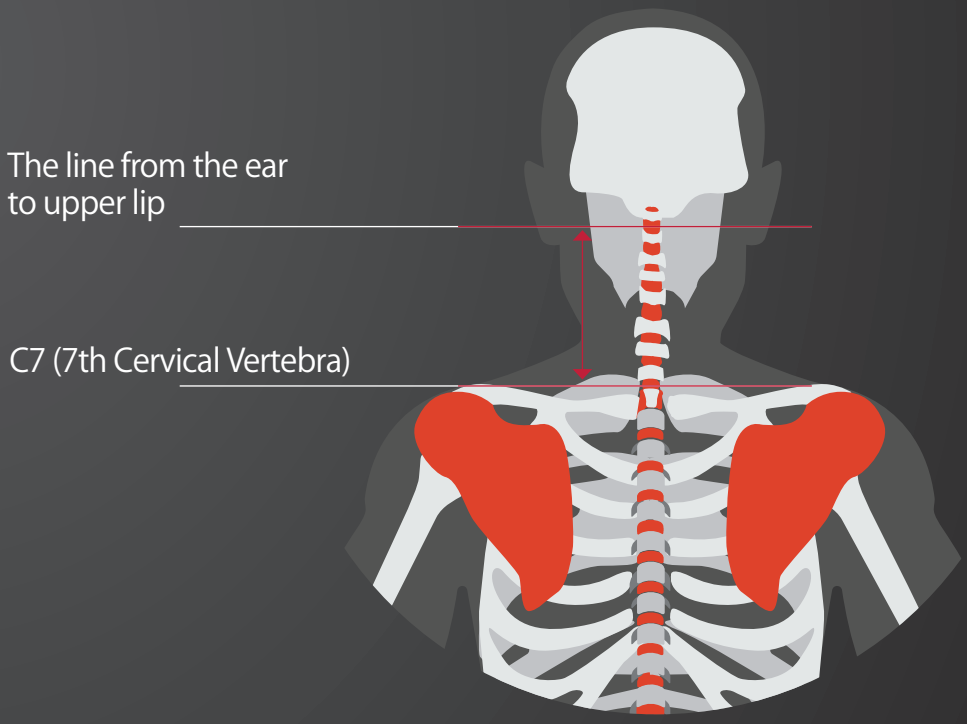
1. Head

Top of head to the line of upper lip and earlobe.



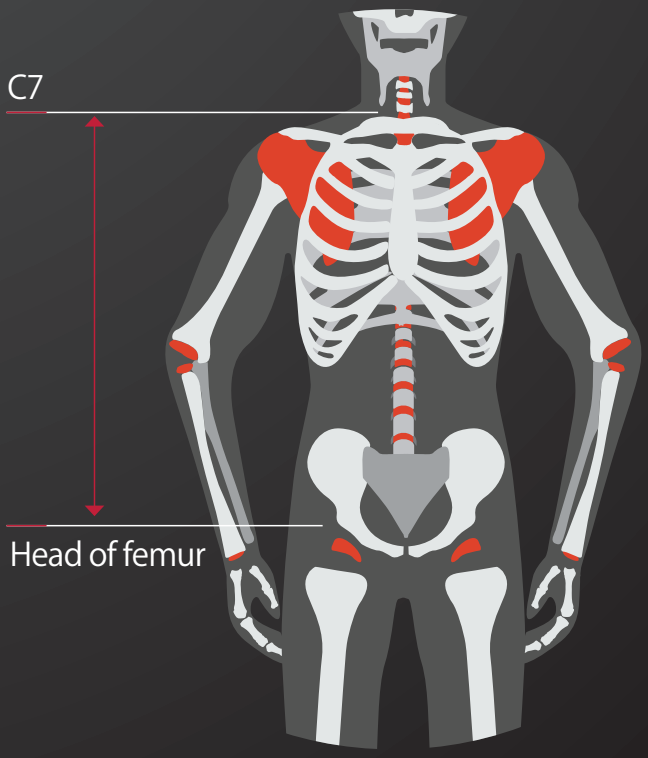
2. Neck

Line of upper lip and earlobe to C7. (the 7th bone of spine)



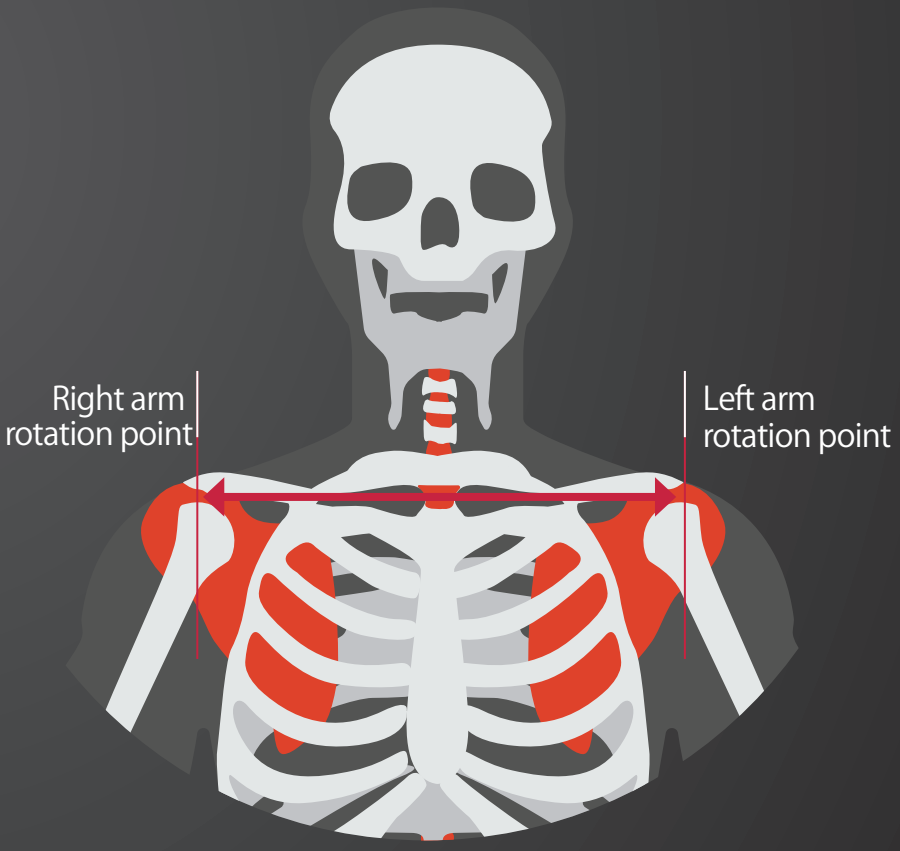
3. Body

C7 to head of femur.



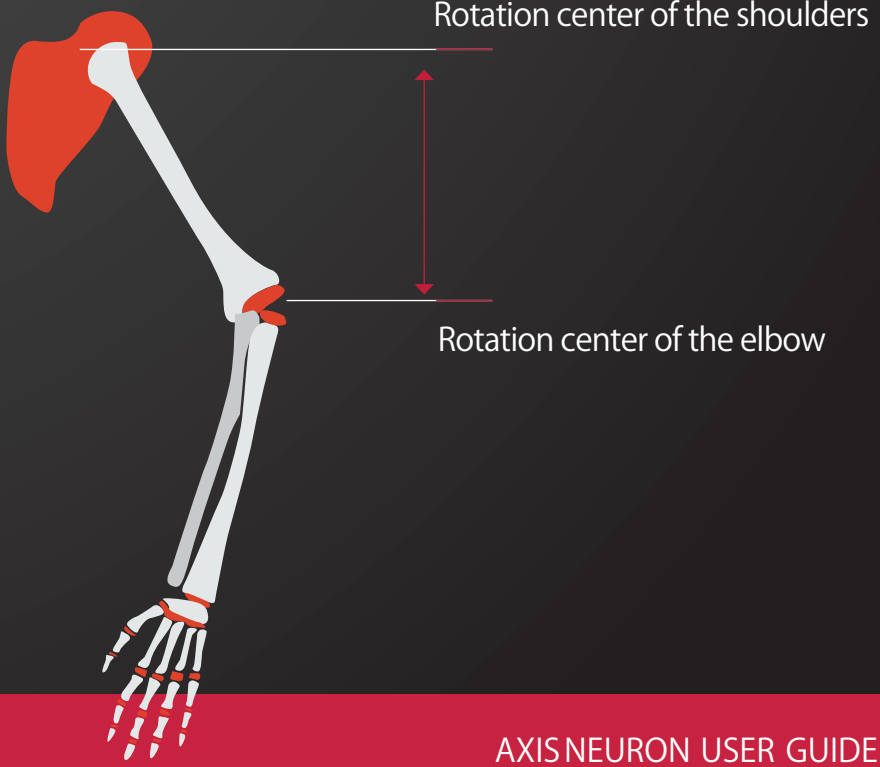
4. Shoulder Width

Left rotation center of shoulder to right rotation center of shoulder.



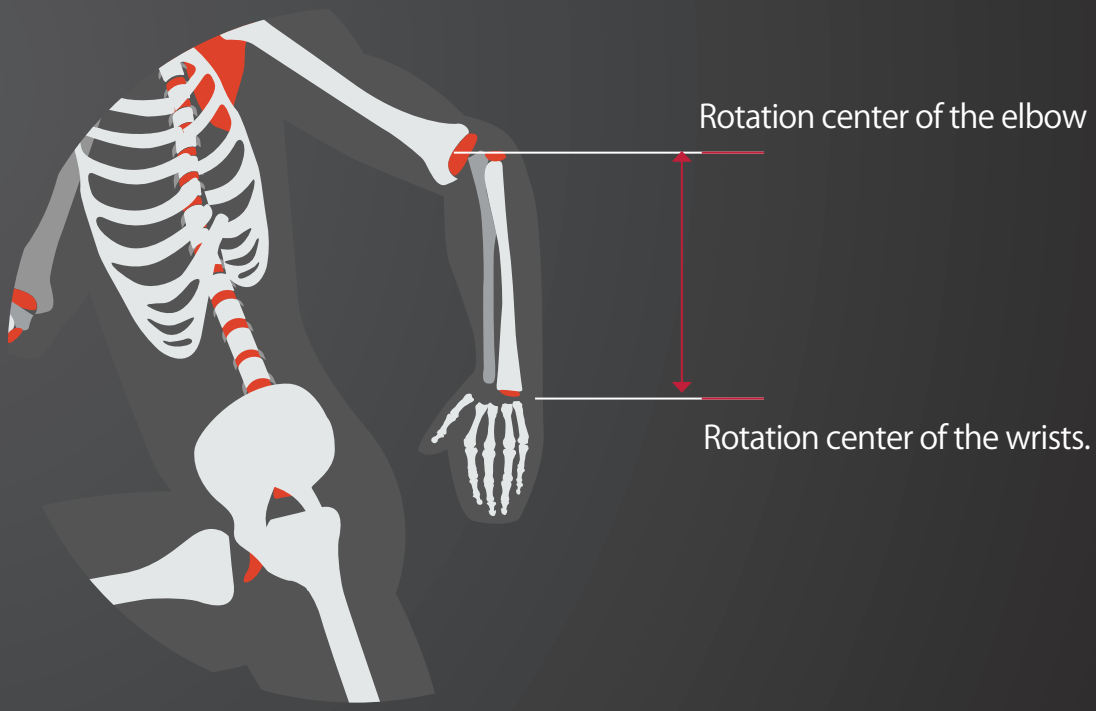
5. Upper Arm

Rotation center of shoulders to rotation center of elbow.



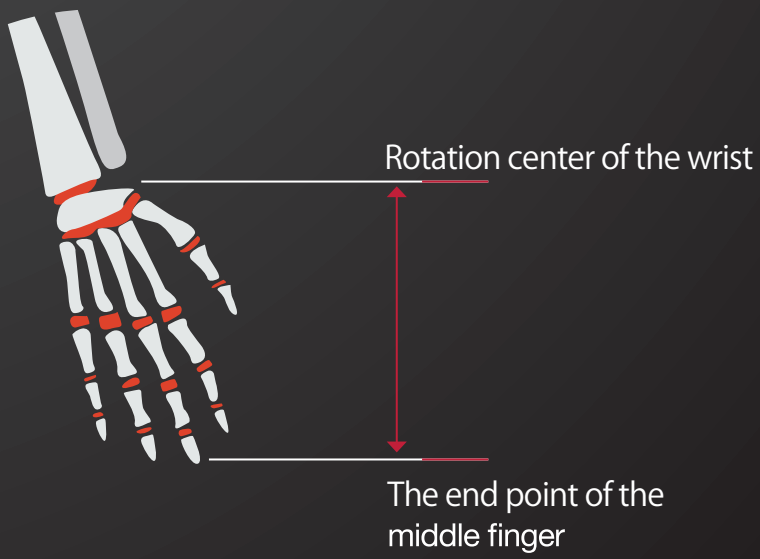
6. Forearm

Rotation center of elbow to rotation center of wrist.



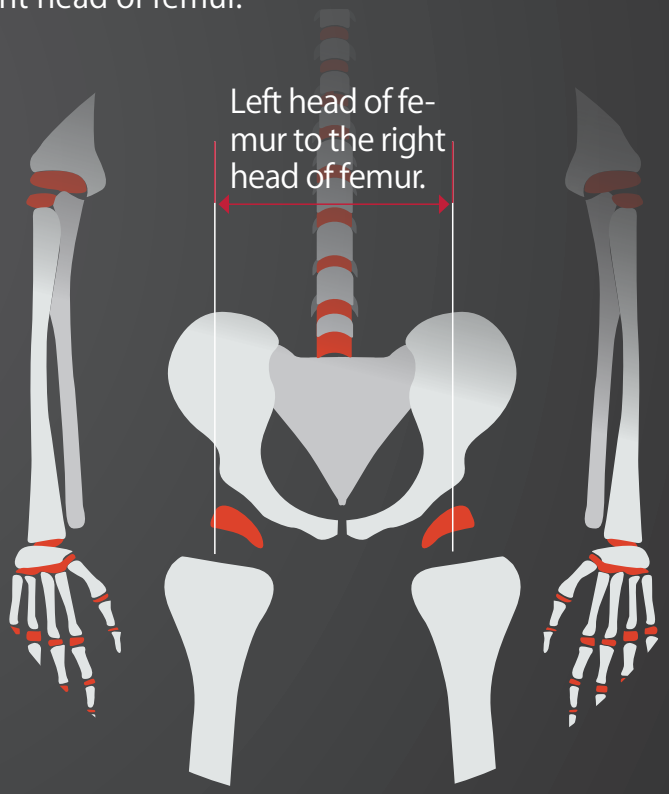
7. Palm

Rotation center of wrist to the top of mid finger.



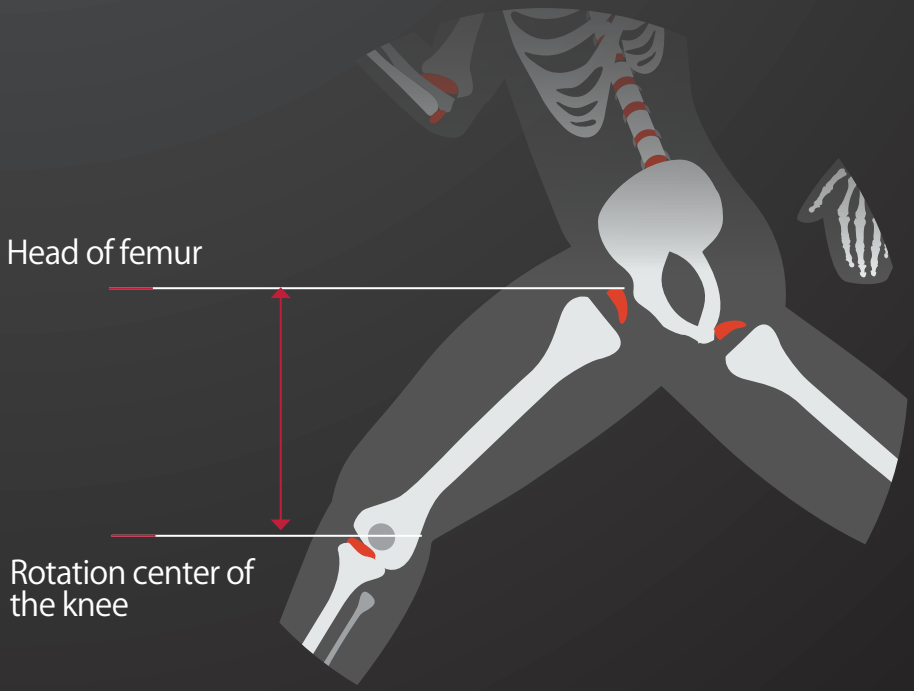
8. Hip Width

Left head of femur to right head of femur.



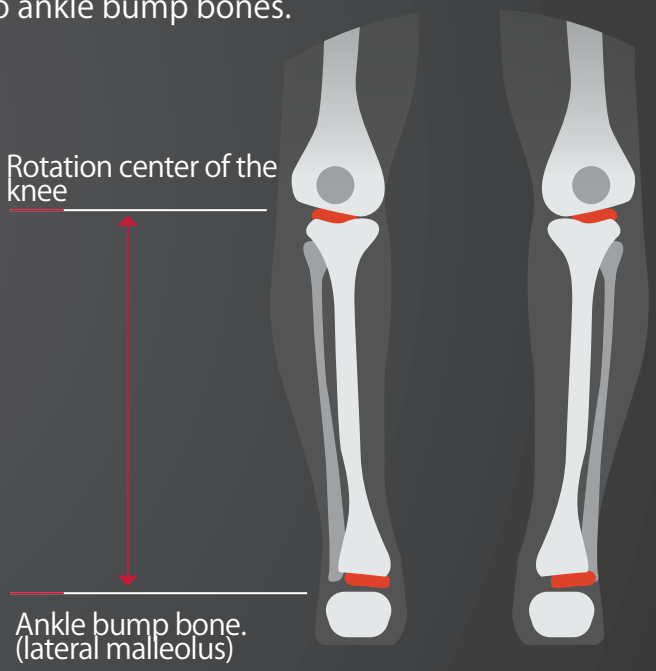
9. Upper Leg

Head of femur to rotation center of knee.



10. Lower Leg

Rotation center of knee to ankle bump bones.



11 Heel Height

Ankle to the ground. (If you are wearing shoes, this measurement is to the bottom of the shoes.)

