

Perception Neuron Studio

AXIS STUDIO

USER GUIDE

Ver 1.1.9931.181

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Table of Contents

1. Software Installation	1
2. Hardware Preparation	2
3. Getting Started with Axis Studio	8
4. Window Layout overview - Capture View	11
5. Window Layout overview - Edit View	17
6. Window Layout overview - Project Management	20
7. Window Layout overview - Menu	22
8. Troubleshooting	27

1. Software Installation

1.1. System Requirements

System	Microsoft Windows 10
RAM	4 GB and above
Display adapters	Nvidia or AMD VRAM 2GB and above Support for OpenGL 4.4 and above Support Directx9 and above
Other requirements	Two standard USB ports one Ethernet port

1.2. Software Installation

1. Download Axis_Studio_x64.msi
2. Open the file and follow the instructions in the setup wizard.

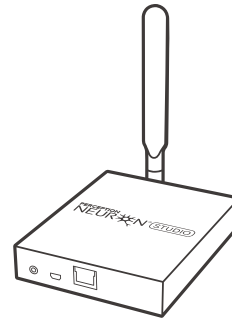
2. Hardware Preparation

2.1. Equipment Checklist



PN Studio sensor

Wireless MEMS inertial sensor.
Gyroscope, accelerometer and magnetometer integrated.



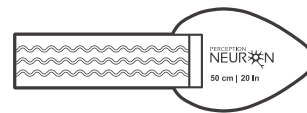
PN Studio Transceiver

All sensor data will broadcast to the transceiver wirelessly by 2.4GHz.
The antenna is linked to the transceiver to enhance the power.



Charging Case

Case for charging and storing sensors.

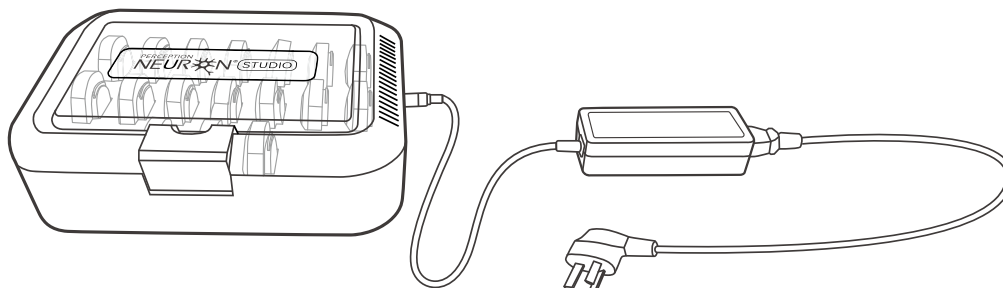


Body Straps

14 set of straps to mount Perception Neuron Studio sensors around your body.

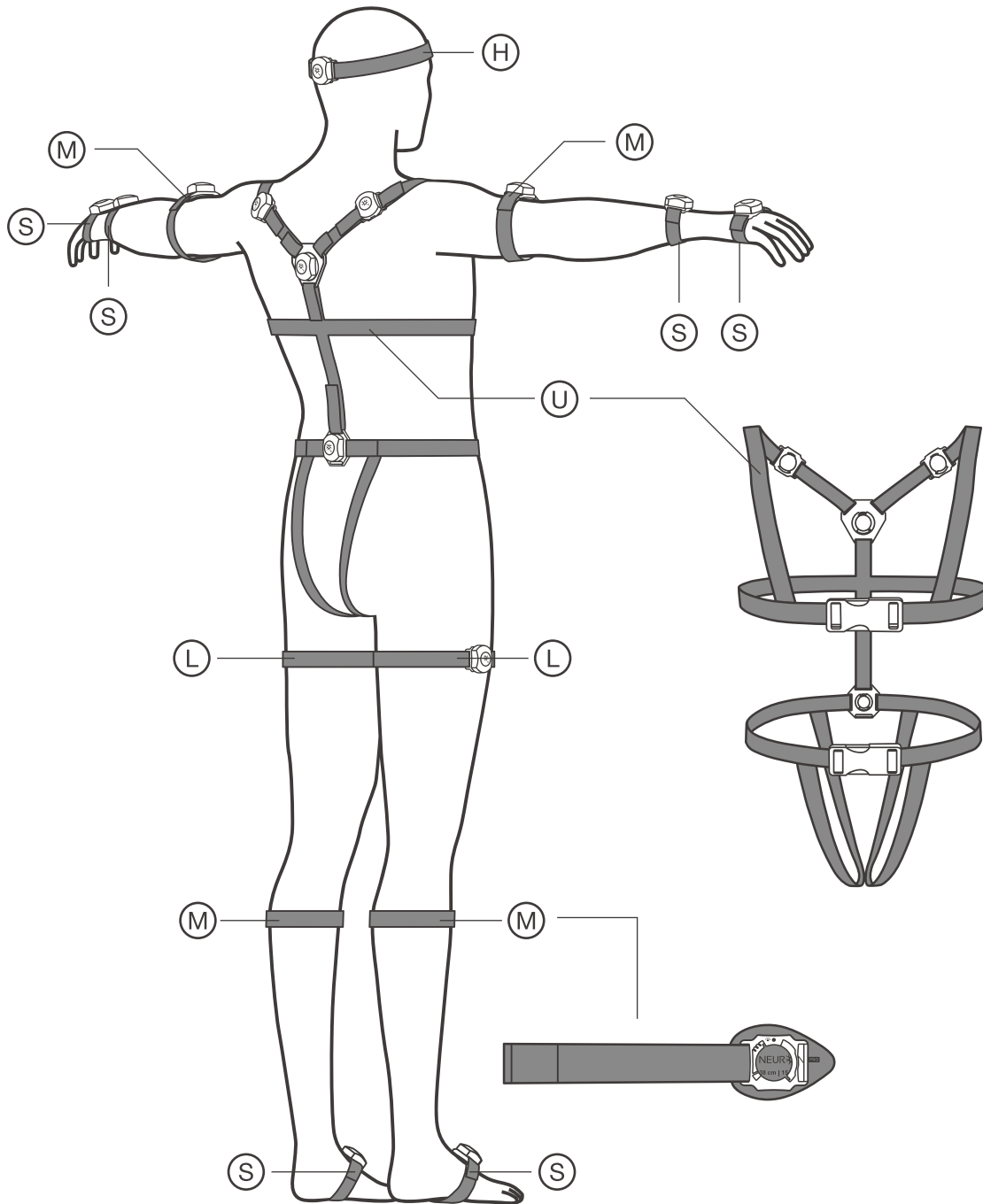
2.2. Charging Sensors

1. Place sensors into the charging case
2. Close the charging case cover
3. Connect the adapter with the power cord to the charging case.



2.3. Wearing Sensors

1. Use the appropriate length of strap that fits the performer for each segment. Attach the straps according to the diagram below.



(S) Small: 28 cm | 11 in

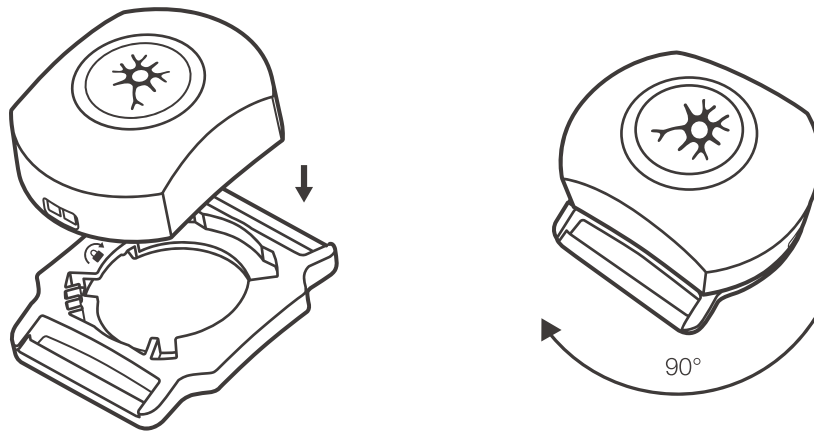
(M) Medium: 38cm | 15 in

(U) Upper body

(H) Head: 62 cm | 24 in

(L) Large: 50 cm | 20 in

2. Place the sensors into the bases. Rotate the sensors 90 degrees clockwise.



2.4. Transceiver Setup

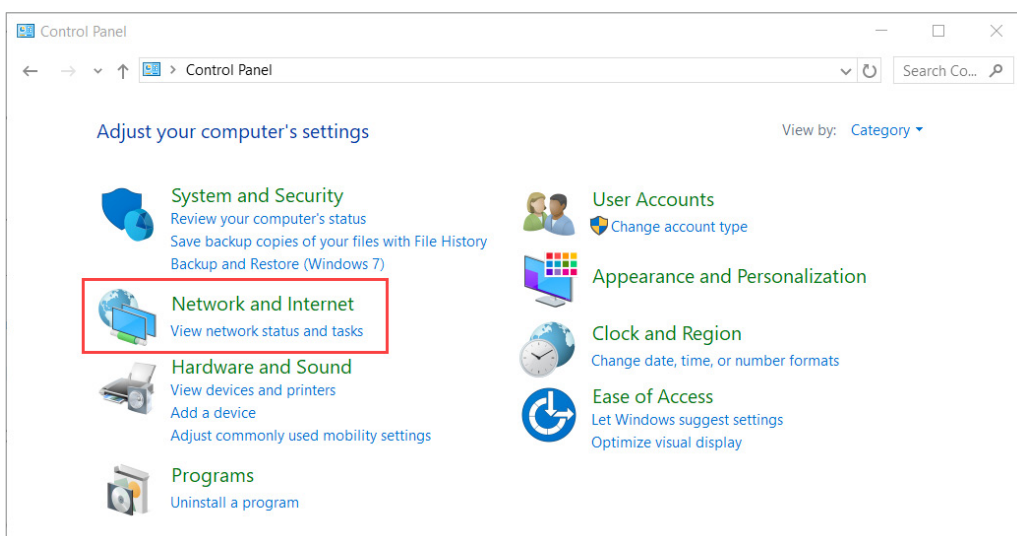
Tip: USB mode can be used when one transceiver and one PN STUDIO is in operation.

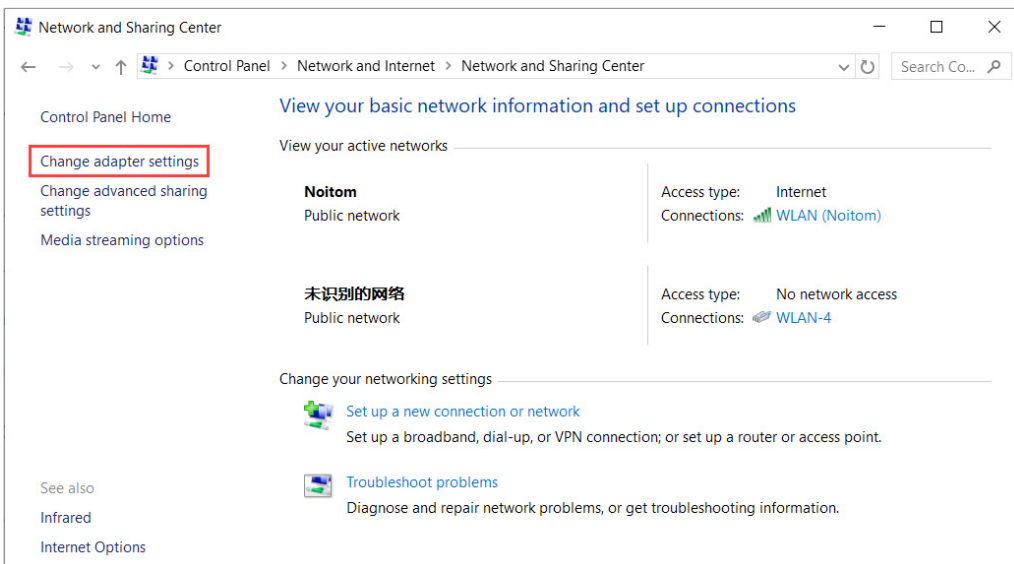
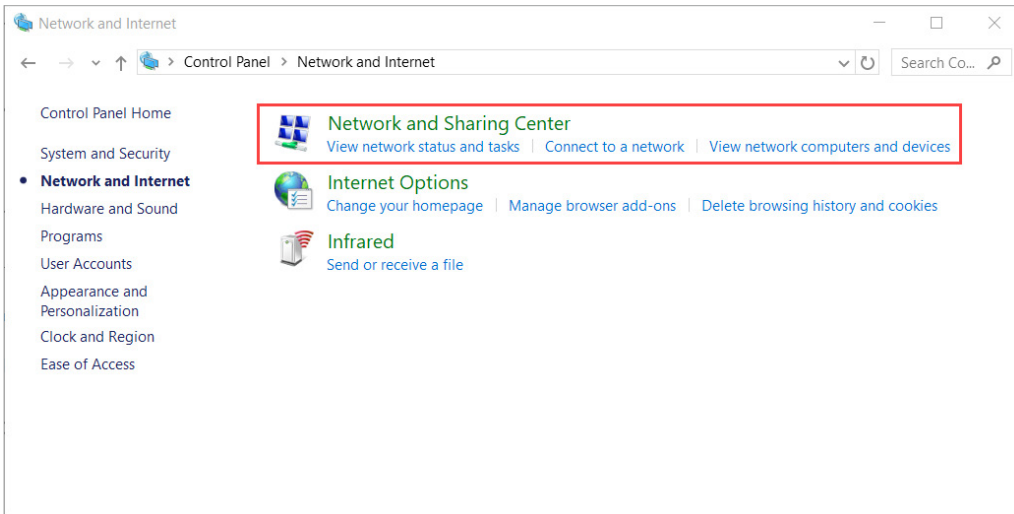
USB connection

When attaching the Transceiver to the computer for the first time, the IP address for the TRANSCEIVER Remote Network Driver Interface (RNDIS) needs to be configured.

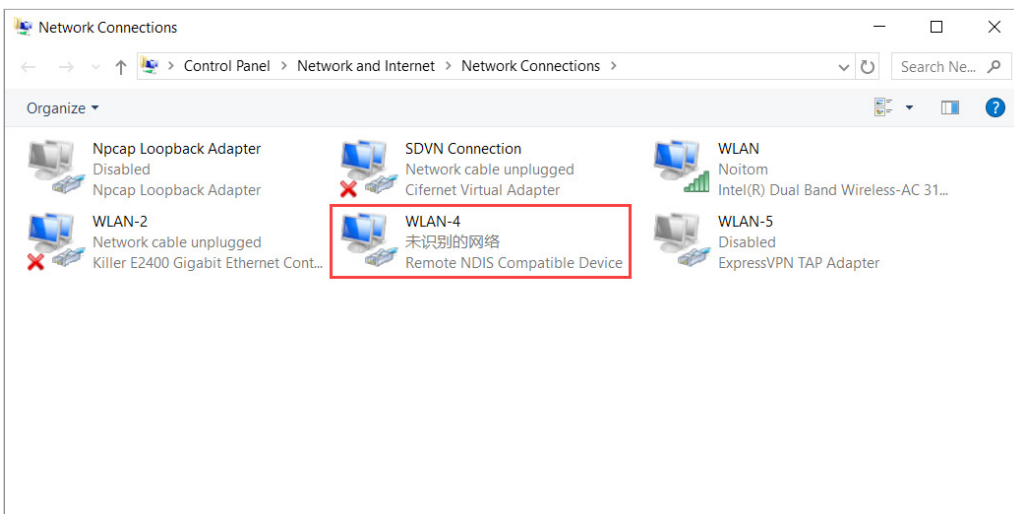
1. Connect the USB to the Transceiver
2. Connect the USB to the Computer
3. Open Network Connections:

Control Panel → Network and Internet → Network and Sharing Center → Change Adapter Settings





4. In the Network Connections panel, locate an adapter with Remote NDIS properties. This new adapter detected by your computer is your Perception Neuron Studio Transceiver.

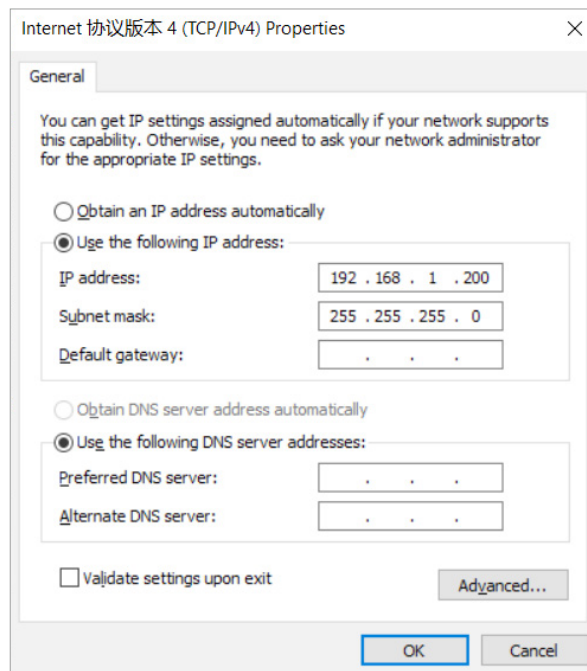


5. Open the properties of the Remote NDIS, and open the IPV4 settings.
6. Set the following IPV4 properties:

IP Address: **192.168.1.200*** (range: 192.168.1-192.168.1.240)

Subnet Mask: **255.255.255.0**

* If 192.168.1.200 is taken by an existing Network Adapter then choose one from the provided IP range.
Network Adapters cannot have conflicting IP addresses.



7. Confirm settings and exit all Network Property windows.
8. Restart Transceiver by disconnecting and reconnecting USB cable from the Transceiver.
9. Open Axis Studio software*

*If the transceiver is not shown in the software, please check USB transceiver link troubleshooting

Ethernet Connection

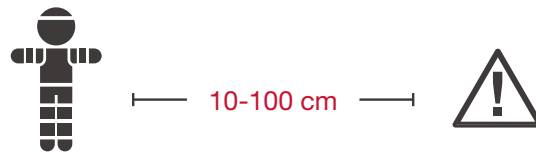
If you are using two or more transceivers simultaneously, use an unmanaged switch and a DHCP enabled router to synchronize the transceivers data.

1. Connect an Ethernet cable from the PC to the router.
2. Connect an Ethernet cable from the router to the switch.
3. Connect Ethernet cables from the transceivers to the switch.
4. Once the transceivers have been connected successfully they show now appear in the software.

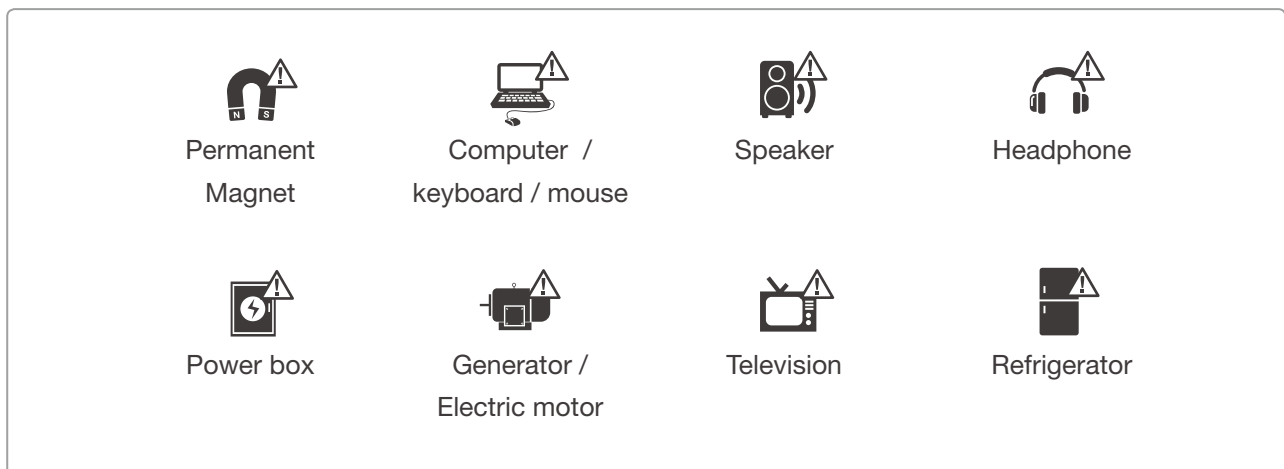
2.5. Working Environment

Perception Neuron Studio inertial system contains magnetometers, magnetometer sensors can be affected by strong magnetic environment. Users must operate the sensors in an environment with the least amount of magnetic interference.

If you choose to use Perception Neuron Studio Inertial System in a location with strong magnetic interference, utilize our “**Anti-mag mode**” found in our software.




Keep 10-100 cm (depending on the strength of the source)
away from magnetic sources.



3. Getting Started with Axis Studio

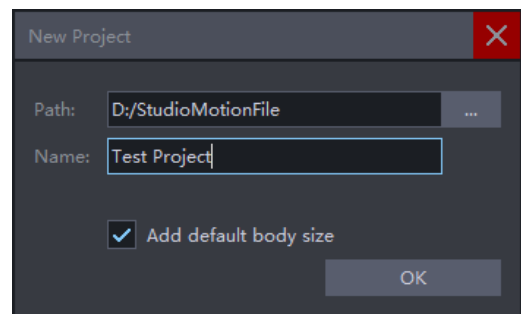
3.1. Open Axis Studio

Open Axis Studio  from the desktop shortcut

3.2. Create Project

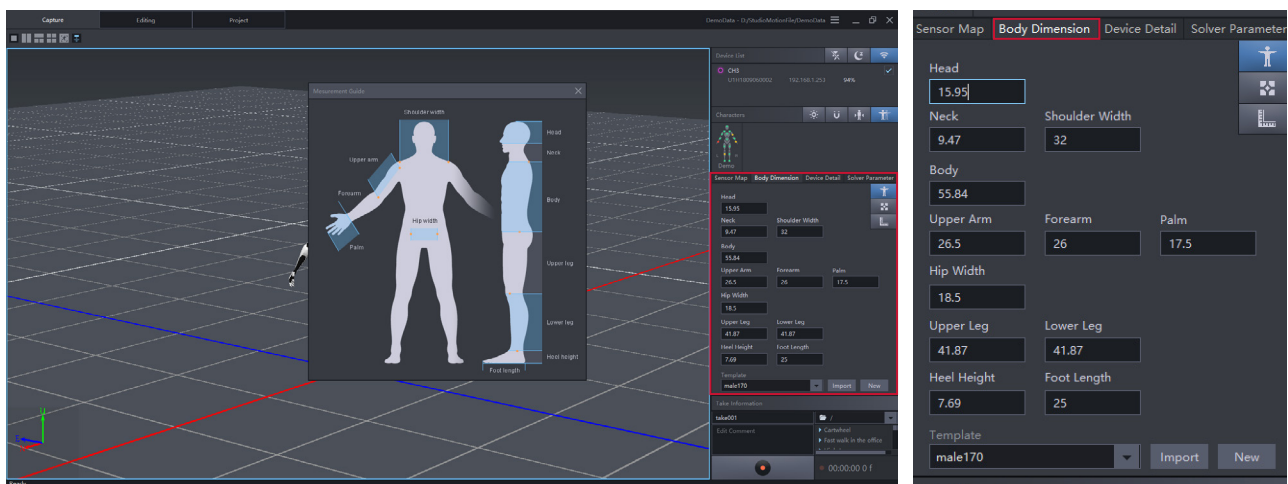
Use Projects to manage all the files associated with motion capture sessions.

- Click New Project
- Enter the project name and choose the location of the project.
- Selecting Add default body size will include body size presets into your project.



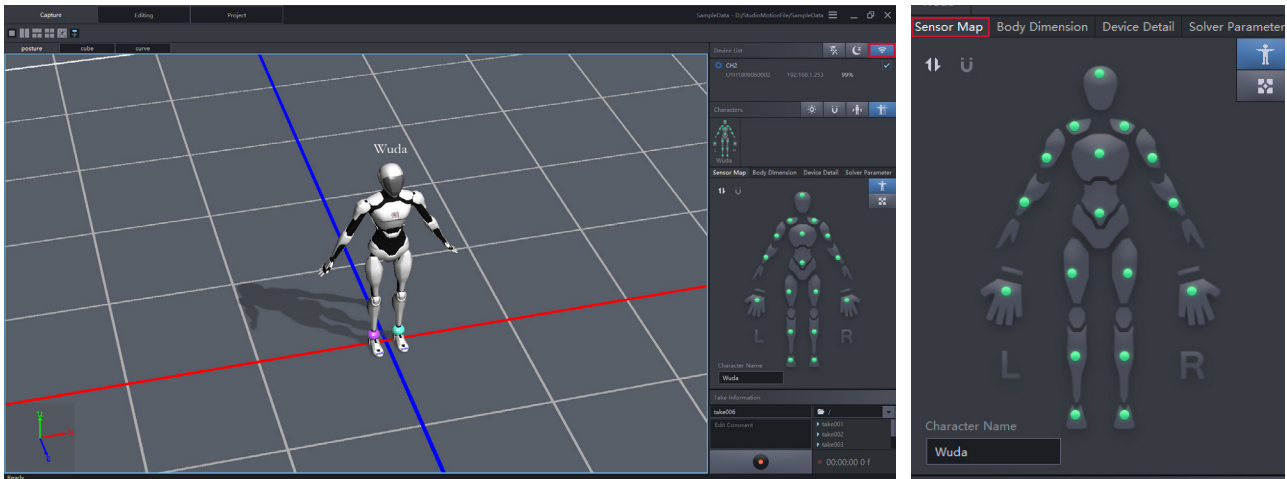
3.3. Measure Body Segment Length

Axis Studio allows users to input their own body size dimensions if the provided default body size presets do not apply. Prior to capturing, choose the body size preset that fits the actor's body dimension closest before carrying out the posture calibration. Inertial motion capture accuracy is highly affected by the body segment length of the Avatar.



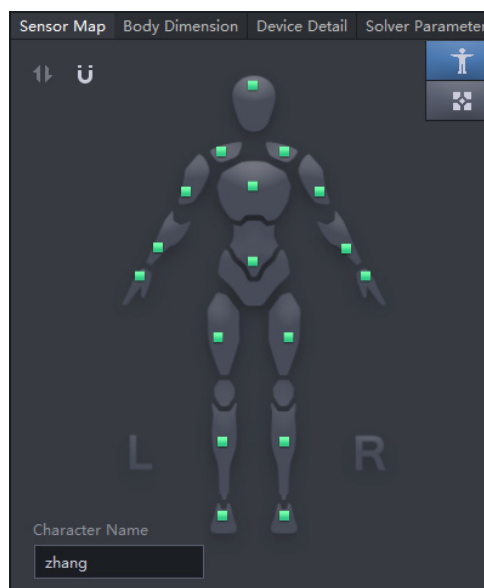
3.4. Link Inertial Sensors to Axis Studio

Turn sensors and gloves on, click the “Connect”  button , then check the sensor map panel for status. In the avatar diagram, green indicators confirm sensors are connected.



3.5. Check Sensor Magnetic Status

Check the magnetic status in the sensor map panel, green indicators confirm sensors are in good magnetic environment. If you cannot find a place with all green square dots, try doing "Magnetic Calibration" in section 7.2



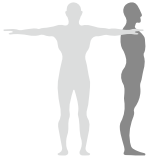
3.6. Posture Calibration

Click “Calibration”  button and follow the pop-up instructions to do a quick calibration process.



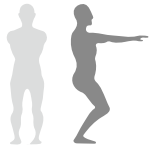
A Pose

Stand straight, arms facing down with palms facing your body. Position feet distance approximately the same distance of your hip width and maintain feet parallel to each other.



T Pose

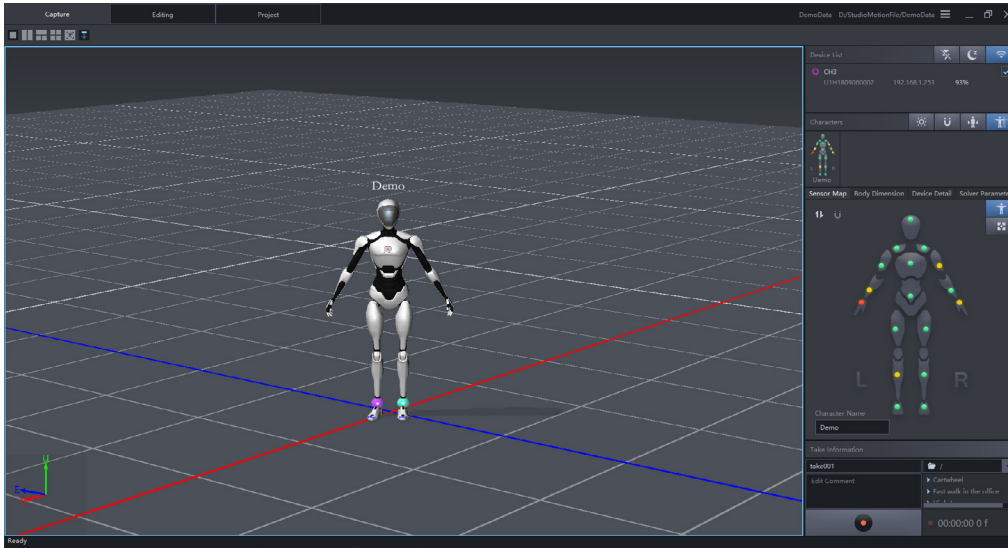
Stand straight spread out arms perpendicular to your body's upward position, with palms facing down. If you are using gloves, extend fingers and position thumb in a resting position.



S Pose

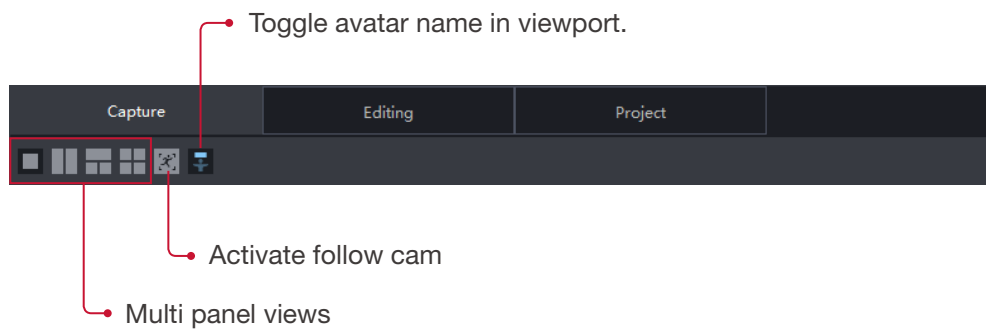
Crouch down with feet flat on the ground while maintaining feet and legs parallel to each other. Extend arms forward with palms facing down.

4. Window Layout overview - Capture View

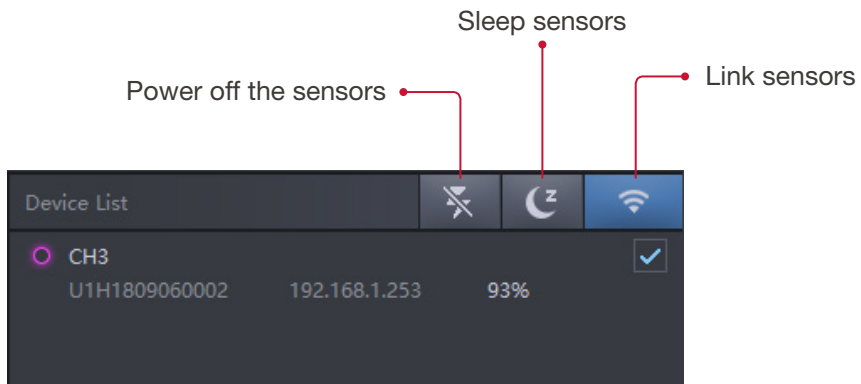


Capture view is the window where all realtime motion capture will be performed.

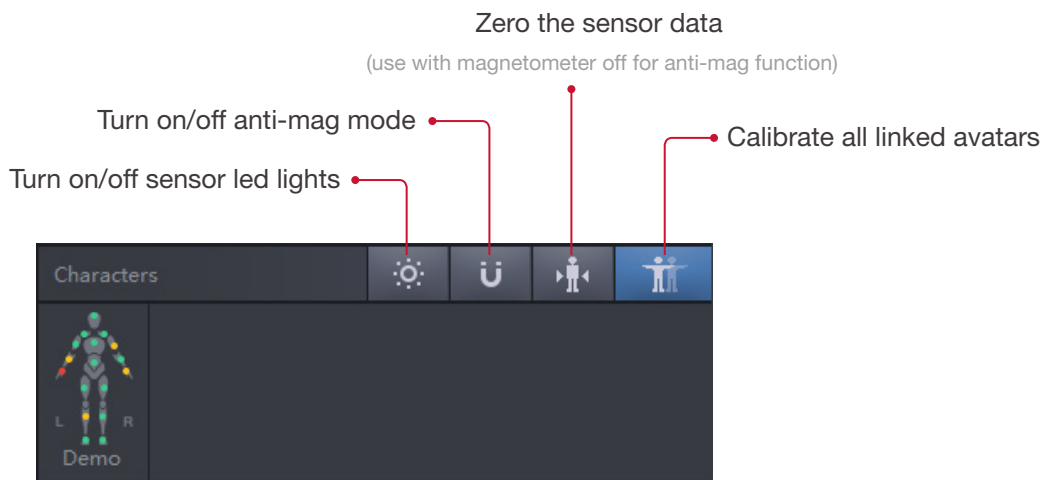
4.1. 3D view functions



4.2. Basic Sensor Management



4.3. Basic functions for Motion Capture



4.4. Sensor map

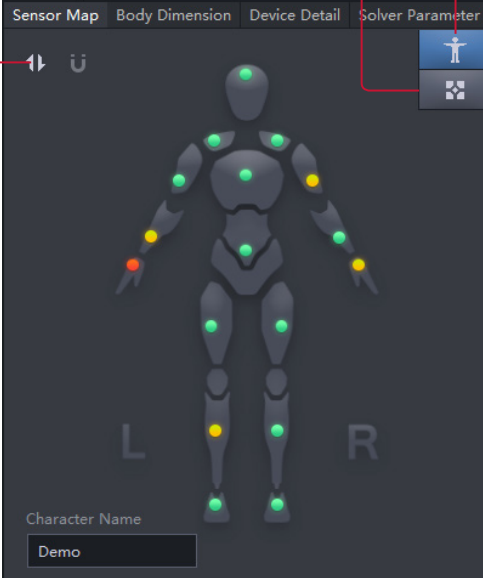
Calibrate selected avatar

'Zero' reset selected Avatar position

Sensor signal strength (round dot):

- Green is good
- Yellow is medium
- Red is bad
- Black is no sensor linked

Tip:
Green or yellow indicator is operable.
Red indicates weak signal communication.

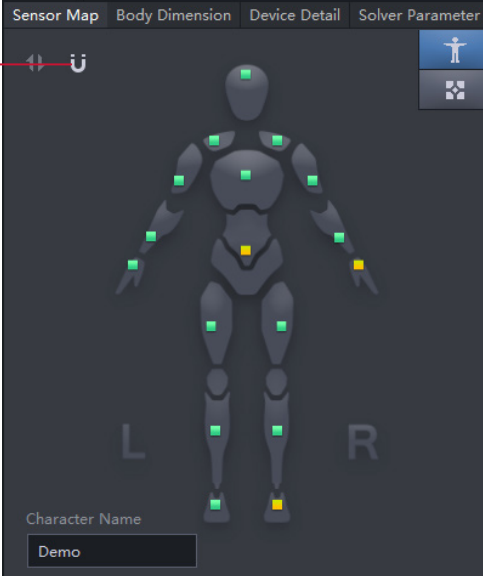


The screenshot shows a software interface with a dark background. At the top, there are four tabs: 'Sensor Map', 'Body Dimension', 'Device Detail', and 'Solver Parameter'. Below the tabs is a human avatar with several colored dots on its body. A red dot is on the left hand, a yellow dot is on the right hand, and several green dots are on the torso and legs. At the bottom left, there is a text field labeled 'Character Name' with the value 'Demo'. On the right side, there are two icons: a person icon and a grid icon. Red lines with dots at the end point from the text labels above to the corresponding icons in the interface.

Magnetic environment (Square dot):

- Green is good,
- Yellow is medium
- Red is bad
- Grey is no sensor linked or in Anti-mag Mode

Tip:
Red square indicates sensor has high magnetic interference.

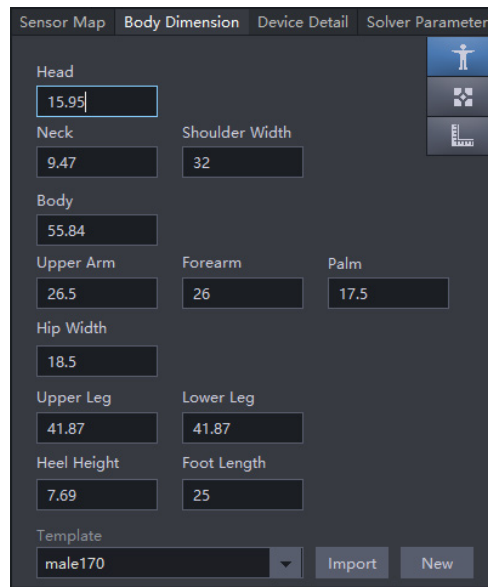


The screenshot shows the same software interface as above. In this view, the dots on the avatar are replaced by squares. Most squares are green, but there is a yellow square on the right hand and a red square on the right leg. The rest of the interface, including the tabs and the 'Character Name' field with 'Demo', is identical to the previous screenshot.

4.5. Body Dimension

import or build new body dimension file.

Show body segment measurement reference guide



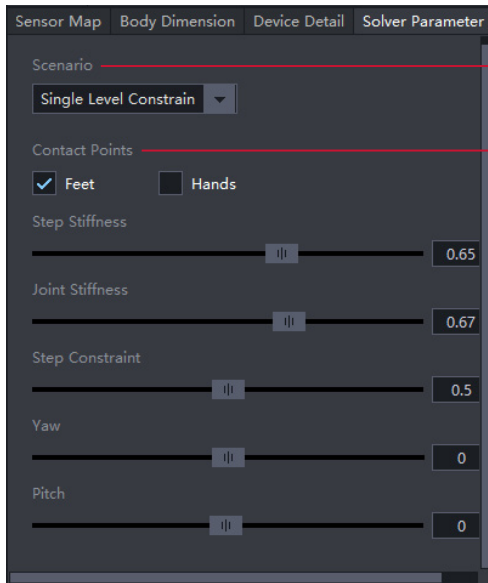
4.6. Device Detail

Displays detailed information of the individual sensors, including sensor ID, sensor signal, magnetic levels, and battery life.

Body segment	Sensor	Signal	Magnetic	Battery
Hips	1	99.9%	■■■■	■■■■
RightUpLeg	2	98.9%	■■■■	■■■■
RightLeg	3	99.9%	■■■■	■■■■
RightFoot	4	99.9%	■■■■	■■■■
LeftUpLeg	5	99.9%	■■■■	■■■■
LeftLeg	6	80.9%	■■■■	■■■■
LeftFoot	7	98.9%	■■■■	■■■■
RightShoulder	8	97.9%	■■■■	■■■■
RightArm	9	90.9%	■■■■	■■■■
RightForeArm	10	92.9%	■■■■	■■■■
RightHand	11	90.9%	■■■■	■■■■
LeftShoulder	12	99.9%	■■■■	■■■■
LeftArm	13	95.9%	■■■■	■■■■
LeftForeArm	14	95.9%	■■■■	■■■■

4.7. Solver Parameter

Adjust algorithm behaviour to control motion capture performance.

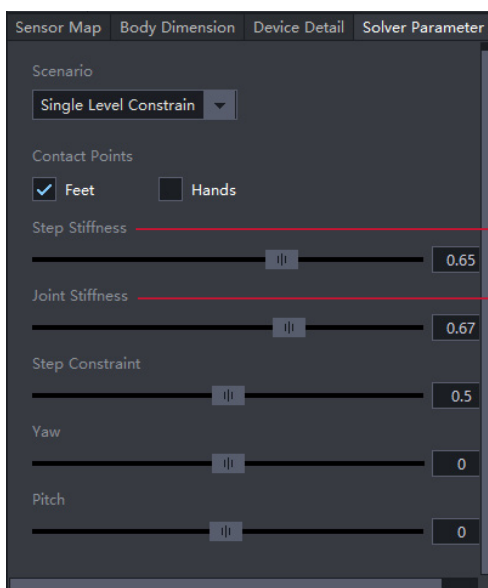


Scenario:

- Choose the motion capture scenario you are using.
- If you are doing motion capture on a flat floor, use Single Level Constrain.
- If you are capturing go upstairs, downstairs or any motion without a certain floor, use Free Climbing.
- Hip Fixed means lock your Avatar in the certain position, you can use it as running on a treadmill or hanging wire.

Contact Points:

- Choose which body segment will make contact with the floor or a solid surface during the performance.
- For most scenarios we choose foot contact, selected by default. If you want to record a movement with hand contact such as cartwheel, select both the foot and the hand contact.

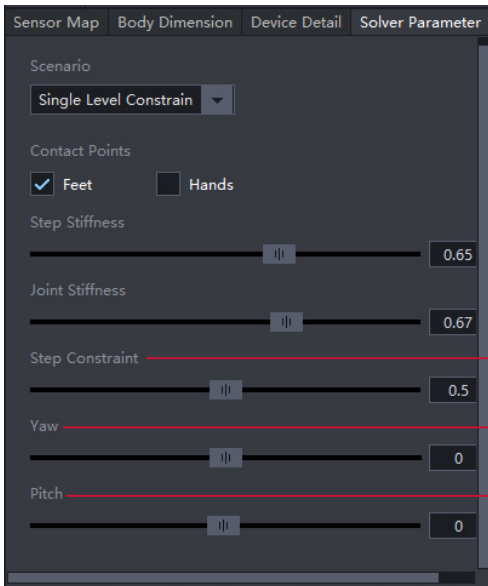


Step Stiffness:

- Axis Studio 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 firmly on the ground and smaller values will allow the feet to slide easily while contacting the ground.

Joint Stiffness:

- There are gaps between different body segments, and JointStiffness is to modify the tolerance of the gaps.
- The smaller the value is, the gaps will be bigger.



Step Constraint:

- The step constraint value determines the threshold a foot contact is activated.
- A higher value increases sensitivity of the foot contact algorithm. A low value reduces the sensitivity of a foot contact.

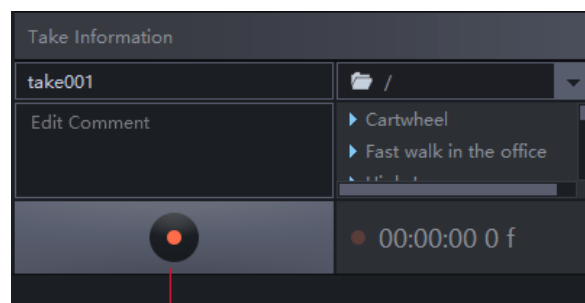
Yaw:

- Adjust the yaw direction of the Avatar.
- You can use it to control the Avatar direction directly in third party software.

Pitch:

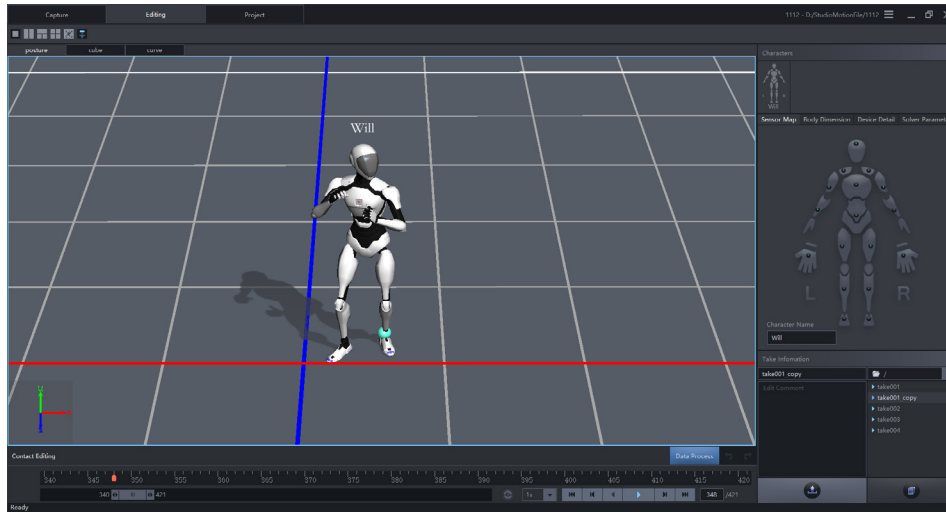
- Adjust the pitch direction of the Avatar.
- If you find the Avatar is too leaned forward than it should be, you can make the Pitch value a little higher.
- Or if you find the Avatar is too leaned back, make the Pitch value lower.

4.8. Other functions



Start and Stop recording

5. Window Layout overview - Edit View



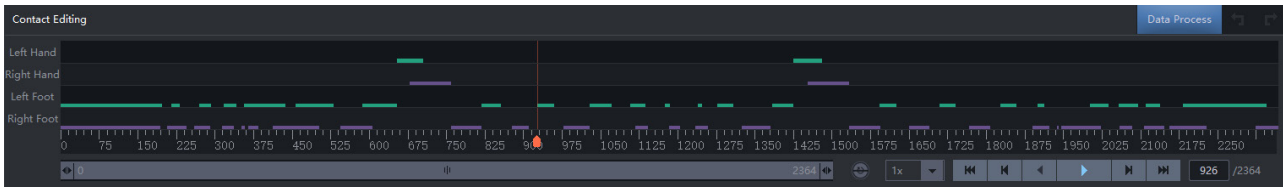
In edit view, review and perform post processing of your captured data. Axis Studio provides an abundance of optimized algorithms to achieve an ideal contact result. Adjustments of the effect can be done by single frames or interval frames values.

5.1 System auto optimization

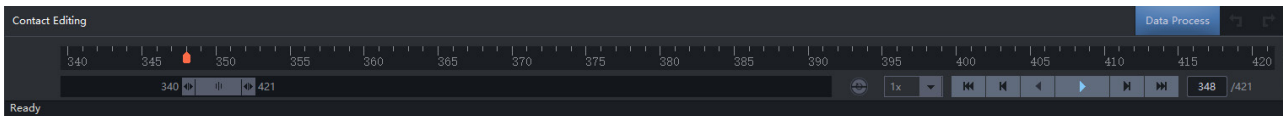
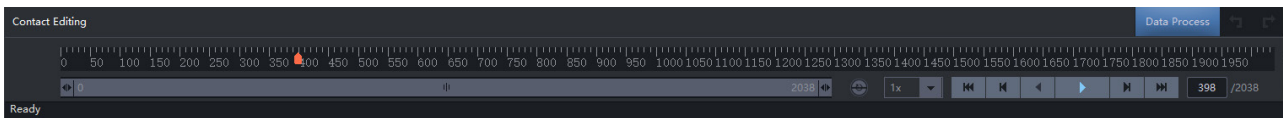
By click “Data Process” [Data Process](#) button after the first time of opening a new recording data, Axis Studio incorporates an automatic post-processing algorithm that will optimize the original motion capture file, such as make-up lost frames during wireless data transfer or correct sensor error data produced by unwanted muscle movement during real-time motion capture. Several files will take longer than others to open due to the amount of post-processing that may be required.



5.2. Contact Editing Window





1. The line color indicates a floor contact captured on particular body segment.
2. **L Hand:** Left hand contact editing area.
3. **R Hand:** Right hand contact editing area.
4. **L Foot:** Left foot contact editing area.
5. **R Foot:** Right foot contact editing area.
6. Right click and drag to modify the frames that you want to edit contact/uncontact points.
7. Change the length of the frames that will be displayed in the bar in order to edit frame by frame. See example below, a capture with 1114 frames, where the visible frames are not long enough to show and edit each frame. If you change the length to make the bar to show a certain length of frame (e.g frame 340-420) only then you will be able to select and edit each frame as needed.



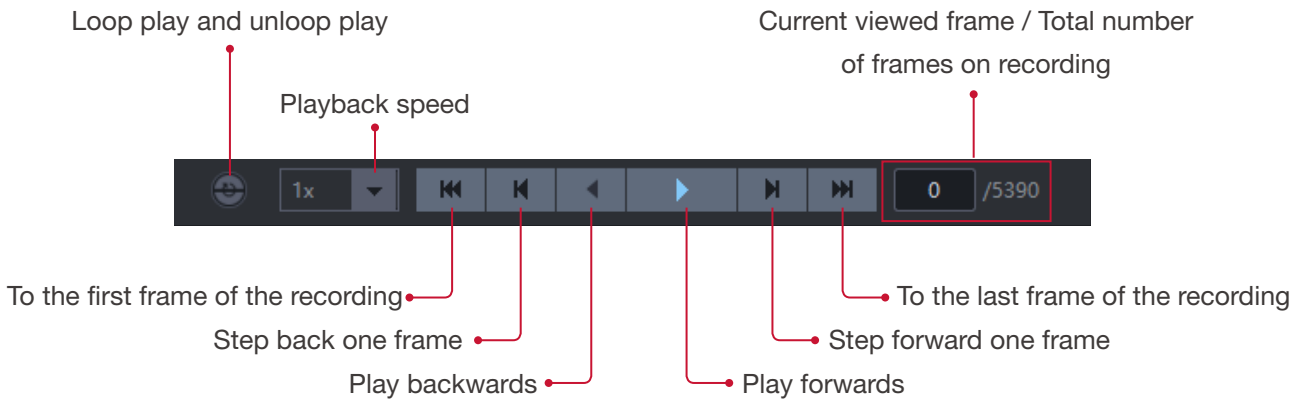
8. After you edit the body segments contact points successfully, you can click “Data Process”

Data Process


9. You can choose  button to undo your editing process, and  button to redo your editing process. After you undo or redo the contact editing, you always need to click “Data Process”

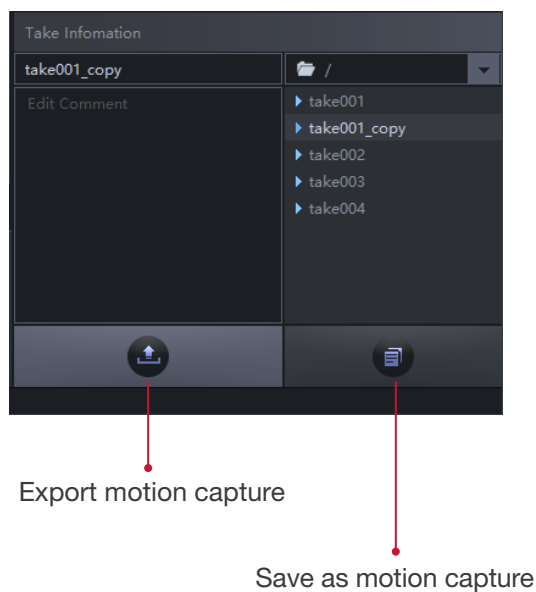
Data Process

5.3. Frame Editing Toolbar



5.4. Save editing work

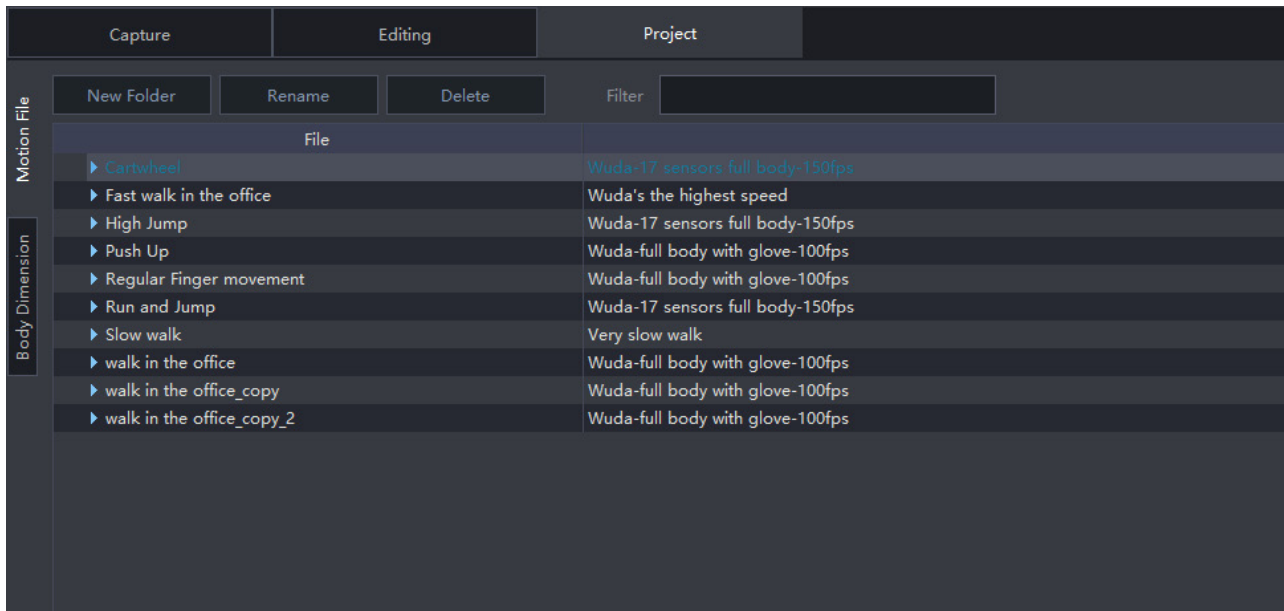
1. The modifications will be automatically saved when you close your motion capture file
2. To save your edits while keeping the original file at the same time, or to save multiple versions of editing work for a single motion capture file, use the “save as”  button.
3. Click the save as button, then you will be able to input a new name for the file that you want to save, choose “save” then the file you are currently editing will be the new file with the name that you just renamed, now the original file will remain the same as it was opened.



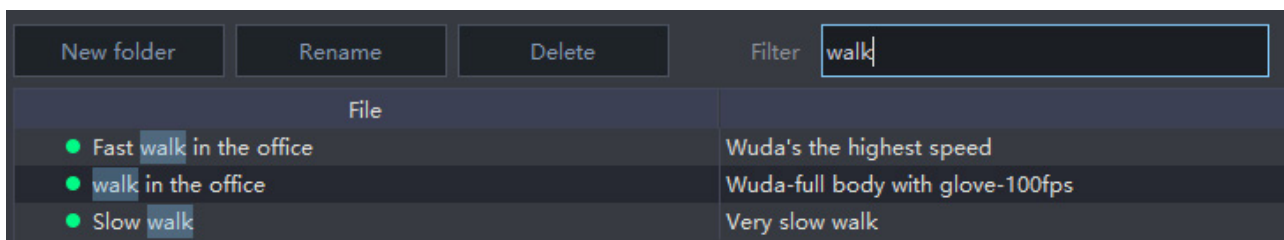
6. Window Layout overview - Project Management

6.1. Motion Files

Manage motion capture files in this project.



1. You can Rename **Rename** and Delete **Delete** your files directly.
2. Create new folders **New Folder** to organize large amount of capture files in this project to optimize file management.
3. If you have a lot of capture files in one project, you will be able to tap key words in the filter to find your file. For example, I tapped “ walk ” in the filter to find the three files with the word walk in the title.




6.2. Body Dimension

Manage body dimension profiles that will be used in the working project. You can modify the skeleton length directly in this page. The body dimension file is a simple xml file which includes the body dimension name and length for each body segment.

Capture		Editing		Project		
Motion File	New	Import	Export	Delete	Filter	
	Body Dimension	Actor(cm)		Head	Neck	Body
female150		15.43	7.71	50.39	29	
female155		15.75	8	52.16	30	
female160		16.07	8.29	53.92	31	
female165		16.6	8.82	55.75	32	
female170		17.12	9.34	57.6	33	
female175		17.65	9.62	59.33	33.97	
female180		18.16	9.91	61.08	34.94	
female185		18.68	10.18	62.84	35.91	
male160		14.95	8.97	52.34	30	
male165		15.45	9.22	54.09	31	
male170		15.95	9.47	55.84	32	
male175		16.45	9.72	57.59	32.75	
male180		16.95	9.97	59.34	33.5	
male185		17.43	10.25	61.02	34.43	
male190		17.92	10.55	62.71	35.36	
male195		18.4	10.82	64.42	36.29	

1. You can Add **New** and Delete **Delete** a Body Dimension file.

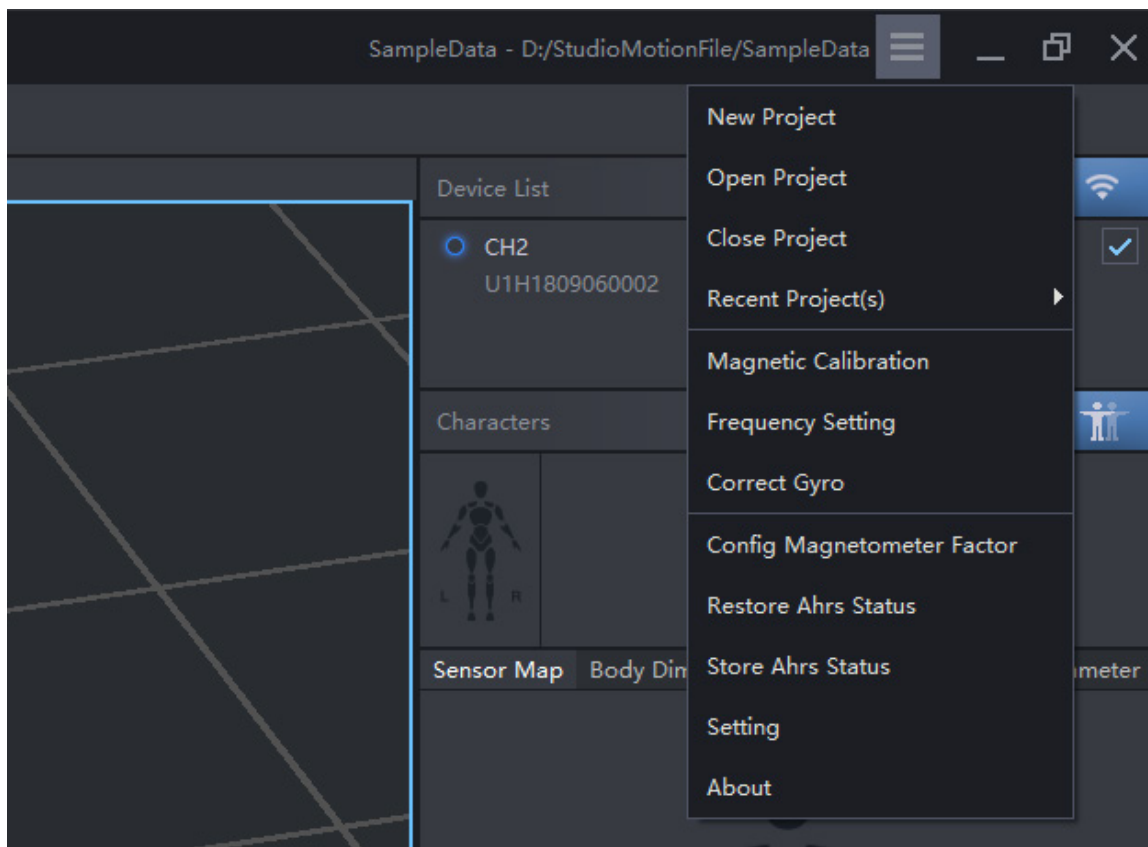
2. You can Import **Import** and Export **Export** a Body Dimension file. Body Dimension file is an *.xml file. You can copy and paste the *.xml body dimension file to anywhere.

Name	Date modified	Type	Size
 Wuda body size.xml	8/31/2019 4:38 PM	XML File	1 KB

7. Window Layout overview - Menu


7.1. Menu Overview


1. **New Project:** Create a new project.
2. **Open Project:** Open an existing project.
3. **Close Project:** Close the project which is opened now.
4. **Recent Project:** A shortcut to find the lasted projects that you opened before.
5. **Magnetic Calibration:** Calibrate your sensors to resist magnetic interference.
6. **Frequency Setting:** PN Studio support three different data transfer frequencies. If you are using more than one set PN Studio at the same time, you need to make sure the these sets of PN Studio are using different frequencies.
7. **Settings:** Basic software settings.




7.2. Magnetic Calibration

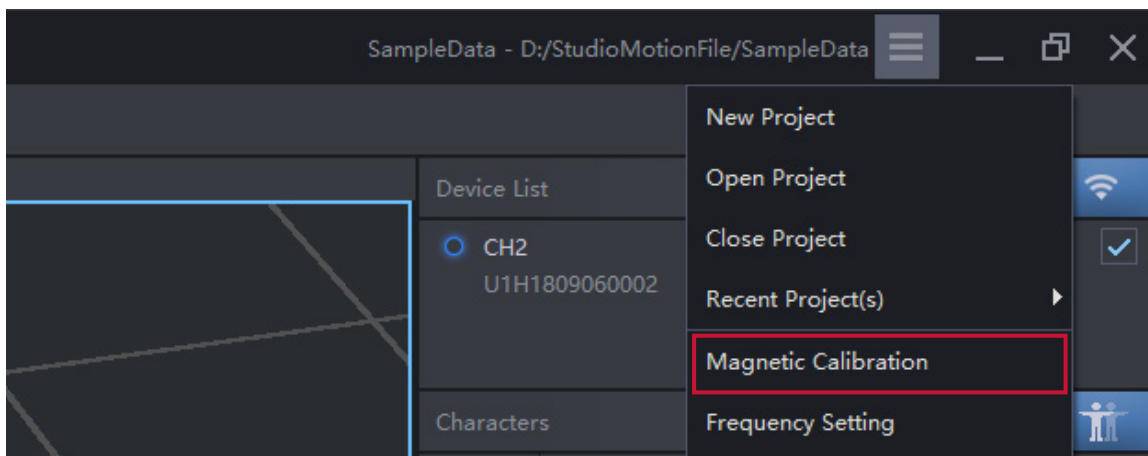
When operating Perception Neuron Studio Inertial System in new environments, we suggest users to perform a magnetic calibration at the same location you'll capture motion. Please follow the steps below:

1. Turn on all the 18 sensors (17 and the back up one) in the charging case and link sensor  , do not remove sensors from the charging case. Please confirm that the gloves (if you have) are turned off.
2. Locate an area where all sensors display a magnetic green status in the Device Detail panel. Perform compass calibration at the found location.

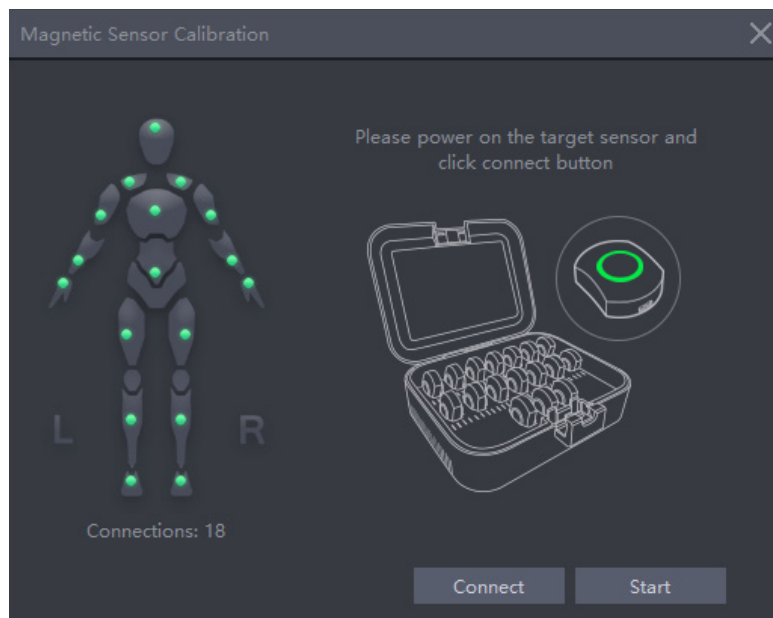


Body segment	Sensor	Signal	Magnetic	Battery
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RightUpLeg	2	98.9%	■■■■	■■■■
RightLeg	3	99.9%	■■■■	■■■■
RightFoot	4	99.9%	■■■	■■■■
LeftUpLeg	5	99.9%	■■■■	■■■■
LeftLeg	6	80.9%	■■■	■■■■
LeftFoot	7	98.9%	■■■■	■■■■
RightShoulder	8	97.9%	■■■■	■■■■
RightArm	9	90.9%	■■■■	■■■■
RightForeArm	10	92.9%	■■■■	■■■■
RightHand	11	90.9%	■■■	■■■■
LeftShoulder	12	99.9%	■■■■	■■■■
LeftArm	13	95.9%	■■■■	■■■■
LeftForeArm	14	95.9%	■■■■	■■■■

3. Place sensors in sleep mode by clicking on the button 
4. Click Compass Calibrate from the Menu options.



5. Click “Connect” button first, then click the “Start” button after sensors light up.



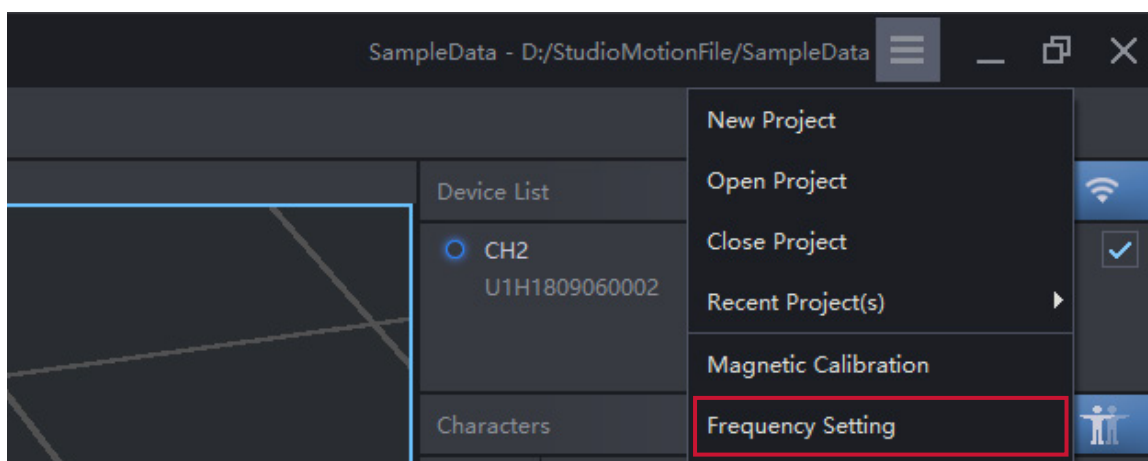
6. Follow the instructions video, rotate the charging case. Axis Studio will calculate the data in the background and the process will complete when there is a successful calculation.

7. Wait until “Sensor magnetic calibration successful” pops up.

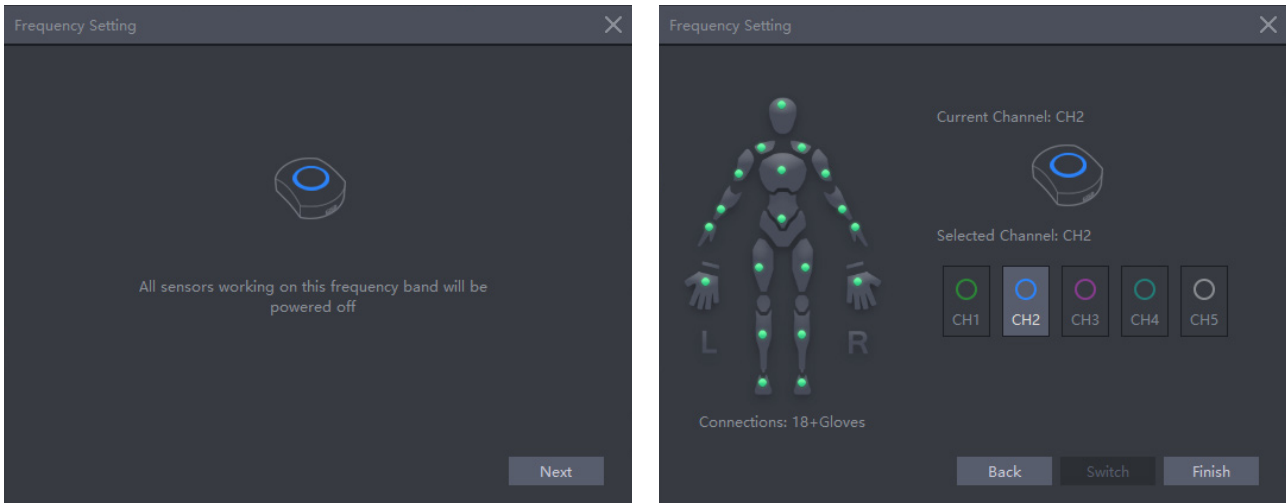
7.3. Frequency Setting

The frequency setting function is only necessary if multiple Perception Neuron Studio Inertial Systems are present.

1. Click frequency switch function in the menu.



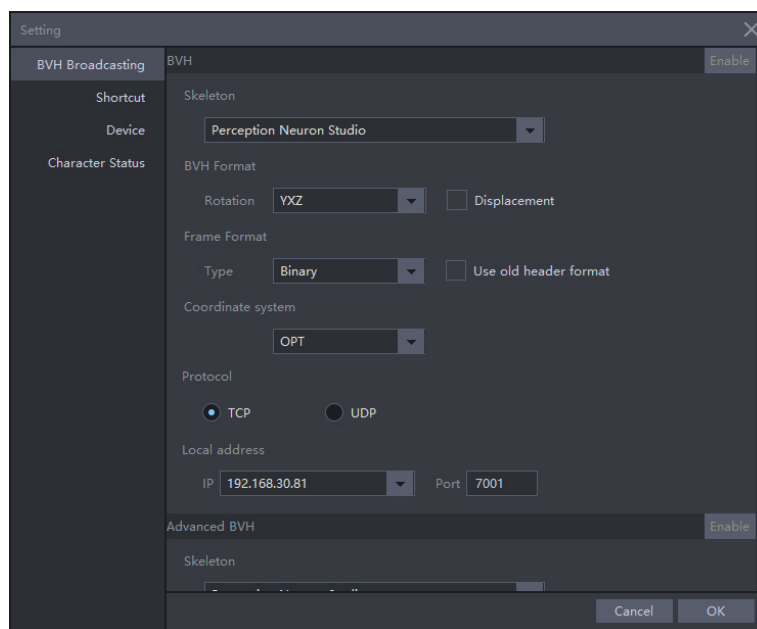
2. Check the quantity of connected sensors in the left corner of the popup window.
3. Next → Switch, all sensor LED color should be changed accordingly, then check the connection sensor number in the left corner of the popup window, make sure it matches the actual sensor number you are using, then click OK.



7.4. Setting

BVH Broadcasting:

BVH Broadcasting is the setting to broadcast the motion capture data in the network through BVH format. Highlight select the “Enable” button to start the BVH broadcasting.



Shortcuts:

Some shortcuts that you can set. We will continually add useful shortcuts

Device:

Configure the FPS and IP address of the connected devices




Character Status:

Choose capture mode. Selecting 'Auto detect' will identify capture mode and will not require changing the status. Choose Full body or Full body + Glove if 'Auto detect' fails to identify capture mode.






8. Troubleshooting

8.1 Anti-mag Mode

If you are using Perception Neuron Studio Inertial System in a location with strong magnetic interference, such as steel container, you can use our “Anti-mag mode”. Use the following steps:

1. Turn on all sensors and find a place with good magnetic environment (Sensor map will display all green).
2. Perform posture calibration at the position with sensor map status all green.
3. Click the button  with the magnetic icon to activate Anti-mag mode in the sensors. The button will become , then sensors LED lights will turn into solid light indicating sensor will not use magnetic data for the reference.
4. Once Anti-mag mode has been activated, motion can be captured in the strong magnetic area.
5. Different movement types and speed can cause the posture of the avatar to drift after 5-10 minutes. Go back to the good magnetic environment, click the button  to turn the Anti-Mag mode off, stand still and wait for the posture to be corrected in a few seconds. Then you will be able to do another 5-10 minutes motion capture work with Anti-Mag mode.

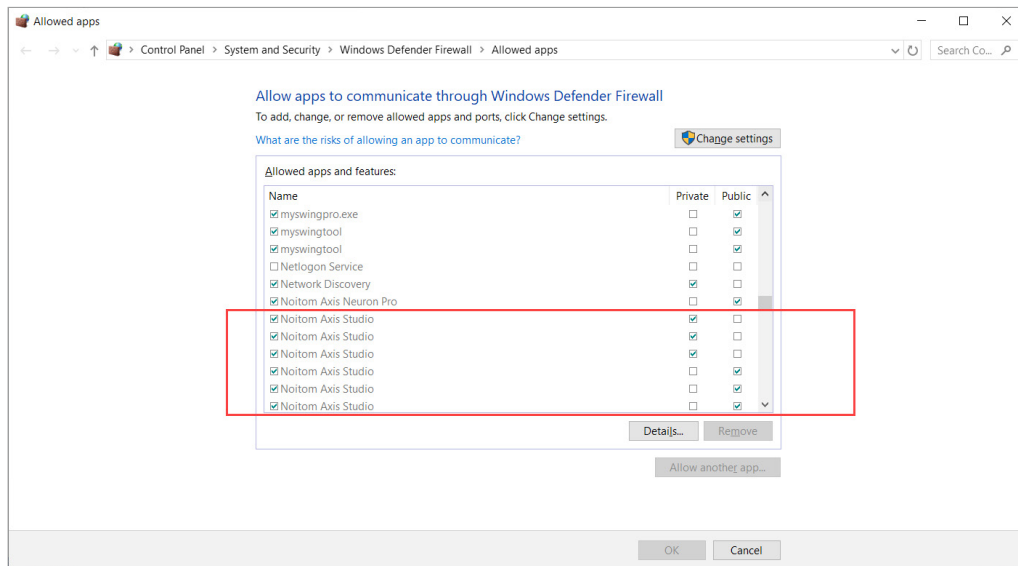
8.2 Sensor Light Instruction

Slow Blink	Sensor in standby mode to save the power
Fast Blink	Sensor in working mode, calculating the transferring the data
Solid light (green, blue, purple)	There is magnetic interference environment around the sensor or the sensor is in Anti-Mag mode.
Solid light (red)	Sensor malfunction, please turn off and turn on the sensor manually.
 Green light	Sensor in channel 1
 Blue light	Sensor in channel 2
 Purple light	Sensor in channel 3
 Cyan light	Sensor in channel 4
 White light	Sensor in channel 5

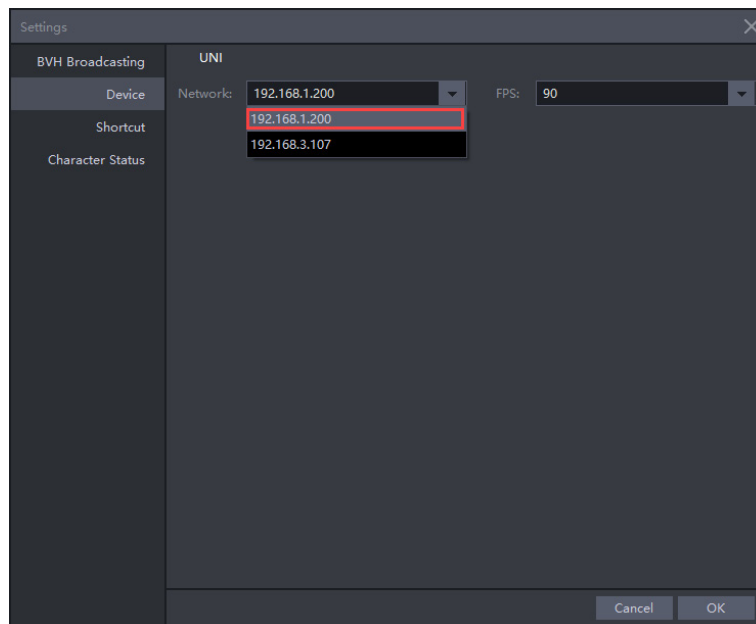
8.3 Perception Neuron Studio Transceiver

Axis Studio is not recognizing Perception Neuron Studio Transceiver

1. Go to Control Panel → System and Security → Windows Defender Firewall → Allowed apps, and make sure that all Noitom Axis Studio software in the list is an “Allowed apps and features”



2. Open the software, go to “Device” page through “Settings” in the stack menu, and make sure to choose the IP of the RNDIS you set (preferred setup with 192.168.1.200)



3. If step one and two are both correct and the transceiver does not appear in the Axis Studio, this is usually a refresh issue. Close the software, unplug and plugin the transceiver, wait for the transceiver light turns into channel light instead of red, then open the software again will solve the problem.

FCC WARNING

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



**We are part of Noitom Ltd.
and dedicated to the development of motion
capture systems for entertainment, sports,
science and medicine.**

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