VICON Capture.U

BEYOND MOTION

VICON CAPTURE.U USER GUIDE

WHAT'S INSIDE?

Vicon Motion Systems is an Oxford Metrics plc company.
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www.vicon.com/captureu

About Vicon Capture.U

Working seamlessly with Vicon Blue Trident sensors, Vicon Capture.U is a visual application for capturing raw inertial and analytic data, which is not limited by laboratory settings. It offers real-time data overlaid on video, enabling you to analyze movement both on the field and in the lab.

With capture modes for collecting and analyzing raw data, Capture.U enables you to view graphical and statistics information in real time. You can also save video or export data as CSV, X1D or PDF files, for further analysis.

For a brief introduction to Capture.U, see the PDF *Vicon Capture.U Quick Start Guide*.

This guide provides information on using both the Capture.U app, for iOS devices; and Capture.U Desktop, for use on Windows PCs and Macs.

- Use the Vicon Capture.U app, page 5
- Use Vicon Capture.U Desktop, page 43

You can also watch Vicon Capture.U videos[1], covering all aspects of using Capture.U, on YouTube.

1 https://youtu.be/kRuio13OqQk

Understand Vicon IMU sensor status

The LEDs on each Vicon IMU display information about the sensor's status.

Vicon IMU status	LED display
Charging	Both LEDs slow blink (50% duty)
Charged	Both LEDs on steady
Battery indication	Both LEDs blink 1–4 times, pause; pattern repeats 3 times. For example, full battery – LEDs blink 4 times, pause; pattern repeats 3 times.
Sampling	Single or both LEDs brief blink (<10% duty); single or both depending on left or right
Bootloader waiting	Single LED on steady
Bootloader connected	Both LEDs on steady
Bootloader exiting	Both LEDs twinkle
Error during a session • Error overrun • Error storage • Error sync timeout • Error sync	Rapid blinking LEDs

Use the Vicon Capture.U app

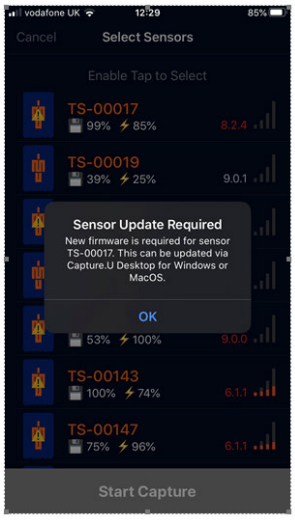
For information on installing and using the Capture.U app, see these topics:

What's new in the Capture.U app 1.1?

> ⚠ To use the Capture.U app 1.1, you must upgrade the sensor firmware to 9.0.4. To do this, you must use Capture.U Desktop 1.1.1 or later.

The latest version of the Capture.U app provides these new features:

- A new visualization mode, **AR Visualization**, enables you to benefit from Apple's ARKit video-based visualization while you're capturing IMU and reference video data. To do this, your iOS device must be a compatible with Apple ARKit 3. See Capture in AR Visualization mode, page 28.
- When you capture in **To Sensor** mode (see Capture to sensor, page 13), you can now use up to 20 sensors, using a single iOS device.
- The Capture.U app notifies you when you need to upgrade your Blue Trident sensors to Firmware 9, which enables you to use your sensors with both Capture.U and Vicon Nexus.
  If your connected sensors need an upgrade, when you start Capture.U, they are displayed with a yellow warning symbol and a message alerts you to their status:



Click **OK**, and upgrade the sensor firmware with Capture.U Desktop (see Update sensor firmware, page 73).

Requirements for the Capture.U app

The Vicon Capture.U app is available for iOS devices only.

Before you begin, ensure your iOS device meets or exceeds these requirements:

- iOS 11 and later - with BLE 4.2 and later devices (1.1)
  To access AR Visualization capture mode, Vicon recommends an iOS 13 device, BLE 5 and an Apple A12 Bionic or above chip device.
- iOS 13 and BLE 4.2 devices:
  - iPad 5th generation (2017) (A9), iPad Air 2 (A8X), iPad mini 4 (A8),
    9.7-inch: iPad Pro (A9X), iPad 6th generation (2018) (A10),
    10.5-inch: iPad Pro (A10X),
    12.9-inch: iPad Pro 1st generation (A9X) and iPad Pro 2nd generation (A10X)
  - iPhone 6s (A9), iPhone 6s Plus (A9), iPhone 7 (A10), iPhone 7 Plus (A10)

For optimum performance, and to access all available capture modes, this specification is recommended:

- iOS 13, BLE 5.0 and Apple A12 Bionic (or above) chip devices.

This table lists the latest iOS 13 supported devices:

iOS devices (iOS 13)	Bluetooth 4.2 (Bionic chip)	Bluetooth 5 (Bionic chip)	Bluetooth 5 with Apple A12 Bionic chip or above (recommended)
iPhones	iPhone 6s (A9)	iPhone 8 (A11)	iPhone Xs (A12)
	iPhone 6s Plus (A9)	iPhone 8 Plus (A11)	iPhone Xs Max (A12)
	iPhone 7 (A10)	iPhone X (A11)	iPhone XR (A12)
	iPhone 7 Plus (A10)	iPhone Xs (A12)	iPhone 11 (A13)
		iPhone Xs Max (A12)	iPhone 11 Pro (A13)
		iPhone XR (A12)	
		iPhone 11 (A13)	
		iPhone 11 Pro (A13)	
iPads	12.9-inch iPad Pro 2nd generation (A10X)	12.9-inch iPad Pro 3rd generation (A12X)	12.9-inch iPad Pro 3rd generation (A12X)
	12.9-inch iPad Pro 1st generation (A9X)	11-inch iPad Pro (A12X)	11-inch iPad Pro (A12X)
	10.5-inch iPad Pro (A10X)	iPad Air 3rd generation (A12)	iPad Air 3rd generation (A12)
	9.7-inch iPad Pro (A9X)	iPad mini 5th generation (A12)	iPad mini 5th generation (A12)
	9.7-inch iPad 6th generation (2018) (A10)		
	iPad 5th generation (2017) (A9)		
	iPad Air 2 (A8X)		
	iPad mini 4 (A8)		

Download and install the Capture.U app

To install Capture.U:

- Download the Vicon Capture.U app  from the App Store to your iOS device.

> Capture.U supports only Vicon Blue Trident sensors. Blue Thunder sensors are not supported.

Attach Vicon IMU sensors to a subject

The method you use to attach the sensors to your subject depends on the type of movement you want to capture.

- To capture the movement of a subject's limbs, you can attach the sensors using the supplied straps.
- To capture the movement of other parts of the anatomy (for example, where movement of the vertebrae is of interest), you can attach sensors directly, using suitable tape.

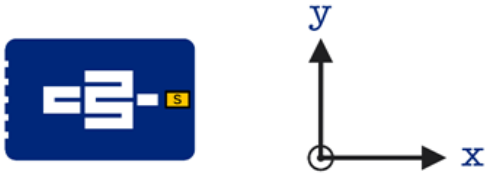
To attach sensors to a subject using the supplied straps:

1. Insert each sensor into its strap with the IMU symbol facing outwards.

2. Attach the straps to the subject, ensuring that:
   a. The strap sits snugly against the limb.
   b. The sensor is oriented with the top (head) pointing in the same direction as the movement of the subject.
   c. The flashing LED is at the top of the strap.
   The following example shows a strap attached so that the sensor sits directly on the medial aspect of the tibia, just above the medial malleolus:

To attach sensors to a subject where straps are not used:

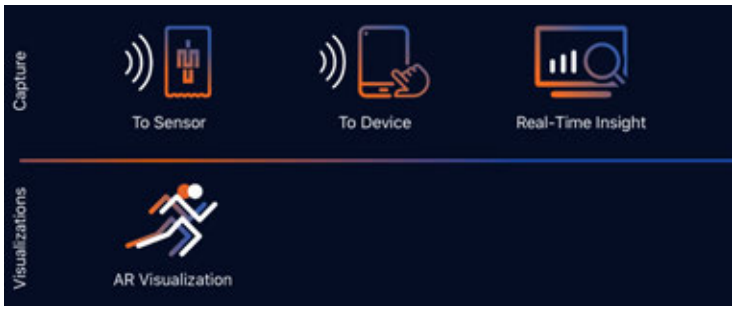
1. Position the sensor on the subject, depending on the required sensor orientation.



2. Secure the sensors using your preferred type of tape (for example, hypoallergenic, double-sided, micropore surgical tape).

Choose a capture mode

On your iOS device, start Capture.U and tap to choose a capture mode.



Your choice of capture mode depends on the number of sensors you want to use, the range you require and the type of output you want:

- For unlimited range and up to 20 sensors, with reference video data directly from the device, choose **To Sensor**. After you have captured the data, download it to your computer with Capture.U Desktop for further analysis.
- For data that is saved directly to your device (where the capture range is constrained by the Bluetooth® range of the device), choose **To Device** or **Real-Time Insight** mode.
- For access to Apple's ARKit video-based visualization (iOS device must be a compatible with Apple ARKit 3), choose **AR Visualization** mode.

> ⓘ In all capture modes, there may be a lag in data frames (a small offset) between sensors when starting capture, but the data will be synced.

The capture modes are explained in more detail in the following sections:

- Capture to sensor, page 13
- Capture to device, page 19
- Capture in Real-Time Insight mode, page 22
- Capture in AR Visualization mode, page 28
- Run Activity Widget demo, page 36

Capture to sensor

Choose the **To Sensor** mode when you want a high sensor count and unlimited range. After capturing the required movement, you can download your data with Vicon Capture.U Desktop.

An example of this type of usage might be to monitor the track performance of multiple athletes who are running a marathon. After capturing data from all the athletes, you can download the data from the sensors to your computer with Capture.U Desktop (see Use Vicon Capture.U Desktop, page 43).

Watch the Vicon video, Capture to Sensor[2] on YouTube.

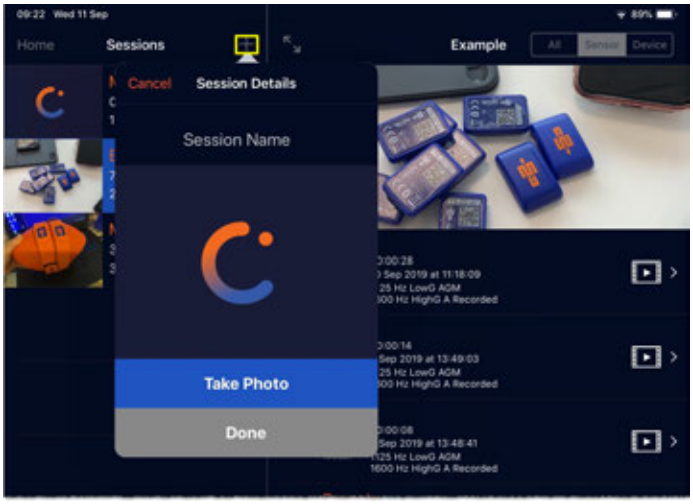
Summary of **To sensor** mode:

No. of sensors:	Up to 20
Data type:	IMU data
Video:	Reference video
Axes:	12 High G and Low G accelerometer Gyroscope and Magnetometer (option to capture all axes)
Output:	Data (.csv, with Desktop) Video (.mp4) and notes (.txt)
Range:	Unlimited
Capture rate:	High G accelerometer (default): 1600 Hz Low G accelerometer and Gyroscope: 1125 Hz Magnetometer: 100 Hz

2 https://youtu.be/yR6tCPH_iJU

To capture to sensors:

1. Open the Capture.U app.
2. In the Capture section tap **To Sensor**.
3. Either create a new session or select an existing one:
   - To create a new session:
     i. At the top of the screen, tap the plus sign + to the right of **Sessions**.

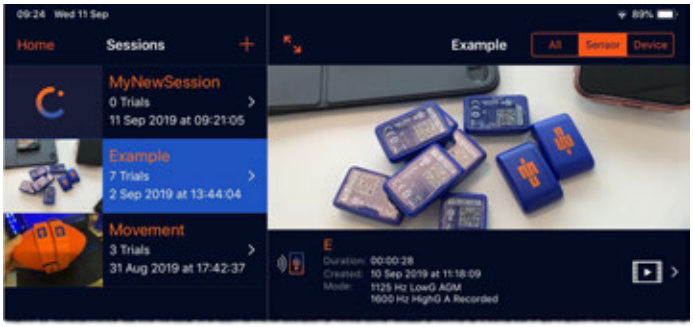


     ii. In the **Session Name** field, enter a name for your new session.

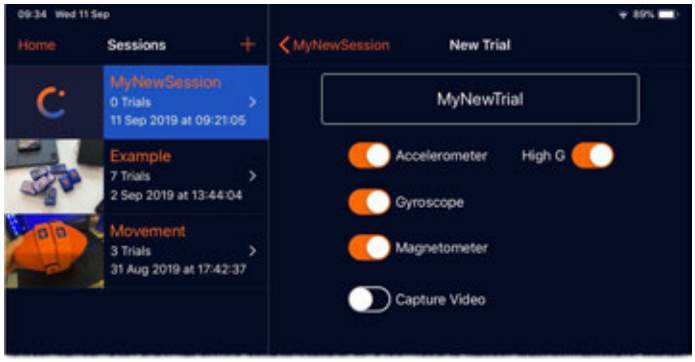
     iii. If you want to add an image as an identifier for the session, tap **Take Photo** and add the required image.

     iv. Tap **Done**.
     Your new session is displayed in the list of sessions on the left.
     (To make any changes, slide the session towards the left and tap **Edit**.)

   - To select an existing session:
     - Tap an existing session in the list on the left.

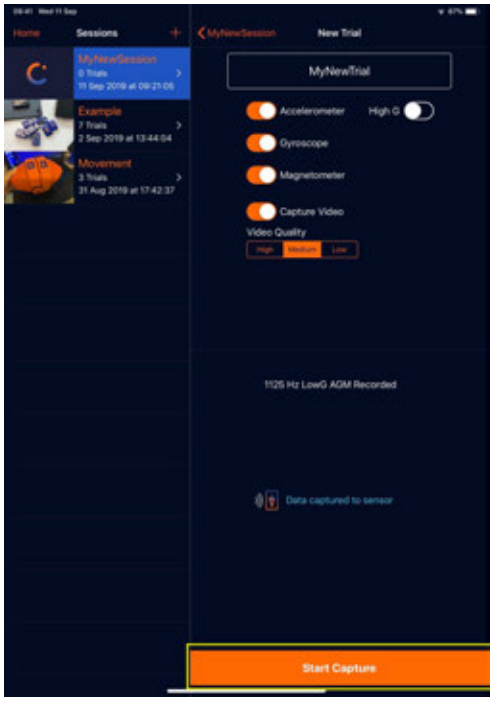


4. At the bottom right, tap **New Trial**, then enter a name for your trial and from the options below, select the data to stream (**Accelerometer (High G** or **Low G**), **Gyroscope**, **Magnetometer**), and whether you want to capture a video.



If you turn on **Capture Video**, you can choose to record **High** (1920 x 1080), **Medium** (480 x 360, the default), or **Low** quality (192 x 144) video.

5. When you have made your selections, check below to make sure the data mode is correct (in this case, it is **Data captured to sensor**), and tap **Start Capture** at the bottom right of the screen.

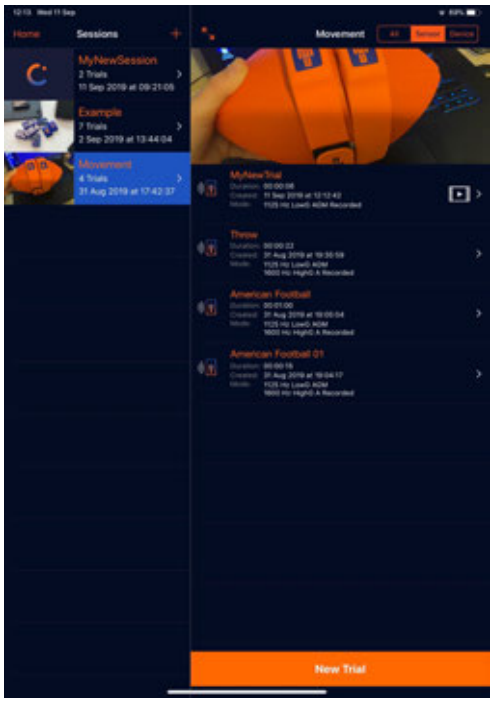


6. Select the sensors, by doing one of the following:
   - Tap to select the required sensors from the list on the right.
     or
   - Tap **Enable Tap to Select** and then tap the required sensor(s) twice.

> If one or more of the required sensors is displayed in orange and is labeled **Reset required**, see Reset sensors, page 37.

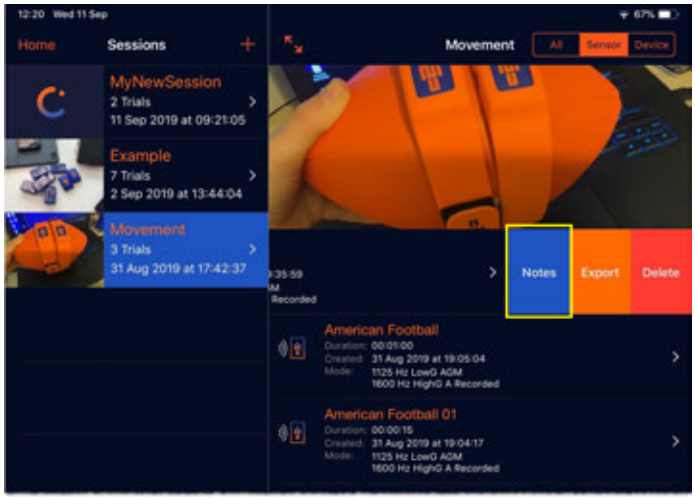
7. At the bottom right, tap **Start Capture**.
   If you chose to record a video, it is displayed at the bottom left of the screen.
   If Video is not selected, you can capture two trials simultaneously.
   To add notes during capture, tap **Notes** (top right).

8. When you have captured the required data, tap **Stop Capture**.
   Your new trial is displayed in the list of trials on the right of the screen (the most recent trial is at the top).



If you recorded a video, you can play it back on your iOS device without exiting Capture.U by tapping the video icon on the right.

To add notes after you have finished capturing, slide the trial towards the left and then tap **Notes**.



9. To export any video and/or notes that you created, slide the trial towards the left, and then tap **Export.**
   If you recorded a video, you are asked if you want to include it in the export.
   Tap **Yes**, then select the required export option.
   A .zip file with the name of your trial, which contains any notes (.txt) and video (.mp4) is exported.

> Use Quicktime or another suitable video player, eg VLC Media Player, to view the downloaded video file.

10. Download your trial data (.csv) with Capture.U Desktop (see Use Vicon Capture.U Desktop, page 43).

Capture to device

Choose the **To Device** mode when you need a higher sensor count than **Real-Time Insight** mode (which is restricted to two sensors).
Data is captured within the Bluetooth range of the device only. In this mode, you can also use reference video.

Watch the Vicon video, Capture to Device[3] on YouTube.

Summary of **To device** mode:

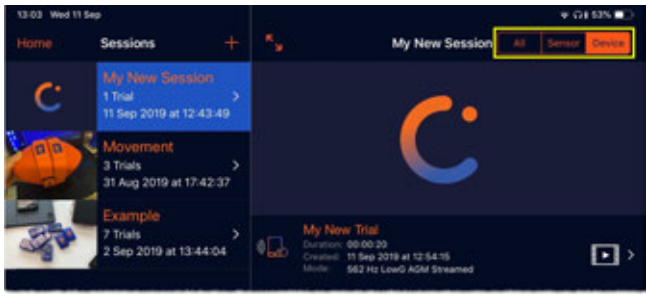
No. of sensors:	Up to 14 (depending on device, eg, BLE 4.2 iOS devices are limited to 7 sensors)
Data type:	IMU data
Video:	Reference video
Axes:	12 High G or Low G Accelerometer, Gyroscope and Magnetometer
Output:	Data (.csv), video (.mp4) and notes (.txt)
Range:	Bluetooth: 20 m+
Capture rate:	High G accelerometer (default): 800 Hz Low G: 800 Hz 2-axes: Low G + Gyroscope: 500 Hz Low G, Gyroscope and Magnetometer: 250 Hz

To capture to a device:

1. Open the Capture.U app.
2. In the Capture section tap **To Device**.
3. Add a new **Session** or select an existing one (see *Capture to sensor*, Step 3, page 14).
4. Create a **New Trial** (see *Capture to sensor*, Step 4, page 15, but note that the capture options differ, as shown in the above table) and then tap **Start Capture** at the bottom right of the screen

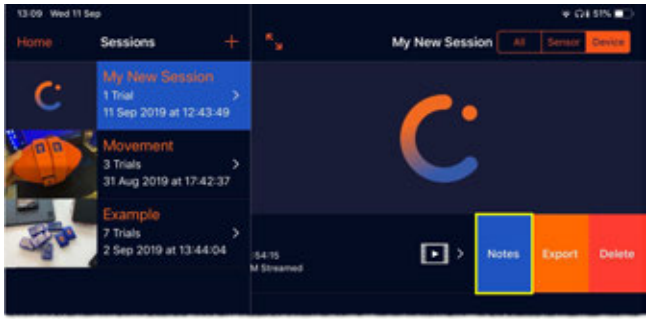
3 https://youtu.be/uFW21vz9CZE

5. Select the required sensors (see *Capture to sensor*, Step 6, page 16).
6. Tap **Start Capture**.
   To add notes during capture, tap **Notes** (top right).
7. When you have captured the required data, tap **Stop Capture**.
   Your new trial is displayed in the list of trials on the right of the screen (the most recent trial is at the top).
   Notice that in the filter at the top, **Device** is automatically selected, to display trials recorded directly to your iOS device. If required, you can change this to display trials captured to sensors, or all trials.



You can play back a recorded video on your iOS device without exiting Capture.U by tapping the video icon in the list of trials.

To add notes after capturing, slide the trial left and tap **Notes**.



8. To export your data and any video/notes, slide the trial left and tap **Export**.
   If you recorded a video, you are asked if you want to include it in the export.
   Tap **Yes**, then tap the required export option.
   A .zip file containing your data (.csv), notes (.txt) and video (.mp4) is exported.

> Use Quicktime or another suitable video player, eg VLC Media Player, to view the downloaded video file.

Capture in Real-Time Insight mode

Choose **Real-Time Insight** mode to capture movement for real-time data streaming from two sensors with video overlay. You can also define your own benchmarks (that is, you can set a threshold for alerts). For example, you can choose to be notified by a sound when a specified level is reached, so that you can easily recognize when an athlete hits a ball hard enough.

An example of using Real-Time Insight mode might be a coach and an athlete who want to review performance data together over multiple trials on an iOS device, then have the coach send the athlete a report of what was reviewed.

Watch the Vicon video, Using Real-Time Insight[4] on YouTube.

Summary of **Real-Time Insight** mode:

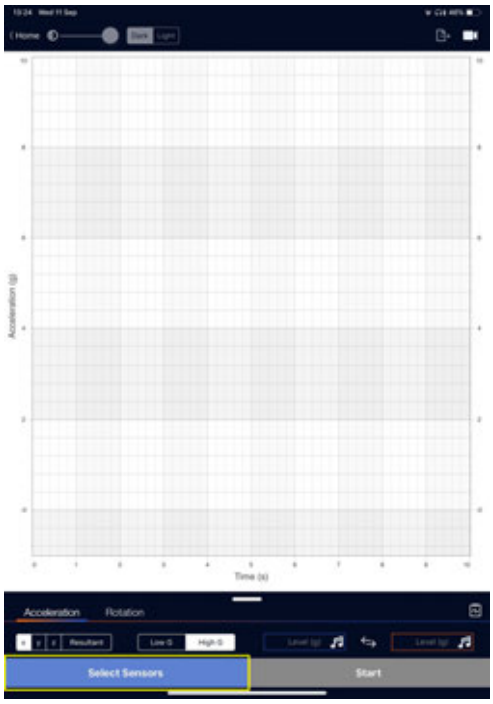
No. of sensors:	2
Data type:	IMU data
Video:	Video data real-time overlay
Axes:	3 High G Accelerometer (default) or Low G acceleration or Gyroscope
Output:	Data (.csv), video (.mp4) and report (.pdf)
Range:	Bluetooth: 20 m+
Capture rate:	High G accelerometer (default): 800 Hz Low G accelerometer and Gyroscope: 500 Hz

4 https://youtu.be/zPk-WlS5OmY

Use the Vicon Capture.U app

To use Real-Time Insight mode:

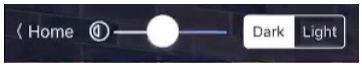
1. Open the Capture.U app.
2. In the Capture section tap **Real-Time Insight**.
3. At the bottom left of the screen, tap **Select Sensors**.



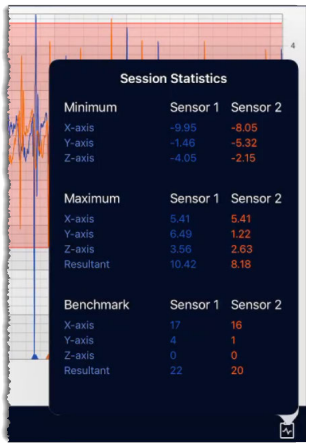
4. Select up to two sensors (for details, see *Capture to sensor*, Step 6, page 16), and then tap **Set**.

5. Select either **Acceleration** (**x**, **y**, **z**, or **Resultant** and **Low G** or **High G**) or **Rotation** (**x**, **y**, or **z**).
   Note that **Resultant** is the peak resultant acceleration, which is calculated by $\sqrt{x^2 + y^2 + z^2}$
   With the **High G** accelerometer selected, the resultant acceleration can reach up to 346 G.
   With the the **Low G** accelerometer selected, the resultant acceleration can reach up to 26 G.
6. At the bottom right of the screen, tap **Start**.
7. To play a sound when a specified level is reached, in the **Benchmarks** area, enter the required values in the benchmark fields.
   The values are indicated by a shaded area on the graph.
8. To view and optionally record real-time video (recorded at 1920 x 1080), tap the Video icon  at the top right of the screen.

The graph is overlaid on the video. To make the graph easier to see, the controls at the top right of the screen, enable you to change the opacity of the graph or select a dark or light version.

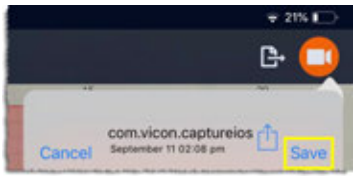


9. To see statistics for the capture in real time, tap the Statistics icon  , towards the bottom right of the screen.
   The minimum and maximum values detected by the sensors are displayed, in addition to how many times the benchmark values have been reached.



10. When you have captured the required movement, tap **Stop**.

11. From the export icons, select the required export type (file or video):
    - To save a video to your device, tap the Video icon (top right) and then tap **Save**.

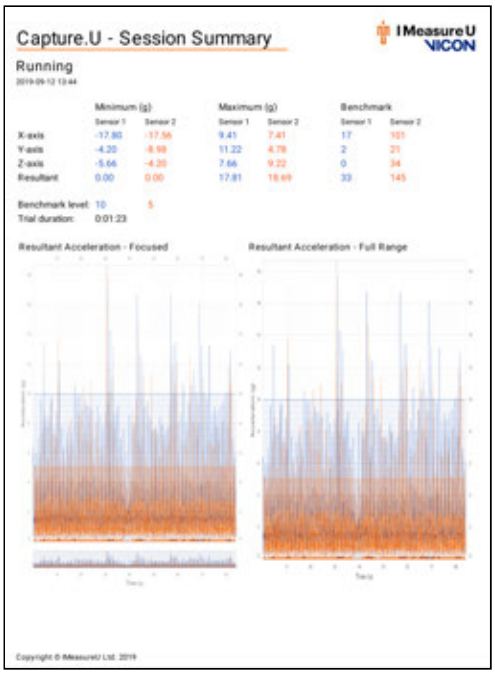


> Find saved videos on the **Photos** tab in the Photos app .

    - To export either a report (.pdf) or data (.csv), or to browse previously recorded videos, tap the File icon (top right).

        - If you choose **Export to PDF**, you can add a title in the PDF preview that is displayed.
          The preview shows the information that will be displayed in the exported PDF, with statistics information at the top of the page, a Focused view of the graph (showing the region of interest) and Full Range view (showing the whole range). This lets you check that the graph is as required before you export it. If it isn't, tap **Cancel**, change the **Acceleration** and/or **Rotation** to show a graph of the required view (X, Y, Z, or Resultant) and tap **Export to PDF** again.

When you're happy with the preview, tap **Export** at the top to export the PDF.



- If you choose **Export to CSV**, the data values exported can be X, Y and Z, but not Resultant.

  > If either LowG or Gyroscope is selected, both LowG and Gyroscope are exported.

- If you choose **Browse Video**, previously captured Real-Time Insight videos are listed. Tap to select a video, then play a minimized preview by tapping the Play icon at the bottom, or tap **Use** at the top right to play in full-screen mode.

Capture in AR Visualization mode

Choose **AR Visualization** mode to explore how using the ARKit with Capture.U can enhance your in-field capture experience while you're capturing IMU and reference video data.

Important
To access the AR Visualization capture mode, your iOS device must:

- Be compatible with the Apple ARKit 3
- Use iOS 13, with the Apple A12 Bionic chip (or later)

If you select this capture mode on an iOS device that doesn't meet these requirements, a message warns you that your device is incompatible, and you are unable to proceed in this mode.

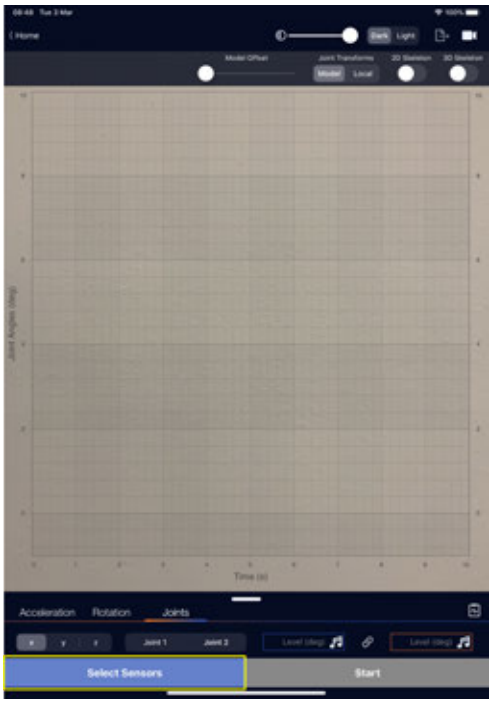
Summary of **AR Visualization** mode:

No. of sensors:	2
Data type:	IMU data
Video:	Video data real-time overlay
Output variables:	4 Joint Angles (default) High G Accelerometer or Low G acceleration or Gyroscope
Output:	Data (.csv), video (.mp4) and report (.pdf)
Range:	Bluetooth: 20 m+
Capture rate:	High G accelerometer (default): 800 Hz Low G accelerometer and Gyroscope: 500 Hz

Use the Vicon Capture.U app

To use AR Visualization mode:

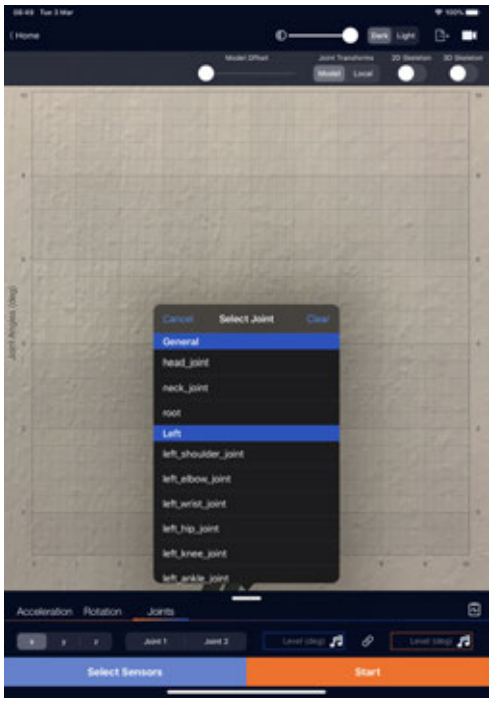
1. Open the Capture.U app.
2. In the Visualizations section tap **AR Visualization**.
3. At the bottom left of the screen, tap **Select Sensors**.



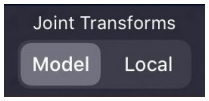
4. Select up to two sensors (for details, see *Capture to sensor*, Step 6, page 16), and then tap **Set**.

5. Select one of these options:

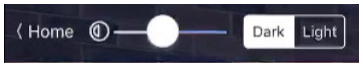
   - **Acceleration** (x, y, z, or **Resultant** and **Low G** or **High G**)
     Note that **Resultant** is the peak resultant acceleration, which is calculated by $\sqrt{x^2 + y^2 + z^2}$
     With the **High G** accelerometer selected, the resultant acceleration can reach up to 346 G.
     With the the **Low G** accelerometer selected, the resultant acceleration can reach up to 26 G.
   - **Rotation** (x, y, or z)
   - **Joints**, which lets you select two joint angles that are derived from the Apple ARKit 3 (tap **Joint 1**, select the required joint, then tap **Joint 2** to select it).



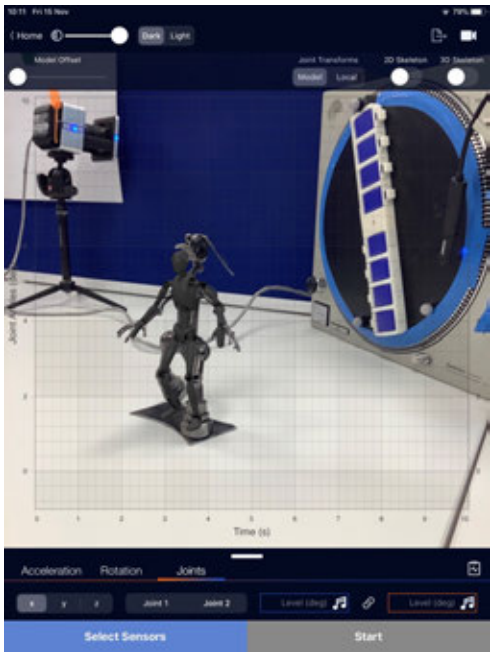
6. At the top right of the screen, you can select whether the joint transforms are model transforms (relative to the root joint) or local transforms (relative to the parent). The default setting is **Model**.



7. At the bottom right of the screen, tap **Start**.
8. To play a sound when a specified level is reached, in the **Benchmarks** area, enter the required values in the benchmark fields.
   The values are indicated by a shaded area on the graph.
9. To record real-time video (recorded at 1920 x 1080), tap the Video icon  at the top right of the screen.
   The graph is overlaid on the video. To make the graph easier to see, the controls at the top right of the screen enable you to change the opacity of the graph or select a dark or light version.



When a subject is visible, the AR figure automatically overlays its image.

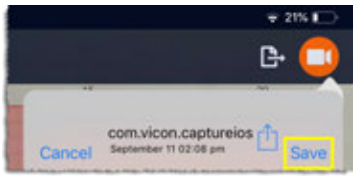


10. To offset the skeleton from the tracked subject, use the **Model Offset** slider at the top left of the screen to apply the required offset.

11. To enable or disable 2D and 3D skeleton visualization, select the required **2D Skeleton** and **3D Skeleton** option(s) below the Video icon.
You can select 2D, 3D, or both.

12. To see statistics for the capture in real time, tap the Statistics icon  , towards the bottom right of the screen.
    The minimum and maximum values detected by the sensors are displayed, in addition to how many times the benchmark values have been reached.

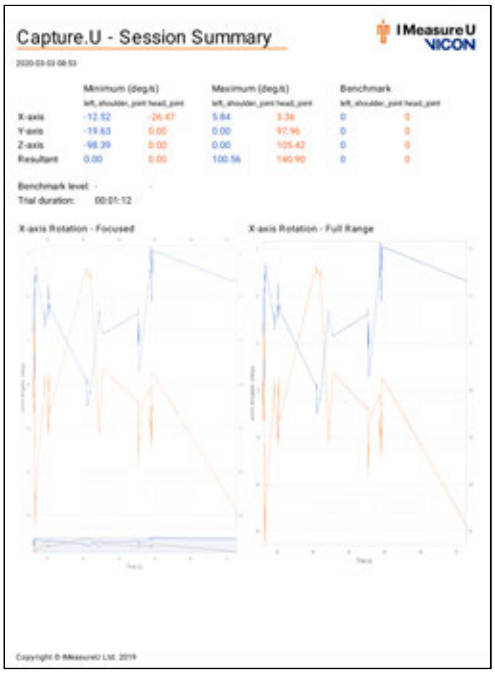
13. When you have captured the required movement, tap **Stop**.
14. From the export icons, select the required export type (file or video):
    - To save a video to your device, tap the Video icon (top right) and then tap **Save**.



Find saved videos on the **Photos** tab in the Photos app.

- To export either a report (.pdf) or data (.csv), or to browse previously recorded videos, tap the File icon (top right).

- If you choose **Export to PDF**, you can add a title in the PDF preview that is displayed.
  The preview shows the information that will be displayed in the exported PDF, with statistics information at the top of the page, a Focused view of the graph (showing the region of interest) and Full Range view (showing the whole range). This lets you check that the graph is as required before you export it. If it isn't, tap **Cancel**, change the **Joints**, **Acceleration** and/or **Rotation** to show a graph of the required view (X, Y, Z, or Resultant) and tap **Export to PDF** again. When you're happy with the preview, tap **Export** at the top to export the PDF.



- If you choose **Export to CSV**, the data values exported can be X, Y and Z, but not Resultant.

  > If you chose to display High G acceleration, High-G and joint data is exported.
  > If you chose to display Joints, Low-G accelerometer and gyroscope data is exported with the joint data.

- If you choose **Browse Video**, previously captured videos are listed. Tap to select a video, then play a minimized preview by tapping the Play icon at the bottom, or tap **Use** at the top right to play in full-screen mode.

Run Activity Widget demo

The Activity Widgets provide pre-defined workflows that have output metrics.

Activity Widgets might be particularly useful in situations where a quick assessment with minimal/no user setup is required, for example, in undergraduate research projects, grass-roots sports, etc.

For a quick demonstration, you can view an animated GIF example. To do this:

1. From the **Activity Widgets**, select **Swimming**.
2. Hold the iOS device in landscape orientation.
3. Tap the screen to run the example through each workflow screen.
4. When you have tapped through all the screens, you are returned to the home screen.
   This provides an overview of the workflow for the activity widgets.

> To exit the Swimming GIF example at any time, tap **Home**.
> You are returned to the Capture.U app home screen.

Further, fully interactive Activity Widgets are planned.

Reset sensors

When you select a capture mode and tap **Select Sensors**, if one or more of the sensors needs a reset, it is displayed in orange and is labeled **Reset required**.

This may happen, for example, if you close the app before stopping a capture.

You can reset sensors using the **Reset sensors** option.

To reset sensors:

1. Tap the Settings icon (the cog symbol, bottom right).

2. Tap **Reset sensors**.

3. Select the sensor by doing one of the following:
   - Select **Tap to Select** and then tap the sensor twice.
     or
   - In the list in the app, tap the sensor name.

   The sensor is selected.

4. Tap **Reset Selected**.

The reset sensor(s) are now available and the app returns to the **Settings** window.

5. To close the **Settings** window, tap the **Back** button or tap a blank area of the Capture.U screen.

Get help on the Capture.U app

1. Tap the Settings icon (the cog symbol, bottom right).

2. Tap **Help**.
3. Tap one of the options:
   - **Customer Support** Opens the Vicon Support webpage[5].
   - **Privacy Policy** Displays the Vicon Capture.U legal policy[6].
   - **Terms of Use** Displays the Vicon Capture.U terms of use[7].
4. To close the **Settings** window, tap the **Back** button or tap a blank area of the Capture.U screen.

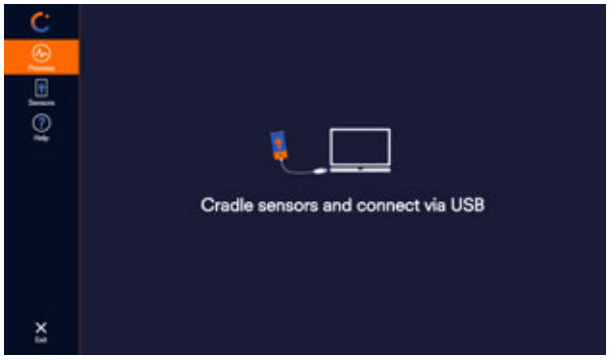
5 https://www.vicon.com/support
6 http://legal.vicon.com/app_privacy_policy.html
7 http://legal.vicon.com/ios_terms_of_use.html

Known issues for the Capture.U app

Issue	Workaround
The ARKit 3 joint data and the Vicon IMU data is not time-synced.	To synchronize the data post-capture, ensure the subject performs a foot-stamp (or any other movement that shows a clear, recognizable signal in both streams) during capture.
In AR Visualization mode, if you export a CSV file, the folder that contains the CSV files is exported with the correct filename (eg, AR Visualization *Date TimeStamp*), but within that folder, some files have *Real-Time Insight* in their names, so the filename is displayed as: *Sensor Number* Realtime Insight *Date TimeStamp*.csv instead of *Sensor Number* AR Visualization *Date TimeStamp.csv* The correct AR visualization data is exported.	None. (To avoid confusion, you may want to rename the file after export.)
When Capture.U is used on an iPhone, it remains in portrait orientation, even when the phone is rotated.	None: this is intended behavior. When Capture.U is used on iPhones, for optimal use of the screen proportions, it is displayed in portrait mode only.
On iPhones, graphs are always exported in portrait orientation (side-by-side).	None: this is intended behavior. As iPhones are locked to portrait orientation (see above), graphs are always exported in portrait orientation (side-by-side).
In Real-Time Insight mode, when you set benchmarks, you can't close the Benchmark keyboard.	To close the Benchmark keyboard, tap the Real-Time Insight graph.
If trial and/or session names are followed by a double space, a period is automatically added. The period is an illegal character, so if you try to use a trial or session name that is followed by a period, the Capture.U app does not save it.	Do not append a double space to trial or session names.

Issue	Workaround
Downloaded High G accelerometer data may exhibit "latching". This is where, when the data becomes close to zero, its value is automatically rounded to zero.	None

Use Vicon Capture.U Desktop



Vicon Capture.U Desktop lets you download data that you collected with Vicon Blue Trident IMU sensors and access a walk-through and documentation.

From Capture.U Desktop, you can export data as CSV (both raw data export and Aligned CSV, for synchronized sensor data, enabling you to directly compare IMU axes), or X1D (for import to Nexus) for further analysis.

Watch the Vicon video, Using Capture.U Desktop[8] on YouTube.

When using Capture.U Desktop, note that:

- Capture.U Desktop is a fixed size window so can't be minimized or maximized.
- To close Capture.U Desktop, click the **Exit** button (bottom left of the window).
- Capture.U Desktop 1.1.1 is supported by Firmware 9.x, and the Capture.U 1.1 app and Nexus 2.10 are supported by Firmware 9.0.4 and later.

For more information about Capture.U Desktop, see:

- What's new in Capture.U Desktop 1.1?, page 45
- Requirements for Capture.U Desktop, page 52
- Download and install Capture.U Desktop, page 52
- Connect sensors to Capture.U Desktop, page 53
- Download a trial from the sensors, page 56
- Edit a downloaded trial, page 69
- Manage connected sensors, page 70

8 https://youtu.be/_RC28CXasrk

Use Vicon Capture.U Desktop

What's new in Capture.U Desktop 1.1?

Capture.U Desktop 1.1.1

The latest release of Capture.U Desktop addresses issues found in Capture.U Desktop 1.1 and embeds firmware 9.0.4, which is the supporting firmware for both the Capture.U 1.1 app and for Nexus 2.10.

Capture.U Desktop 1.1

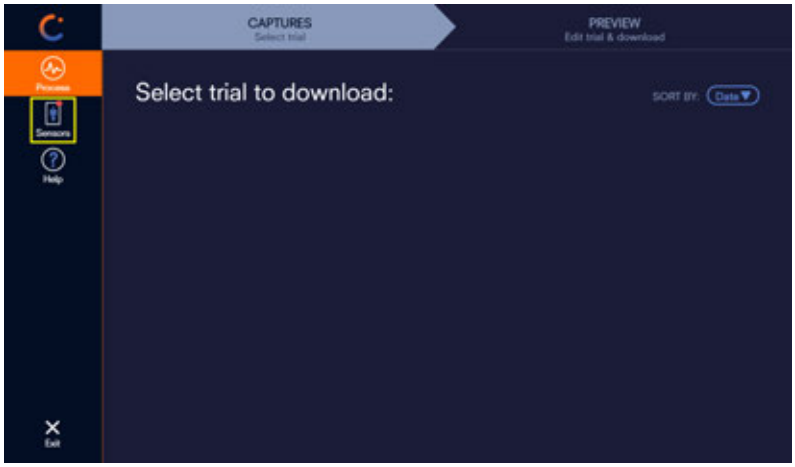
Capture.U Desktop 1.1 provides the following features:

Support for Firmware 9

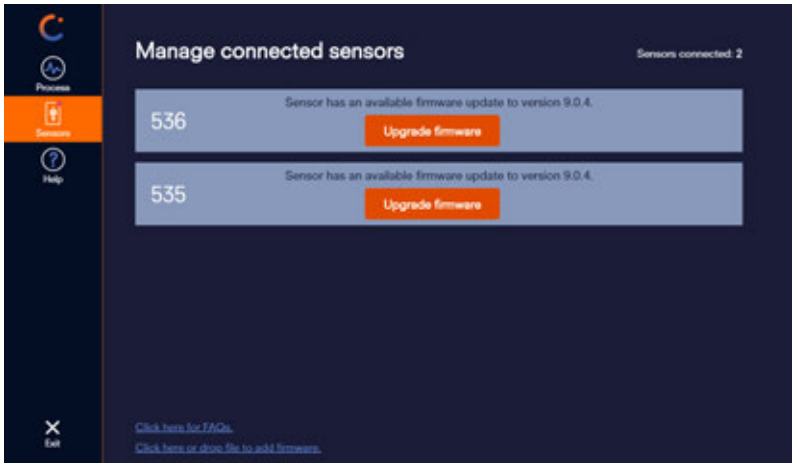
Capture.U Desktop enables you to upgrade your Blue Trident sensors to Firmware 9, which enables integration with Nexus 2.10 and the Capture.U app.

To upgrade Blue Trident sensors:

1. Connect the sensors to the computer and launch Capture.U Desktop 1.1.1. The connected sensors display a red circle to let you know that firmware needs to be upgraded.

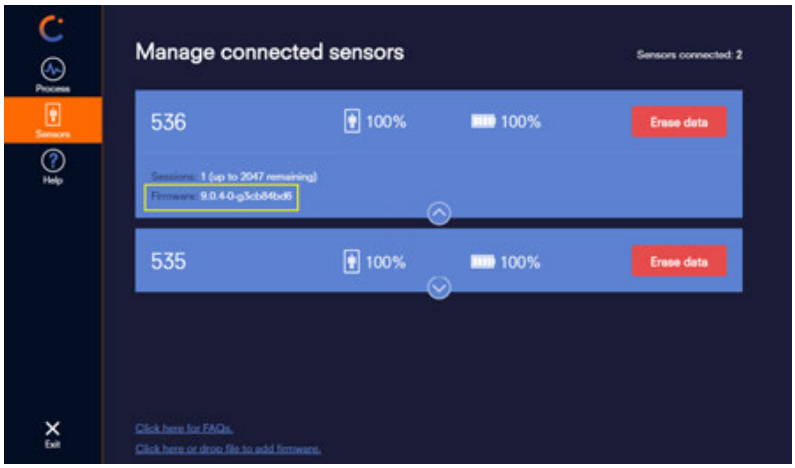


2. Click the **Sensors** tab.
   Capture.U Desktop informs you of the availability of a firmware upgrade.



3. Click **Upgrade firmware**.

When the firmware has finished updating, you can expand the displayed information to view the updated firmware number on the **Sensors** tab.



Load updated firmware (9.x) to upgrade Blue Trident sensors

If new Blue Trident sensor firmware becomes available (that is, firmware later than 9.0.4), add this file to Capture.U Desktop either by clicking or dropping the firmware file into the **Sensors** tab.

To revert back to 9.0.4 firmware, remove the added firmware file by deleting the firmware file located in:

C:\Users\Username*AppData\Roaming\Capture.UDesktop\firmware*

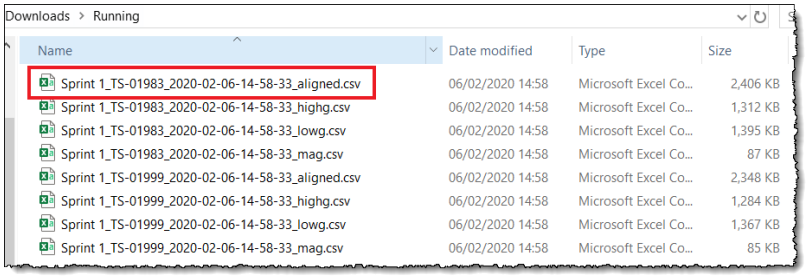
Synchronize and align data for a CSV export

Capture.U enables you to export a synchronized CSV. For example, the low-G (16-G) accelerometer, which captures at 1125 Hz, is synchronized and aligned to the high-G (200-G) accelerometer, which captures at 1600 Hz.

To export aligned CSV data:

1. On the **Process** tab, select **Aligned CSV**.

2. Click **Download** to export the aligned CSV data.
   All the synchronized and aligned CSV files include `_aligned` on the CSV export.

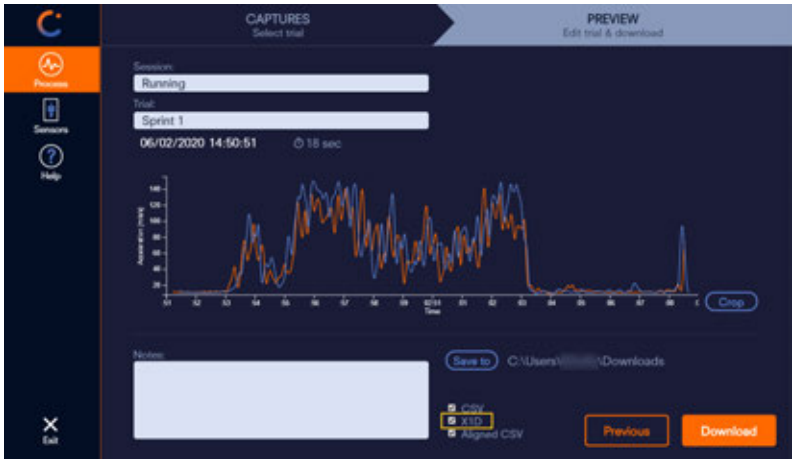


Export X1D files

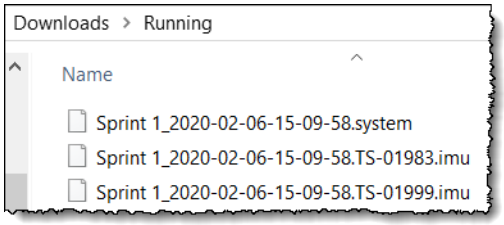
The X1D export option enables you to import captured **To Sensor** trials into Vicon Nexus 2.10.

To export an X1D file:

1. On the **Process** tab, select **X1D**.



2. Click **Download**.
   The X1D file is exported as *.imu* and *system* files.



3. Load this file into Nexus.

Requirements for Capture.U Desktop

The following requirements are the minimum that are recommended and fully supported:

Capture.U Desktop for Windows

- Windows 10 (64 bit)

Capture.U Desktop for OSX

- macOS Sierra (10.12)

Download and install Capture.U Desktop

To install Capture.U Desktop on your computer:

1. Check that your computer software meets the recommended specification (see Requirements for Capture.U Desktop, page 52).
2. Download Capture.U Desktop from: https://www.vicon.com/software/capture-u/
3. Unzip and double-click the .exe file to install.

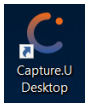
Connect sensors to Capture.U Desktop

To connect sensors:

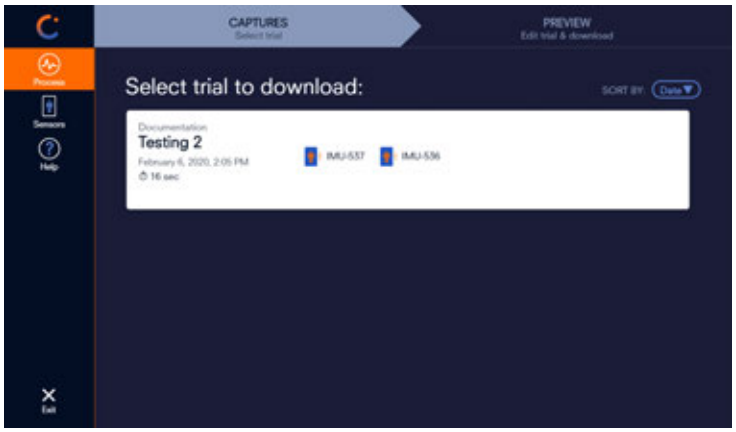
1. Insert each Blue Trident sensor into its USB adapter.
2. With the supplied micro-USB cables, connect the adapter(s) to the computer.

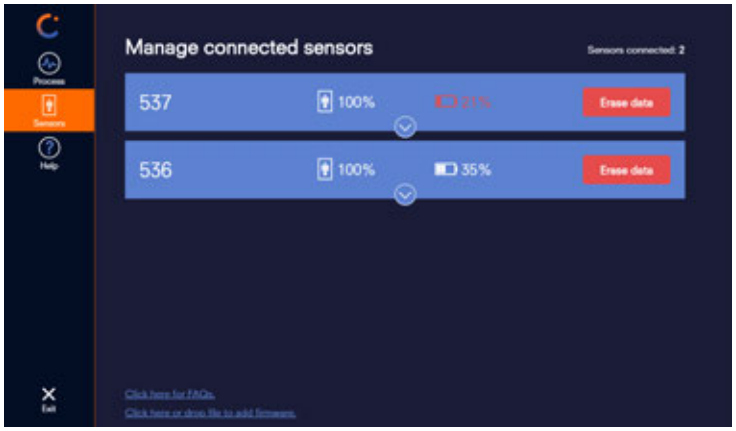
If you can't connect all the sensors that were used for capturing data because you used more sensors that you have USB ports, connect the sensors to the available ports. You will be able to connect the remaining sensors later. For more information, see Download a trial when some sensors are not connected, page 63.

3. On your computer, start Capture.U Desktop.



4. To confirm that one or more sensor(s) is connected to Capture.U Desktop, click either **Process** or **Sensors**.
   All connected sensors are displayed.





Capture.U icons on the Captures tab

The following icons are displayed on the **Captures** tab to indicate the status of the sensors:

Icon	Meaning
	Blue Trident sensor is connected to Capture.U Desktop.
	Blue Trident sensor is not connected to Capture.U Desktop.
	Blue Trident sensor was selected for the trial, but no data has been recorded or data has been erased.
	Blue Trident sensor data has been downloaded for the trial.

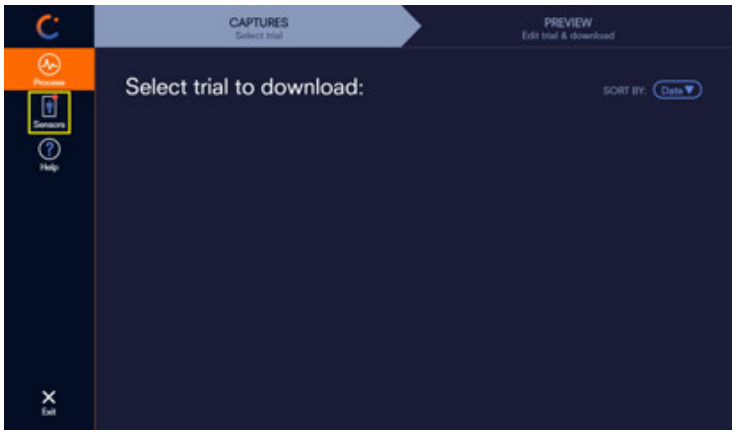
Download a trial from the sensors

The following steps describe how to download a trial from the sensors where all the sensors used for the capture are connected and no data is missing. For information on other scenarios, see also:

- Download a trial when some sensors are not connected, page 63
- Download a trial when sensor data has been erased, page 67

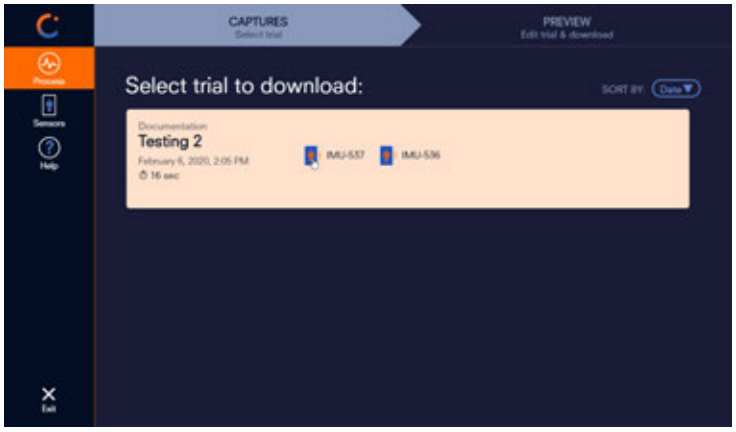
To download a trial from the sensors:

1. Ensure your Blue Trident sensors are connected to your computer (see Connect sensors to Capture.U Desktop, page 53).
   If a red circle is displayed in the top right of the **Sensors** symbol, the Blue Trident sensors need a firmware update.

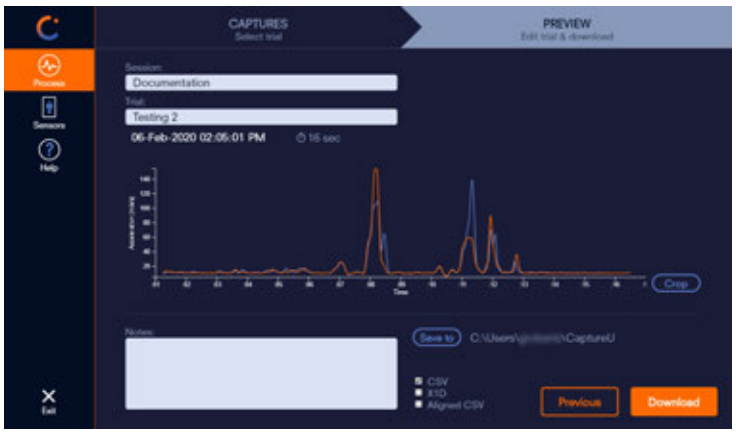


   Before attempting to continue, update the firmware (see Update sensor firmware, page 73).
   Note that you can't download trials that were captured with the **To Sensor** capture mode until the sensor firmware has been updated.

2. Select **Process** and on the **Captures** tab, under **Select trial to download**, click the required trial.

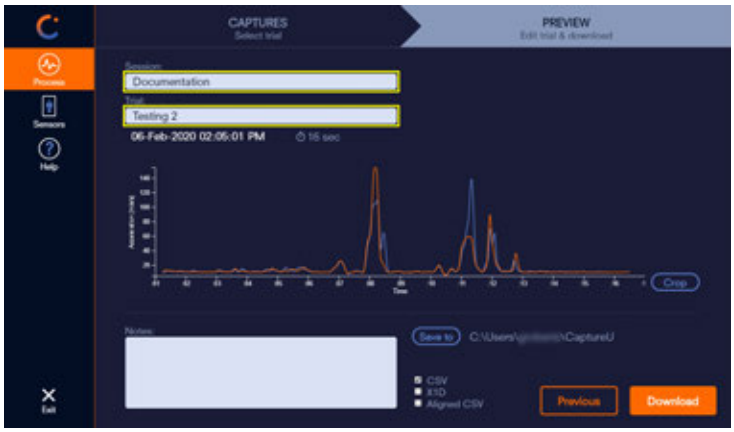


The **Process** screen changes from the **Captures** tab to the **Preview** tab.

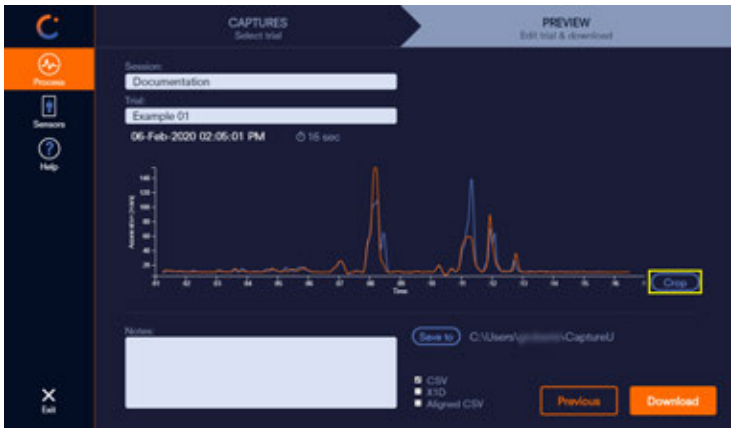


Preview shows the Resultant acceleration, not the captured onboard data.

3. If required, before downloading the trial, you can edit the capture to rename it, crop it, add notes, and/or change the Save location:
   - To rename the trial, click in the **Session** and/or **Trial** fields.



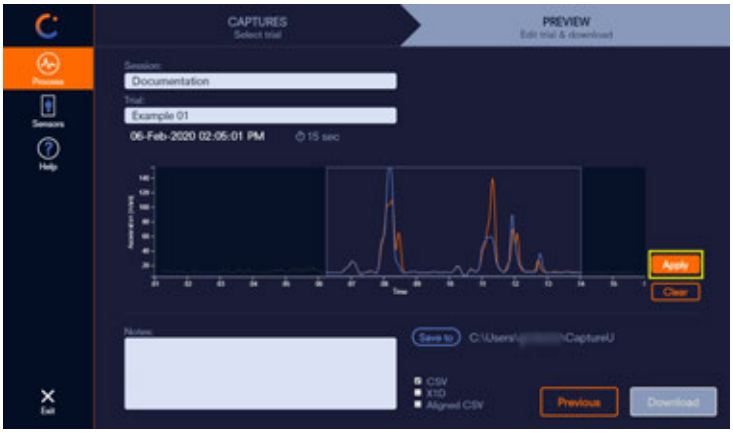
   - To crop the trial, so that you download only the region of interest:
     i. Select the **Crop** button at the bottom right of the graph.



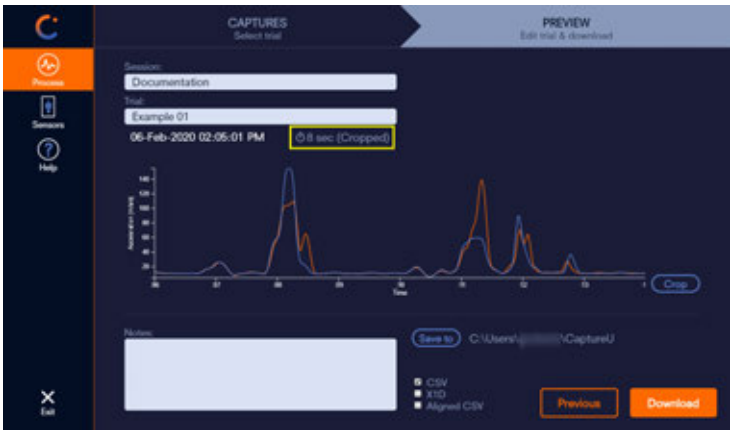
     ii. Select the required part of the trial by clicking on the graph then dragging over the region of interest.
     The selected region is indicated by a rectangle. If you need to adjust the size of the selected region, drag the sides of the rectangle.

In the following example, the selected region excludes the start and end of the trial.

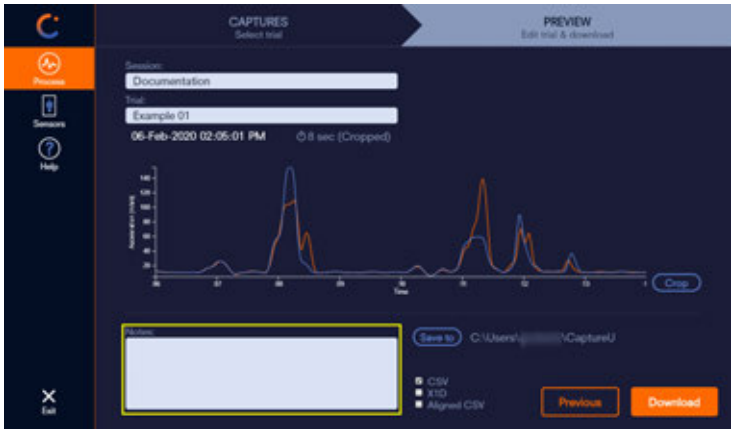
iii. Select **Apply** to crop the trial.



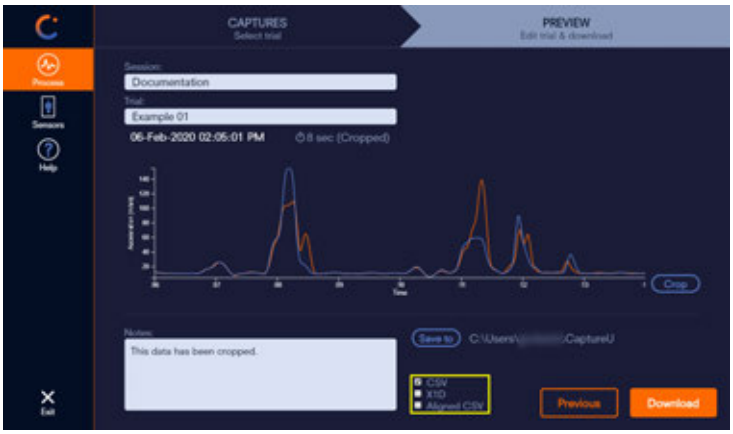
The time of the trial changes to the cropped time.



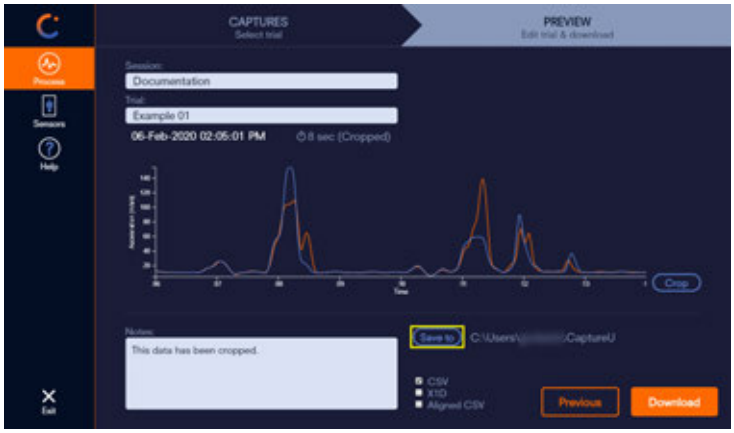
- To add notes, click in the **Notes** field (bottom left).



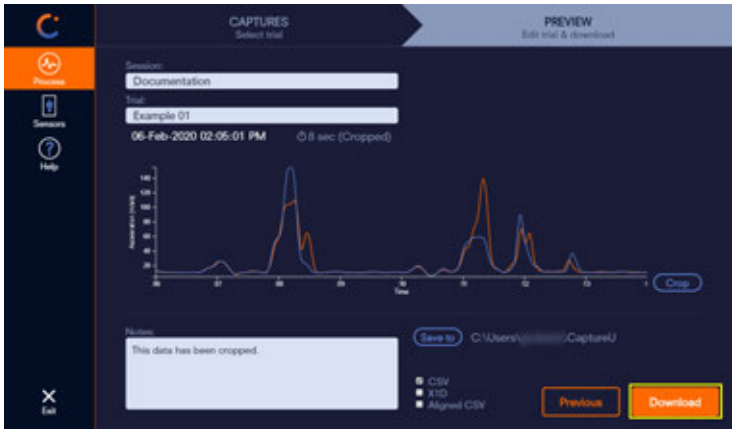
- To change the file type to download, select from:
  - **CSV** The default setting
  - **X1D** For import into Nexus
  - **Aligned CSV** Exports synchronized sensor data, also as a CSV file, so that you can directly compare your IMU axes.



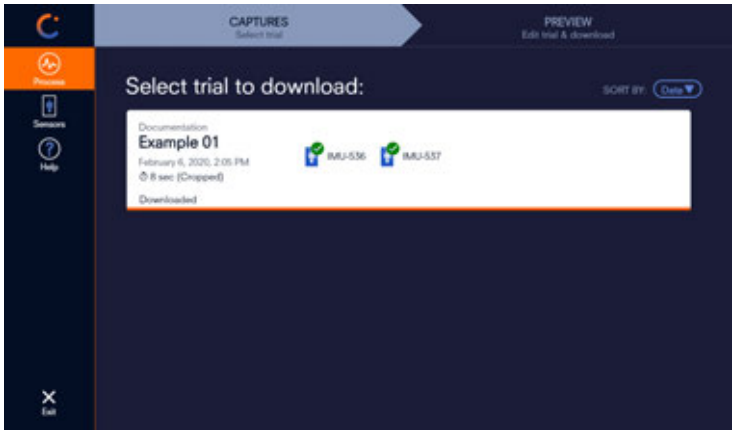
- To change the location for downloaded trials, click **Save to**.
  This displays the File Explorer, enabling you to select the required folder.



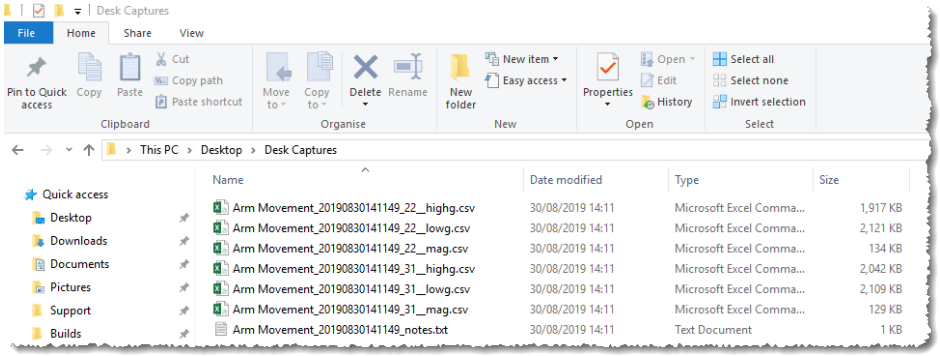
4. When you have finished editing the trial, click **Download** to save the trial data to your computer.



An orange progress bar indicates the download status.
When the trial has finished downloading, the trial is labeled **Downloaded** and green check marks are displayed on each sensor.



The trial data and any notes you created are saved in the **Save to** folder.

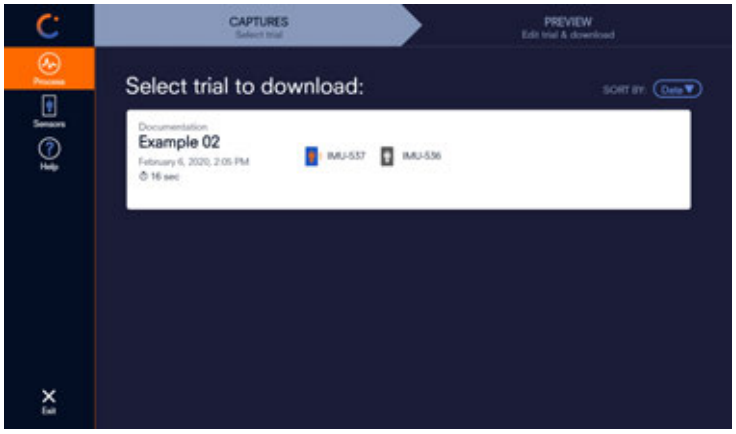


Download a trial when some sensors are not connected

If you can't connect all the sensors that were used for capturing data because you used more sensors that you have USB ports, connect the sensors to the available USB ports. You will be able to connect the remaining sensors later.

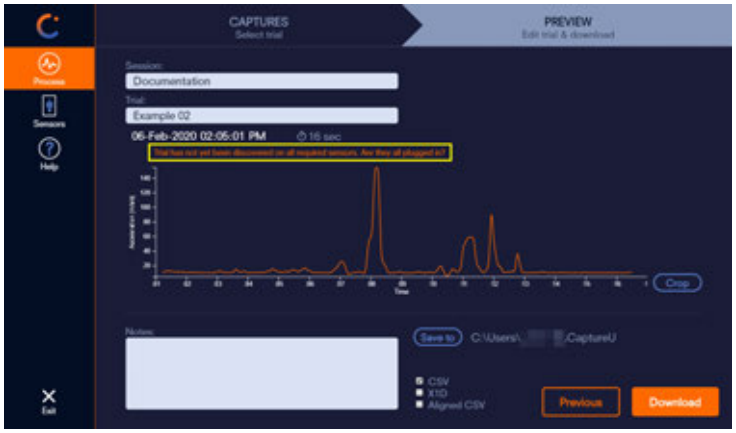
To download a trial when some sensors are not connected:

1. Connect sensors to the available USB ports on your computer (see Connect sensors to Capture.U Desktop, page 53).
2. Select **Process** and on the **Captures** tab, notice that connected sensors are displayed in blue and sensors that are not connected are displayed in gray. This example shows a trial that was captured with two sensors, but with only one of the sensors connected.

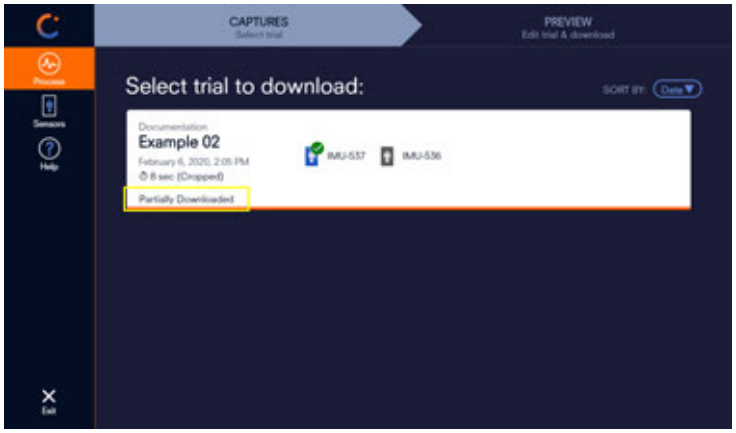


3. Under **Select trial to download**, click the required trial.

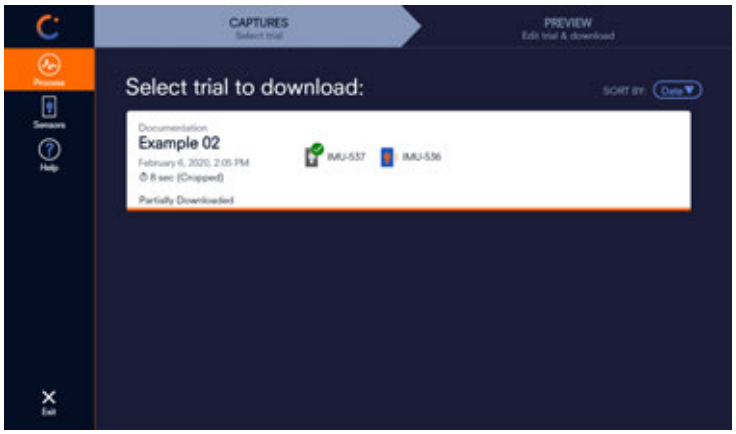
On the **Preview** tab, a message warns you that not all sensors are connected.



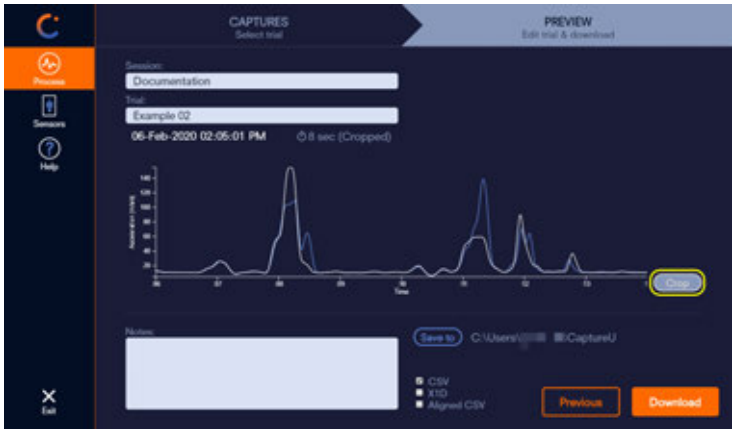
4. Edit the trial if required (see Step 3, page 58 in *Download a trial from the sensors*). To ensure data formatting is consistent, any cropping of the data of the connected sensors is automatically applied when you connect the remaining sensors.
5. When you have finished any editing, click **Download**.
   When the trial has been downloaded, it is labeled **Partially Downloaded**.



6. Connect the remaining sensor(s) to the computer.

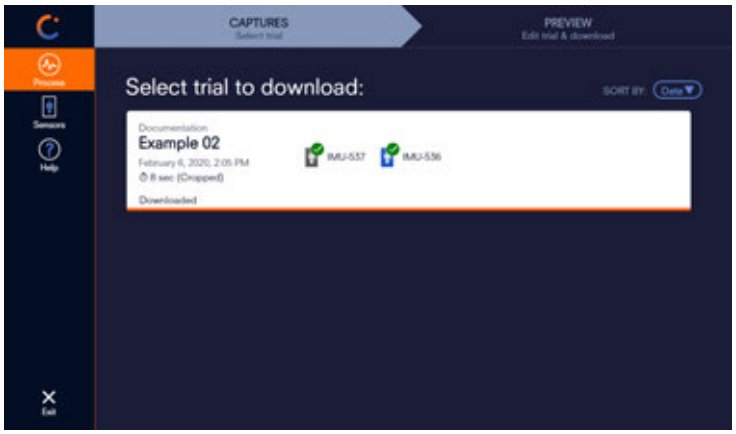


7. Select the trial.
   On the **Preview** tab, notice that the **Crop** button is unavailable, to ensure the data is formatted in the same way as the previously connected sensors.
   If you cropped the trial when you connected the first set of sensors, the trial is automatically cropped in the same way as the previously connected sensors.



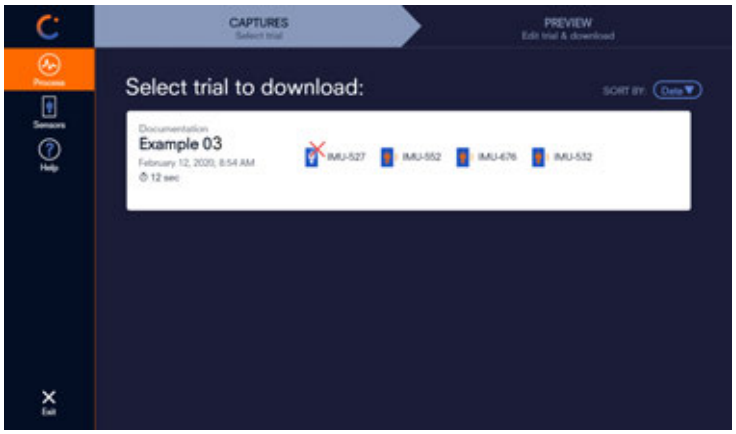
8. Click **Download**.

When data from all the sensors has been downloaded for the associated trial, green check marks are displayed for each sensor.

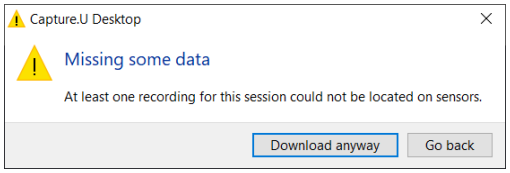


Download a trial when sensor data has been erased

1. If you deleted data from one or more sensors that were used in a trial before downloading the data, when you connect the relevant sensor(s), any sensor with deleted data is displayed with a red cross on the **Captures** tab:

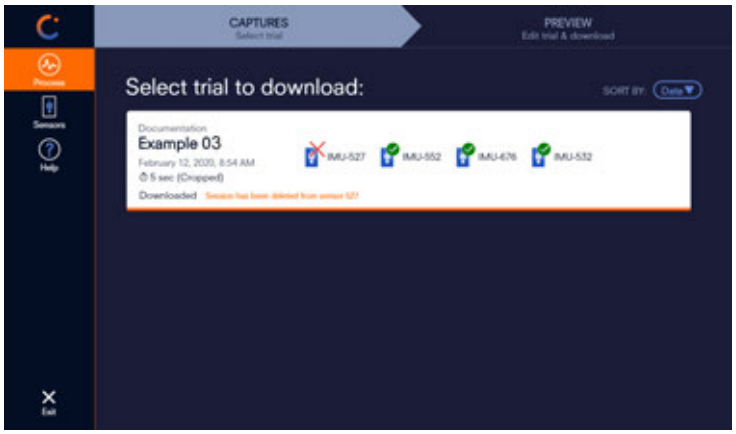


   You can still download data from the other sensors, but when you select the trial, a message warns you that some data is missing.



2. To continue, select **Download anyway**.
3. Edit the trial if required (see Step 3, page 58 in *Download a trial from the sensors*) and then click **Download**.

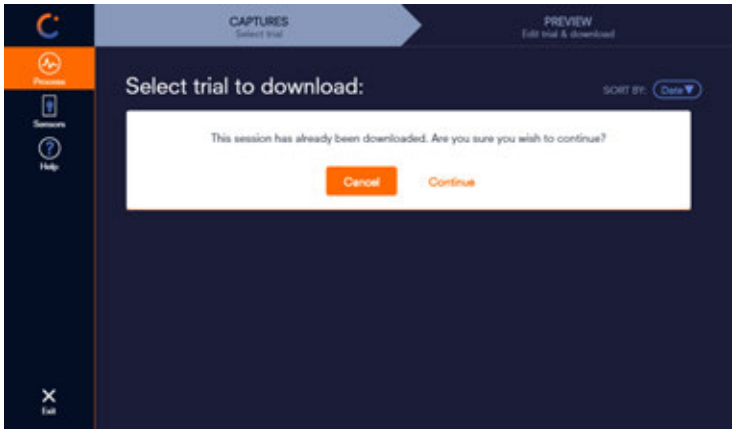
When the trial has been downloaded for all sensors, on the **Captures** tab, you are warned that the trial has not been discovered on all the required sensors.



Edit a downloaded trial

To change a trial that you have downloaded (for example, if you want to crop the trial), provided that you haven't deleted the data from the sensor, you can re-download the trial and make the required changes.

1. With the relevant sensor connected, select **Process** and on the **Captures** tab, select the required trial.
   A message notifies you that this session has already been downloaded and asks if you want to continue.



2. Click **Continue**.
   You can then edit the trial as required and download in the same way as the original download (see Download a trial from the sensors, page 56).

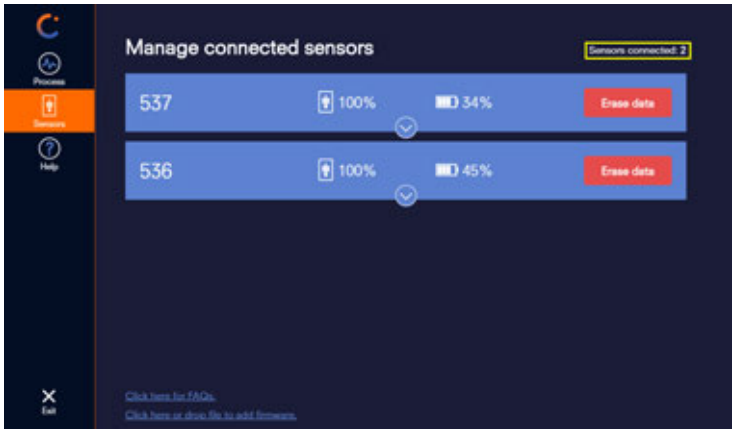
> If you haven't changed the session/trial name and Save location, the trial export files are only differentiated by their download time.

Manage connected sensors

To manage connected sensors, in the main Capture.U Desktop window, click **Sensors**.

From here you can update the firmware (see Update sensor firmware, page 73), delete data from the sensors (see Erase data from sensors, page 72), and display detailed information about each one.

At the top right of the window, the number of connected sensors is displayed.



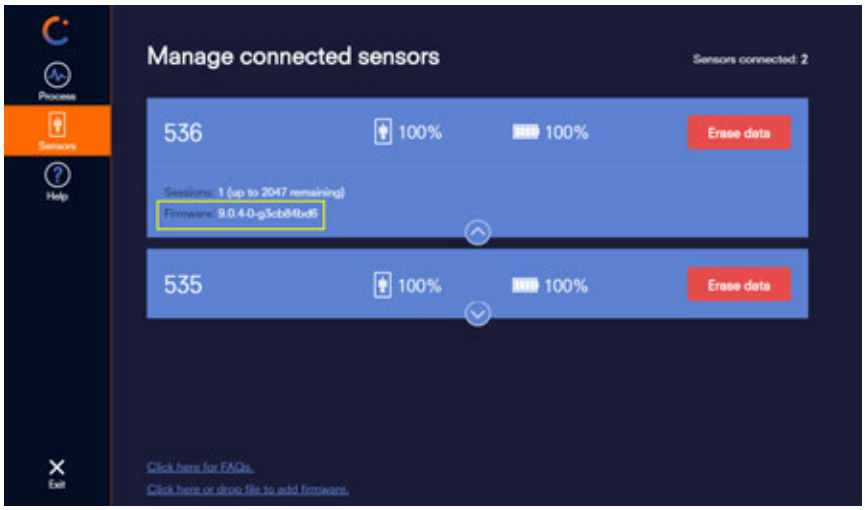
For each connected sensor, the following information is displayed (left to right):

- Sensor ID number
- Percentage of storage available for the sensor
- Battery percentage. Connected sensors are charged if they are not already fully charged.

For further information, click the downward arrow.

The following details are displayed:

- **Sessions**: Number of recorded trials on the sensor
- **Firmware version**

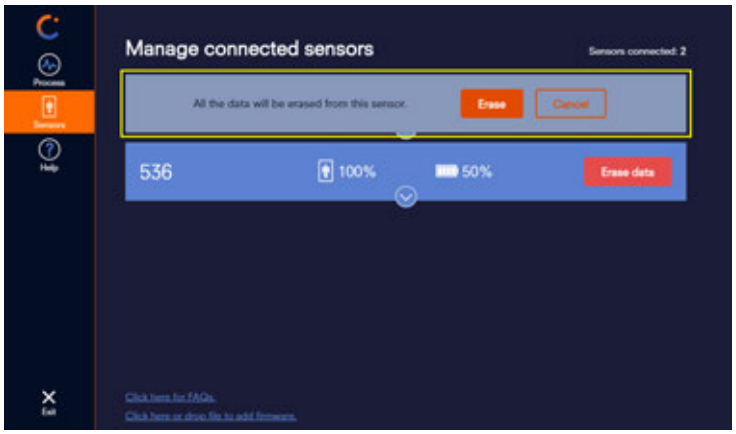


Erase data from sensors

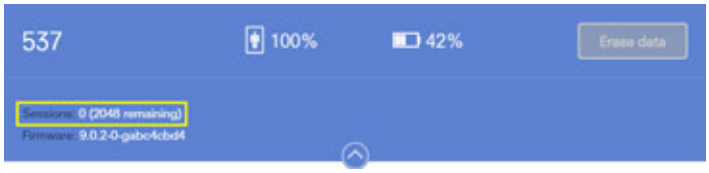
To remove unwanted data from your sensors, you delete it using the **Erase** button in the **Sensors** screen.

To erase data from a sensor:

1. Ensure the sensor(s) from which you want to erase data is connected.
2. Click **Sensors** and then for the required sensor, click **Erase**.
   A message notifies you that all data will be erased from the sensor and you're given the opportunity to confirm or cancel.



3. To delete the data from the sensor, click **Erase**.
   When the data has been erased from the sensor, the **Erase** button is disabled and if you click the down arrow, you can see that the **Sessions** information now shows a zero.

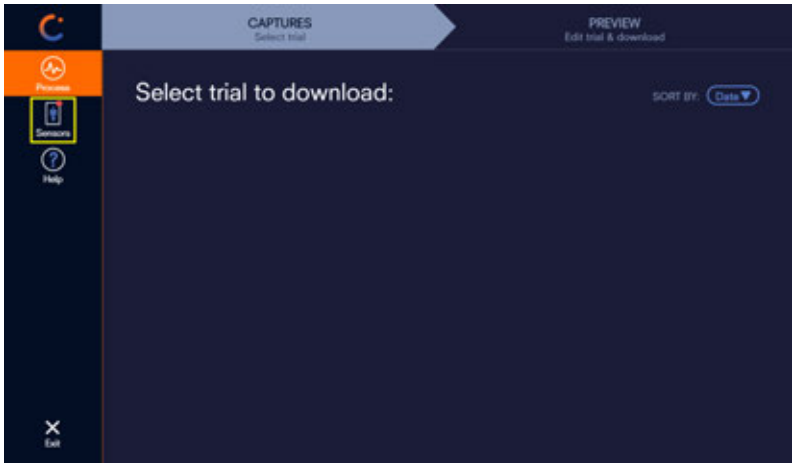


Update sensor firmware

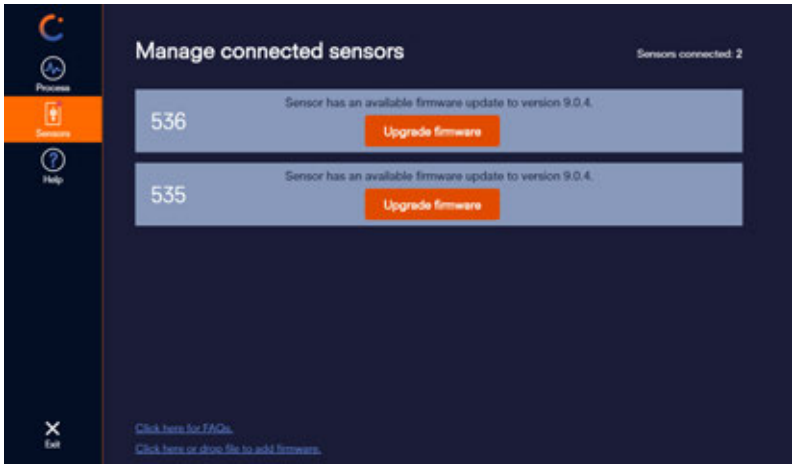
Capture.U Desktop enables you to upgrade your Blue Trident sensors to the latest firmware.

To update sensor firmware:

1. If your sensors aren't plugged in, connect them to the computer (see Connect sensors, page 53) and launch Capture.U Desktop.
   The connected sensors display a red circle to let you know that firmware needs to be upgraded.



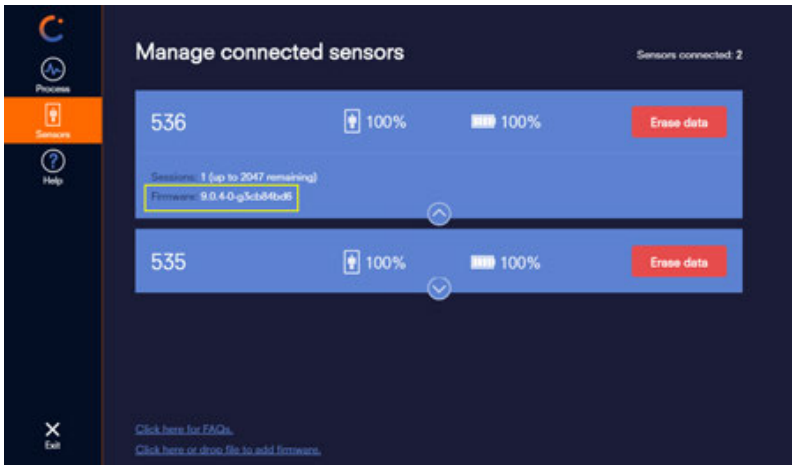
2. Click the **Sensors** tab.
   Capture.U Desktop informs you of the availability of a firmware upgrade.



3. Click **Upgrade firmware**.

The status changes to **Firmware upgrade in progress**.

4. When the firmware has finished updating, you can expand the displayed information to view the updated firmware number on the **Sensors** tab.



5. If other sensors need to have their firmware upgraded, repeat the above steps for each one.
6. You can now download trials that were captured using the **To Sensor** capture mode (see Download a trial from the sensors, page 56 and Capture to sensor, page 13).

Get help on Capture.U

To get help on using Capture.U:

1. Start Capture.U Desktop and click **Help**.

2. Choose from the following options:
   - **Guides*** Visit the Vicon IMU documentation web page[9].
   - **FAQs*** Visit the Vicon FAQs web page[10].
   - **Support*** Visit the Vicon Support web page[11].
   - **Start walkthrough**. Launch a quick tour of Capture.U Desktop.
     To use this option, ensure that you have first captured data using the **To Sensor** capture mode in the Capture.U app and connected the sensor(s) to the computer.
     To end the walkthrough at any stage, click **Help** and then click **End walkthrough**.
   - **Version check**. Click the version number (bottom right) to display more detailed version information about Capture.U Desktop.

* Internet access required

9 https://docs.vicon.com/display/IMU/IMU+documentation
10 https://www.vicon.com/faqs/
11 https://www.vicon.com/support/

Known issues for Capture.U Desktop

Issue	Workaround
Downloaded High G accelerometer data may exhibit "latching". This is where, when the data becomes close to zero, its value is automatically rounded to zero.	None