



GoPro Telemetry Overlay Instruction Manual

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TELEMETRY
OVERLAY

GoPro Telemetry Overlay

<https://goprotelemetryextractor.com>

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Sections

You can access these sections on the top-left area of the program. Each section is only available if the previous one has been completed.

Video

The first step in your workflow will be to import video footage.
You can select a single file or multiple consecutive files, that will be merged into a single one.
After selecting video files, an optimization process will start. This converts videos to a more friendly format that will allow for smoother work in the Project and Gauges sections. You can skip this step at the expense of performance, but in some cases (h265/hevc videos) videos might not play if you do.
By default, the program will try to look for telemetry in videos and go straight to the Gauges section.

Project

You can tweak several settings and default values for the project.

- Project name

- Resolution (ideally native or smaller)
- Frame rate (ideally native or lower)
- Orientation (rotates video and the axes of some accel and gyro gauges)
- Fonts (otf and ttf formats supported)
- Colors (you can change these for each gauge later)
- Shadows (help distinguish elements from the background)
- Text border (makes text more legible)
- Drawers (darker areas where gauges will stand out)

In and Out points

You can define the area of video and data sources you want to work with. This will affect the work area in the Gauges tab and the look of any Gauges that draw a path. It can also be used to set a starting or ending point for the telemetry, making it easier to sync different sources.

Trimming a project will change the aspect of some gauges. For example, the GPS Path gauge will only cover the area included in that part of the video.

To export just a section of a project without affecting gauges, use the Export tab instead.

Telemetry

By default the program will try to find telemetry in video files, but you can also add telemetry to videos that do not contain it. Or you can add multiple sensor sources to a single video.

Telemetry will be parsed to match the settings of the project. If you change these, you may be asked to reinterpret the telemetry for best results.

These are some of the supported telemetry formats and the telemetry data streams they contain. Not all models support all data streams, and some devices need external sensors in order to record the data.

When indicated, a format supports extra or custom streams, for example new columns in a CSV. For these streams to be available you need to enable the “Read extra streams” option in Settings. These values will be available when creating custom gauges, and their name will be prefixed with a _ character.

GoPro

HERO9 Black, HERO8 Black, Max, HERO7 Black, HERO6 Black, HERO5 Black, Fusion, HERO7 Silver, HERO5 Session (no GPS) and HERO7 White (no GPS).

The GPS data is only available when the setting is activated (look for it in the Regional Settings of the camera) and the recording is done in good signal conditions: a clear view of the sky, with no obstacles, never upside down and waiting for a GPS lock before pressing record.

Other streams are only available in some models and modes. For example, Orientation data is only available in the HERO8 and newer cameras (Max, HERO9...), so gauges like Lean Angle, Pitch Angle or Heading won't be available for previous models. Also, Orientation values are not absolute, so applying an offset may be necessary.

Can include: GPS (location, speed, altitude), Accelerometer, Gyroscope, Orientation, Date/Time, ISO, Shutter Speed, White Balance

DJI drones

Air 2s, Mavic Air 2, Mini2, Mavic 2 Pro, Mavic 2 Zoom, Mavic 2 Enterprise, Mavic Mini, Mavic Pro, Phantom 3, Phantom 4, Phantom 4 Pro, Inspire 2, Matrice Series...

Telemetry is recorded in subtitle format, either as a separate file or embedded in the video file. Both formats are supported. Enable telemetry recording with the “Video Caption” option in the camera settings.

Other models are supported via AirData CSV files (Mavic Air 1, FPV... see below), even if the video subtitles are not enabled.

Can include: GPS (location, speed, altitude), Date/Time, ISO, Shutter Speed, F-Number, White Balance, Focal Length & Extra Streams

Insta360

One R, One X2, One X, Pro other models may also be supported.

The GPS data is recorded if the setting is enabled and a compatible device is linked (the GPS remote, the mobile app, the smartwatch app...)

Accelerometer and gyroscope data are generally recorded when shooting in INSV format or FlowState stabilization.

Some Insta360 models record the data to the LRV file instead of the main video. In those cases import the main video first and then the data by selecting the LRV from the Telemetry section.

Can include: GPS (location, speed, altitude), Date/Time, Accelerometer, Gyroscope, Shutter Speed

Garmin (FIT)

Modern Garmin watches and trackers that record metrics to the .FIT format are supported. The data can be downloaded as .FIT from the "Activities" section of Garmin Connect, which can also be used to convert older files to the FIT format.

Can include: GPS (location, speed, altitude), Heart rate, Temperature, Cadence, Power, Date/Time & Extra Streams

GPX

GPX files with valid tracks are supported. Most GPS trackers, GPS smart watches and Android/iOS phones can record to this format. Many software tools also allow to download data in this format, including Strava and Garmin Connect. Basic GPX files include position and time data, others also contain fitness and sensor data such as cadence, heart rate, temperature...

The GPX import option is also a good solution to import data formats that are not natively supported. Many hardware manufacturers record to their own data software but allow users to convert the data to GPX. For example, INNOVV dash cams (K2, K3, K5) record GPS data that can be extracted to GPX format with Dashcam Viewer.

Can include: GPS (location, speed, altitude), Date/Time, Cadence, Heart rate, Temperature, Power, Depth & Extra Streams

AirData (CSV)

AirData.com allows to store flight logs from multiple brands (DJI, Autel, Parrot, Freefly, Wingcopter, Yuneec) and download them as CSV files. These contain more data fields than the DJI video captions and are more accurate, but are not always automatically synced. By using both you can sync one to the other and have the best of both worlds.

To retrieve the AirData CSV files you need to

- Register in AirData.com
- Upload your flight logs to AirData. See instructions
- Go To AirData.com > My Flights > My Logs, select your flight by date and download it as CSV

Not all drone models include all the data streams.

Can include: GPS (location, speed, altitude), Battery, Orientation, Gimbal, Thumbsticks, Voltage, Date/Time & Extra Streams

RaceCapture (LOG)

RaceCapture devices and software by AutoSport Labs are generally used for motorsports data logging and record data specific to racing, such as RPM, engaged gear...

Can include: GPS (location, speed, altitude), Accelerometer, Gyroscope, Engine RPM, Gear, Voltage, Oil Temperature & Pressure, Fuel Level, Coolant Temperature & Pressure, Date/Time & Extra Streams

Garmin Flight Log (CSV)

G1000, G300, G3X Touch and G5 are avionics suites designed by Garmin for aircraft. They record data to a CSV file at a 1Hz rate and include location, speed, orientation and other useful data streams. Compatibility with G900X not tested.

By default the GPS data will be used for gauges like speed (ground speed) or altitude. If "Read extra streams" is

enabled in Settings you can also create Custom gauges like indicated airspeed, barometric altitude, recorded vertical speed, etc.

Not all devices include all the data streams.

Can include: GPS (location, speed, altitude), Orientation, Engine RPM, Oil Temperature & Pressure, Voltage, Accelerometer, Temperature, Battery, Date/Time & Extra Streams

RaceChrono (CSV)

RaceChrono is a lap timer, data logging and data analysis app designed for use in motorsports. It can export CSV logs with multiple data streams.

Can include: GPS (location, speed, altitude), Engine RPM, Throttle, Accelerometer, Orientation, Date/Time & Extra Streams

VBOX (VBO)

(Basic support) RACELOGIC designs and manufactures race car camera and data systems for motorsports. Their devices are designed to optimize driver performance and can export data as VBO files. The core data fields are supported and some additional modules too.

Can include: GPS (location, speed, altitude), Accelerometer, Temperature, Voltage, Date/Time & Extra Streams

KML

(Basic support) Keyhole Markup Language is an XML notation for expressing geographic annotation and visualization within two-dimensional maps and Earth browsers. It was developed for use with Google Earth but is also compatible with programs like ArcGIS, Global Mapper, Blender, Merkaartor, Keyhole PRO... Data loggers like Ebike Analyzer, Foreflight and many more record to this format.

Can include: GPS (location, speed, altitude), Date/Time & Extra Streams

CAMM

Google's Camera Motion Metadata Spec is a standard that multiple Street View-enabled cameras use for storing GPS and sensor data. Brands like Parrot (Anafi), Insta360 (Pro2) or LabPano (Pilot Era) use this format. Basic support is provided.

Can include: GPS (location, speed, altitude), Date/Time

Apnealizer (CSV)

Apnealizer is a tool that helps you organize and perform detailed analysis of your underwater dives. It exports data to a simple CSV format.

Can include: Depth, Temperature, Heart rate, Date/Time & Extra Streams

Litchi (CSV)

Litchi creates alternative apps to fly DJI drones. It also records flight logs to CSV format, allowing to create preset and custom gauges.

Can include: GPS (location, speed, altitude), Battery, Orientation, Gimbal, Thumbsticks, Voltage, Temperature, Date/Time & Extra Streams

AiM (CSV)

AiM data loggers are used in multiple motorsports for accurate time tracking. Popular models include the Mychron series for Karting. The CSV files can be obtained with the AIM race analysis software by selecting a "Time" export and including at least the following streams: Time (sec), GPS_Altitude (m), GPS_Latitude (°), GPS_Longitude (°), GPS_Speed (km/h or mph). Potentially compatible with Motec as well (not tested).

Can include: GPS (location, speed, altitude), Accelerometer, Gyroscope, Voltage, Engine RPM, Gear, Throttle, Brake, Temperature, Date/Time & Extra Streams

Alfano (ZIP)

(Experimental) Alfano creates lap timer hardware for motorsports, especially karting. One of their most popular devices is the Alfano 6. ZIP files are supported.

Can include: GPS (location, speed, altitude), Engine RPM, Throttle, Brake, Date/Time & Extra Streams

Mind Monitor (CSV)

(Experimental) Mind Monitor is an app used to track EEG brainwave data from “Muse: The Brain-Sensing Headband” from Interaxon devices.

Can include: Date/Time, Accelerometer, Gyroscope & Extra Streams

FuelTech (CSV)

(Experimental) FuelTech manufactures performance engine management systems, like ECUs. Some data streams from their FT550 unit are natively supported, other are available as Custom Gauge or Dynamic Text. CSV files must be exported with a TIME column in seconds.

Can include: Engine RPM, Throttle, Gear, Date/Time & Extra Streams

NMEA (TXT/LOG)

Text based files containing NMEA 0183 sentences. These are typically used by GPS receivers to send information on position, speed and accuracy. The specification has been defined by, and is controlled by, the National Marine Electronics Association.

Some cameras record GPS data to this format, for example Sony’s HDR-AS300 Action Cam.

Can include: GPS (location, speed, altitude), Date/Time

protern.io (CSV)

(Experimental) protern.io creates hardware and software for alpine ski coaching improvement via accurate data analysis. GPS-based gauges with good frequency and accuracy are available with their CSV files.

Custom CSV

You can create custom CSV files with any columns you need. Columns should be separated by commas.

The first row contains the headers and requires at least utc (ms) (unix time in milliseconds) OR date (date-time text formatted as YYYY-MM-DDTHH:mm:ss.sssZ) OR time (ms) (video time in milliseconds).

Each header should contain the name of the stream and the units (if available). For example power (W).

International System Units with official abbreviations are recommended, as they are more likely to be automatically convertible to other units.

Some groups of columns are supported and will allow dedicated gauges:

- GPS: lat (deg), lon (deg), alt (m)
- Orientation: heading (deg), pitch angle (deg), bank (deg)
- Accelerometer: accel x (m/s²), accel y (m/s²), accel z (m/s²)
- Gyroscope: gyro x (deg/s), gyro y (deg/s), gyro z (deg/s)

Other columns will be read as either numeric values (for Custom gauges) or text values (for the Dynamic Text gauge). Text columns should not contain commas.

You can force a column to be interpreted as text by using (text) as units in the header. This can be useful to preserve a certain number formatting.

For example:

time (ms)	lat (deg)	lon (deg)	alt (m)	custom 1 (unit)	custom 2 (text)
0	41.91438947	1.685143395	100	42	Sentence A
100	41.91438948	1.685143396	101	43	Sentence B
200	41.91438949	1.685143397	102	44	00001

Can include: GPS (location, speed, altitude), Accelerometer, Gyroscope, Orientation, Date/Time, Custom columns

More formats will be added over time. Get in touch if you have a special interest in a particular format or sensor stream.

Gauges

This is where you will spend creative time composing the elements and look of the telemetry overlay.

By default, the program will suggest some basic gauges after you load telemetry data. You can leave those or customize everything.

Bottom area

Add Gauge

Select the gauges you want to add. You will only be able to choose those that are compatible with the imported telemetry.

These are the available gauge types:

- **Speedometer:** Speed of travel in 2D (latitude and longitude) or 3D (including vertical)
For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV
- **GPS Path:** Current coordinates and total path shape with optional speed or altitude color gradient. Map and satellite options
For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV
- **Accelerometer:** Experienced forces and vibrations as recorded by the device, by axis or total magnitude
For GoPro, Insta360, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, AiM, Mind Monitor, Custom CSV
- **Altitude:** Altitude relative to sea level or lowest point of the path
For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV
- **Distance:** Current and total distance travelled
For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV
- **Heart Rate:** Heart rate in beats per minute
For Garmin FIT, GPX, Apnealizer
- **Slope:** Angle or percentage of ascent or descent. Requires very accurate altitude data
For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV
- **Dynamic Map:** GPS map with zoom, tilt and orientation controls for a much more customizable tracking
For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV
- **Gyroscope:** Rotation (angular speed) recorded by the device, per axis
For GoPro, Insta360, RaceCapture, AiM, Mind Monitor, Custom CSV
- **Bearing:** Direction of travel relative to the North
For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV
- **Acceleration (GPS):** Acceleration based on GPS data. Designed for 4 wheel vehicles. Requires a highly accurate GPS signal
For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV

- Time & Date: Customizable time. Can be based on GPS time, file time or custom. Stopwatch option
For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Apnealizer, Litchi, AiM, CAMM, Alfano, FuelTech, KML, NMEA, protern.io, Mind Monitor, Custom CSV
- Lap Timer: Automated lap timer based on GPS positions and a custom finish line. With best lap and lap differences
For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV
- Cadence: Rotations in an activity, for example from a bicycle pedal
For Garmin FIT, GPX
- Pace: Speed for running sports, in terms of time per distance
For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV
- Power: Measure of power in watts or horsepower
For Garmin FIT, GPX
- Vertical Speed: Rate of climb or rate of descent. Requires very accurate altitude data
For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV
- Thermometer: Reading from a temperature sensor: ambience, body, device...
For Garmin FIT, GPX, Garmin Flight Log, VBOX, Apnealizer, Litchi, AiM
- Elevation Gain: Accumulated positive (gain) and negative (loss) changes in altitude throughout the path
For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV
- Coordinates: GPS latitude and longitude
For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV
- Altitude vs Distance: Shows the elevation profile over distance instead of time. Useful for fitness sports like cycling and running
For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV
- Orientation: Shows the position of the device in space as heading (or yaw), pitch angle and bank (lean angle or roll)
For GoPro, AirData, Garmin Flight Log, RaceChrono, Litchi, Custom CSV
- Heading: Shows the direction the device is pointing to
For GoPro, AirData, Garmin Flight Log, RaceChrono, Litchi, Custom CSV
- Gimbal: Shows the orientation of the camera gimbal as heading and pitch angle
For AirData, Litchi
- Gimbal Heading: Shows the direction the camera is pointing to
For AirData, Litchi
- Thumbsticks: Shows the position of a remote controller thumbsticks, generally of a drone
For AirData, Litchi
- Battery %: Shows the battery left as a percentage
For AirData, Garmin Flight Log, Litchi
- Gear: Shows the current gear of a vehicle

For RaceCapture, AiM, FuelTech

- Engine RPM: Rotational speed of a vehicle engine

For RaceCapture, Garmin Flight Log, RaceChrono, AiM, Alfano, FuelTech

- Throttle: How much the throttle pedal or control is being used, as a percentage

For RaceChrono, AiM, Alfano, FuelTech

- Brake: How much the brake pedal or handle is being used, as a percentage

For AiM, Alfano

- Lean Angle: Angle or rotation recorded by the device around the longitudinal axis. Also called banking or roll

For GoPro, AirData, Garmin Flight Log, RaceChrono, Litchi, Custom CSV

- Lean Angle (2 wheel): Lean angle estimate for 2 wheel vehicles based on GPS data. Requires a highly accurate GPS signal

For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV

- Pitch Angle: Angle or rotation recorded by the device around the transversal axis, often in the plane of the travel direction

For GoPro, AirData, Garmin Flight Log, RaceChrono, Litchi, Custom CSV

- Longitudinal Acceleration (GPS): GPS-based acceleration along the direction of travel. Requires a highly accurate GPS signal

For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV

- Lateral Acceleration (GPS): GPS-based acceleration along the left-right axis, ideally of 4 wheel vehicles. Requires a highly accurate GPS signal

For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV

- Attitude Estimate: Experimental. Inclination (Pitch/Roll) based on gyroscope and accelerometer. Works for non-constant acceleration. Device/camera alignment is important

For GoPro, Insta360, RaceCapture, AiM, Mind Monitor, Custom CSV

- GPS Path + Compass: Like the GPS Path but the position is an arrow pointing to the direction of travel or the device/gimbal heading (when available)

For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV

- Oil Temperature & Pressure: Readings from vehicle oil sensors

For RaceCapture, Garmin Flight Log

- Coolant Temperature & Pressure: Readings from vehicle coolant sensors For RaceCapture

- Fuel Level: Remaining fuel as a percentage

For RaceCapture

- Battery Volts: Battery level as voltage

For AirData, RaceCapture, Garmin Flight Log, VBOX, Litchi, AiM

- Distance Home: Distance in a straight line to the home point or first location

For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBOX, Litchi, AiM, CAMM, Alfano, KML, NMEA, protern.io, Custom CSV

- Depth: Vertical distance to the surface, generally used in underwater sports

For GPX, Apnealizer

- Dive Speed: Vertical speed, up or down, when performing a dive

For GPX, Apnealizer

- ISO: Camera sensitivity to light

For GoPro, DJI

- Shutter Speed: Time a frame is exposed in camera

For GoPro, DJI, Insta360

- White Balance: How colors are interpreted by the camera, with preset icons

For GoPro, DJI

- F-Number: Aperture of the camera diaphragm

For DJI

- Focal Length: Type of lens or zoom level. Determines the vision angle

For DJI

- Custom: Allows to choose any numeric data stream and creates a gauge of the desired style

For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBox, Apnealizer, Litchi, AiM, CAMM, Alfano, FuelTech, KML, NMEA, protern.io, Mind Monitor, Custom CSV

- Dynamic Text: Allows to display text from a written stream, for example text columns of a CSV

For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBox, Apnealizer, Litchi, AiM, CAMM, Alfano, FuelTech, KML, NMEA, protern.io, Mind Monitor, Custom CSV

- Static Title: Create your own titles

For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBox, Apnealizer, Litchi, AiM, CAMM, Alfano, FuelTech, KML, NMEA, protern.io, Mind Monitor, Custom CSV

- Static Image: Import an image file

For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBox, Apnealizer, Litchi, AiM, CAMM, Alfano, FuelTech, KML, NMEA, protern.io, Mind Monitor, Custom CSV

- Watermark: Brag about being a Telemetry Overlay user

For GoPro, DJI, Insta360, Garmin FIT, GPX, AirData, RaceCapture, Garmin Flight Log, RaceChrono, VBox, Apnealizer, Litchi, AiM, CAMM, Alfano, FuelTech, KML, NMEA, protern.io, Mind Monitor, Custom CSV

- More to come...

Some gauges have variants

- Mini: Minimal gauge with just an icon, a value and some labels
- Vs Time: Graph showing the evolution of the value throughout the video
- Scope: Moving graph showing the evolution of the value for a few seconds around the current time
- Circular: Partial or full circle where the current value is indicated by a needle or completion bar
- Completion: Vertical or horizontal bar where the value is indicated by filling the space between the minimum and maximum values and by progressively adapting the color
- Gradient: Bar painted with a gradient between the up and down colors that is filled according to the current value
- Positive Negative: Bar that paints positive and negative values in opposite directions and different colors
- Value in Range: Bar where the current value is marked by a rectangular mark and a number moving between the minimum and the maximum
- Compass: 360 degree circle to indicate a direction (such as Bearing or Heading) relative to the cardinal direction

- **Tilt:** Symmetric angle range used to indicate inclination level, bank, roll

Gauges are organized by type (Basic, Advanced, Minimal...) and you can also add Custom gauges and elements, which can be based on any available data source or on static user-input (like custom titles or images). Most gauges share many of their features, settings and controls, but there are some special cases worth mentioning.

GPS Path allows to load a background image from the Shape control tab. This can be one of multiple map styles or a satellite photo of the area. This gauge also allows you to set a "Value type", which in this case refers to a third dimension (in addition to latitude and longitude) that will determine the color gradient (up & down colors) of the path.

Time & Date: The program will try to read the video time from GPS timestamps. If these are missing, it will read the time from the video file. The gauge can be turned into a stop-watch by using the trim controls section.

Custom Title / Image: These "Elements" allow you to place text or images anywhere on the screen to provide context information or a watermark a project. You can also decide when they appear or disappear by setting trims.

Accelerometer / Gyroscope: The shape tab of these gauges allows to indicate the "orientation" the device was in when recording. This allow to interpret the forces on each axis correctly. This assumes the device is pointing in the same direction of the lens. For example, a 180 Orient value would mean the sensor or device was upside down.

Edit Gauges

Click on a gauge to load it on the right-hand area and edit its properties.

Sync Telemetry

Choose a telemetry source and change its time offset and speed so it matches the video footage. Source to sync lets you choose which telemetry source you want to sync, if there is more than one. Sync to determines when the telemetry data starts (or ends).

- **Video Start:** The data starts when the video starts
- **Video End:** The data ends when the video ends
- **In Point:** The data starts at the Project In Point (see the Project section)
- **Out Point:** The data ends at the Project Out Point
- **Video Timestamp:** The app will use the data timestamps and the video timestamps to find a sync point (unreliable)
- **Other telemetry source:** If a different data source is already in sync, use its timestamps to sync this one
- **Offset / Offset slider:** If none of the options provides an exact sync, you can manually specify a sync offset in seconds or milliseconds until you get a good result
- **Starts/Ends Now:** Set the data beginning or end to the current video time

Data Speed allows to correct differences between the speed of the data and the speed of the video, especially in time-lapses.

- **Real Time:** The original data speed is correct
- **Match Video:** The data should last the same as the video
- **In to Out:** The data should last the same as the In and Out Project points (see Project section)
- **Other telemetry source:** If a different data source has the correct speed setting, copy it to the current one

- **Stretch:** If the previous options do not provide correct speed, you can modify the speed as a percentage on top of them

For example, if you started tracking telemetry with a watch after the video started, you can go to the Project section and set the In point to the moment the telemetry starts, then sync to the In Point. Note that this setting will apply to every gauge that uses this stream.

Trim (element)

Some gauges allow you to trim the duration of some displayed element. For example, you could trim the GPS Path to draw only a single lap of a racetrack (while the gauge point does all the laps) by setting the start and end points where the lap starts and ends. The gauge will do the entire course, but the track will only be drawn once. Or you can set a start and end point to the Time & Date gauge to turn it into a stop watch.

You can enable and disable the start and end points independently, if you need to.

Additionally, some gauges can be “Expanded”. This disables trims and does the opposite: the gauge will cover the entire telemetry stream, including data before and after the video, if available. This is useful when recording a long file of telemetry (for example a trip), but only videoing a small section of it.

Patterns

In this section you can save the visual appearance of your project as a pattern and reuse it later in a completely different project with different video and telemetry data sources.

This will save the visual appearance of the Project and Gauges sections, but not things that depend on your loaded video or telemetry data: synchronization, gauge trims, in and out points, project resolution, frame rate...

Right side area

Here you can control the appearance and behavior of the selected gauge. Hold the mouse pointer over an element to display a help hint

Title

Click to change the title of a gauge. As you can choose to display the title next to the gauge, this can help viewers understand the context of each graph. You can translate the title to your local language or give any additional information you want.

Hide / Show gauge

Hide a gauge if you do not need it now but may go back to it later. Useful for improving performance and focus. To select the gauge again, do it from the bottom “Edit Gauges” tab.

Lock / Unlock gauge in place

Prevent a gauge from being moved with the mouse. Useful if two gauges are close together. To select the gauge again, do it from the bottom “Edit Gauges” tab.

Duplicate exact gauge

Make a perfect copy of a gauge. It is so perfect that you will not see two gauges until you move one of them somewhere else.

Draw gauge on top

Draw a gauge on top of the rest. Reorder gauges so that the selected one is always visible.

Reset gauge

Return a gauge to its initial state, in case you modified it beyond repair.

Delete gauge

Remove a gauge from your project.

Size and Colors

Quickly customize the look of a gauge.

You can keep the Project colors to have a consistent palette, but also tweak anything you want.

Text

Change the size, position, decimals, distance and other details of the main text or value.

Label

Tweak the attributes of the secondary text, including the gauge title.

Icon

Some gauges (minimal ones, for example) have an icon. Control it here.

Ticks

Many gauges include ticks within the range of gauge positions. Change their length, thickness... If you add fill, ticks will be replaced by a semi-transparent background.

Gauge

Change the size, thickness, style and behaviour of the main visual value indicator.

Path

Some gauges are graphs, change the appearance of their path here.

Shape

Change some general aspects of the gauge looks here, including rotation.

Image

Some gauges may require you to specify an external image file and/or its properties.

Values

Here you will find controls for how the program interprets the sensor data. It can be which axis from a multi-axis stream it takes into account, the minimum and maximum expected values, preferred units...

You can apply smoothing to make the movements and shapes of gauges more pleasant or even understandable. This also helps when the telemetry has bad quality or noisy values. Use with caution, as overdoing it might give you unrealistic results.

Some types of values might have a note saying "Computed". This means the value was not directly read from the data, but computed by the program from other values. For example, if data does not include Speed but only GPS positions, the program can use those to compute Speeds. When changing from a computed to a non-computed value (or vice-versa), you may see changes in the amount of smoothness you need to apply for data to look good.

Trimmed duration

For gauges that allow trimming, this shows the trimmed duration when trims are active (see Trim controls in the Bottom Area).

Source

If you have multiple telemetry sources, here you can tell the gauge to take the data from one or the other. Sometimes you can also filter out bad data by using filters. For example:

- The number of satellites the device had access to in that moment Higher is more accurate
- Dilution of precision x 100. The area of uncertainty of positions. Lower is more accurate
- Type of GPS fix. None, 2D (latitude and longitude) or 3D (latitude, longitude and elevation). Higher is more accurate
- Wrong speed. Any location that produces speeds higher than specified will be ignored

Note that this setting will apply to every gauge that uses this stream.

Main area

Here you can select and move gauges around.

Export

Formats

Choose the export format that better suits your workflow.

MP4

In most cases you will want to export a finished video in mp4 format. You can tweak the quality and render speed depending on your needs, and disable the audio output if necessary.

You can also define a chroma background if you plan to do chroma keying in a different video editor, for example a green screen or blue screen effect.

The h264 codec option is widely supported by most video software and hardware. The HEVC (h265) option provides higher compression (smaller files) while preserving quality, but is not as widely supported.

MOV

You can also export a transparent movie with just the gauges. This is useful if you want to continue editing the video in an external video editor (Adobe Premiere, Davinci Resolve, Final Cut Pro X...). You can apply color corrections and other processes to the video footage without affecting the gauges, then apply the gauges layer on

top.

The ProRes (4444) codec provides a professional low compression output but with very large file sizes, while QT RLE preserves quality at a higher compression rate but is not a 100% compatible with every editing software.

PNG

This option works like the transparent MOV file, but it creates a transparent image file for each frame in the video.

Encoders

Depending on the chosen format and encoder you will have some options:

- **Video Quality:** Determines the visual fidelity of the exported images
- **Bitrate:** (mbit/s) Determines the size and, to some extent, the visual quality of the exported video. By default it tries to match the bitrate of the original footage
- **Render Speed:** Modifies the render time of the project. If a bitrate is set, it also helps determine the quality of the result. If Video Quality is set instead, speed has an impact on the file size (bitrate) but not on the video quality

For a more technical explanation of what each control does, see [this link](#), where Video Quality is equivalent to “CRF” (higher quality translates as lower CRF) and speed is “preset” (between “veryslow” and “ultrafast”) Depending on your hardware you may have additional GPU-based (graphics card) encoding options. Generally, they are faster than the standard encoder, although they have not been thoroughly tested. These options might not work even if they seem available. Not all graphics cards are compatible with all resolutions.

- **NVIDIA:** For the NVIDIA generations Kepler, Maxwell, Pascal, Volta, Turing and newer. [More info](#)
- **AMD AMF:** For most recent Radeon GPUs starting with the Southern Islands family and APUs of the Kabini, Kaveri, Carrizo families and newer
- **Quick Sync:** For Intel processors of the Sandy Bridge (h264) and Skylake (HEVC) architecture and newer. [More info](#)
- **Video Toolbox:** For most 2015 and later Macs

In and Out points

You can export a section of a Project by setting In and Out points. This will not affect the look, length or sync of gauges.

Options

You can access these options on the top-right area of the program

Notifications

Warnings and recommendations will appear here.

Open Project

You can load a previously saved project. Make sure you save your current work first.

Save Project

Save current work. You can choose to override a previously saved file or save a new version every time. You can choose the name the project will be saved with in the Project section.

Start empty project

Discard everything and start from scratch. Think wisely before doing this. You might want to save your work first.

Help

Open the documentation, tutorials and other information section.

Settings

Configure some defaults and preferences here.

Directories

- Export — Where your finished videos will save
- Cache — Where optimized media will be saved. It is recommended to use the “Delete cache” button from time to time, especially after finishing a large project
- Overwrite — Will try to overwrite a finished video if exported it again

Units

Setting preferences here will make new gauges choose units accordingly, when possible. You can choose between metric (meters, kilometers...) or imperial (feet, miles...) and nautical (knots...) or american (month/day/year dates...) preference on top of it.

Guides

- Grid — Divide the screen by the specified number for easier composition
- Title and Action Safe Area — Show safety margins for broadcast TV

Default Pattern

Choose if you want basic gauges created automatically after data is imported or choose a custom Pattern file with your preferred gauges, colors and customizations (See the help and tutorials to learn how Patterns work).

MapBox

Replace the standard map and satellite imagery options with your own MapBox styles with custom layers, language, colors, sizes...

- Create a mapbox.com account (a free one will suffice)
- Create your own styles with MapBox Studio
- Generate two access tokens: One standard (or public) and one with the STYLES:LIST scope
- Introduce your MapBox username and access tokens in Telemetry Overlay's Settings

Advanced

- Look for telemetry in videos — Disable if you have videos that contain telemetry but only want to use a different telemetry data source, or if the program gets stuck trying to retrieve data from videos that don't have any
- Sort files alphabetically — The program tries to sort consecutive video and telemetry files by a number of criteria (creation time, file name, file date...). Enable this if you want a strictly alphabetical order
- Try to sync added telemetry — The software will try to sync external telemetry sources automatically to the video when added. This does not always work perfectly for some data formats, but can be adjusted after the import. Disable it if you prefer to do the sync entirely manually

- Skip video optimization — The initial optimization step will be skipped automatically. This can be useful if you want to work faster and have a powerful computer or shoot at low resolutions, but will prevent your video from playing at all in the program if it was shot in HEVC (h265) or potentially other formats. Even in that case, your video will play fine after exporting it
- Show unavailable gauges — Display all the gauge buttons, even those for which the current project does not include the necessary sensor data
- Read extra streams — The program will try to read data streams that are not natively supported, especially from text-based formats like CSV or LOG. These streams will be usable in Custom gauges. Units are not guaranteed to be read correctly
- Gauge update rate — Significantly improve render times by reducing the gauge update frequency, which looks good in most cases. It does not affect video frame rate. This can also improve performance slightly within the program
- GoPro: Use strict GPS times — By default, the program uses a blend of GPS and MP4 timestamps, which works well in most cases. Enable this if you want to strictly use GPS timestamps in GPS based gauges like Speed, GPS Path or Time & Date. This can be inaccurate, especially in time-lapse modes, where GoPro cameras simplify GPS data excessively. After changing this setting, reinterpret any existing telemetry sources
- GoPro: Read accel & gyro — For very long videos or some camera models (Fusion), reading the accelerometer and gyroscope data can slow down the program or even crash it. Disable this if that is your case. You will still have GPS-based acceleration
- Insta360: Read accel & gyro — The accelerometer and gyroscope data in Insta360 cameras take much longer to read than other sources, so this is disabled by default. You can still show some acceleration values with GPS-based gauges, but enable this if you want the 3-axis accelerometer and gyroscope gauges. After changing this setting, reinterpret any existing telemetry sources
- Optimized resolution — Low resolution improves performance when editing. With high resolution the preview looks better. This does not affect the exported result
- Optimization process — Hardware processes could be faster if your system supports them. Software (default) works well enough in most cases

Debug code

Only use this when requested by support

Controls

Video Controls

The video sections (Project, Gauges, Export) give you playback buttons:

- Play or pause video
- Turn sound on or off
- Set In and Out points around your area of interest for the Project, the final Export or when trimming a gauge
- Move cursor 1 frame forward or backwards
- Move cursor to the In or Out point, or to the start/end of the video

Additional functions are available through keyboard shortcuts.

Keyboard Shortcuts

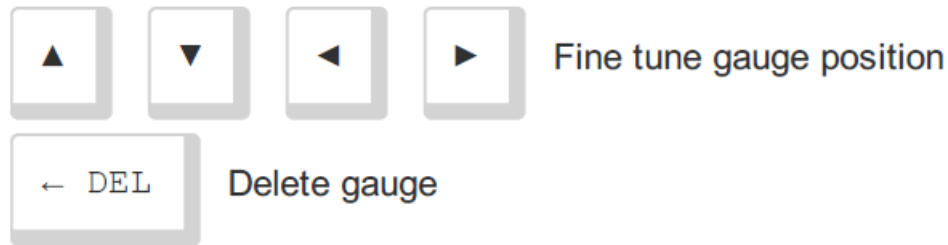
Program

(	CMD	/	Ctrl	)	+	O	Open Project
(	CMD	/	Ctrl	)	+	S	Save Project
(	CMD	/	Ctrl	)	+	N	New Project

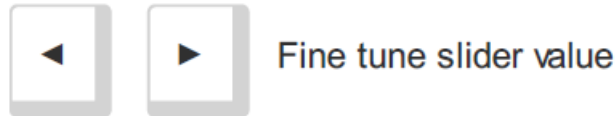
Video Player

SPACE	Play/Pause video
◀	Move 1 frame forward
▶	Move 1 frame backwards
I	Set In point
O	Set Out point
Q	Go to In point
W	Go to Out point
L	Increase playback speed
K	Stop playback
J	Decrease playback speed
H	Move 2 seconds backwards

Selected Gauge



Slider Controls



System Requirements

Minimum

- 64 bit Operating System
- Windows 7 and newer or macOS 10.10 (Yosemite) and newer
- Enough space for multiple copies of your video
- 1.6GHz processor
- 8 GB of RAM

Recommended

- 2.5GHz processor
- 16GB of RAM
- SSD hard drive
- NVIDIA or AMD graphics card (for PC version)

For Mac users, both Intel and Apple Silicon versions are available.
If you need a Linux version, get in touch after you make your purchase.

Trial version

Compared to the Full version, the trial

- Expires after a few days
- Adds a watermark to videos
- Does not read consecutive files
- Lacks some of the special gauges
- Cannot export transparent (or chroma key) video/frames
- GPS maps/satellite are not available
- Does not auto-adjust DJI SRT altitudes
- Does not include support and updates

Get the Full version here

About

Created by Juan Irache Duesca

Logo design by Francesc Cuixart

For help, error reporting and suggestions contact app@prototyping.barcelona

To share your videos and discuss tips or ideas with the community, join the Facebook group


To stay up to date with new tools, products and ideas, subscribe to the telemetry newsletter or to the YouTube channel

For more telemetry tools visit goprotelemetryextractor.com

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<https://goprotelemetryextractor.com>

Documents / Resources

	GoPro Telemetry Overlay [pdf] Instruction Manual Telemetry Overlay
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[Manuals+](#)