



TELEMETRY OVERLAY

<https://goprotelemetryextractor.com>

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GoPro, DJI drones, Insta360, Garmin (FIT), GPX, AirData & Flight Reader (CSV), Garmin Flight Log (CSV), OBD-II (CSV), DJI Action 4 & 5, IGC, Tesla (CSV), AiM & MoTec (CSV), Alfano (ZIP), ArduPilot (CSV), RaceBox (CSV), INNOV (MP4/TS), NMEA (TXT/LOG), Starlane (CSV), I2M (CSV), Sailmon (CSV), protom.io (CSV/.protom), Android/iPhone, Unipro (TSV), RaceCapture (LOG), RaceChrono (CSV), GRT Avionics (CSV), QStarz (CSV), TrackAddict (CSV), Parrot, Sony (MP4/LOG), FlySight (CSV), Torque app (CSV), Vakaros (CSV), Aprilia (TXT), Harry's LapTimer (CSV), Expedition (CSV), Dynon (CSV), Dashcams & generic, Flymaster (CSV), VBOX (VBO), Litchi (CSV), KML, TCX, Subsurface (CSV), SpeedAngle (SA), Betaflight Blackbox (CSV), OBDLink (CSV), OpenTX (CSV), Apnealizer (CSV), FuelTech (CSV), Dynojet (CSV), BYB Tech (CSV), EUC World (CSV), Chigee (LOG), aRacer SpeedTek (CSV), SM-Modellbau (CSV), Mind Monitor (CSV), LTC audio, Custom CSV

Gauges

Bottom area

Add Gauge, Edit Gauges, Sync Telemetry, Trim (element), Patterns

Right side area

Title, Hide / Show gauge, Lock / Unlock gauge in place, Duplicate exact gauge, Draw gauge on top, Reset gauge, Delete gauge, Size and Colors, Text, Label, Icon, Ticks, Gauge, Path, Shape, Image, Values, Trimmed duration, Expand visible data, Source

Main area

Export

Formats

Finished video (MP4), Transparent Video (MOV, WEBP, WEBM), Transparent frames (PNG)

Encoders

Blast rendering

In and Out points

More export options

Add to Export Queue, Save export settings as default

Options

Notifications

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Save Project

New project

Export Queue

Batch Loader

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Shut down (Windows only)

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Directories, Units, Guides, Default Pattern, MapBox, Elevation Replacement, Retrieve weather data, Advanced, Other

Controls

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About

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. If you need to work on non-consecutive video files, either create separate projects or (once you are comfortable with your single project workflow) consider using the Batch Loader tool in the Export Queue.

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 videos might not play in the preview window if you do. This does not affect the quality of your final exported video.

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 (most otf and ttf formats supported). Generic ones (at the top) work best for unicode characters
- + 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

Most recent GoPro cameras include GPS and sensor data: HERO13 Black, HERO11 Black, HERO10 Black, HERO9 Black, HERO8 Black, Max, HERO7 Black, HERO6 Black, HERO5 Black, Fusion, HERO7 Silver.

Some other models have sensor data (Accelerometer, Gyroscope...) but no GPS: HERO12, HERO (2024), HERO11 Mini, HERO10 Black Bones, HERO5 Session and HERO7 White.

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 and never upside down. Turn on the camera with the Power button (not the Record one) and wait for a GPS lock before recording so the camera can find the GPS satellites.

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...) and not in all recording modes, so gauges like some Lean Angle options, Pitch Angle or Heading won't be available for previous models. Also, Orientation heading values are not absolute, so applying an offset may be necessary.

The HERO4 Black & Silver, HERO5 Session & Black, HERO6 Black, and probably HERO7 models can record basic fitness data (speed, altitude, heart rate) if connected to a compatible Polar watch (V800, and maybe M600 and H10). Enable "Read extra streams" in the general settings to access these.

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

DJI drones

Most DJI drones record flight logs to the SD card: Air 3, Air 3S, Neo , Mavic 3 Pro, Mini 4, Mini 4 Pro, Mini 3 Pro, Mavic 3, Mini 3, FPV, Avata 2, Avata, Air 2s, Mavic Air 2, Mini 2, 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" or "Video Subtitles" option in the camera settings of the flight app.

These and other models are supported via AirData CSV files (like the Mavic Air 1, see below), even if the video subtitles are not enabled. Some of the DJI Action cameras also allow to record GPS data or can be used by importing external telemetry logs, resulting in a different range of available gauges/streams.

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

Insta360

Most of the recent Insta360 cameras can record GPS data if paired with a compatible GPS-enabled remote: [One X5](#), [Ace Pro 2](#), [One X4](#), [Ace / Ace Pro](#), [One X3](#), [Go 3](#), [One RS](#), [One R](#), [One X2](#), One X, [Pro 2](#), 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 Action Remote](#), [GPS Preview Remote](#), the old GPS Smart Remote, the mobile app, one of the smartwatch apps...

If recording GPS data with the Insta360 mobile app, be aware that the GPS Activity Stats feature does not send the data to the camera. It just keeps it on the phone. Make sure to go into the camera preview, enable GPS recording from the settings, start and stop the recording from the mobile app, and keep the phone screen on for the entire recording.

You can add telemetry gauges to full 360 videos, reframed videos, or to your preexisting professional 360 workflow (Adobe Premiere, Final Cut Pro, etc.). See the relevant tutorials.

If using a non-360 lens or shooting mode (4K, 1 Inch, Steadycam), note that the Insta360 app is only capable of recording the GPS data if the Pro mode (or Active HDR video) is enabled, not Basic or Quick. These modes can be changed from the camera itself (not the app) by clicking on the resolution. When using the GPS Remote, GPS data is recorded even if the Basic/Quick mode is selected. Another important limitation of the phone app is that the phone needs to have the screen on for the entire recording. Otherwise the data is not recorded correctly. For these reasons, the GPS Remote or even the smartwatch apps are recommended.

Additionally, accelerometer and gyroscope data are generally recorded when shooting in INSV format or Pro/FlowState stabilization. To read these streams, enable "Read accel & gyro" in the general Settings of Telemetry Overlay.

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 (like TCX) to the FIT format. Garmin is renowned for the accuracy of their devices, which makes FIT files a great alternative to in-camera data.

Other watch and activity tracker brands like Suunto, Wahoo, Coros, and Hammerhead Karoo also record or export activities to this file type.

Garmin Virb cameras also record data as a .FIT file within their storage structure. The files need to be retrieved from their folder and imported manually.

With an Apple Watch, to retrieve your activity export the data from the Health app as a .zip file. This includes all data, it is not possible to select only 1 track. Alternatively, use an Indie app called [HealthFit](#). In HealthFit, you can see a preview of the map and export just 1 GPX file from a workout.

Can include: GPS (location, speed, altitude), Heart rate, Temperature, Cadence, Power, Gears, Wind, 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, including devices from Garmin, Suunto, Wahoo, Polar, Apple, Samsung, and Amazfit. Many software tools also allow to download data in this format, including Strava and Garmin Connect. Basic GPX files include position, elevation, and time data, others also contain speed, 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 format but allow users to convert the data to GPX.

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

AirData & Flight Reader (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

On the other hand, [Flight Reader](#) is a desktop software that decrypts and views the flight data inside of the DJI TXT flight logs, DroneDeploy LOG flight logs, Drone Harmony CSV flight logs, Litchi CSV flight logs, or Map Pilot CSV flight logs from DJI drones. With the "Read extra streams" setting in Telemetry Overlay many more data streams will become available for Custom gauges.

Not all drone models include all the data streams. Even more drone models can be supported with other import methods and formats, like DJI subtitles logs, Parrot, OpenTX, GPX, GoPro... See their corresponding section.

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

Garmin Flight Log (CSV)

[G1000](#), [G300](#), [G3X Touch](#), [G5](#), [G600](#), [G500 TXi](#), [GTN 750](#), [GTN 650Xi](#), [G2000](#), [G3000](#), [GI275](#), etc. are a avionics suites designed by Garmin for aircraft. They record data to a CSV file, usually at a 1Hz rate and include location, speed, orientation and other useful data streams. Compatibility with other similar models has not been tested.

These logs tend to be very accurate as they are based on high quality hardware sensors which require great precision for navigation and safety. They are a great alternative to using in-camera GPS data. Not all device models include all the data streams.

Flights logs can include data for multiple days and sessions. It is best to avoid that if possible. Single-activity logs work best.

Can include: GPS (location, speed, altitude), Orientation, Airspeed, Rate of Climb, Altimeter, Engine RPM, Oil Temperature & Pressure, Voltage, Accelerometer, Temperature, Battery, Turn Coordinator, Wind, Date/Time & Extra Streams

OBD-II (CSV)

OBD-II (also OBD2 or OBDii) stands for [On-board diagnostics](#). It is a standard vehicle manufacturers follow to enable monitoring and problem solving via electronic means. While this typically means being able to see and clear ECU error messages, the communication port also conveys live performance data that is useful for telemetry visualization.

Almost every commercial car sold in the last 20 years uses this standard and has a communications port available near the steering wheel. There are multiple adapters in the market that enable communication between the car and a mobile phone, including inexpensive ones like Veepeak or Elm327, and higher-end models with advanced features. This is a great alternative to recording GPS data with an action camera, as it combines the precision of instrument-based sensors like speedometer, engine RPM, throttle, temperatures and pressures with reliable GPS data captured by the smartphone.

Telemetry Overlay supports multiple OBD-II-capable recording apps: OBDLink/OBD Fusion, Torque, Harry's Laptimer, RaceChrono, RaceCapture, TrackAddict... See their respective sections for more specific details.

Can include: GPS (location, speed, altitude), Engine RPM, Throttle, Accelerometer, Gyroscope, Orientation, Gear, Brake Pressure, Oil Temperature & Pressure, Steering Wheel, Temperature, Fuel Level, Date/Time & Extra Streams

DJI Action 4 & 5

The [DJI Osmo Action 4](#) and [DJI Osmo Action 5 Pro](#) cameras can record GPS data when connected to the [dedicated remote control](#). Accelerometer, Orientation, and Camera settings (shutter speed, ISO...) are also recorded by the camera alone. In addition to that, the newer Action 5 Pro can record very interesting barometer-based altitude and depth data, ideal for aviation (non-pressurized cabin), scuba diving, and more.

Newer models may also be supported. Other DJI Action or DJI Osmo cameras that do not record GPS data internally can also be used by recording GPS data externally with a phone, smartwatch, or activity tracker. The Osmo Pocket 3 records basic camera data (like ISO, shutter speed, white balance, etc.). DJI drones are also widely supported, see the specific drones sections.

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

IGC

[International Gliding Commission](#) (IGC) files contain GPS, barometer data and can sometimes include additional data like attitude, temperature or airspeed. The data is designed for multiple types of glider flights. Barometer-based altitude tends to provide much more accurate results than GPS-based altitude.

Can include: GPS (location, speed, altitude), Rate of Climb, Altimeter, Airspeed, Temperature, Accelerometer, Date/Time & Extra Streams

Tesla (CSV)

There are multiple ways to import data from Tesla drives, the most specific being TeslaMate, Tesla Track Mode, and Tessie.

[TeslaMate](#) (experimental) is an open source data logger for tesla vehicles. It can run on your own server (setup is an advanced process), or in a third-party server, usually as a paid service. It records a wide range of data streams and its quality is generally good. To retrieve the data in a usable format, some manual setup is necessary the first time.

+ TeslaMate Setup

- + Go to Drives and select a Drive
- + Add -> Visualization
- + Introduce this Query as Code: `SELECT $__time(date), * FROM positions WHERE car_id = $car_id AND $__timeFilter(date) ORDER BY date ASC`
- + Change Query Format to "Time Series"
- + Change the Title to "For Telemetry Overlay"
- + In Standard options, set Decimals to 15
- + Optionally change the visualization type to "Table"
- + Save your changes

Then each time you record a drive, select it, look for the "For Telemetry Overlay" panel, open its options and select More > Export CSV.

Some Tesla vehicles (Model 3 Performance, both legacy and Highland) have a [Track Mode V2](#) setting that allows drivers to customize their handling. In this mode, the car also records a significant amount of car metrics to the CSV format. Video and telemetry data is downloadable to a USB drive. the data includes lap times, acceleration, deceleration, G-meter, vehicle thermals and tire utilization. To save data, plug in a USB flash drive with a folder named TeslaTrackMode.

The methods above are recommended, but if not available to you, there is also the option to use [Tessie](#) (experimental). It is a third-party app and a platform for managing Tesla vehicles. After being connected to a car, it can export a CSV file of each drive with a significant amount of information. To this date, with most Tessie versions and Tesla firmwares, the available data frequency is very low (2 samples per minute), which is not good for many gauges and use cases. This may improve over time, but not guaranteed.

Some of the data streams may be available in one format and not the others. For example, Tesla Track Mode may include steering wheel and pedals data but lack outside air temperature.

If you want to support future development of Tesla features within Telemetry Overlay, purchase a Tesla [through this referral link](#) and get a significant discount on your car.

Can include: GPS (location, speed, altitude), Accelerometer, Throttle, Brake Pressure, Steering Wheel, Power, Battery, Temperature, Date/Time & Extra Streams

AiM & MoTec (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 (Race Studio) by selecting a "Time" export and including at least the **Time (s)** stream, and ideally GPS coordinates, altitude, and speed. Export CSV files in the RS2Analysis Style, even if using Race Studio 3. You may need to enable CSV exports first [as shown here](#) by going to Preferences (first icon on the top left corner) -> Data Download -> Advanced, or you can convert files with the batch tool. CSV headers need to be in English, so it is best not to have Race Studio in a different language.

Not all headers included in AiM/MoTec CSV files are supported for default gauges, but using default or commonly used header names and will make compatibility more likely. These are some of the known headers and units (you can deduce some

corresponding headers, like GPS Longitude from GPS Latitude): Time (s), GPS Latitude (deg), GPS Speed (km/h), GPS Altitude (m), AccelerometerX (g), InlineAcc (g), GyroX (deg/s), RollRate (deg/s), Logger Temperature (°C), Battery (V), RPM (rpm), Current Gear (#), Throttle (%), Brake (%), Steering Angle (deg), Fuel Level (%), Oil temperature (°C), Oil Pressure (bar), Coolant Temperature (C), Coolant Pressure (kPa), GPS Satellites, GPS PosAccuracy (m), GPS HDOP. For columns that are not mapped to the default gauges, enable the "Read extra streams" general setting and use Custom gauges instead.

Due to their similar format, [MoTec](#) CSV files are also supported.

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

Alfano (ZIP)

[Alfano](#) creates lap timer hardware for motorsports, especially karting. One of their most popular devices is the Alfano 6. ZIP files are supported (not their contents separately, but the entire ZIP file).

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

ArduPilot (CSV)

[ArduPilot](#) is an open source autopilot system supporting many vehicle types: multi-copters, traditional helicopters, fixed wing aircraft, boats, submarines, rovers and more. It allows exporting the recorded data to CSV format for DashWare.

Stream/gauge availability depends greatly on the specific setup for a vehicle. Other DashWare CSV files could be compatible but have not been tested.

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

RaceBox (CSV)

[RaceBox](#) manufactures motorsports timing systems with high frequency and precision GPS sensors, with a focus on lap timing and drag metering.

The RaceBox and Telemetry Overlay teams collaborated to ensure compatibility and an easy workflow.

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

INNOV (MP4/TS)

[INNOV](#) creates dash cams with a focus on surveillance, mostly used on motorcycles, but also on other vehicles. GPS data is recorded via a hardware module. Basic support should work with models K2, K3 and K5, although altitude data seems to be missing on some. Other models have not been tested.

Looking for data in some INNOV models can be very slow, so the program does not necessarily do it by default. You will need to enable this in Settings.

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

NMEA (TXT/LOG)

Text based files containing [NMEA 0183](#) sentences are supported. 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 or the Olympus TG-Tracker. NMEA 2000 files are not supported.

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

Starlane (CSV)

[Starlane](#) manufactures electronics for motorsports, including physical lap timers like Davinci and Corsaro. Data can be transferred in CSV format. Speed data from the device should match your Telemetry Overlay setting: km/h for metric and mph for imperial.

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

I2M (CSV)

[I2M](#) creates electronic components and software for motorports, especially motorcycling. Their DAT logs can be converted to the supported CSV files with the Danas Pro software. Preserving the file name convention of the DAT file in the CSV should help calculate good timing data.

Can include: GPS (location, speed, altitude), Accelerometer, Gear, Voltage, Engine RPM, Heart rate, Brake, Brake Pressure, Date/Time & Extra Streams

Sailmon (CSV)

[Sailmon](#) manufactures sailing instruments for boats, including the Sailmon Max. Other models have not been tested.

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

protern.io (CSV/.protern)

[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.

protern.io has worked closely with Telemetry Overlay to improve integration between the two products, and ski world champions put both systems to the test regularly.

In addition to the Protern.io CSV data, you can also use the [Protern Clock app](#) for iOS to embed a timecode audio track in your video recordings and make data and video synchronization easier.

The new .protern file format that contains both video and data in a single file is also supported.

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

Android/iPhone

Android and iOS (iPhone, iPad, Apple Watch) devices can record GPX files with GPS and other sensor data with the right apps if the necessary sensors are connected. For simple GPX files with GPS data, you can use:

- + [GPS Logger for Android](#): The default settings are fine (1 second interval, no filters), but enabling EGM96 is recommended
- + [GPX Trail Tracker for iOS](#): Set the app Distance filter to zero and export a GPX with TrackPoints (trk), not WayPoints

Other apps might be able to capture additional streams like heart rate, power...

With an Apple Watch, to retrieve your activity use an Indie app called [HealthFit](#). In HealthFit, you can see a preview of the map and export just 1 GPX file from a workout.

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

Unipro (TSV)

(Experimental) Raw TSV logs from [Unipro lap timers](#) are supported. Only the first session is considered, so make sure to export a single session from the Unipro software.

Can include: GPS (location, speed, altitude), Accelerometer, Engine RPM, Brake, Throttle, Voltage, Steering Wheel, 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, fuel level, lap times...

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

RaceChrono (CSV)

[RaceChrono](#) is a lap timer, data logging and data analysis app designed for use in motorsports. It runs on mobile phones and can export CSV logs with multiple data streams. Versions 1, 2 and 3 of their CSV format are supported, with v3 apparently being more comprehensive and reliable.

Can include: GPS (location, speed, altitude), Engine RPM, Throttle, Gear, Accelerometer, Orientation, Gyroscope, Temperature, Battery, Fuel Level, Date/Time & Extra Streams

GRT Avionics (CSV)

[GRT Avionics](#) manufactures electronic flight instrumentation. Their EFIS devices can export flight log data as CSV. The default units and headers are expected.

Can include: GPS (location, speed, altitude), Orientation, Airspeed, Rate of Climb, Altimeter, Engine RPM, Oil Temperature & Pressure, Voltage, Temperature, Date/Time & Extra Streams

QStarz (CSV)

[QStarz Racing Club](#) produces GPS and IMU trackers designed for motorsports racing, but also useful in other fields due to their small size, low weight and high GPS frequency. Data must be exported to CSV format (labelled as MS Excel in their software).

It seems QStarz in some cases records data for more than one session/day on the single CSV file. This should be avoided. Ideally, each CSV file should contain a single session or, at least, have them in the correct order, which does not always seem to be the case.

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

TrackAddict (CSV)

[TrackAddict by HP Tuners](#) is an Android and iOS app that specializes in collecting and analyzing motorsports data. It reads data both from the smartphone sensors and from connected OBD-II sources.

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

Parrot

[Parrot](#) manufactures consumer and prosumer drones like the Anafi and Disco, which can record GPS data directly into the video files themselves. Other drone models might be compatible but have not been tested. For more detailed flight logs and better compatibility (Bepop 2...), use the AirData import option instead.

Can include: GPS (location, speed, altitude), Airspeed, Orientation, Battery, ISO, Shutter Speed, Date/Time

Sony (MP4/LOG)

Multiple [Sony](#) camera models, including action cams and professional camcorders, can record telemetry data. In some cases the unit has a built-in GPS module, in others you need to connect the camera to a smartphone app from their Imaging Edge lineup. Models that record some level of telemetry include at least: AS300, FDR-X3000, RXO II, ZH1. The type of data and its quality varies across models, so it is important to do some research before making a purchase decision. Some models record the data internally in the MP4 file, others create a LOG file in the SD card.

Can include: GPS (location, speed, altitude), Accelerometer, Shutter Speed, White Balance, F-Number, ISO, Date/Time

FlySight (CSV)

[FlySight](#) devices for wingsuit pilots provide real-time audible indication of glide ratio, horizontal or vertical speed. They also record basic GPS data to exportable CSV files. New FlySight devices record more than one CSV file, of which the TRACKS one should be picked.

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

Torque app (CSV)

[Torque Lite](#) and [Torque Pro](#) are popular OBDii diagnostics apps for Android. They allow to track and log multiple vehicle health metrics alongside GPS data. CSV exports with GPS data and OBD speed are supported.

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

Vakaros (CSV)

Vakaros creates professional instruments for sailing. Data from their [Vakaros Atlas 2](#) tracker, and maybe others, is supported if exported to CSV format.

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

Aprilia (TXT)

(Experimental) TXT logs from Aprilia's motorbikes, recorded using their V4-MP app ([Android](#), [iOS](#)) and the electronic unit [Piaggio Multimedia Platform](#) are supported. The app allows to extract the log files by sending them as an email.

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

Harry's LapTimer (CSV)

[Harry's LapTimer](#) is a racing timer and data analysis app for Android and iOS that supports external sensors via OBD. That makes it really flexible when it comes to recording a wide range of sensors and displaying their values.

Can include: GPS (location, speed, altitude), Orientation, Accelerometer, Gear, Engine RPM, Throttle, Brake Pressure, Oil Temperature & Pressure, Steering Wheel & Extra Streams

Expedition (CSV)

[Expedition](#) develops software for navigation and sailing, with a focus in racing. Their features include chart plotting, weather display and weather routing.

With some versions of the Expedition software, the native CSV logs are not supported and you will need to use the "Extract log" option.

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

Dynon (CSV)

[Dynon Avionics](#) creates instruments for experimental and light sport aircraft. Their logs include very comprehensive hardware-backed metrics. Their Skyview lineup and some legacy products like the FLIGHTDEK-D180 are supported to different degrees.

Dynon logs can include data for multiple days and sessions. It is best to avoid that if possible. Single-activity logs work best. If you have a log including many activities or days, you can edit it to delete unwanted rows, but be careful as many spreadsheet software

options tend to modify the data and make it incompatible. Excel is especially bad for this, but with other options like Numbers or Sheets you may also need to disable automated cell conversion. A plain text editor like Notepad is a good alternative.

Can include: GPS (location, speed, altitude), Orientation, Airspeed, Rate of Climb, Altimeter, Engine RPM, Turn Coordinator, Accelerometer, Oil Temperature & Pressure, Voltage, Temperature, Date/Time & Extra Streams

Dashcams & generic

We are grouping many dashcams and generic camera brands that use other protocols under this extraction method. This includes dozens of less popular brands and models, like LabPano Pilot Era, TomTom Bandit, BlackVue, Garmin Dash Cam (like model 57), some Autel drones (like Evo II), Yada RoadCam Pro 4K, Lamax S9, Jomise T860S-GM, Vantrue S1, 70mai, Rove Stealth 4K, NextBase, Akaso, Ambarella A12, Cobra Dash Cam, BikeBro, Wolfbox, Blackvue DR900X, Adzome GS65H, ABASK A8 4K, Veement T90X, iiwey s1, E-ACE B44, Rexing V1-4k, Rove R2-4K, GKU D900, DOD LS600W, 470, 980...

Also, Google's [Camera Motion Metadata Spec](#) is a standard that multiple Street View-enabled cameras use for storing GPS and sensor data.

Looking for data in some generic video formats can be very slow, so the program does not do it by default. You can enable searching specifically for data in generic cameras in Settings.

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

Flymaster (CSV)

(Experimental) [Flymaster](#) is focused on the production of electronic navigation instruments and software for gliding and ultra-light aviation. Some manual picking of streams and gauge options might be necessary in order to show meaningful data.

Can include: GPS (location, speed, altitude), Heart rate, Altimeter, Airspeed, Rate of Climb, 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

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, Rate of Climb, 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.

Only a subset of KML formats is supported: Files with gx:Track elements containing coordinates and a "when" element, or Placemarks with Points and TimeStamps. To import other flavors of KML, try to convert them to one of the supported types of files (KML or other).

Custom KML shapes and layers are not supported for now. To display maps with custom layers see the information on custom MapBox styles.

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

TCX

Training Center XML is the format some old Garmin trackers record data to. While this is supported, FIT file support is generally better and has a larger user base, so use them instead when possible. TCX files can be converted to FIT (often labelled as "original") with [Garmin Connect](#).

Other watch and activity tracker brands like Polar or Fitbit also use this file format.

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

Subsurface (CSV)

[Subsurface](#) is a software that can visualize and convert diving log files from many formats, companies, and devices. For example, Cochran, DiveLogs.de, JDiveLog, Liquivision, Suunto, UDCF, UDDF, XML, Divesoft, Datatrak, WLog, MkVI, APD, OSTCtools, or DAN DL7.

To prepare the data, load it in Subsurface and Export it to the "CSV dive computer dive profile". Some of the data streams will appear as default gauges, other will be available for Custom gauges. Alternatively, more data streams for Custom gauges can be imported if you choose the "CSV computed profile panel data" export option, but date data is lost this way, which may make synchronization slightly harder.

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

SpeedAngle (SA)

[SpeedAngle](#) manufactures lap timers for motorsports with a focus on motorbike lean angle calculations and analysis. In addition to basic streams other values like recorded lap and sector times, lean angle, and linear acceleration are available as Custom gauges.

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

Betaflight Blackbox (CSV)

(Experimental) [Betaflight](#) is control software for multi-rotor unmanned aerial vehicles. Their flight logs contain common and advanced data fields that can be displayed with default and Custom gauges. The data can be converted to CSV with their [Blackbox log viewer](#).

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

OBDLink (CSV)

[OBDLink](#) manufactures diagnostics adapters for vehicles. Their hardware can connect to the OBDLink app, but there is also a separate [OBD Fusion](#) app that can record data from other hardware components into the same CSV format.

Make sure you are logging at least GPS latitude, longitude, and vehicle speed. To do so, go to Settings, Preferences, Logging, Select items to log. Changing the Time format to "Date and Time" can help with data and video synchronization.

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

OpenTX (CSV)

[OpenTX](#) is open source firmware for RC radio transmitters that supports multiple radio transmitter models. This import also enables support for EdgeTX-csv logs.

Can include: GPS (location, speed, altitude), Orientation, Battery, Rate of Climb, Thumbsticks, Date/Time & Extra Streams

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

FuelTech (CSV)

[FuelTech](#) manufactures performance engine management systems, like ECUs and data loggers. Models like FT600, FT550, FT500, FT500LITE and FT450 allow exporting the recorded data to CSV with their FTManager software. Some data streams are natively supported, while others are available as Custom Gauge or Dynamic Text. CSV files must be exported with a TIME column in seconds. Other expected units are °C for temperature, bar for pressure and km/h for speed.

GPS data is not present in these files, so many of the common Telemetry Overlay default gauges are not available, but several racing ones are. Enabling "Read extra streams" in the general settings will activate some additional gauges.

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

Dynojet (CSV)

[Dynojet](#) creates hardware for multiple motorsports, but especially motorcycling. Their software can export CSV files from some electronic components. The expected headers of the CSV are, at least time, PC5_TPS, PC5_ENGINE RPM, PC5_GEAR POS, PC5_SPEED. Exported speed data units should match your Telemetry Overlay setting: km/h for metric and mph for imperial.

GPS data is not present in these files, so many of the common Telemetry Overlay default gauges are not available, but several racing ones and many Custom gauges are. Enabling "Read extra streams" in the general settings will activate some additional gauges.

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

BYB Tech (CSV)

(Experimental) [BYB Tech](#) is a data acquisition solution (hardware and software) that has become the standard in downhill mountain bike racing and is also present in motocross, quads, cars and more. Their telemetry software allows to export a compatible CSV by choosing Video Overlay -> Export selection for video overlay.

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

EUC World (CSV)

(Experimental) [EUC World](#) is an app for electric unicycles. It can replace the factory app in everyday use, and it adds a series of functions. It is a popular app for many EUC riders around the world. It can export CSV files with multiple metrics.

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

Chigee (LOG)

(Experimental) [Chigee](#) creates accessories for motorcycles. Their Aio-5 Lite smart riding system creates videos and compatible log files with GPS data and multiple extra streams like temperatures and pressures. Other devices may or may not be compatible, as they haven't been tested yet.

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

aRacer SpeedTek (CSV)

[aRacer SpeedTek](#) creates a series of EFI-related products that can log some engine data to .loga files. GPS data is not recorded, so many of the common Telemetry Overlay default gauges are not available. Some racing ones are, and other interesting engine streams can be displayed as Custom gauges, including Vehicle Speed.

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

SM-Modellbau (CSV)

(Experimental) [SM-Modellbau](#) creates very small and lightweight trackers for remote controlled planes, boats, and other model vehicles. They accept modularity, which means the data recorded data streams can be expanded based on your needs. Their GPS Logger 3 records data to the compatible NMEA format, but you can use their software to export a CSV with all the available data streams.

Can include: GPS (location, speed, altitude), Accelerometer, Rate of Climb, Airspeed, Date/Time & Extra Streams

Mind Monitor (CSV)

[Mind Monitor](#) is an app used to track EEG brainwave data from "[Muse: The Brain-Sensing Headband](#)" from [Interaxon](#) devices. GPS data is not available but acceleration and a range of interesting streams are.

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

LTC audio

Linear (or Longitudinal) Timecode (LTC) is an encoding of [SMPTE timecode data](#) in an audio signal. Telemetry Overlay can parse date and time data from videos that have a compatible (both date and time) LTC audio channel. You can record such a channel by plugging an iPhone/iPad with the [Protern Clock app](#) to your camera via an audio cable or by using a [DISH](#) device. Make sure to enable the "LTC from audio" setting before you import your footage by choosing the time format your device records: Dish records [Atomic time](#), Protern Clock is Atomic by default but can be changed to [UTC](#), and for other generators you need to check their documentation.

Other LTC audio timecode recorders like Tentacle Sync or LTC Timecode Generator for Android might also work, as long as they follow the required format. The *User Bits* must contain the current date as either yyymmdd or ddmmyy00. Devices that record the Local time will only work correctly if you edit your videos in the time zone where you recorded them.

This can be very useful to assist with automated and manual synchronization of video and data. Any data source that contains valid UTC timestamps should sync automatically to a video with a compatible LTC audio channel.

When you optimize your footage or export it, the program will try to mute the unpleasant LTC audio track automatically. If you skip the initial optimization process, you might want to mute the video manually.

Note: With Apple Silicon Macs you will need Rosetta 2 installed in order to read LTC audio. You can install it by running any Intel Mac program.

Can include: Date/Time

Custom CSV

You can create custom CSV files with any columns you need. Columns must be separated by commas. Numbers must use a dot as the decimal point and no separator for thousands.

CSV files from Telemetry Extractor v2.0 and newer are also well supported. CSV files from previous versions of Telemetry Extractor may need manual tweaking.

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) **OR time (s)** (video time in seconds) **OR timecode** (video time as HH:mm:ss.sss).

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

Some columns and groups of columns are supported and will allow dedicated gauges. Headers of these columns must be named **exactly as highlighted** (some variations of units may be ok, but this is not guaranteed).

- + GPS: **lat (deg)**, **lon (deg)**, **alt (m)** (optional), **speed (m/s)** (optional)
- + 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)**
- + **gear**
- + **engine (rpm)**
- + Airspeed: **ias (kn)**, **tas (kn)**
- + **vertical speed (ft/min)**
- + Altimeter: **barometric altitude (ft)**, **msl altitude (ft)**, **barometer setting (inHg)**
- + Turn Coordinator: **turn rate (deg/s)**, **slip skid**
- + Wind: **wind direction (deg)**, **wind speed (m/s)** (or kn)
- + Thumbsticks: **rc throttle**, **rc rudder**, **rc elevator**, **rc aileron**

Some GPS quality columns are also supported for dynamically filtering out bad GPS data: **satellites** (nubmer of gps satellites), **gps dop** (dillution of precision), and **gps fix** (type of GPS fix: a number from 0 to 3)

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.

Third-party tools may create or convert data files from multiple sources to this format.

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

Using the following supported units will enable unit conversion within the program

- + Speed: km/h, mph, m/s, kn, ft/min, 1000 fpm, 100 fpm, m/min, min/km, min/500m, min/mi, m/h, ft/s, ft/h
- + Distance: mm, cm, dm, m, km, mi, ft, NM, in, STA, yd
- + Acceleration: m/s², g, ft/s²
- + Rotation: rad/s, rpm, rpm x1000, deg/s, spm
- + Frequency: Hz, KHz, Mhz, GHz
- + Percent: %, proportion, per mille
- + Angle: deg, rad, °, :1
- + Temperature: °C, °F, K
- + Pressure: Pa, mb, hPa, psi, kPa, inHg, bar
- + Power: W, hp, mW, kW, MW
- + Time: h, min, s, ms, µs
- + Flow: LPH, GPH, lb/min
- + Volume: L, dL, cL, mL, hL, gal, cm³, cc
- + Text: text

Can include: GPS (location, speed, altitude), Accelerometer, Gyroscope, Orientation, Date/Time, Gear, Engine RPM, Airspeed, Rate of Climb, Altimeter, Turn Coordinator, Wind, 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 all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor
- + **GPS Path:** Current coordinates and total path shape with optional speed or altitude color gradient. Map and satellite options
For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor
- + **Accelerometer:** Experienced forces and vibrations as recorded by the device, by axis or total magnitude
For all sources except DJI, Garmin FIT, GPX, AirData, Alfano, Flymaster, Apnealizer, Litchi, Ardupilot, NMEA, Sailmon, GRT Avionics, protern, phone apps, OpenTX, Expedition, Parrot, KML, TCX, Subsurface, SpeedAngle, FlySight, Vakaros, FuelTech, Dynojet, EUC World, Chigee, aRacer
- + **Altitude:** Altitude relative to sea level or lowest point of the path
For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor
- + **Distance:** Current and total distance travelled
For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor
- + **Heart Rate:** Heart rate in beats per minute
For Garmin FIT, GPX, Flymaster, Apnealizer, I2M, phone apps, TCX, Subsurface, EUC World
- + **Slope:** Angle or percentage of ascent or descent. Requires very accurate altitude data
For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor
- + **Gears:** Bicycle front and rear gears as numbers or teeth, and the corresponding gear ratio
For Garmin FIT
- + **Dynamic Map:** Moving GPS map with zoom, tilt and orientation controls for a much more customizable tracking (might not work on Windows 7)
For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor
- + **Gyroscope:** Rotation (angular speed) recorded by the device, per axis
For GoPro, Insta360, OBDii, AiM, RaceBox, RaceCapture, RaceChrono, OBDLink, BYB Tech, Mind Monitor, Custom CSV
- + **Bearing:** Direction of travel relative to the North. Also known as Track
For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor
- + **Acceleration (GPS):** Acceleration based on GPS data. Designed for 4 wheel vehicles. Requires a highly accurate GPS signal
For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor
- + **Time & Date:** Customizable time. Can be based on GPS time, file time or custom. Stopwatch option
For all sources except Harrys LapTimer
- + **Lap Timer:** Automated lap timer based on GPS positions and a custom finish line. With best lap and lap differences
For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor
- + **Cadence:** Rotations in an activity, for example from a bicycle pedal
For Garmin FIT, GPX, phone apps, TCX
- + **Pace:** Speed for running sports, in terms of time per distance
For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor
- + **Power:** Measure of power in watts or horsepower
For Garmin FIT, GPX, phone apps, TCX, Tesla, Aprilia
- + **Vertical Speed:** Rate of climb or rate of descent, computed from GPS altitude data. Requires very accurate altitude data
For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor
- + **Thermometer:** Reading from a temperature sensor: ambience, body, device...
For Garmin FIT, GPX, Garmin Flight Log, OBDii, AiM, IGC, VBOX, RaceChrono, Apnealizer, Litchi, GRT Avionics, phone apps, Dynon, TrackAddict, Subsurface, Tesla, EUC World
- + **Elevation Gain:** Accumulated positive (gain) and negative (loss) changes in altitude throughout the path
For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **Dashboard:** Speed, engaged gear and engine RPM in a single especially designed display

For OBDii, AiM, Alfano, RaceCapture, RaceChrono, Starlane, I2M, Harrys LapTimer, Aprilia, Custom CSV

+ **Coordinates:** GPS latitude and longitude

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **Altitude vs Distance:** Shows the elevation profile over distance instead of time. Useful for fitness sports like cycling and running

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **Orientation:** Shows the position of the device in space as heading (or yaw), pitch angle and bank (lean angle or roll)

For GoPro, DJI Action, AirData, Garmin Flight Log, OBDii, RaceBox, RaceChrono, Litchi, Ardupilot, Sailmon, GRT Avionics, OBDLink, OpenTX, Expedition, Dynon, Parrot, Harrys LapTimer, KML, Betaflight, Vakaros, Custom CSV

+ **Heading:** Shows the direction the device is pointing to

For GoPro, DJI Action, AirData, Garmin Flight Log, OBDii, RaceBox, RaceChrono, Litchi, Ardupilot, Sailmon, GRT Avionics, OBDLink, OpenTX, Expedition, Dynon, Parrot, Harrys LapTimer, KML, Betaflight, Vakaros, Custom CSV

+ **Wind Direction and Speed:** Shows the direction and speed of recorded wind data

For Garmin FIT, Garmin Flight Log, Sailmon, Expedition, 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 a remote controller thumbsticks, generally of a drone

For AirData, Litchi, OpenTX

+ **Battery %:** Shows the battery left as a percentage

For AirData, Garmin Flight Log, RaceChrono, Litchi, OpenTX, Parrot, Tesla, EUC World

+ **Gear:** Shows the current gear of a vehicle

For OBDii, AiM, Alfano, RaceCapture, RaceChrono, Starlane, I2M, Harrys LapTimer, Aprilia, FuelTech, Dynojet, aRacer, Custom CSV

+ **Engine RPM:** Rotational speed of a vehicle engine as Revolutions Per Minute

For Garmin Flight Log, OBDii, AiM, Alfano, RaceCapture, RaceChrono, Starlane, I2M, GRT Avionics, OBDLink, Dynon, Unipro, TrackAddict, Harrys LapTimer, Torque, Aprilia, FuelTech, Dynojet, aRacer, Custom CSV

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

For OBDii, AiM, Alfano, RaceChrono, Starlane, OBDLink, Unipro, TrackAddict, Harrys LapTimer, Tesla, Torque, Aprilia, FuelTech, Dynojet, aRacer

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

For AiM, Alfano, I2M, Unipro, TrackAddict

+ **Brake Pressure:** How much the brake pedal or handle is being used

For OBDii, AiM, Starlane, I2M, Harrys LapTimer, Tesla

+ **Steering Wheel:** Visual representation of the steering wheel position

For OBDii, AiM, Alfano, Unipro, Harrys LapTimer, Tesla

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

For GoPro, DJI Action, AirData, Garmin Flight Log, OBDii, RaceBox, RaceChrono, Litchi, Ardupilot, Sailmon, GRT Avionics, OBDLink, OpenTX, Expedition, Dynon, Parrot, Harrys LapTimer, KML, Betaflight, Vakaros, Custom CSV

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

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **Airspeed:** Analog display with speed through air (or over ground if only GPS available)

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **Altimeter:** Barometric-like instrument with customizable altitude information in a round display

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **Attitude Indicator:** Aviation-inspired instrument showing the pitch and bank (roll) relative to the horizon. Requires good orientation data

For GoPro, DJI Action, AirData, Garmin Flight Log, OBDii, RaceBox, RaceChrono, Litchi, Ardupilot, Sailmon, GRT Avionics, OBDLink, OpenTX, Expedition, Dynon, Parrot, Harrys LapTimer, KML, Betaflight, Vakaros, Custom CSV

+ **Heading Indicator:** Compass with an airplane pointing in the heading/bearing direction

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **Turn Coordinator:** Aviation instrument that combines rate of turn with lateral acceleration to determine coordinated turns vs slipping or skidding

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **Vertical Speed Indicator:** Round aviation-themed gauge with rate of climb or descent data, based on GPS or instrument

recordings

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

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

For GoPro, DJI Action, AirData, Garmin Flight Log, OBDii, RaceBox, RaceChrono, Litchi, Ardupilot, Sailmon, GRT Avionics, OBDLink, OpenTX, Expedition, Dynon, Parrot, Harrys LapTimer, KML, Betaflight, Vakaros, Custom CSV

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

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **Acceleration (speed-based):** Longitudinal acceleration based on speed data. Can be more stable than Acceleration (GPS) with some tracking devices

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

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

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **Zero to Speed:** Calculate acceleration times as zero to 60 or zero to 100

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **Distance Timer:** Times for distance segments, for example each 1 km, a quarter-mile, etc.

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **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 all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **Oil Temperature & Pressure:** Readings from vehicle oil sensors

For Garmin Flight Log, OBDii, AiM, RaceCapture, GRT Avionics, Dynon, Harrys LapTimer, FuelTech

+ **Coolant Temperature & Pressure:** Readings from vehicle coolant sensors

For RaceCapture

+ **Fuel Level:** Remaining fuel as a percentage

For OBDii, AiM, RaceCapture, RaceChrono, TrackAddict

+ **Battery Volts:** Battery level as voltage

For AirData, Garmin Flight Log, AiM, VBOX, RaceCapture, Litchi, Ardupilot, Starlane, i2M, GRT Avionics, Dynon, Unipro, Betaflight, EUC World, aRacer

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

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

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

For DJI Action, GPX, Apnealizer, phone apps, Subsurface

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

For DJI Action, GPX, Apnealizer, phone apps, Subsurface

+ **Heart Rate Zones:** Computes effort levels based on age, maximum heart rate and resting heart rate

For Garmin FIT, GPX, Flymaster, Apnealizer, i2M, phone apps, TCX, Subsurface, EUC World

+ **Power Zones:** Computes effort levels based on the Functional Threshold Power

For Garmin FIT, GPX, phone apps, TCX, Tesla, Aprilia

+ **Power to Body Weight:** Provide the athlete's weight to show a calculation of the power to body weight ratio

For Garmin FIT, GPX, phone apps, TCX, Tesla, Aprilia

+ **Sector Times:** Manually set sector markers and compare times and differences continuously

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **Corner Speeds:** Mark corners in a track and compare speeds over each pass

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **ISO:** Camera sensitivity to light

For GoPro, DJI Action, DJI, Parrot, Sony

+ **Shutter Speed:** Time a frame is exposed in camera

For GoPro, DJI Action, DJI, Insta360, Parrot, Sony

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

For GoPro, DJI Action, DJI, Sony

+ **F-Number:** Aperture of the camera diaphragm

For DJI, Sony

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

For DJI Action, DJI

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

For all data sources

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

For all data sources

+ **Static Title:** Create your own titles or texts

For all data sources

+ **Static Image:** Import an image file as a logo, watermark or gauge accessory

For all data sources

+ **Export GPX:** Export a basic GPX file alongside your video

For all sources except Apnealizer, FuelTech, Dynojet, aRacer, Mind Monitor

+ **Watermark:** Brag about being a Telemetry Overlay user

For all data sources

+ 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 project

+ **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, lean angle...

+ **Digital:** Glowing ticks that can take multiple shapes and show progress with both completion and color gradients

+ **On Off:** Displays enabled (on, true, zero) or disabled (off, false, one) values, like a switch or boolean

+ **Tape:** A moving range of values as a tape and the current value is highlighted in the center

+ **Stats:** A series of statistics on the go and for the entire session: Minimum, maximum, average, percentage...

+ **Design:** Gauges with more curated designs, often hardware-inspired, but fewer customization options and less affected by general settings like colors or shadows

+ **Image:** Load an image file from your computer and animate it based on the selected data and behavior

+ **Vs Distance:** Graph showing the evolution of the value against the cumulative distance

+ **Color:** Color shade based on the values of the selected stream

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 static titles or images).

You can search gauges by their name, description or the streams they use.

The **Preview** button next to the gauge search box will show a preview of the selected gauges. When pressing it multiple times, some gauges will show different visual styles or data sources.

Most gauges share many of their features, settings and controls, but there are some special cases worth mentioning.

GPS Path / Dynamic Map 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. Additional styles can be created by linking a MapBox account in Settings. The GPS Path 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. Other variants allow you to select a data source for the direction of the position arrow.

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.

Static Title / Image: These 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 enables the correct interpretation of the forces on each axis. This generally 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.

For other gauge variants and controls, see the available tutorials or experiment with them.

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 (usually 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.

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. Think of them as presets, templates, or layouts.

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...

Some activity-based preset Patterns have already been created for you. Generally these patterns will show more data streams if your data source contains supported activity-specific streams.

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. The result may vary depending whether you added the gauge directly, through a Pattern, or as part of a saved project.

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. The smoothing number means how many data samples to each side of the current one will be averaged.

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).

Expand visible data

Some gauges allow data expansion, which means 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. This will enable more consistent minimum and maximum values if creating multiple videos of a long activity. Some gauges may not be affected by this setting.

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.

Finished video (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.

Transparent Video (MOV, WEBP, WEBM)

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 most common format for transparent videos is mov. The PNG video encoder is widely compatible with other software and has some level of compression and provides excellent visual quality (note that it creates a single video file, not separate PNG files). The ProRes (4444) codec provides a professional low compression output but with very large file sizes, while not being visually superior to PNG video, so it's probably overkill. QT RLE preserves quality at a higher compression rate but is not a 100% compatible with every editing software. Additional GPU encoders (like VideoToolbox) might be available for higher compression, but they are generally not supported in other video editing software.

Since MOV transparent videos tend to be very large, the WEBP & WEBM formats are also available experimentally. They provide great quality with much smaller file sizes (especially WEBM). Some video editing programs might not support them (especially WEBM). Export times can be very long. WEBP does not support audio.

This option works like the transparent MOV file, but it creates a transparent image file for each frame in the video. In general, the Transparent Video option is more stable and recommended for most users, as this will generate thousands of files very quickly.

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"). The values on that page do not map exactly to quality values in Telemetry Overlay, but they allow a general understanding of the concepts.

Depending on your hardware you may have additional GPU-based (graphics card) encoding options. Generally, they are faster than the standard encoder, but they might not work in all situations, even if they appear as available. Not all GPU encoders are compatible with all resolutions, frame rates or input video formats.

- + NVIDIA: (Windows and Linux) For the NVIDIA generations Kepler, Maxwell, Pascal, Volta, Turing and newer. [More info](#)
- + AMD AMF: (Windows only) For most recent Radeon GPUs starting with the Southern Islands family and APUs of the Kabini, Kaveri, Carrizo families and newer
- + Quick Sync: (Windows and Linux) For Intel processors of the Sandy Bridge (h264) and Skylake (HEVC) architecture and newer. [More info](#)
- + Video Toolbox: (Mac only) For most 2015 and later Macs
- + VAAPL: (Linux) [Video Acceleration API](#) for multiple hardware configurations: Intel, AMD, Direct3D, etc. You may need to use your own version of FFmpeg and enable the "Use system binaries" option.

This table shows relative export speeds in MP4 for multiple "Gauge update rate" and Encoder combinations. Actual render speeds will vary in each environment and project, so this is only a rough reference. The GPU H264 encoder calculations were made with an NVIDIA card, but other GPU options provide similar results on compatible systems. GPU encoding to H265 tends to be as fast as H264, whereas software (default) encoding of H265 can be very slow, so GPU encoding is very much preferable if you need the higher compression level of H265.

		Gauge Update Rate			
		Full	Half	Quarter	Eighth
Encoder	H264	1X	1.9X	3.4X	5.4X
	GPU H264	1.1X	2.1X	3.7X	6.3X

To sum up. Lower "Gauge update rates" currently provide a bigger exporting speed advantage than GPU rendering, but both have a positive impact, especially when combined. A lower "Gauge update rate" will also create smaller files if exporting to one of the transparent formats.

On some systems (especially Linux), GPU processes might benefit from enabling the "Use system binaries" option and installing a custom version of FFmpeg on the system.

Blast rendering

This is an experimental render process that might shorten export times significantly. It can still be unstable, degrade the visual quality of gauges, or produce buggy results at this stage. It is important to save projects before exporting them with this process, and to review things like data synchronization and image quality in the exported results.

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, as opposed to changing the In and Out points from the Project section.

More export options

The Export button has a PLUS sign adjacent button that opens more options:

Will add the current project to the Export Queue instead of rendering it immediately. See the section about the Export Queue for more details.

Save export settings as default

Use the current Export settings for future projects to simplify your work. Especially useful if automating projects with the Batch Loader tool within the Export Queue.

Options

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

Notifications

Warnings, recommendations, and update notifications 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.

New project

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

Export Queue

This is considered an advanced topic, so a good knowledge of the software will be necessary in order to achieve the desired results. The Export Queue exports multiple projects with a single click. It is useful if you are working on multiple videos and need to export them all overnight. Queue items can be sorted by dragging them, and their label can be edited for easier identification.

The Export Queue has some additional automations to simplify your workflow and increase productivity:

Batch Loader

Automate project creation with one or multiple videos and (optionally) a data file. This will give you the chance to select multiple video files, quickly create projects with them (with the default settings) and add them to the Export Queue.

The tool will ask if the multiple files are consecutive (they don't have time gaps in between) or independent (there are some time gaps between them). This is necessary in order to interpret the data correctly. If your video files are not consecutive and you want to export your work as a single video, see the next section "Join Exports".

The tool will ask if any external data files are necessary for the project. If loading multiple data files here, they **must be consecutive**, like a single activity. Otherwise run the Batch Loader multiple times.

A single data source can be applied to multiple video files, but this will only work correctly if there is valid data in the videos to allow automated synchronization. If this is not possible it is recommended to create the projects manually before add them to the Export Queue.

For these automations to succeed, the program needs to have a default Pattern set in the general Settings. If using external data and the "Expand visible data" option is enabled, most gauges will display data based on the entire activity (full distance, full path, etc.), and not just the video section. Otherwise this will depend on the "Expand visible data" option of each gauge in your default Pattern.

Optionally, the default Export options can be modified from the Export section in order to automate exporting to a specific format.

Soundtrack

Select an audio file (music, voice narration, sound effects...) to be added to all the exported videos in the Queue. The original audio will also be preserved, if enabled in the Export options. If joining exports, the soundtrack will be applied to the entire edit.

Shut down (Windows only)

Enabling this option will force the computer to shut down once all the projects in the queue have been exported successfully.

Join Exports

Output multiple projects as a single video, instead of multiple video files (one per project). This is useful if multiple non-consecutive videos are part of the same activity, especially if they share a continuous external data file.

Joining to a single video is only possible if all the projects in the Export Queue share the same Export settings. Project settings like resolution and frame rate will be copied from the first project to the rest. This process will not work with video sources that differ in resolution, frame rate, and other core settings.

An interesting use case of this feature is doing simple video edits within Telemetry Overlay. For example, you can create a single long project and repeatedly add your favorite snippets to the Export Queue by setting In and Out points in the Export section. Then join them all to a single video summary. For more advanced video editing work, standard video editing software is recommended.

Help

Open the documentation, tutorials and other information.

Settings

Configure some defaults and preferences here.

Directories

- + Export — Where your finished videos will save by default
- + Cache — Where optimized media and temporary files will be saved. Choose a local folder path (not a cloud or remote one) without special characters (latin alphabet) for best results. 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 when exporting 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. The grid can be proportional to the screen ratio, or squared.
- + Title and Action Safe Area — Show safety margins for broadcast TV
- + Snap to grid — "Magnetically" attach gauges to the grid lines and guides for beter precision when using the mouse

More custom guides options can be found in the Gauges timeline.

Default Pattern

Choose a preset activity if you want gauges and styles created automatically after data is imported or choose a custom Pattern file with your preferred gauges, colors and customizations. The available presets are:

- + Basic — The classic Telemetry Overlay look and gauges, suitable for most sports and activities
- + Cycling — Performance and fitness metrics, ideal when using long Garmin FIT files or other fitness trackers that support cycling data
- + Moto Circuit — Selection of gauges for motorcycles in a circuit, including a customizable lap timer and optional sensors for advanced data sources
- + Car Circuit — Selection of gauges for racing cars in a circuit, including a customizable lap timer and optional sensors for advanced data sources
- + Aviation — Dashboard with analog plane instruments, ideal for Garmin Flight logs but also compatible with other GPS sources
- + Drone — Layout for drone footage review and analysis. Especially for DJI and AirData (Parrot, Yuneec, Autel...) data sources
- + Moto Road — Selection of gauges for motorcycles on roads and the outdoors. Optional sensors for advanced data sources
- + Car Road — Selection of gauges for 4 wheel vehicles on roads and the outdoors. Optional sensors for advanced data sources
- + Sailing — Template for sailing and other flat water sports
- + Skiing — Metrics for snow and descent sports such as skiing or snowboarding, with a focus on elevation and descent speed

- + Diving — Gauges for scuba diving, free diving, and other underwater activities. Works best with diving data sources
- + Fitness — Clean layout for running, cycling, or other fitness activities, with a focus on power, heart rate, pace, and cadence
- + Skydiving — Focus on altitude, vertical speeds and G forces
- + Dashcam — Information-dense overlay with mostly text-based gauges
- + Crash Reconstruction — Multiple metrics and graphs around speed, acceleration, time and location, for analysis of car crashes or other events
- + Text Only — Almost all text-only gauges for a distraction-free clean look
- + Digital — Illuminated progress bars, inspired by motorsports dashboards but useful for any activity where speed counts
- + Plane HUD — Inspired by common tape-based heads-up display in airplanes, but useful for other activities with changes in altitude
- + Fullscreen Map — Show a full screen Dynamic Map instead of the video, and some key gauges on top of it (can be slow to render)
- + protern.io — Starting point for protern.io projects (and others where GPS acceleration and speed matter). You can add more streams as Custom gauges
- + Bottom Row — Minimal gauges in a thin bottom drawer
- + Equirectangular VR — Starting point for equirectangular VR projects, where gauges are distributed on the faces of a cube. Use with the Equirectangular VR setting
- + Sync Assistant — This layout will help you find sync points by displaying different map sizes, time-based graphs and other key metrics

MapBox

Gauges like the GPS Path and the Dynamic Map include some map and satellite imagery options by default:

- + Dynamic: High-quality map with detailed 3D cities and extra options like lighting and labels
- + Standard: Clean map for all purposes. Similar to Google Maps
- + Satellite: Real satellite imagery. Similar to Google Earth
- + Hybrid: Satellite imagery with some text labels
- + Classic: Vintage textures and colors for a more interesting look
- + Dark: Dark color palette for contrast with clear paths and backgrounds
- + Light & buildings: Light color palette for contrast with dark paths and backgrounds. Buildings have volume if viewed at an angle

You can replace the default 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](https://mapbox.com/studio) (GL JS setting of at least up to 3.0.0 is supported)
- + Generate two [access tokens](#): One standard (or public) and one with the STYLES:LIST scope
- + Introduce your MapBox username and access tokens in the program Settings
- + Then your own map styles will become available

Using your own MapBox keys may also enable faster map imagery loading.

Elevation Replacement

If recorded elevation is unreliable due to a poor GPS signal, or just missing because your device does not record altitude, you can generate and introduce [a Google Maps API key](#) here so altitude data of the GPS path is retrieved from Google's terrain altitude database. This generally produces good results, but small inaccuracies in the data may have unexpected effects on gauges like vertical speed or slope. Of course, this won't generate useful data if your activity involves flying or diving, as only terrain altitude is considered.

Be aware that Google API keys can generate costs. The range of free usage for personal purposes is normally quite generous, but do check [the Google documentation](#) to make sure you don't incur in unexpected costs.

Retrieve weather data

(Experimental) You can retrieve online weather data like wind, temperature, pressure, rain, etc. by introducing paid [a Weatherbit API key](#) here.

Keys that enable historical data can be expensive, but the feature can be tested with a trial key.

The accuracy of the data depends on the Weatherbit service, and its frequency is not higher than a sample per kilometer every 15 minutes. Telemetry Overlay cannot control or guarantee the quality of the data.

An alternative source for weather data exists for Garmin users. The free [FIT Weather Record](#) data field will record more accurate

weather data that Telemetry Overlay can also read.

Advanced

+ General

- + Advanced gauge options — Show advanced controls like interpolation, per-gauge sync, and replacing missing data with zeros, in the gauge value controls
- + Any font as Mono — The Mono Font dropdown in the Project section will include non-mono fonts, in case you want to use them for minimal gauges
- + Use system binaries — Use your own system utilities instead of built-in ones: FFmpeg, FFprobe, ExifTool and IrcDump. Do not enable if you are not sure what you are doing
- + Super low FPS — Enable super low frame rate options in the Project section, for super fast and small exports. Useful for transparent formats
- + Use sync from Patterns — Only use if your video and data cannot auto-sync, and if you are importing the same type and number of data sources across projects. For example, if you always need to set a known sync offset

+ Import

- + Look for telemetry in videos — Disable if your videos don't have telemetry data or you only want to use external data files. Otherwise the program will waste time looking for data in the video files
- + 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 preview with certain formats. Even in that case, your video will play fine after exporting it
- + 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
- + Trust video time zone — Time zones in video creation times are often wrong. By default the software tries to fix this by treating dates as local. Enable this if gauges using file dates seem to be off
- + Sync to creation time — If syncing external data to GPS timestamps automatically fails, sync to video creation time. Creation times can be very unreliable, so only use this if you know your video timestamps are trust worthy
- + Orientation from IMU — Try to compute orientation data (pitch, roll, and relative heading angles) from accelerometer and gyroscope data. This may only be accurate with some devices (Experimental)

+ Export

- + Allow empty exports — Enable the Export section even if no gauges are present. This might be useful if you just want to join consecutive video files or add "empty drawers" to them
- + Conservative exports — Use less aggressive export strategies if you are getting crashes or stuck exports. Export times may be longer. If you experience export issues, also consider closing other programs, freeing up hard drive space, and rebooting the computer
- + More GPU — Try to slightly improve export speed when using some GPU encoders (NVIDIA, Intel, VAAPI) by doing more tasks on the GPU. Can lead to crashes or imperfect results
- + Wait for maps — Wait for maps being fully loaded when exporting. This can lead to the export being slower or even stuck if there are internet connection issues
- + High RAM — Sometimes exports can get stuck on systems with high RAM. This setting tries to prevent that

+ Modes

- + Video-less mode — Enable starting a project with no video footage, just telemetry data file(s) with an empty background
- + Equirectangular VR — Import equirectangular footage and create full 360 videos. Gauges will be placed on the sides of a cube surrounding your point of view. You may need to convert your footage to equirectangular with software provided with your camera (GoPro Player, Insta360 Studio...). Disable when working on flat or reframed projects (Experimental)

+ Visual

- + Dark mode — Make most elements within the program darker for a more relaxed experience
- + Unavailable gauges — Display all the gauge buttons, even those for which the current project does not include the necessary sensor data

+ 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
- + Strict GPS times — The program uses a blend of GPS and MP4 timestamps by default, which works great in most cases. Only

enable this if your GPS position and related values are shaky in a good signal situation. Test your results and disable it again unless it really helps. Probably only useful for some HERO7 and HERO8 samples

+ **.FIT**

+ Parse laps — Will enable reading lap data from FIT files as extra streams for creating Custom gauges

+ Ignore file time — The program tries to correct timestamps with the internal file time if there is a discrepancy, but in very rare cases this can lead to breaking good timestamps. Try this if the date displayed for a FIT file is very wrong

+ **DJI**

+ Drones: Trust video time — Video-based timestamps tend to be inaccurate, especially for syncing external data, but on some drone models they might be the only way to enable automated sync if doing multiple videos per flight. Avoid this if you only record one video per flight. This also modifies the default behavior of the Time & Date gauge, which will have a preset Trim point and display a timer

+ Drones: Skip altitude correction — Some DJI subtitle logs only record altitude relative to the take-off point. The program tries to compute the sea-level altitude value from that. This settings disables that and the recorded value is shown instead

+ Osmo Action: Fix time zone — The Osmo Action GPS Bluetooth Remote Controller for DJI Action cameras often records incorrect time zones, which causes bad times and makes syncing external data files difficult. This tries to fix that automatically

+ **Insta360/generic**

+ Search INNOV & unknown — Reading data from certain camera brands can be extremely slow. Only enable this if you use an INNOV camera or if you know your video contains data but the program is failing to read it

+ Fast parsing — Try to parse data from Insta360, INNOV, SONY, and other less common camera brands faster. This can break compatibility with some cameras

+ Read accel+gyro — The accelerometer and gyroscope data in some cameras can take much longer to read than other streams. With this disabled, you can still show some acceleration values with GPS-based gauges, but enable this if you want the 3-axis accelerometer and gyroscope gauges. Not all models have usable IMU data

Other

+ Debug - Use this when requested by support or if you need one of the experimental features below. You can write multiple codes separated by commas. Restart the program after changing codes.

+ **forceequirect**: Useful for making an equirectangular transparent overlay without an equirect source video. Distorts original footage

+ **oldcolors**: The way we handle video colors was changed recently, especially for special cases like 10bit or HDR. Use this option if previous versions produced better results.

+ **goprofaces**: Import a GoPro video, and look for the Faces gauge (just for fun)

+ **pattern tz**: Preserve time zones in pattern files so all the projects that use them use the saved time zone and not the computer's

+ **durationalt**: Some video files might have mismatching durations depending on how the length of the video is read. If a project or export does not match the original video duration you can try this option

+ **hyperdelay=1000**: GoPro models HERO7 through 10 can have a delay in GPS timestamps that causes external data files to not auto-sync correctly. This delay is unpredictable for the program, but if you know your files to usually be delayed by a certain time, you can specify it here in milliseconds (+/-)

+ **choosebestsource**: If a project has multiple data sources, normally a new gauge will be created with the latest one, or the one on top in the Telemetry section. For some gauges with optional streams, this affects the options the gauge will have. For example, a Heading Indicator gauge can display just Bearing data for a basic GPS source, but also recorded Heading data from a more complex one. With this option, the data source with the most optional streams available will be picked.

+ Reset license - Use this if you want to move your Telemetry Overlay license to a new computer (of the same operating system)

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

📐 Open grid and guides controls for easier layout composition

🖼 Open the video preview in a separate (non-interactive) window for a second monitor or a full screen visualization

📷 Save a full resolution screenshot of the current moment

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

▲

▼

◀

▶

← DEL

Fine tune gauge position

Delete gauge

Slider Controls

◀

▶

Fine tune slider value

System Requirements

Minimum

- + 64 bit Operating System
- + **Windows 10** and newer or **macOS 10.13 (High Sierra)** and newer or **Ubuntu 12.04, Fedora 21, Debian 8** 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 your operating system is not supported, get in touch by email to see what can be done.

Trial version

Compared to the Full version, the trial

- + Expires after 3 days
- + Adds a watermark to videos
- + Does not join more than 2 consecutive files
- + Cannot export transparent (or chroma key) video/frames

- + GPS maps/satellite are not available
- + Does not include the Export Queue, Batch Loader or Join Exports features
- + Does not auto-adjust DJI SRT altitudes
- + Does not include email support and updates

Get the [Full version here](#)

About

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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](#)

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