GhostDelta

Live faster or slower — on every special stage.

Overview and user guide · As of July 28, 2026 · App version 0.9.0 (in development)

What GhostDelta does

GhostDelta turns an iPad or iPhone on the dashboard into a personal ghost-racing system for rally sport. While driving on closed special stages and circuits, the app shows full-screen and at a glance whether the current attempt is faster or slower than your own reference run: green means faster, red means slower, plus the difference in seconds. No map, no menus, no distraction — exactly the one piece of information that matters in the car.

The comparison is no simple clock comparison: GhostDelta calculates by distance. Every position is projected onto the track line surveyed during reconnaissance and compared with the time the reference run needed at exactly the same spot on the track. The display therefore stays correct even if you approach differently, overtake or spin — the position on the track never jumps backwards.

Ghost and Delta — the two words behind the app

To understand the app you only need two terms. The first comes from racing games: there, your own best lap drives along once more as a semi-transparent “ghost car” — you race against yourself. That is exactly what this app does in a real car, just without the picture: the ghost is the stored reference run. It starts the moment the vehicle crosses the start line and drives the track invisibly, exactly as fast as last time.

The second term comes from mathematics. Delta is the fourth letter of the Greek alphabet — as a capital letter, a triangle: Δ. In engineering and science, Δ has always stood for a difference, the gap between two values. In motorsport, too, “delta” is the established term for it: Formula 1 drivers get their delta to the best time on the steering wheel, circuit professionals drive by the delta bar of their lap timer.

The delta of this app is the time difference to the ghost at exactly the spot on the track where the vehicle is right now: your own time up to here, minus the time the ghost needed to reach the same spot. A minus is therefore good — if you see −1.5 you are one and a half seconds ahead of your ghost and the display is green. A plus means the ghost is ahead, and the display turns red. The number lives

throughout the whole run and shows immediately whether a corner, a braking zone or an entire passage gained or cost time.

The app's name is made of these two words: GhostDelta — the ghost is the opponent, the delta is the one number that decides the fight against it.

The features at a glance

- **Fully automatic operation —** Arming before the start is all it takes. Crossing the start line starts the run automatically, the finish line ends and saves it — both moments are interpolated between fixes to the millisecond. No button press while driving.
- **Four display levels including a builder —** The race display opens by itself at the start line and offers four levels selectable by swiping: Minimal (full screen with delta and direction arrow), Compact, Detail with a green/red sector bar — and the Custom view: a tile builder in which the co-driver assembles the display from building blocks such as delta, elapsed time, speed, sector, lap or track line.
- **Creating tracks with a recce run —** In recce mode the track is surveyed during reconnaissance: tap at the start, drive, tap at the finish. Length, directions of travel and the complete track line are created automatically, with a plausibility check against the target length from the event regulations.
- **Event import —** Events including their stage plan can be imported as a file — the track list is then grouped by event, with stage numbers, target lengths and planned start times. Several stages can share the same physical track.
- **Lap counting and exit warning —** For stages with a loop section, the co-driver sets two markers during the recce: loop entry and loop exit. During the run the app counts the laps ("Lap 2/3") and warns before the final exit with a full-screen yellow EXIT display — deliberately without a warning tone, because both crew members wear helmets and talk over the intercom.
- **Section analysis —** After the drive, GhostDelta splits every run into a selectable 10, 15 or 20 sections and shows per section in green or red where time was gained and lost — as a table and a bar chart.
- **Elevation recording —** Every fix carries elevation data alongside position and speed. This makes uphill and downhill passages and crests visible in the track profile.
- **Offline and private —** GhostDelta works completely offline — no account, no server, no transmission. All data stays on the device as plain files and can be viewed and backed up via the Files app.
- **Finish screen and sharing —** After every finish-line crossing, the finish screen shows the complete result — and "Share result" turns it into a ready-made image for the share menu, with a track map in sector colors; the building blocks of the image are freely selectable and sortable via the share builder.
- **Multilingual, receiver-friendly —** German and English are built in, further languages prepared. External Bluetooth GNSS receivers (e.g. Garmin GLO 2, Dual XGPS160) are integrated system-wide and used automatically — around ten positions per second instead of one.

Reliability

The app's calculation core is checked with standalone test programs on every change — from line detection through the delta calculation to lap counting. In addition, every new feature runs against real drives recorded in the field: in practical testing, the live-calculated final delta matched the actual difference of the total times to the tenth, and the automatic line detections were within a few meters of the surveyed points.

> *An honest note on the current state: GhostDelta is a young program in active development. Planned but not yet included are, among other things, manual selection of the reference run, exchanging runs between devices (ghost against other drivers), comparison against a manually entered rival time, and GPX export.*

User guide

1 · First steps

On first launch, iOS asks for the location permission — please allow it; without position the app cannot measure anything. On first recording, the “Motion & Fitness” prompt follows: please allow this too. The app only uses it to read the barometric pressure sensor for elevation recording; no health or fitness data is collected. Both permissions can be changed at any time in the iOS Settings under Privacy & Security.

The app has three areas, reachable as tabs at the bottom: Recce (create and manage tracks), Competition (arm and drive) and Results (saved runs and comparisons). The settings and the Important notes are reached via the Recce tab and the red info in the Competition tab respectively. The app announces new notes by itself with a red box — once read and confirmed with the check mark at the bottom, it disappears until there is something new.

2 · Pairing an external GPS receiver (recommended)

The internal GPS delivers one position per second — enough for trying things out. For competition use, an external Bluetooth receiver such as the Garmin GLO 2 or Dual XGPS160 is recommended:

1. Switch the receiver on and pair it in the iOS Settings under Bluetooth.
2. Done — iOS integrates the receiver system-wide, GhostDelta uses it automatically, with no setup in the app at all.
3. Check: in the Competition tab the update rate rises to about 10 Hz as soon as the receiver delivers.

> *Important for iPads: only models with a cellular modem have a built-in GPS. A Wi-Fi-only iPad measures exclusively with an external receiver.*

3 · Creating a track: the recce run

Every track is created during reconnaissance. The most important rule: drive the recce exactly the way the stage will be timed — same direction, same road, and on circuits including every lap. The recorded line is the calculation basis for everything that follows.

1. In the Recce tab choose “New track” and give it a name — the name belongs to the road, not the stage number (several stages can use the same track).
2. Standing at the start point, tap “Start is here”.
3. Drive the complete stage. On circuits, tap “Set loop entry” once and “Set loop exit” once along the way, each while passing the spot — these are two different points.
4. Standing at the finish point, tap “Finish is here”. The app calculates length and directions of travel and checks the length against the target length from the event regulations, if available.

> *The app determines the direction of travel at start and finish retroactively from the first and last roughly 30 meters driven — so simply approach and drive through normally, no compass needed.*

4 · Importing an event

1. Put the event file (JSON) into the Files app or bring it to the device via AirDrop.

2. In the Recce tab choose “Import event” and open the file.
3. The track list now shows the event with all stages, target lengths and start times. Track skeletons without coordinates are completed with the recce run; a repeated import never overwrites tracks that are already surveyed.

5 · Driving in competition

1. In the Competition tab tap “Arm” — from now on the app watches the start lines of all complete tracks. It recognizes by itself which track is being driven.
2. Drive to the start, standing or flying — both work. As the start line is crossed, the run begins automatically and the race display takes over the screen; brightness jumps to maximum.
3. While driving, swipe between the four levels: Minimal, Compact, Detail, Custom view. Green = faster, red = slower than the reference (the last valid run of this track); the arrow shows the direction in addition to the color. On the first run of a track there is no reference yet — the display stays neutral gray.
4. Crossing the finish line ends and saves the run automatically and closes the race display. “Cancel” discards the current attempt; canceled runs remain viewable but never become the reference.

> *If the signal drops for more than two seconds, the display turns gray with “NO SIGNAL” — the run keeps going in the background. Switching tabs does not disarm; armed stays armed until you deliberately cancel.*

6 · Circuits: lap and exit

If both loop markers were set during the recce, the race display shows the current lap (“Lap 2/3”). Before the final loop exit — and only before this one — the screen turns full-screen yellow with the word EXIT, so the co-driver can call it in time. The lead-in is selectable in the settings between 100 and 500 meters (default 300 m; on very short laps a smaller value is advisable). There is deliberately no warning tone. The finish line is circuit-proof as well: it only triggers shortly before the actual end of the track; intermediate passes near the finish do not end anything.

7 · Results and section comparison

The Results tab lists all saved runs per track with date, duration and status. Every run can be viewed individually; comparing two runs splits the track into the configured number of sections and shows the difference per section — green gained, red lost — as a table with a totals row and as a bar chart. So after the drive you can see in which part of the track the time lies.

8 · Finish screen and sharing the result

With the finish-line crossing, the finish screen opens automatically: the total time, large, with hundredths, below it in green or red the difference to the reference run, plus distance driven, top and average speed, the average time per kilometer, all sector times with delta, and a table with time and speed per kilometer. The same screen can be opened later for any saved run: Results → run → “Show finish screen”.

Via “Share result”, one tap turns it into a ready-made image for social media: a dark card with the GhostDelta logo, track name, length and date, the big numbers — and the driven track as a map on

which every sector is colored green (faster) or red (slower) and labeled S1, S2, …, including START and FINISH. The image goes through the normal iOS share menu to Facebook, WhatsApp and the like; posting is always done by hand, the app sends nothing by itself.

You decide what the card looks like: “Customize share image” opens the share builder. There the five building blocks — total time & difference, track map, key figures, sector times, time per kilometer — can be switched on and off individually and dragged into any order using the handles. The arrangement is saved and applies to all future share images.

> *The header with the GhostDelta logo and the stage data always stays on the card — it is the recognition mark. And at least one building block stays active; an empty card cannot be created.*

9 · Settings — what they do

Appearance. Light, dark or following the system setting, plus accent color, text size and bold text. All of this applies only to the management screens — track list, settings, results. The race display is deliberately excluded: its colors green, red, yellow and gray are signal colors with a fixed meaning and always stay the same.

Units. Kilometers or miles — affects all distance and speed figures in the app.

Smoothing. Background: every GNSS position wobbles by a few meters, even at a standstill. If the app displayed the delta raw from every single fix, the number would jump back and forth by tenths several times per second and the surface would flicker in the border zone between green and red — unreadable in the car. The app therefore averages the display over a short time window, and that window is exactly what you set here:

- **Weak (0.25 s) —** the display reacts practically immediately but visibly jitters. For drivers who want to see right away whether the new braking point gains time.
- **Medium (0.5 s) —** the default: a calm number, reaction within half a second. Right for the vast majority of uses.
- **Strong (1.0 s) —** a very calm, sluggish display that lags about one second behind. Pleasant on undulating stages with unsettled reception.

> *Smoothing only changes the display while driving. Saved runs, final times and the section comparison always calculate with the unsmoothed raw data — no accuracy is lost here.*

Section analysis. This concerns the evaluation after the drive: when comparing two runs, the app splits the track into sections of equal length and shows for each whether it was faster (green) or slower (red) — as a table with a totals row and as a bar chart. Here you set how many sections the track is split into: 10, 15 or 20.

An example: a 5 km stage with 10 sections gives pieces of 500 m each. The comparison then shows, say: section 3 (1.0–1.5 km) −0.8 s green, section 7 (3.0–3.5 km) +1.2 s red, all others near zero. That makes it clear: the lost time lies almost entirely in the part of the track between kilometer 3.0 and 3.5 — that is where a closer look pays off (approach, line, braking point). More sections pin the spot down more precisely but make the individual values smaller and more sensitive to measurement noise. Rule of thumb: short stages 10, long stages 15 or 20.

Exit warning (circuit). The lead-in of the yellow EXIT warning: this many meters before the final loop exit, the display turns yellow (100–500 m, default 300 m). The right value depends on the lap length —

on a 450 m lap, 300 m would put almost the entire final lap in yellow, so 100–150 m fit there; on large circuits 300 m is a good value. As a guide: at 100 km/h, 300 m are covered in a good 10 seconds.

Accuracy warning. Every GNSS fix reports how accurate it is. If the accuracy before the start is worse than the configured threshold (5–30 m, default 15 m), the Competition screen shows a warning — better to wait briefly for better reception than to start with poor data. For perspective: the internal GPS is usually at 3–8 m in the open, an external receiver usually below that; 15 m therefore means “clearly worse than normal”.

Language. The app follows the iOS system language (German and English included); the button jumps directly to the language selection for GhostDelta in the iOS Settings.

10 · Checklist before the start

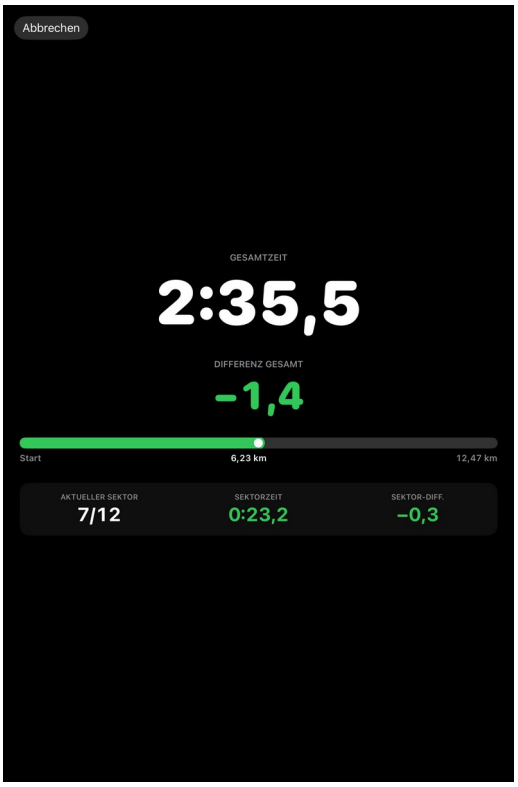
- **Quiet —** Rally focus active (no calls and notifications), Guided Access if needed.
- **Power —** Device charged or on board power; the app handles the screen lock itself.
- **Reception —** Reception check in the Competition tab: check accuracy and rate, external receiver paired.
- **Track —** Track complete (recce driven), reference run available if you want to compare.
- **Go —** Arm — GhostDelta does the rest.

The views in pictures

All screenshots come directly from the app (iPad simulator, sample data). While driving you simply swipe sideways between the four levels; the yellow exit warning and the gray state appear by themselves and disappear again.

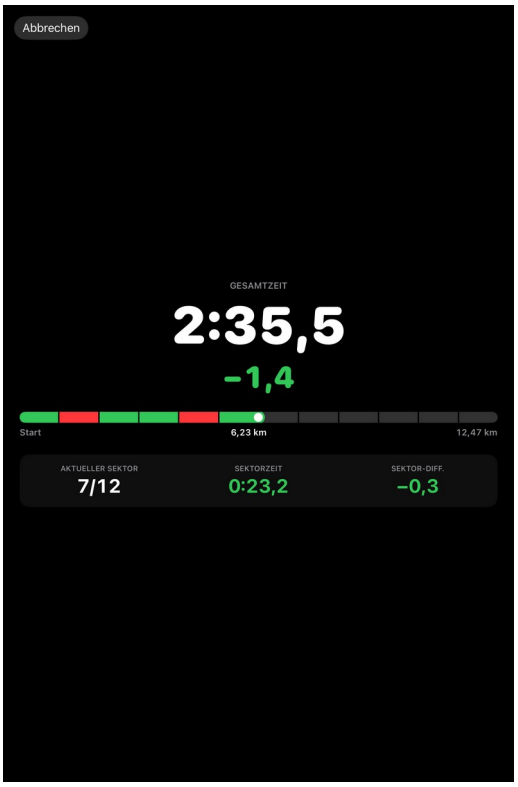
Level 1 · Minimal (faster)
Full-screen green: 1.4 s faster than the reference. At the bottom: kilometers, lap and total time.

Level 1 · Minimal (slower)
The same view in red: 0.8 s slower. Arrow and sign in addition to the color.



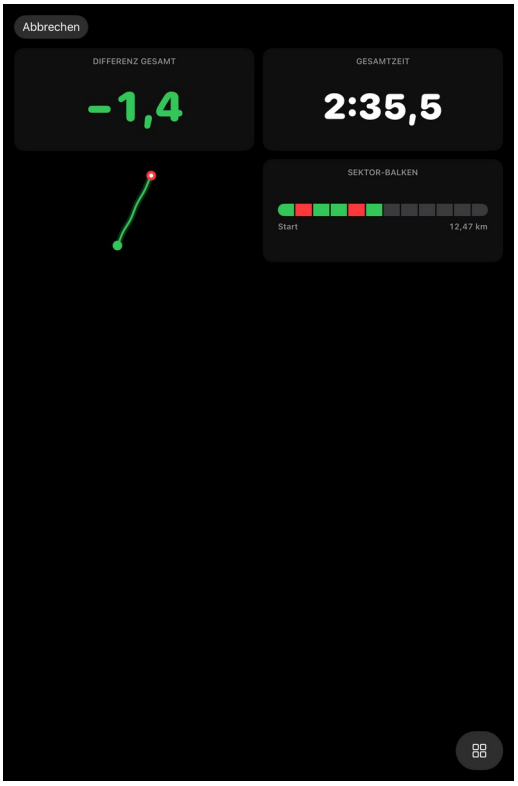
Level 2 · Compact

Total time large, difference in color, progress bar and sector map.



Level 3 · Detail

Additionally the segmented sector bar: every driven section green or red.

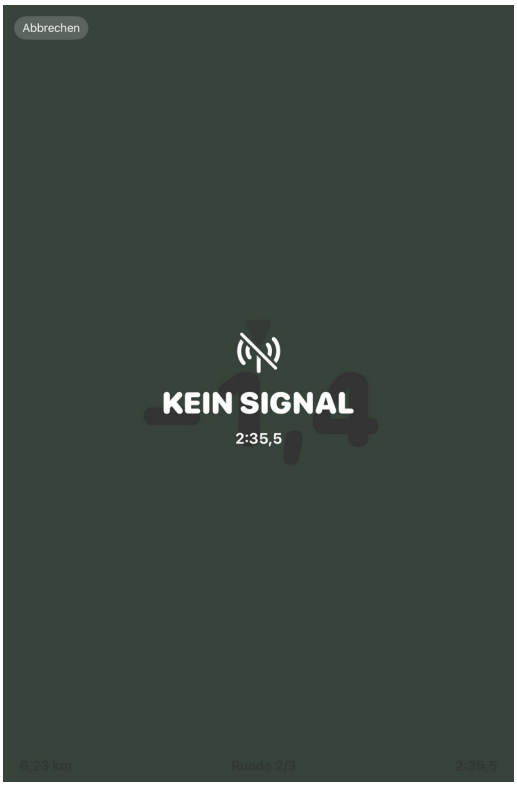


Level 4 · Custom view

The tile builder: choose and arrange building blocks freely — here delta, total time, track line and sector bar.

Exit warning (circuit)

Before the final loop exit the whole screen turns yellow — no sound, the color is enough.



Signal loss

No reception for more than two seconds: the display turns gray, the run keeps going.