LAURA LUTTMER

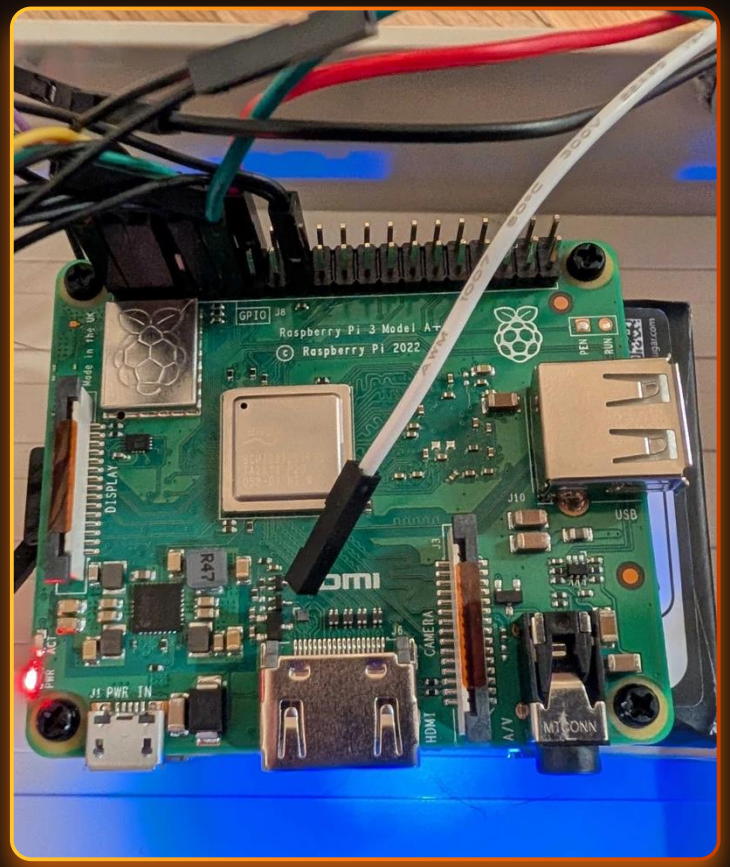
FAST AND FURIOUS: OTEL DRIFT

AN OPENTELEMETRY COLLECTOR ON A TOY CAR, AND WHAT BREAKS AT THE EDGE.



KUBECON NORTH AMERICA · NOVEMBER 12, 2026 · SALT LAKE CITY

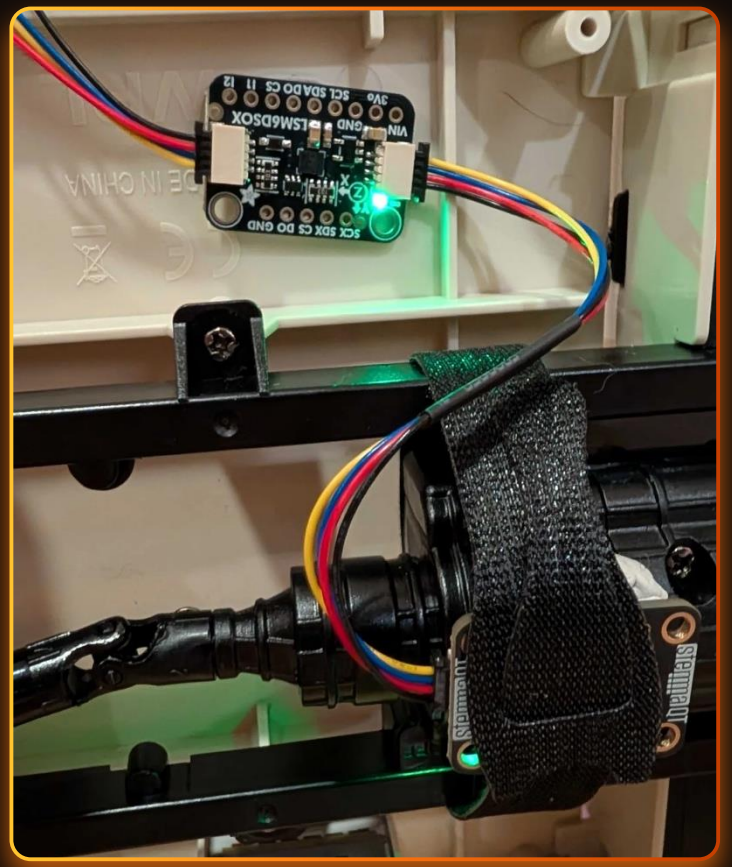
WHAT'S ON THE TRUCK



Raspberry Pi 3A+

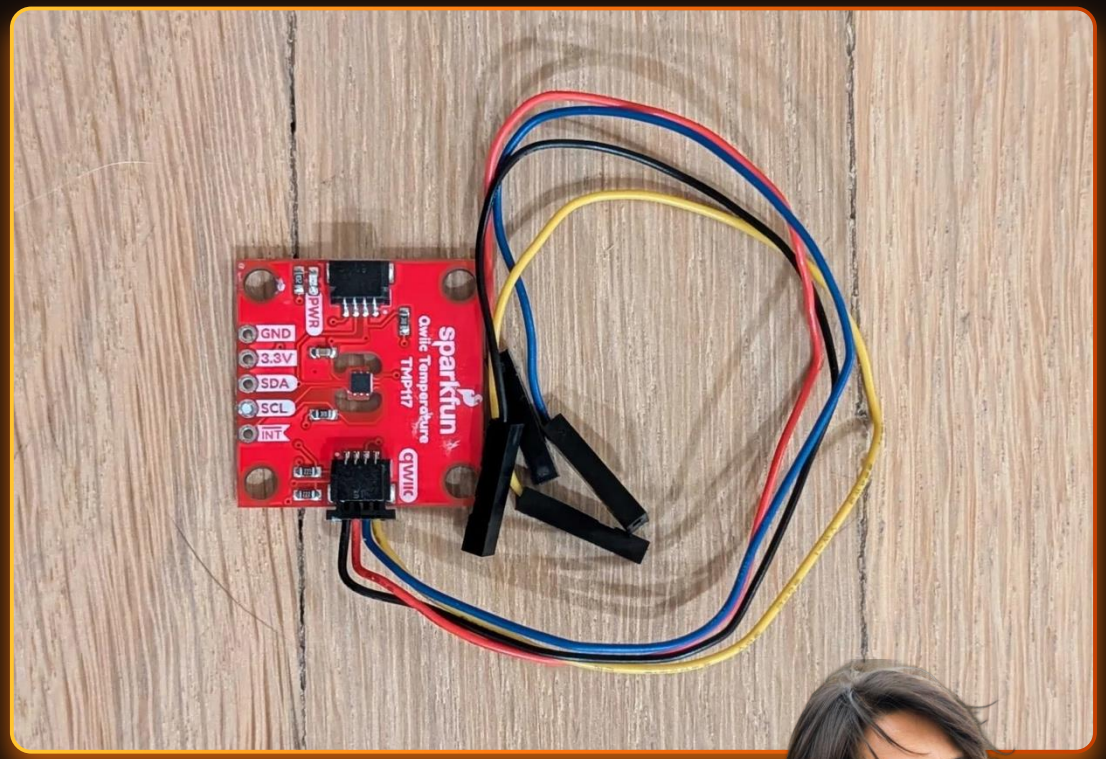


Wheel-speed sensor + magnet

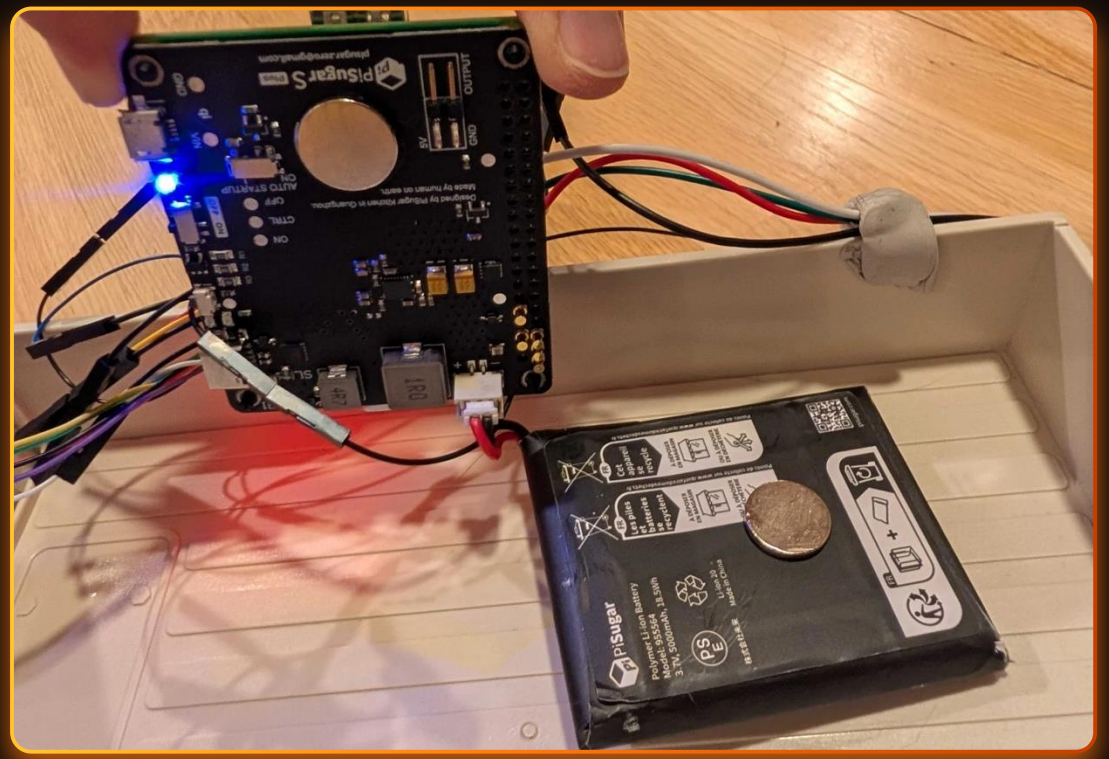


Accelerometer + temperature sensor

WHAT WENT WRONG



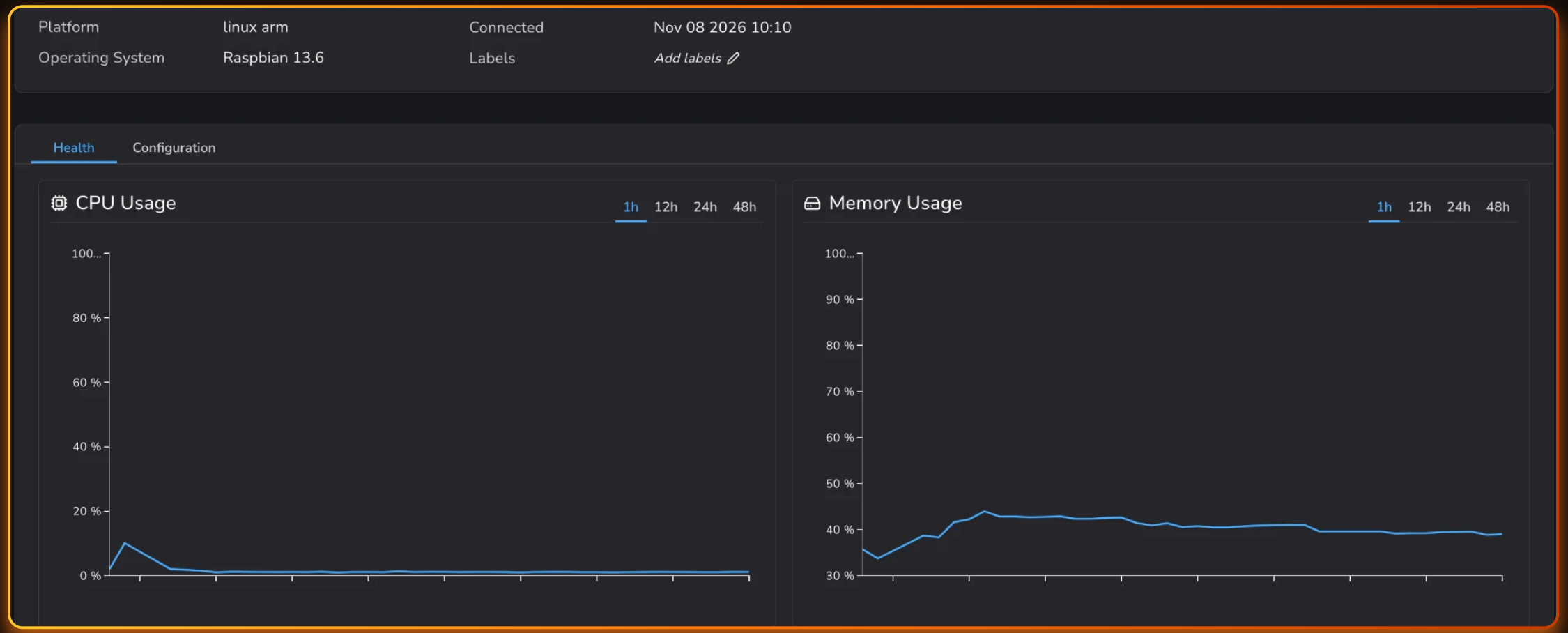
The temperature sensor, died October 2026



The battery, not lasting as long as it should



THE COLLECTOR FIT



About 150-200 MB of 512 MB, 1 to 2% of all cores (4), with host metrics and system logs turned on. Raspberry Pi 3 Model A+.



MOST OF WHAT AN EDGE DEVICE SEES NEVER LEAVES IT.

WHAT FELL BETWEEN THE READINGS



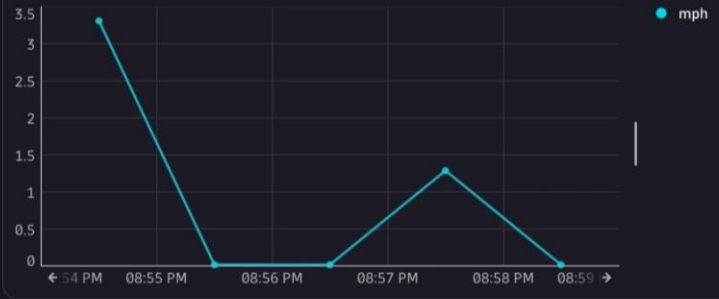
RC Car: Preso

Nov 7, 2026, 8:54 PM → 8:59 PM

1 min

Hardest hit	Top speed	Odometer	Donut count	Motor temperature
g	mph	ft	donuts	°F
15.70	6.60	31	0	68.10

Speed (mph)



Impact force (g)



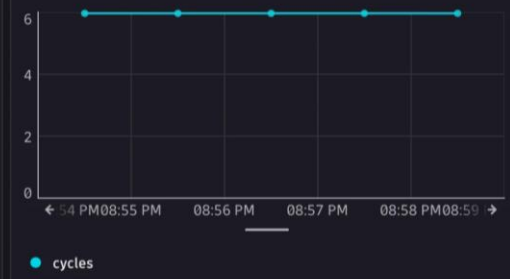
What just happened

time	event	direction	g
11/7/2026, 8:57:17 PM	impact	front	15.69
11/7/2026, 8:56:23 PM	impact	front	14.89
11/7/2026, 8:55:17 PM	impact	front	13.43
11/7/2026, 8:54:01 PM	impact	front	14.33

Wheel speed vs GPS speed (mph)



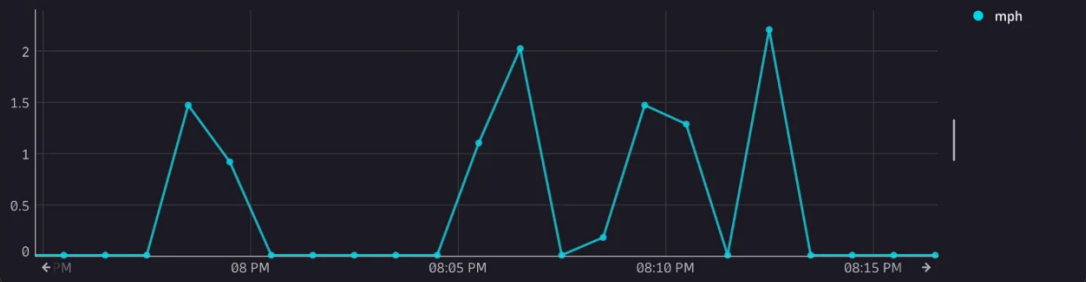
Sensor cycles per minute (about 6 = nothing lost)



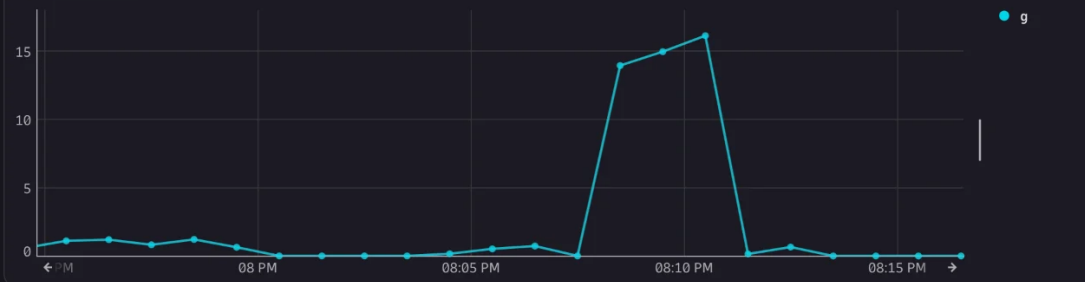
WHAT SURVIVES

Hardest hit	Top speed	Odometer	Donut count	Motor temperature
g	mph	ft	donuts	°F
16.10	5.40	337	6	68.80

Speed (mph)



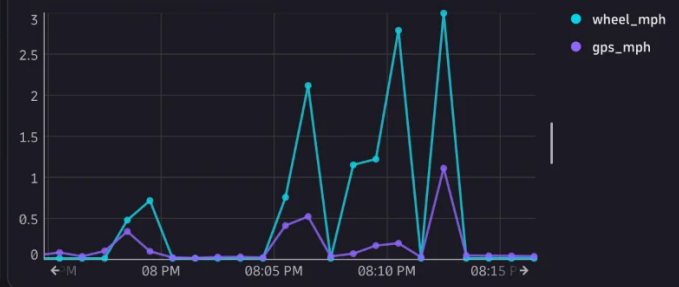
Impact force (g)



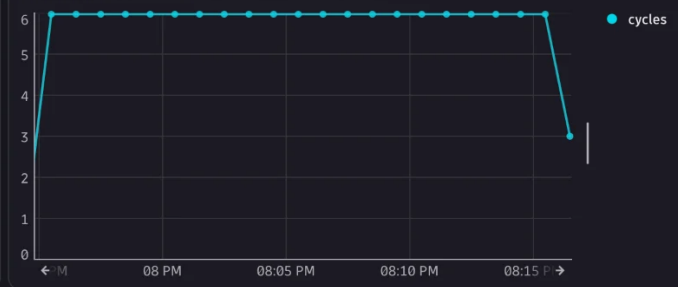
What just happened

time	event	direction	g
11/7/2026, 8:10:36 PM	impact	front	16.12
11/7/2026, 8:10:33 PM	stuck		
11/7/2026, 8:10:30 PM	impact	front	14.72
11/7/2026, 8:10:28 PM	stuck		
11/7/2026, 8:10:25 PM	impact	front	10.49

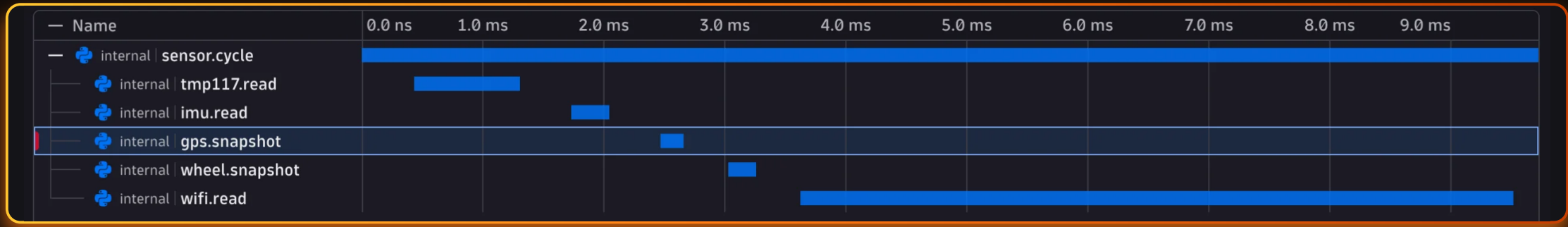
Wheel speed vs GPS speed (mph)



Sensor cycles per minute (about 6 = nothing lost)



ONE TRACE PER CYCLE, ONE SPAN PER SENSOR



Core

Service	pi-sensors
Span kind	internal
Span name	gps.snapshot
Duration	187.55 µs
Span status	Error
Span status message	no fix
Start time	November 8, 2026 at 12:18:32.491
End time	November 8, 2026 at 12:18:32.491

EDGE DEVICES GO OFFLINE ON PURPOSE.

FIVE MINUTES WITH NO NETWORK: DURING



During the outage, the lines stop when the network drops.

FIVE MINUTES WITH NO NETWORK: AFTER



Afterward the gap fills in, every reading at its real time.

WHAT THE COLLECTOR WAS DOING



THREE SETTINGS

Drop Raw Copy

Enable Retry on Failure Read More

Initial Interval (Seconds): 5
Time to wait after the first failure before retrying.

Max Interval (Seconds): 5
The upper bound on backoff.

Max Elapsed Time (Seconds): 0
The maximum amount of time spent trying to send a batch, used to avoid a never-ending retry loop.

Enable Sending Queue Read More

Number of Consumers: 10
Number of consumers that dequeue batches.

Queue Size: 5000
Maximum number of batches kept in memory before dropping.

Enable Persistent Queuing Read More

Persistent Queue Storage *: Bolt (Legacy)
The storage to use for the persistent queue.
Not sure which storage to use?

Persistent Queue Directory *: storage
The directory used to temporarily store telemetry data. Relative paths resolve against the collector's installation directory.

Synchronize Persistent Queue to Disk

Timeout: 1
The timeout for storage operations in seconds.



THE NETWORK ISN'T THE ONLY THING THAT GOES AWAY.



SOMETIMES EDGE DEVICES CAN'T BE REACHED.

THEY HAVE TO BE MANAGED ANYWAY.

bindplane | Overview | Gateways | Edge Fleets | Collectors | Configurations | Library | Blueprints | Bindplane Demo / LaurasR

Configurations > LaurasRCcar_Prod

Details

View Configuration File | Duplicate | Delete

Name	LaurasRCcar_Prod v7 History
Description	*Add a description*
Rollout	Rolled out to 1 Collector Rollout Options
Platform	Linux
Collector Type	BDOT 1.x (Stable)
Collector Role	Edge
Labels	*Add labels*

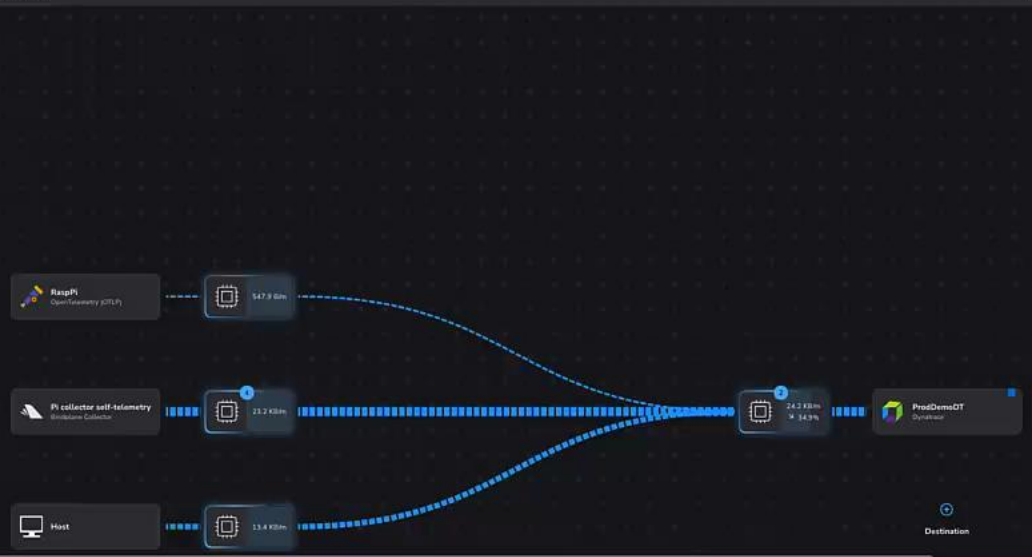
Discard | Compare | Start Rollout | Rollout Pending 0/1

Pipelines

Open Advanced Editor | Live | Draft | 1m | 5m | 1h | 24h

Logs

Metrics



bindplane | Overview | Gateways | Edge Fleets | Collectors | Configurations | Library | Blueprints | Bindplane Demo / LaurasRC

Collectors > raspberrypi

Details

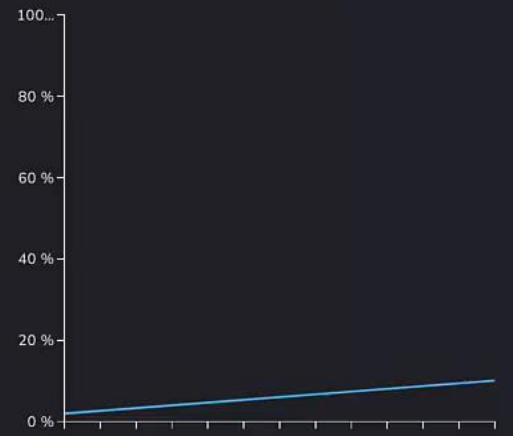
Change Configuration | View Recent Telemetry

Name	raspberrypi	Collector ID	01a0c133-81fd-7e77-abe6-2ccd827c53f3
Status	Connected	Remote Address	35.191.81.1
Type	BDOT 1.x (Stable)	MAC Address	b8:27:eb:80:e9:c7
Version	v1.112.0	Fleet	-
Host Name	raspberrypi	Configuration	LaurasRCcar_Prod
Platform	linux arm	Connected	Nov 08 2026 10:10
Operating System	Raspbian 13.6	Labels	*Add labels*

Health | Configuration

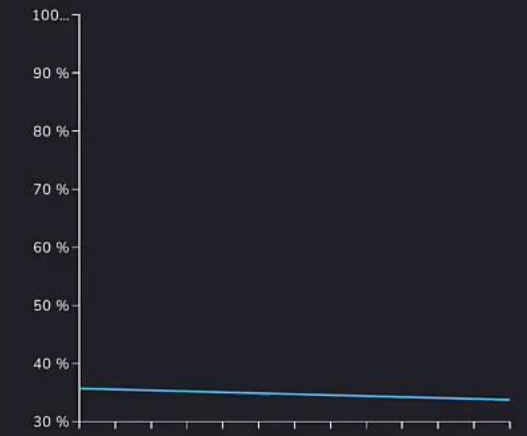
CPU Usage

1h | 12h | 24h | 48h

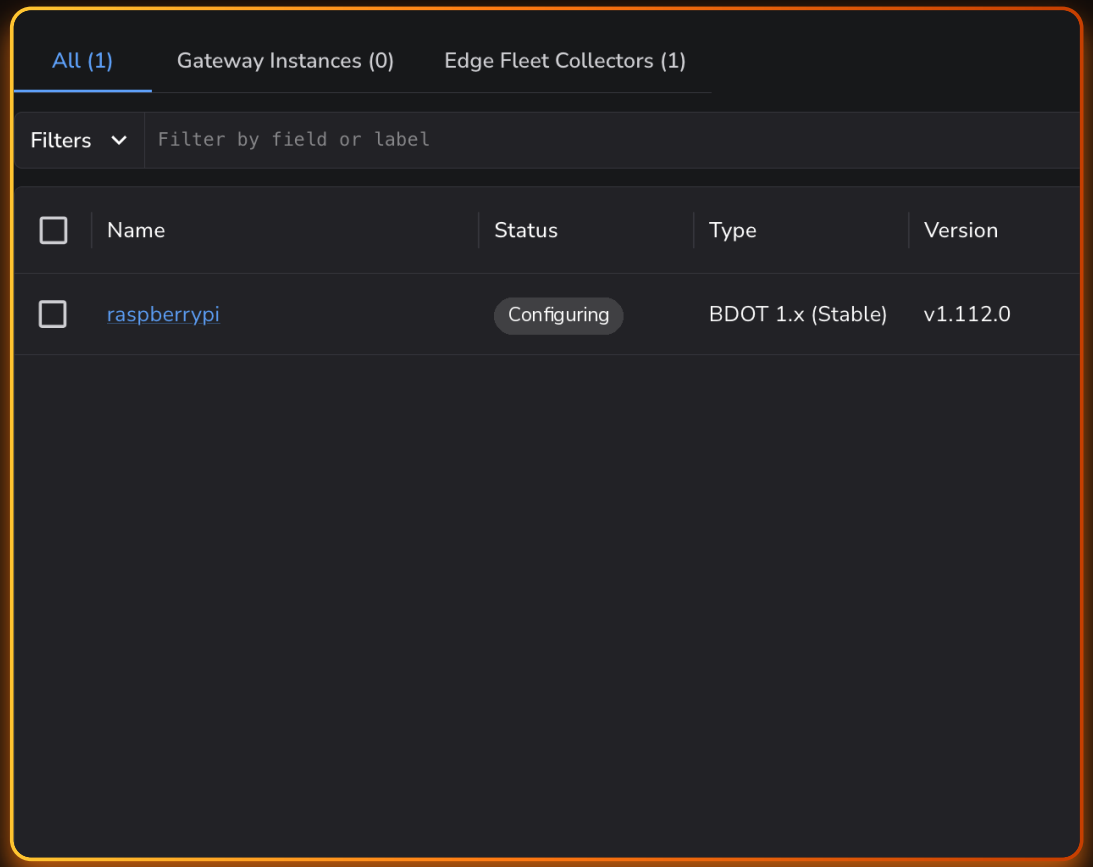


Memory Usage

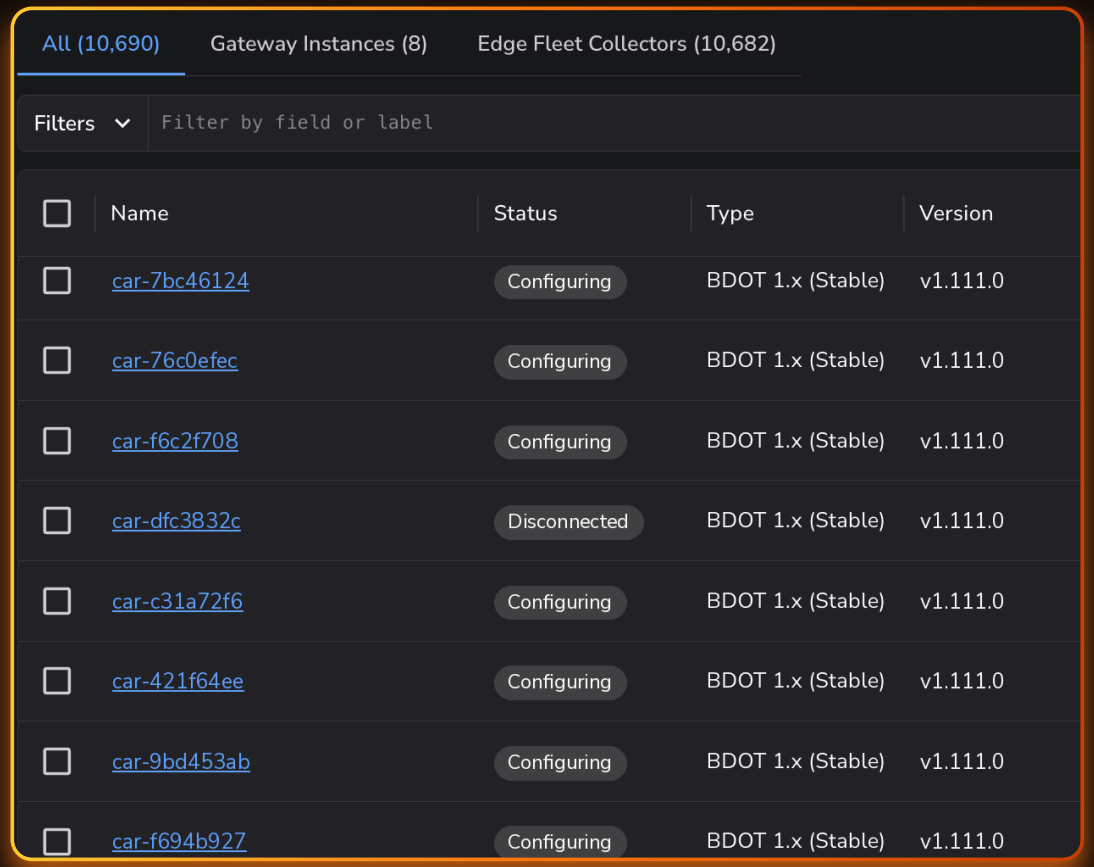
1h | 12h | 24h | 48h



EVERY CHANGE IS A RESTART.



One toy truck



A fleet

A FLEET IS NEVER ONLINE ALL AT ONCE.



INSIDE THE CAR



MANY COMPUTERS, ONE WAY OUT

Each computer runs a collector. Only one should reach the outside.

THE PARTS COME AND GO

A computer can be off when a change arrives, or start up while the car has no signal.



MOST OF WHAT AN EDGE DEVICE SEES NEVER LEAVES IT.



EDGE DEVICES GO OFFLINE ON PURPOSE.



SOMETIMES EDGE DEVICES CAN'T BE REACHED. THEY HAVE TO BE MANAGED ANYWAY.



Screenshots are of Bindplane and Dynatrace.

Movie stills and clip © Universal Pictures: *The Fast and the Furious* (2001), *The Fast and the Furious: Tokyo Drift* (2006), *Fast Five* (2011), *The Fate of the Furious* (2017).

ChatGPT used to create the cover, interior car, and slide 20 car images.

Claude used for initial research, Pi wiring instructions and troubleshooting, PI script, and slide design.