SIDE PROJECT · SEPTEMBER 2026

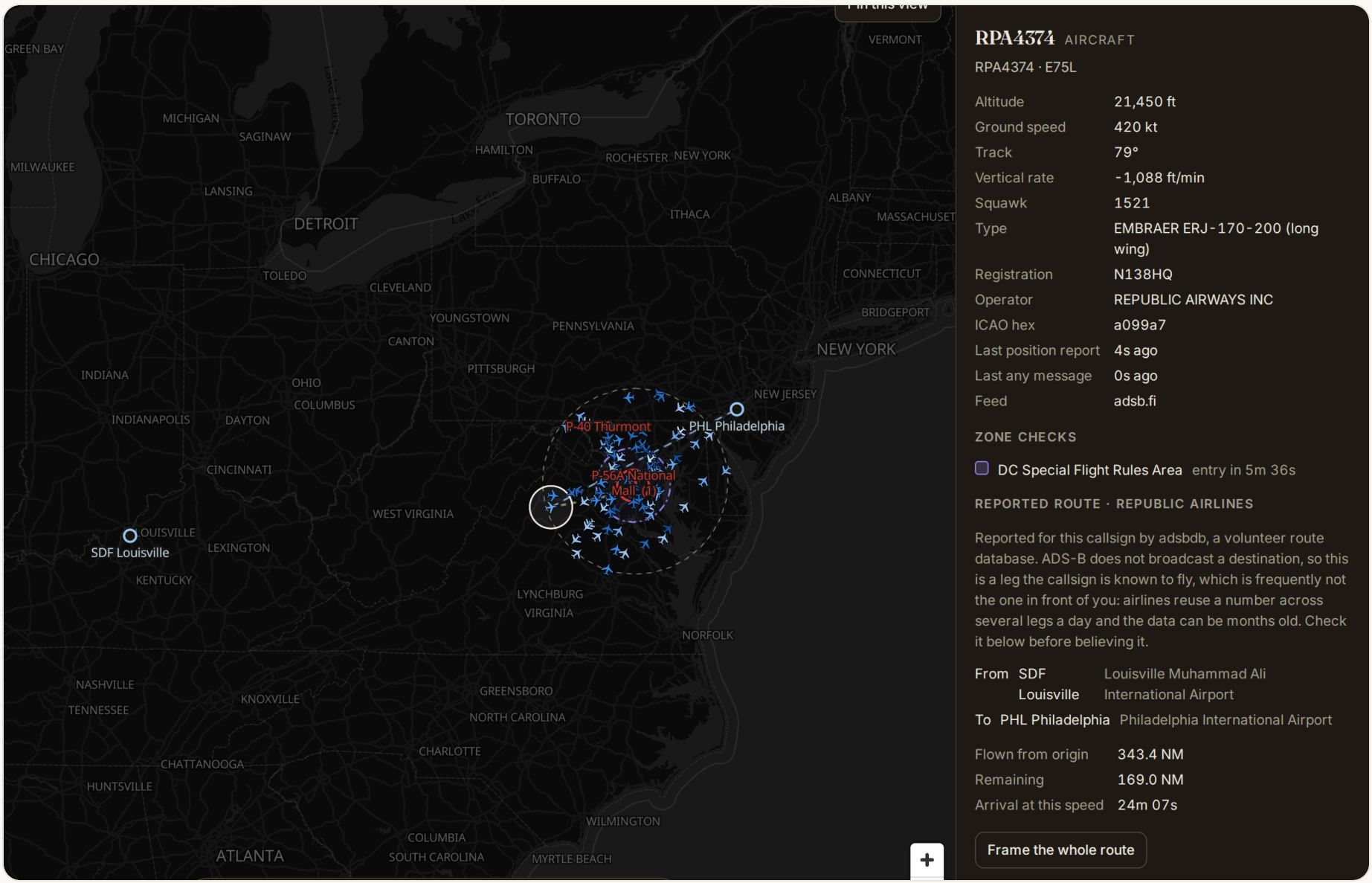
Project Flys Down

Live aircraft and ships on one map, with a detection engine that warns before something enters restricted airspace.

flysdown.jaronwilson.dev

WHAT YOU ARE LOOKING AT

One flight, and only what was watched



An airliner mid-flight. Solid is the track actually watched; dashed ahead is the reported route to its destination, with distance remaining and an arrival estimate. The departure airport is marked, never drawn to: a straight line from there claims a path no flight flies.

WHAT IT DOES

Four questions, answered live

- Is anything inside restricted airspace right now, and at what altitude?
- If nothing changes, what enters a zone next, and how long have we got?
- Are two ships converging on each other, and how close will they pass?
- Where did this flight come from, and where is it going?

THE PROBLEM NOBODY WARNS YOU ABOUT

Serverless has no IP address of its own

1 in 8

polls succeeded from the edge before the fix

Community ADS-B feeds rate-limit by IP, and a Cloudflare Worker egresses from addresses shared with every other customer on the platform. Measured from production: adsb.lol returned 429 on most attempts, adsb.fi served a bot challenge every time, and OpenSky did not answer at all. None of them send CORS headers, so the browser cannot call them either. Changing source does not fix it. The address is the problem.

THE FIX

Move the fetch, not the source

2 to 9 s

age of live aircraft data in production, about 490 targets

A small poller runs where the IP is ordinary. It asks the site which map areas people are actually looking at, fetches those, and pushes snapshots into Cloudflare D1, which the edge reads first. Demand driven, so it follows the map instead of polling a fixed list of cities.

```
browser  ->  /api/aircraft  ->  D1 snapshot (fresh)   <-  relay, every 8 s
                            |
                            +->  aggregators directly (usually refused)
                            +->  last known good, labeled stale with its age
```

DETECTION, PART ONE

Projected airspace entry

Every target is dead-reckoned forward and checked against each zone in three dimensions, so a jet at 35,000 ft over a surface-to-18,000 ft prohibited area is correctly not an incursion, while one descending into the band is caught. The step size is tied to each zone’s own radius, because a fixed 15 second step at 500 knots walks straight over a one mile circle, and the crossing time is then refined by bisection.

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N9287Y reaches P-40 Thurmont in 56s, 5000 ft
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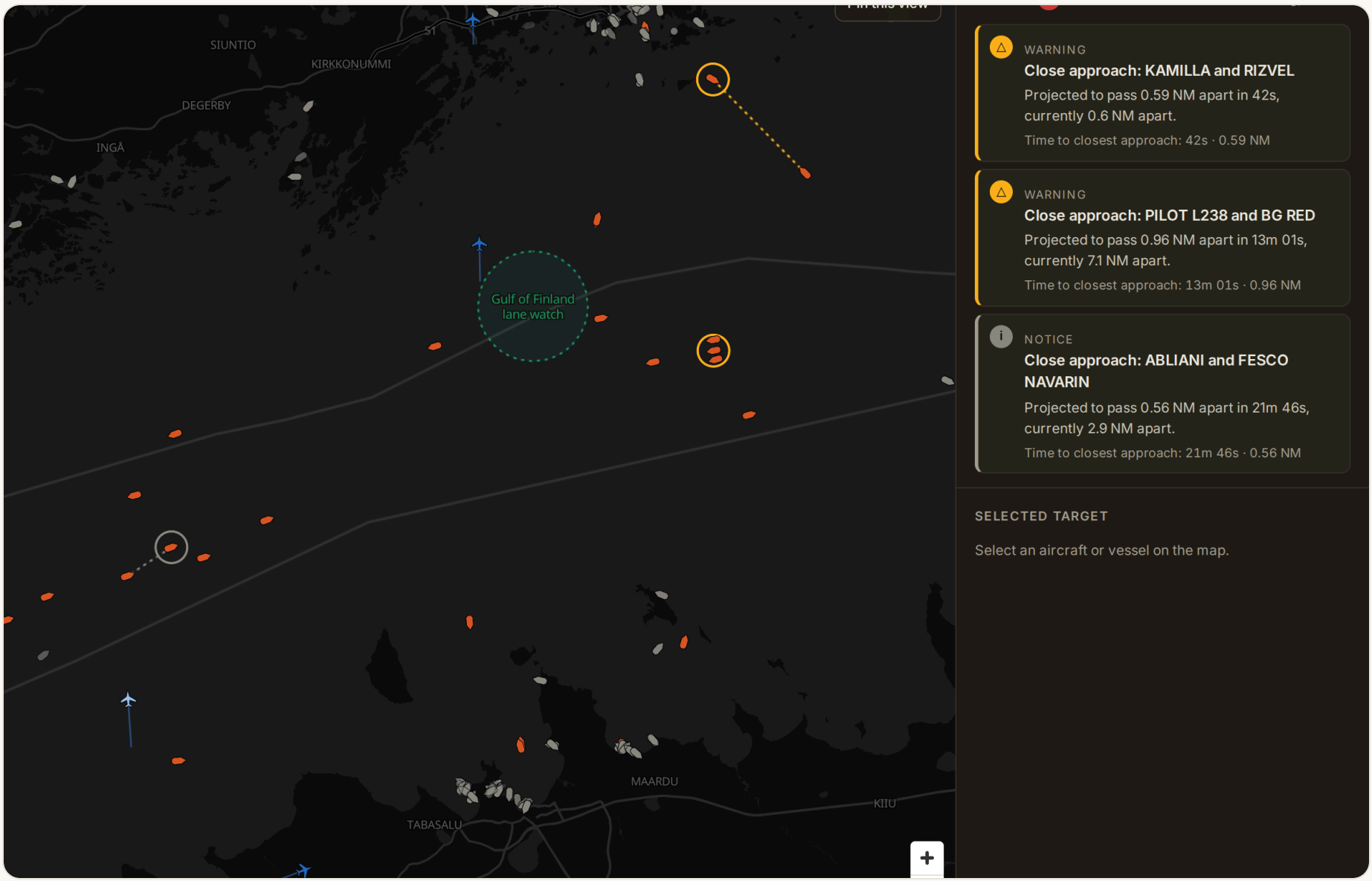
a real alert, over Camp David

DETECTION, PART TWO

Two ships, one relative track



Closest Point of Approach by relative motion, the same alarm model an ARPA radar uses: a preset CPA limit and a warning time. Moored and anchored ships are excluded, or a harbor would drown the feed with pairs lying a cable apart at zero knots.

WHEN THE DATA IS WRONG

Seven routes in ten described a different flight

- ADS-B broadcasts position, not schedule, so origin and destination come from a volunteer database keyed on the callsign. Airlines fly one number over several legs a day, and the database holds one of them.
- Measured at Washington National: of ten arriving aircraft with route data, seven were reported on a leg between two airports that were neither where they sat nor where they had come from.
- Four checks now test a route against the aircraft itself: does the flown plus remaining distance match the leg, is it pointed at the destination, is it parked at neither end, is it descending to land somewhere else. Eight of the ten were rejected, and neither correct route was.
- What survives is still labeled reported, not known, with no arrival estimate and a link to a source that holds the day’s schedule. A dashboard that states a wrong destination confidently is worse than one that admits the limit.

GETTING THE BORING PARTS RIGHT

Real airspace, and honest staleness

- Zone geometry is the FAA’s own published Special Use Airspace, not hand-drawn. Their one-mile circles ship as 6,285-point polygons; simplification takes that to 17 with no visible difference.
- Transiting the DC Special Flight Rules Area with a clearance is routine, so it is advisory: drawn and reported, never alerted. That change took one view from 55 alerts to 3 real ones.
- When every upstream refuses, the map shows the last good picture labeled with its age. A dashboard that quietly shows five minute old positions as current is worse than one showing nothing.
- Route data is keyed on the callsign, so it can describe a leg the aircraft is not flying. Every route is checked against the aircraft’s own position and track, and one that disagrees is labeled unverified with no arrival estimate rather than drawn as fact.

BY THE NUMBERS

What it took

8,000
lines, no framework, no build step

57
unit tests, plus a real-browser smoke test

16
restricted zones from FAA data

4
live data sources, none needing a key

$0
hosting: Cloudflare free tier

13
page write-up of how it all works

HAVE A LOOK

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ADS-B from adsb.fi and adsb.lol, AIS from Fintraffic Digitraffic, airspace from the FAA, routes from adsbdb, basemap from OpenFreeMap. Built on Cloudflare Pages with MapLibre GL JS.

Designed and directed by Jaron Wilson. Built with Claude, by Anthropic, as a working collaboration: Jaron set the requirements and made the product calls, Claude wrote the code, ran the measurements and drafted the write-up.

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