

PATROL

A search drone that looks for one missing person's things, with no internet.

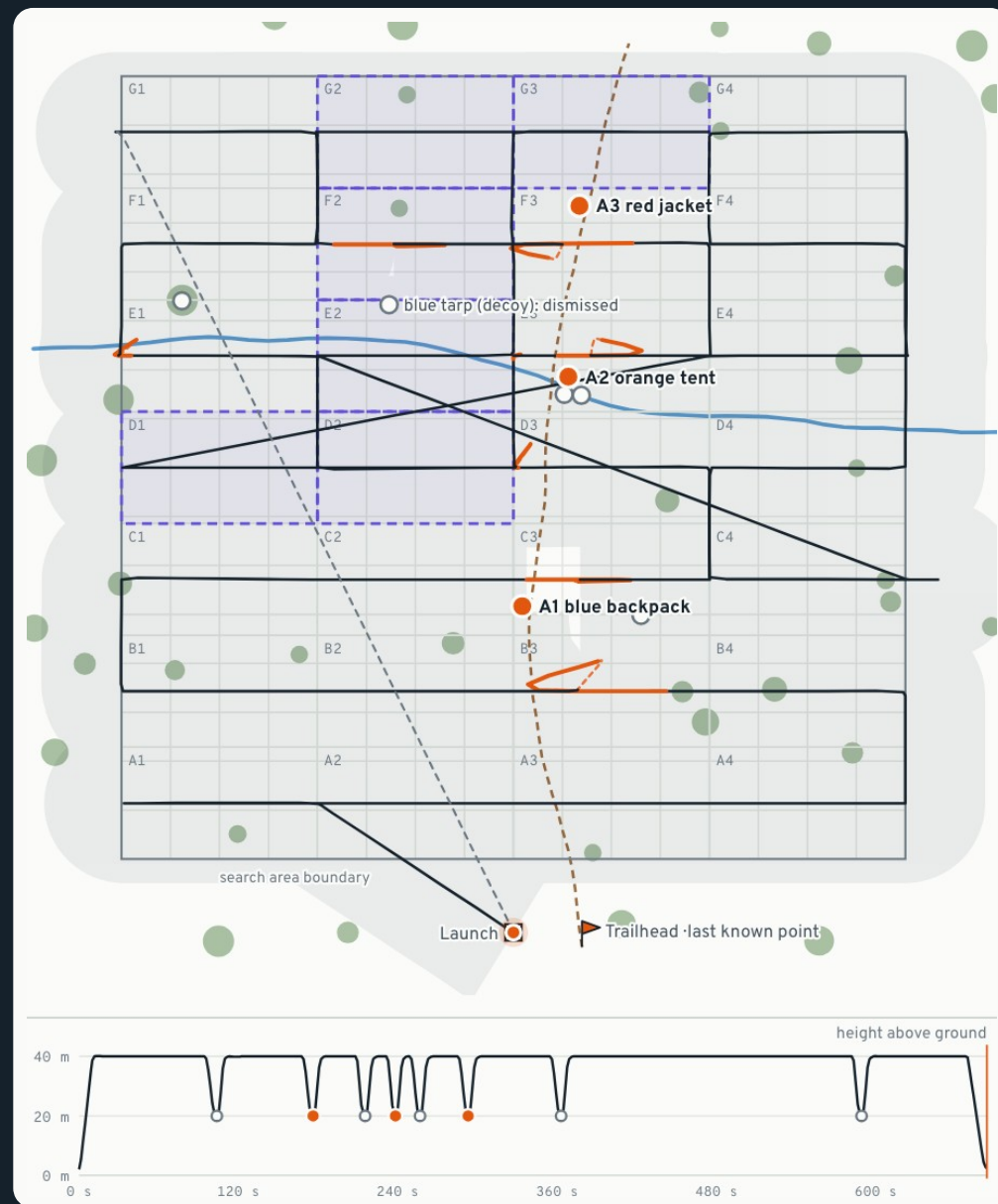
"The camper had a blue backpack, an orange tent, and a gray dog."

3 of 3

things found on a real-time flight, no false alerts

0.32 s

median time to judge one odd-looking spot



Simulated flight, drawn from its own log

Everything it sees, thinks and finds

The screenshot displays the Patrol interface with the following components:

- Header (1):** Patrol: search, SWEEP, 43% AREA SEARCHED, 80% BATTERY, 4:01 SIM CLOCK, DECISION SOURCE: CLEF MEDIAN 381 MS, ALERTS 3. Includes buttons for Sound off, REPLAY x16, and Play again.
- Looking for (2):** blue backpack, orange tent, gray dog. Descriptions: blue backpack (rectangular blue fabric object), orange tent (bright orange geometric shape), gray dog (small gray furry shape).
- Camera (3):** ZOOM CAMERA, S4 at 20 m, 24 m slant. ZOOM, 20 m - S4. CONFIRM. ALERT A3: blue backpack found.
- Decision trace (4):** CLEF 450 ms confirm S4 at 20 m. CLEF'S CHOICE: blue backpack (80%), orange tent (2.3%), gray dog (7.4%), something else (7.7%), nothing (3.0%). IS IT THE CLUE? (CONFIRM NEEDS 50%): blue backpack (79%), orange tent (<1%), gray dog (2.6%).
- Map (5):** MAP, show planted items. Legend: searched (blue square), dismissed (orange circle), alert (red circle). Trail, stream, LKP. Grid G1-G4, F1-F4, E1-E4, D1-D4, C1-C4, B1-B4, A1-A4. Scale 20 m.
- Chase view (6):** CHASE VIEW, third person. 3:55 SPEECH: "Alert A3. Possible blue backpack spotted 10 meters east and 30 meters north of search center, 132 meters from trailhead. Ground team should visually confirm the object is the missing backpack." 3:54 NOTE: A3 Possible blue backpack spotted 10 meters east and 30 meters north of
- Alerts (8):** ALERT A3 blue backpack (t 3:19). from 36 m what the sweep saw. confirmed at 20 m close-up photo. LOOKING FOR blue backpack (9.6, 29.9) 79% CONFIDENCE. Spot S4: 20 m confirm (blue backpack 79%). RADIO NOTE - qwen38: Possible blue backpack spotted 10 meters east and 30 meters north of search center, 132 meters from trailhead. Check: Ground team should visually confirm the object is the missing backpack. ALERT A2 orange tent (t 2:30). from 36 m what the sweep saw. confirmed at 20 m close-up photo. LOOKING FOR orange tent (10.7, -16.7) 93% CONFIDENCE. Spot S3: 20 m confirm (orange tent 93%). RADIO NOTE - qwen38.

- Header** state, area searched, battery, who decided
- Looking for** the clues, in qwen38's words
- Camera** the sweep photo, then the close-up and verdict
- Decision trace** the crop Clef-Flash judged, and its odds
- Map** lanes, trail, spots checked, alerts, next sectors
- Chase view** for the audience; no model uses it
- Log** every decision, note and spoken line
- Alerts** sweep crop beside the confirming close-up

The moment of an alert in the demo flight: Clef-Flash has just confirmed the blue backpack from 20 m.

Watch the whole flight

Patrol: search **SWEEP** **43%** **80%** **4:01** **CLEF 69** **FALLBACK 0** **QWEN38 7** **3** **ALERTS**

LOOKING FOR **blue backpack** ~0.5 m
a rectangular blue fabric object with visible straps and buckles, roughly the size of a large book.

orange tent ~2 m
a bright orange geometric shape, likely triangular or dome-like, with visible seams and a smooth synthetic surface.

gray dog ~0.6 m
a small gray furry shape with four legs and a tail, appearing as a compact oval mass on the ground.

ZOOM CAMERA S4 at 20 m, 24 m slant **CONFIRM**

ALERT A3: blue backpack found

MAP show planted items
searched open dismissed alert
trail stream LKP

ALERTS click a card to enlarge, key A: latest

ALERT A3 blue backpack t 3:19

from 36 m what the sweep saw confirmed at 20 m close-up photo

LOOKING FOR **blue backpack** **POSITION, M** **(9.6, 29.9)** **CONFIDENCE** **79%**

Spot S4: 20 m confirm (blue backpack 79%)

RADIO NOTE · qwen38
Possible blue backpack spotted 10 meters east and 30 meters north of search center, 132 meters from trailhead.
Check: Ground team should visually confirm the object is the missing backpack.

ALERT A2 orange tent t 2:30

from 36 m what the sweep saw confirmed at 20 m close-up photo

LOOKING FOR **orange tent** **POSITION, M** **(10.7, -16.7)** **CONFIDENCE** **93%**

Spot S3: 20 m confirm (orange tent 93%)

RADIO NOTE · qwen38

DECISION TRACE **CLEF** 450 ms confirm S4 at 20 m

CLEF'S CHOICE

blue backpack	80%
orange tent	2.3%
gray dog	7.4%
something else	7.7%
nothing	3.0%

CONFIRM

What Clef saw: the zoom photo at 20 m.

IS IT THE CLUE? (CONFIRM NEEDS 50%)

blue backpack	79%
orange tent	<1%
gray dog	2.6%

White ticks: dismiss below 20%, confirm at 50% or more, in between go lower.

CHASE VIEW third person

LOG

3:55 **SPEECH** "Alert A3. Possible blue backpack spotted 10 meters east and 30 meters north of search center, 132 meters from trailhead. Ground team should visually confirm the object is the missing backpack."

3:54 **NOTE** A3 Possible blue backpack spotted 10 meters east and 30 meters north of

- 3 min 23 s, replayed at 3.5× with the alerts read aloud.
- Three finds, the tarp checked and dismissed, no false alerts.
- This recording is also the stage fallback.

Searchers start with words, not photos

WHAT THE FAMILY SAYS

“The camper had a blue backpack, an orange tent, and a gray dog.”

- Nobody has trained a detector on this person’s blue backpack.
- No cell signal: an alert is about 270 bytes of text plus a 20 KB photo.
- Decide in the air. After landing, every “maybe” costs another flight.



From 40 m, a backpack is a smudge

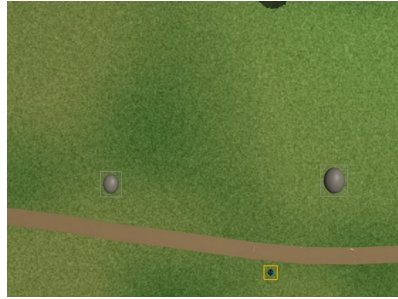
About 22 pixels across: enough to look odd, not enough to be sure.

A flight in five moments

“...a blue backpack, an orange tent, and a gray dog.”

1 Say it

Parakeet writes it down. qwen38 turns each thing into a sentence about how it looks from above.



2 Sweep at 40 m

A photo every 12 m. The finder boxes odd spots; Clef-Flash says 61% backpack in about 0.3 s.



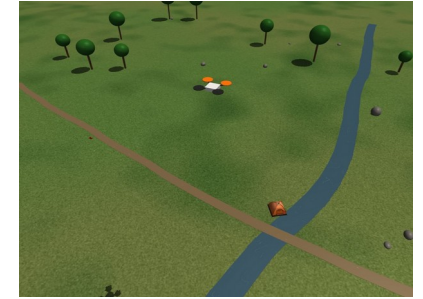
3 Follow a lead

Down to 20 m for a close-up. The backpack scores 94.5%: confirmed.



4 Alert

A position, a photo and a spoken note. The tent alert lands 0.24 m from the tent.



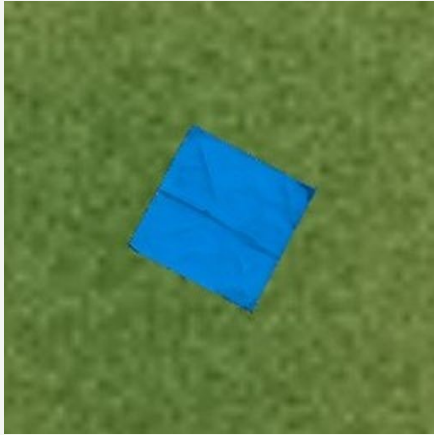
5 Think ahead

qwen38 reorders the sectors. The second find came 29.5 s sooner, on average.

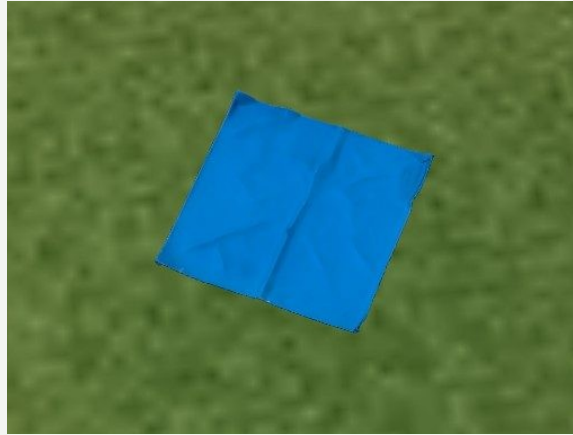
Real flights in the simulator, with the real models deciding.

A decoy dismissed, a backpack confirmed

FROM 40 M



CLOSE-UP AT 20 M



DISMISSED

FROM 40 M

17%

blue backpack?

AT 20 M

4%

A flat sheet. Best clue score 4%.

FROM 40 M



CLOSE-UP AT 20 M



CONFIRMED

FROM 40 M

61%

blue backpack?

AT 20 M

94.5%

Straps and pockets. Back in the lane with an alert.

Scores are Clef-Flash's probability that the spot is the blue backpack.

Four models fly it, three built the props

● Clef-Flash

THE FAST EYES

Judges each odd spot in about
0.3 s

● qwen38

THE SLOW THINKER

Clue sentences, radio notes, trail
plans, second opinions

● Parakeet

THE EARS

Speech to text in 20 to 90 ms

● Kokoro

THE VOICE

Reads every alert aloud

Plain code flies the drone and owns safety. Models advise; no model can override it.

THREE MORE MODELS, CHAINED BY m3d, BUILT EVERY PROP FROM ONE SENTENCE

*“a royal blue
hiking backpack
with black straps”*



The sentence

“a royal blue hiking backpack”

Z-Image Turbo

concept picture, 20 s

Apple Vision

cut-out, under a second

Hunyuan3D

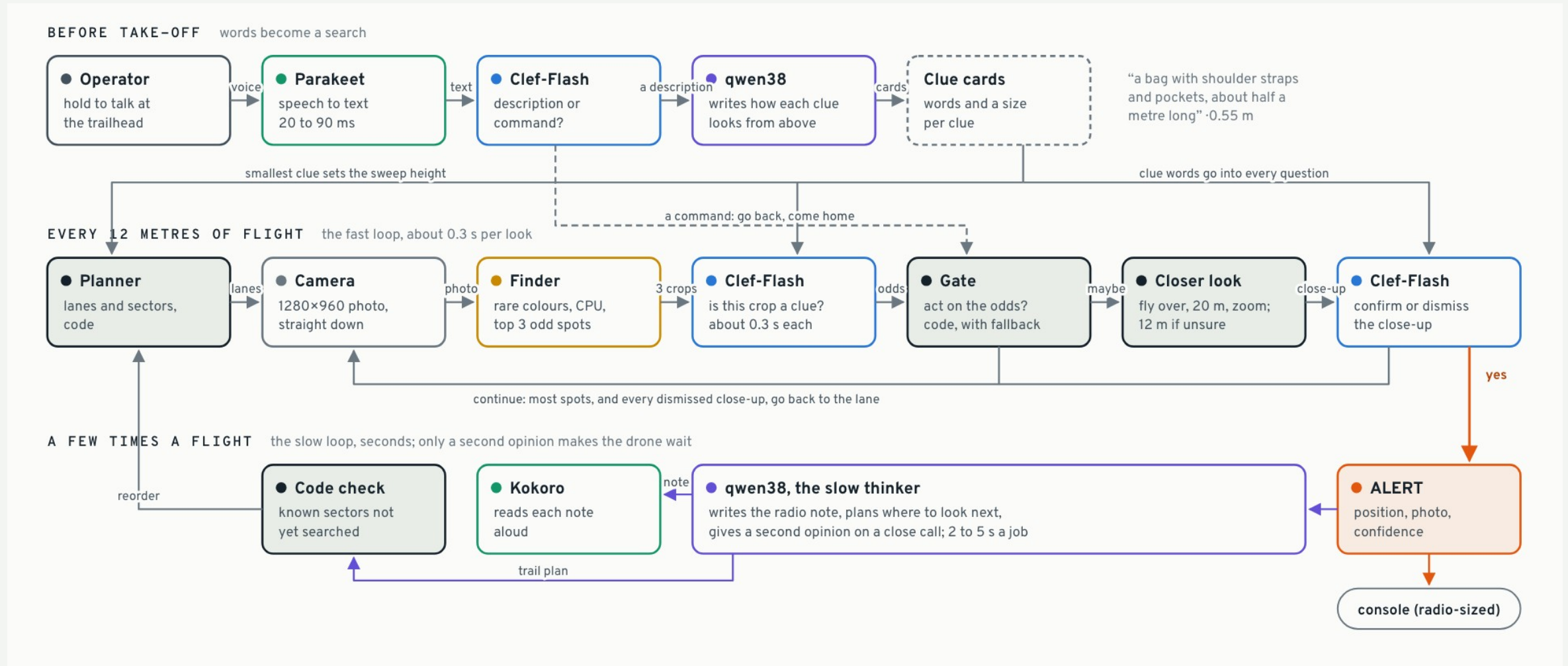
shape and textures, 260 s

In the simulator

photographed by the drone

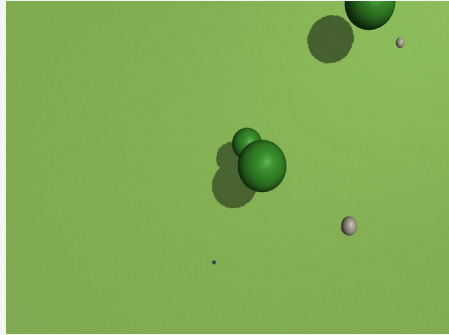
About 5 minutes per item, 8 items. All of it happens before the flight.

Fast loop, slow thinker, code in charge

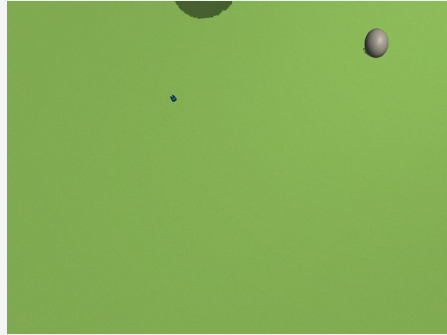


Clef-Flash judges every photo in about 0.3 s. **qwen38** does a few background jobs. **Code** checks every answer and owns safety.

Fly high, look close



sweep · 60 m
the finder misses it



sweep · 40 m
the sweep height



sweep · 20 m
easy, but twice the lanes



zoom · 20 m
the first closer look



zoom · 12 m
only if unsure

1 of 10

views where the finder found the
backpack from 60 m

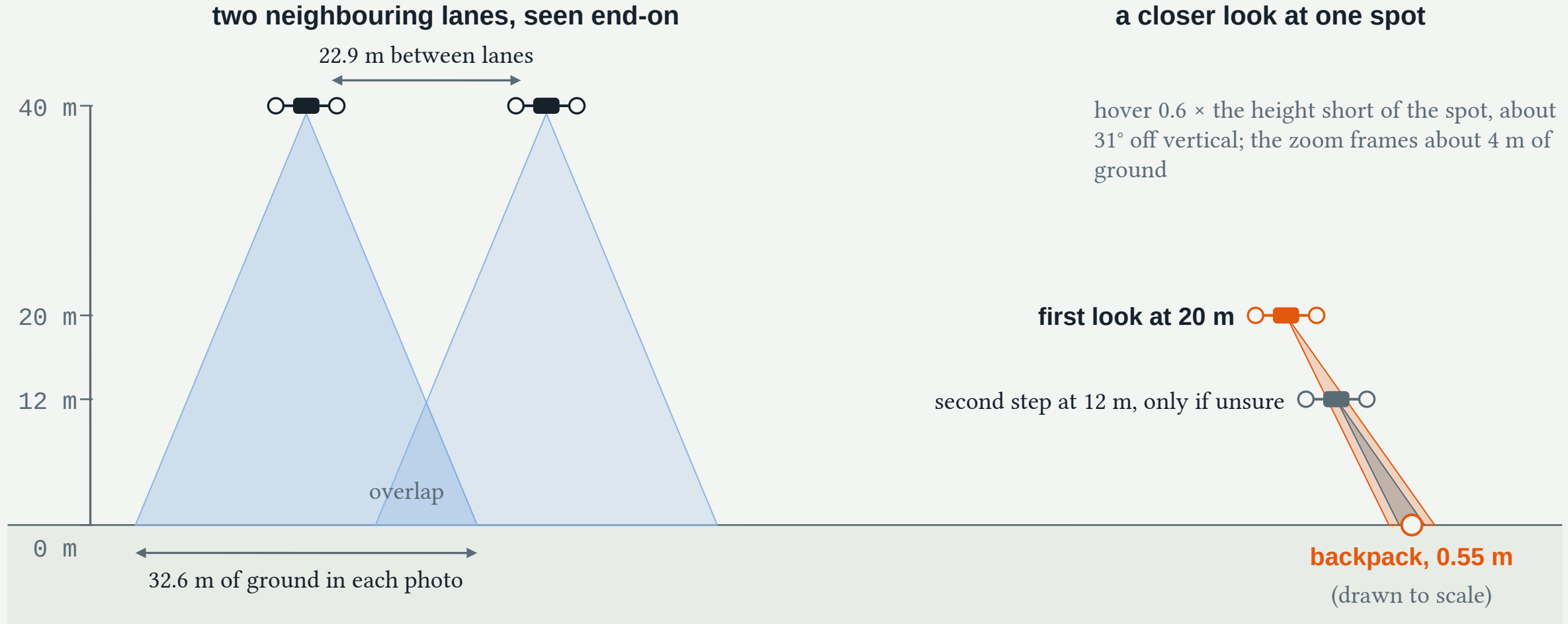
10 of 10

views where it found it from 40 m, so
40 m is the sweep height

7 vs 13

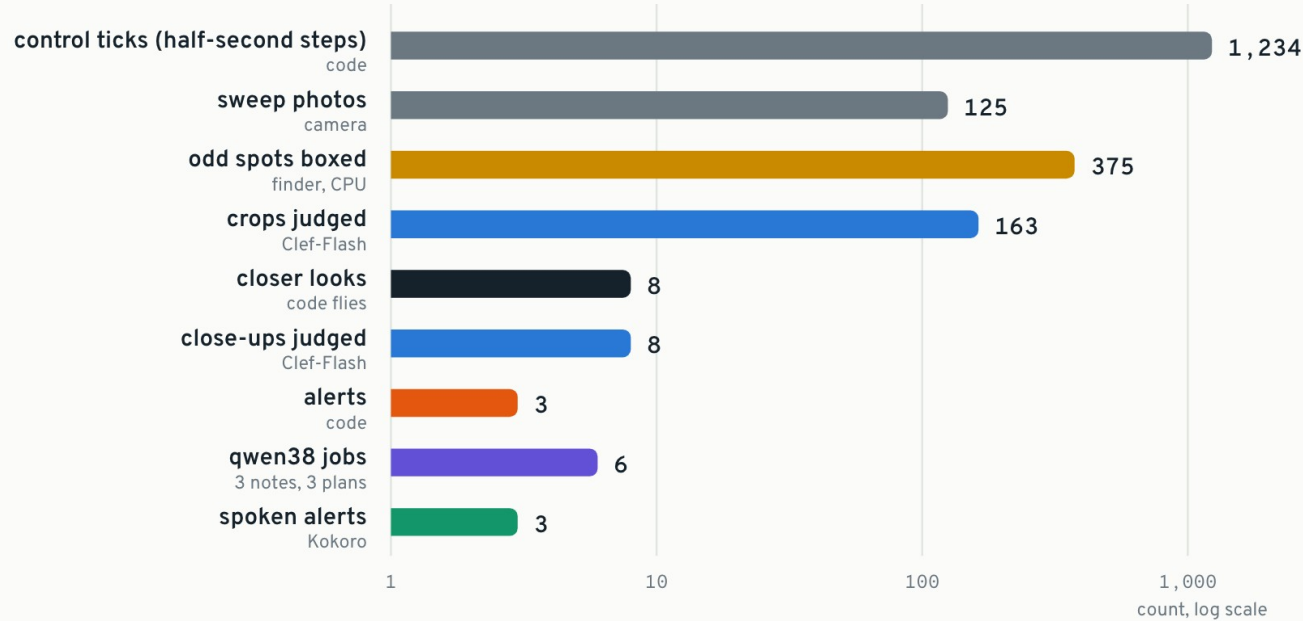
lanes to cover the 160 m square from
40 m versus 20 m

Higher means fewer lanes



At 40 m, 7 lanes cover the square. At 20 m it would take 13.

Each model sees only what it must



One flight: 683 s over a 160×160 m square. Clef-Flash's 171 calls took about 56 s of model time; qwen38's 6 jobs about 15 s, in the background.

375

odd spots boxed by the CPU finder, on every photo

163

crops judged by Clef-Flash, plus 8 close-ups

6

qwen38 jobs: 3 radio notes, 3 trail plans

Talking to it

THE OPERATOR SAYS

"Missing hiker. Blue backpack, orange tent, grey dog."

"Start the search."

"Go back to the last alert."

"Stop searching and come home."

CLEF-FLASH ROUTES IT TO

describe

start_search

go_back_to_last_alert

return_home

WHAT HAPPENS

qwen38 writes the clue cards

take off and sweep

fly back and look again

straight home

20 to 90 ms

Parakeet, speech to text

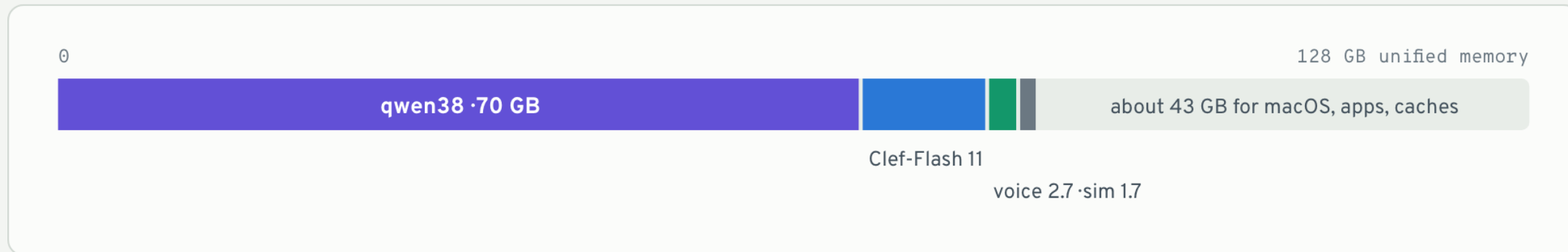
45%

minimum Clef-Flash confidence to act on a command

94.7%

confidence on the operator's spoken description

One laptop, no internet



128 GB

One MacBook Pro M5 Max

A 40-core GPU and 128 GB of unified memory run every model, the simulator and the console at once.

No internet

Everything is local

Every model runs on the laptop and nothing in the code calls out.

0.3 to 0.4 s

One GPU is the limit

Clef-Flash answers that fast when the GPU is free. With another job running, 2 to 6 s.

It works end to end, in a simulator

3 of 3

found on a real-time flight,
683 s, no false alerts

17 of 18

scenario flights pass, over three
sets of fresh seeds

0 in 45

false alerts across 45 flights and
95 alerts

0 vs 7

false alerts, live versus
reviewing photos after landing



Found from words alone

Dog, helmet (0.3 m) and sleeping bag:
items never used for tuning.

Read these as “this behaviour works”, not as real-world detection rates.

What doesn't work yet

PASSES, ONE MISS

One miss left: the finder

On a 30-minute battery the four-clue flight covers the whole area; 17 of 18 pass. The miss: the finder never boxed one sleeping bag.

PARTLY

New items lean on qwen38

Clef-Flash's close-ups score 0.12 to 0.29 on held-out items. Two of four finds came via a second opinion.

OPEN

It has only seen a simulator

Flat ground, no wind, no GPS error. Real aerial imagery is untested.

OPEN

No radio, no Wi-Fi-off rehearsal

The alert is radio-sized, but no radio exists. Offline is by design, not yet by test.

PARTLY

Small numbers

Three seed sets per scenario, two seeds for the trail test, six flights for live versus after landing.

What's next

1

Fix the finder's blind spot

The last held-out miss was a sleeping bag the colour finder never boxed.

2

Wi-Fi-off rehearsal

Run the whole demo with the network actually off. About ten minutes.

3

Real aerial photos

Replay HERIDAL, SARD or WiSARD imagery. Approved; dataset licences are being checked.

4

Hybrid after-landing pass

Re-check saved photos, but only send a team to spots no close-up cleared. A day of work.

5

Real flight software

PX4 in simulation, then a real drone. Weeks, and hardware.

From a convincing simulator to evidence that matters on real ground.