SAW-Bench

Learning Situated Awareness in the Real World

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MOTIVATION

Reasoning about yourself in space

Human perception is inherently ***situated*** — continuously relating ourselves to the physical world and reasoning over actions from our **own viewpoint**, **pose**, and **motion**.

Environment-centric
Relations among objects in a scene — the focus of prior benchmarks.

Observer-centric
Reasoning relative to the agent's viewpoint, position & motion.

THE QUESTION

Do multimodal models understand themselves in space — where they are, how they've moved, and what they can do given the physical constraints?

THE BENCHMARK

Six situated-awareness tasks

- **Self-Localization** — where am I?
- **Route Shape** — shape of my path?
- **Spatial Memory** — what changed?
- **Relative Direction** — way to where I was?
- **Reverse Route Plan** — how to get back?
- **Spatial Affordance** — can I act now?

THE BIG PICTURE

Camera motion ≠ observer motion

INSIDE SAW-BENCH

Real egocentric video, human-annotated

Self-recorded with **Ray-Ban Meta (Gen 2)** smart glasses; audio removed so reasoning is purely visual.

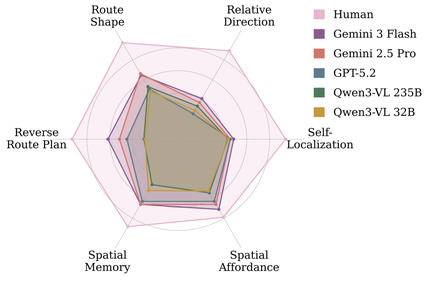
Courtyards · Parking lots · Lawns & plazas · Lecture halls · Classrooms · Rec rooms · Households …

786 real-world videos

2,071 human QA pairs

6 awareness tasks

24 models evaluated



FINDING 1 · ROTATION & EGOMOTION

Where you look ≠ where you go

60.0%
Gemini 3 Flash misreads as zigzag

53.3%
Qwen3-VL 235B misreads as zigzag

FINDING 2 · ERROR ACCUMULATION

Error compounds as the path turns

Models	Straight	Single Turn	Two Turns
Human	**100.00**	**96.67** (-3.33%)	**90.00** (-10.00%)
Gemini 3 Flash	73.33	70.69 (-3.60%)	40.61 (-44.63%)
Gemini 3 Pro	63.33	56.90 (-10.16%)	36.46 (-42.44%)
Gemini 2.5 Pro	73.33	55.17 (-24.76%)	33.41 (-54.44%)
GPT-5.2	30.00	39.66 (+32.20%)	22.49 (-25.03%)
Qwen3-VL 235B	90.00	8.62 (-90.42%)	27.85 (-69.06%)
Qwen3-VL 32B	80.00	12.07 (-84.91%)	21.83 (-72.71%)

FINDING 3 · OBJECT PERMANENCE

Out of view is read as gone

Models describe each frame correctly yet treat **non-visibility as non-existence** — they lack a persistent world-state.

FINDING 4 · SCENE OPENNESS

Openness ≠ difficulty