This Week in Robotics

Window: 2026-08-31 → 2026-09-06.

THE LINE

NVIDIA agreed to buy Hugging Face for $12.9B, putting LeRobot's maintainer inside the company that ships Isaac GR00T — and in the same week a 0.54M-parameter policy with no language encoder and no pretrained vision hit 95.1% on LIBERO, which says more about the benchmark than about the policy.

1 Policy learning & VLAs

MINERVA

PREPRINT / U. Tokyo

Scales a from-scratch CNN plus flow-matching chunk head *down* until LIBERO breaks. The architecture is subtraction: language becomes a 40-entry task-ID table, action-token self-attention becomes an MLP mixer, and the freed 26% of parameters goes to the encoder. Code, recipes, all checkpoints, Apache-2.0. Deep read in §6.

Knowing When to Stop

PREPRINT / Tsinghua

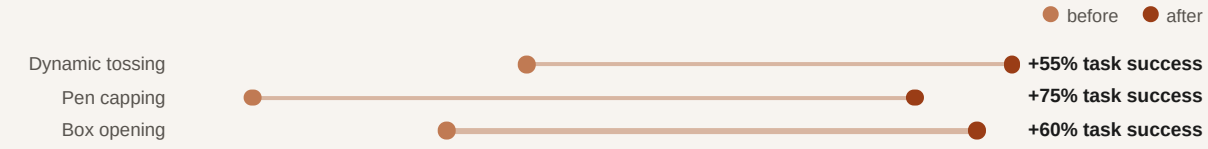
Training-free adaptive chunking: cross-attention from action queries to VLM tokens disperses with the action index and saturates near 95% of its log-N bound, so truncate where entropy is both high and flat. The mechanism check earns it: entropy tracks held-out action MSE at Spearman ρ = 0.432, and the partial correlation after removing the index is still 0.214. LIBERO 94.88 → 97.25 over the best fixed horizon and real dual-arm 47.5 → 61.7 (n=20/task), but RoboTwin π0.5 only 61.6 → 62.9 with no standard deviations reported — inside plausible seed noise. The real claim is matching a post-hoc-tuned horizon without knowing it, at a *longer* average horizon (18.1 vs 10) and under 7 ms overhead. No code stated.

SmoothRL

PREPRINT / Astribot

Under asynchronous inference each chunk is only partly executed, so $\nabla_a Q$ is truncated to the execution region [n, 2n) while the critic keeps the committed prefix as state augmentation for the concurrent decision process. Frozen base plus a TD3-style attached network in *raw* action space, which lets human interventions serve directly as regression targets — no latent inversion. 250 on-robot episodes per task take dynamic tossing from 39% to 94% and pen capping from 8% to 83%, with box opening reaching 90% only after dipping to 20% — below the frozen base — at 150 episodes. No code.

SmoothRL: frozen base policy → 250 on-robot rollout episodes



One episode per initial-state configuration, single robot, no seed repeats, authors' own protocol. Box opening dipped to 20% — below the frozen base — at 150 episodes before recovering.

arXiv 2608.29768, preprint, unreproduced, no code released

ZETA

PREPRINT / Galbot + PKU

Controlled cross-embodiment ablations on a π0.5-class backbone, 14 held-out embodiments, 6,300 sim rollouts per model over 3 runs. EEF-delta state *and* actions beat absolute-EEF/world-delta 75.7% vs 60.3% in sim and 89.9% vs 56.0% real, concentrated on arm-only and full-embodiment shifts; 5% target-embodiment data in pretraining is worth 13.4 pp, which is why they insist "strict" and "pretrain-exposed" zero-shot are different claims. No code stated.

XR-2

PREPRINT / PrimeBot + PKU

Releases 1,500 hours of bimanual household data — 531.7 h of real-robot teleoperation over 32,518 trajectories on a 25-DoF mobile bimanual platform, plus roughly 1,000 h of in-the-wild UMI collection across 200+ households and 5,000 garments — and trains a 5B VLA on it. The number worth having is the scaling shape on clothes folding: 34% at 30 h, 84% at 120 h, then flat (82% at 160 h). Three rounds of DAgger under a failure-weighted budget take a 58% checkpoint to 74%, 82% and 93%. Expert data buys coverage of the expert's own distribution; only on-policy corrections reach the states a deployed policy visits. Rig, model and pipeline are proprietary, so what transfers is the curve, not the result.

Worth naming: four independent papers add supervision that is **free or discarded at inference** — PHR-VLA, Temporal Forcing, GIFT (+4.6 to +12.6 pp), EGR (code out). Nobody wants to pay for their inductive bias at run time any more.

2 Manipulation, dexterity & sensing

Aero Hand Open

PREPRINT / Chestnut Robotics

Sixteen joints, seven motors, 374 g, **$314 bill of materials**, fully 3D-printed, covering all 33 GRASP-taxonomy grasps on one hardware configuration. The contribution is that the *cable transmission* is modeled in MuJoCo — every cable and return spring a spatial tendon wrapping CAD-derived pulley cylinders, wrap sides pinned so moment arms follow from geometry rather than being fitted. Agreement is therefore a prediction, not a fit: 0.04–1.40 mm cable-excursion error across the four fingers, 0.29–0.45 mm RMS tracking. The thumb is the weak channel at 31–33% excursion mismatch, its abduction–flexor coupling carried only to first order. In-hand cube rotation trained purely in sim runs zero-shot on seven motor encoders and nothing else. Design files, firmware, model, RL package and deployment node released.

N0-Foundation

PREPRINT / NeoteAI + Fudan

A tactile-UMI handheld rig, 30,000+ hours of synchronized visuo-tactile demonstrations, and **OpenNeoData, a 5,000-hour open subset** over six embodiments and 250+ tasks. The bet is that dense three-axis force fields, not raw sensor images, are the hardware-agnostic interface between tactile sensors. Their own simulated suite is the honest part: π0.5 leads at 45.8% mean over twelve tasks, and sustained-contact tasks stay near-unsolved (18% on gear placement).

ChainSplat

PREPRINT / KTH, CODE

Models a cable as an eight-joint screw-theoretic revolute chain with link-wise Gaussians, recovering geometry, dynamics and *external force* from multi-view RGB alone — no depth, no F/T sensor, no particle set — and the compact joint-space state is what makes trajectory optimization and real-time state estimation affordable. Soft: three ropes, 24 five-second trajectories, one model fit per trajectory and evaluated on the base trajectory it was fit to. System identification, not generalization.

Facet-0

PREPRINT

Makes force a *generated* quantity rather than a monitored one: flow matching emits an action chunk and the predicted wrist wrench jointly, and a distributional action-wrench critic scores contact outcomes for RL post-training. The reported contact-rich assembly gap is large — 82% against 15% — but the evidence is a project page with no weights and no dataset release, and the result rests on a proprietary 1,000-hour force-synchronized corpus. Unreproduced single-lab claim.

Three contact-control results worth knowing, all preprints, none with code stated: torque-space MPPI with explicit rigid-body dynamics at a 166 Hz solver rate for compliant 7-DoF force control; behavior-realization separation for physical HRI, splitting desired contact-port acceleration from its receding-horizon QP realization, with workspace overshoot falling from centimetres to sub-millimetre on a Franka FR3; and a finger with a passive continuously-variable transmission whose moving-pulley routing buys 3.6× mean force amplification with abduction unchanged — no CAD released.

Contact without tactile hardware advanced twice more, both preprints: Blind Dexterity drives whole-body G1 manipulation from joint encoders alone, and distributed whole-arm interaction reaches 71% real grasping success from four IMUs in a soft arm.

3 Platforms & embodiment

BRIDGE

PREPRINT / CMU + HUST + JoyIn

Co-designs morphology and controller instead of choosing actuators after the fact: candidate topologies are screened by kinematic retargeting error, then by closed-loop tracking error under a trained policy, with calibrated torque–speed limits enforced during training. An 88 cm, 21-DoF humanoid at **$1.5K** with open design *and* open policy — against $3K/$5.7K/$6K for Bumi, K1 and ToddlerBot, none of which open both. Tracking success 94.83% vs 91.87/92.66/88.23 in MuJoCo on a merged LaFAN1 benchmark; the backflip and dance clips are video evidence only.

WM-LOCO (preprint) reports 93.3% real G1 success on foothold-constrained terrain, single lab, no code stated, unreproduced. No humanoid *company* published a method this window — Galbot's ET1 pre-order is a press release with no evaluation.

Four more legged preprints, none with code stated. ADAPT fits a diffusion action prior over text-labelled trajectories and refines it with RL for closed-loop text-steered whole-body control. Agile traversal of sparse 3D structures uses monkey bars to force perception of thin overhanging geometry — a harder perceptual problem than terrain, because the thing you must not miss is mostly empty space. Stay Seated puts a humanoid on a passive caster chair so the actuators stop paying for weight support. And humanoid safe stop casts emergency stop as a learned stoppability value rather than one fixed maneuver executed regardless of feasibility — the most deployment-relevant of the four. Separately, nonlinear body oscillations finds six normal modes of a compliant quadruped that each develop into a distinct gait; hardware-validated, and a reminder that morphology still does control work.

4 Open source & tooling

By friction removed. **MINERVA**: Apache-2.0, four checkpoints, ~2 h to train one model on a single consumer GPU, ~55 min for the full four-suite eval. **Aero Hand Open**: a dexterous hand for $314 whose MuJoCo model ships through Menagerie, ~13 h of printing. **Peg-in-Bench** (preprint, AIST): STLs plus a scenario generator — five peg shapes × three tolerances (0.1/1/3 mm), magnet-mounted hole pieces with eight orientations, machine-readable task JSON. A reproducible contact-rich physical eval for the price of resin; no baselines yet. **SolarWM**: data engine, metric annotations for 1.43M clips, code and weights.

The data layer moved more than the tooling layer. TacVerse released handheld-UMI bimanual visuo-tactile sets in LeRobot v3.0 with rectified tactile video streams, CC-BY-SA. RoboMIND's Agilex bimanual split was reprocessed to v3.0 at 8,638 episodes, 5.4M frames and 54 tasks. Apple's EgoDex was converted to v3.0 with train/test subdirectories — somebody else's conversion week you no longer spend. MIT Media Lab published a tactile and hand-pose contrastive encoder with three seeds, retrieval mAP, training code *and* the exact preprocessed cache, a level of release completeness almost nobody manages. A v3.0 → v2.1 downgrade script now exists for openpi stacks that have not migrated.

Nothing in window from LeRobot (still v0.5.1, April), MuJoCo/MJX, Isaac Lab, ManiSkill, Genesis, RoboCasa or ROS 2. OpenWAM dropped ~35 world-action checkpoints with no card or license — unusable as a baseline until someone says what they are.

5 Money & moves

NVIDIA → Hugging Face, $12.9B

, 2026-09-03 (TRADE PRESS); NVIDIA states the platform stays open and its compute won't be required. INFERENCE \2192 LeRobot's maintainer — the default stack for one-arm builds — now sits inside the vendor of Isaac GR00T, and an open-platform commitment in a press release is a statement, not a governance structure.

Figure ↔ Nscale, $3.5B compute

Scaling past $6B, up to 100,000 Vera Rubin GPUs, Nscale taking equity (TRADE PRESS). INFERENCE \2192 humanoid capital is buying *training* capacity rather than fleets, and equity-for-compute means the supplier co-underwrites the bet.

Lyte, $165M Series C at $1.6B

For 4D coherent vision silicon (TRADE PRESS). INFERENCE \2192 perception hardware is a funded category again, on the premise that depth quality rather than policy architecture is the binding constraint. Also: Medtronic put $700M into Cornerstone Robotics (surgical, no robot-learning content); Wandercraft is seeking €100M at €750M, not closed.

Below the headline numbers, the data layer is commercialising. Visko closed a $10M pre-seed for a streaming world model; Kinetic Blocks opened a gated-beta marketplace pricing teleop and robot-execution datasets with LeRobot v3.0 support and A+ to F quality grading; X Square unveiled TwinDEX, an isomorphic wearable rig claiming 5.3× collection throughput and a 24-step chemistry task acquired with zero on-robot teleoperation — vendor claim, nothing released. INFERENCE \2192 once demonstrations are priced with quality grades, the scarce asset stops being episode volume and becomes the grading rubric.

6 Deep read of the week

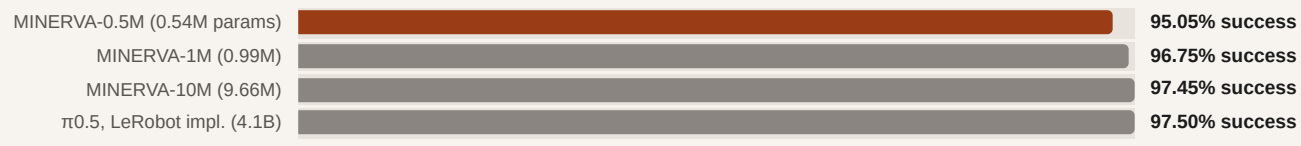
One this week. Aero Hand Open and the adaptive-chunking paper were the other candidates, covered above; neither independently earns this depth — the hand's contribution is a released artifact rather than a result to interrogate, and the chunking gains sit inside unreported seed noise on its own primary benchmark.

MINERVA — how small a policy standard LIBERO actually demands. arXiv:2609.03715, preprint, U. Tokyo. Unreproduced; code and checkpoints released.

Setup. All four LIBERO suites, `lerobot/libero` (1,693 demos, 273k frames, 40 tasks pooled), Franka in sim, 2,000 rollouts per point with hard resets. Held out in the standard protocol: nothing — that is the point. Two extensions do hold things out: LIBERO-90 (89 tasks) and LIBERO-Plus (10,030 perturbed variants over 7 factors).

Method. Inherited: ACT-style chunking and temporal ensembling, a flow-matching DiT head, spatial-softmax keypoints, FiLM conditioning, velocity distillation. New is the design principle — contain nothing the benchmark exercises, then shrink until it breaks.

LIBERO four-suite average vs. total parameters



MINERVA rows are 2,000 rollouts at a single training seed. The π0.5 row is the LeRobot implementation's reported result at 10 episodes/task (400 rollouts) — a reference point, not a protocol-matched comparison. A three-seed rerun of the 1M model spans 94.60–96.75, so gaps under ~1 point are not resolvable.

arXiv 2609.03715, preprint, unreproduced; code and checkpoints released

The number that matters

Is not 95.05%. It is the **±1-point training-seed band**, from retraining the 1M baseline three times (94.60–96.75; its long-suite score alone spans 87.6–92.8). Read the scaling curve against it: 96.75 at 1M to 97.45 at 9.66M is 0.7 points for 10× the parameters, and the 97.50 reference is inside the same band. Against that instrument only two choices survive: chunk length (−3.16 at chunk 8, −2.20 at chunk 32, and the failure is interpretable — short chunks break the goal suite by letting the policy dither between branches, long chunks break the long suite by not reacting at subgoal boundaries) and vision allocation (−1.41 mean, −4.6 on long). Flow matching versus one-pass L1 regression is +0.34 across three seeds — no measurable difference — while regression is up to 3.8× faster. The shipped 0.54M model closes its loop in ≈5 ms on eight laptop CPU threads, against 1.0 s for SmolVLA and 12.8 s for π0.5.

The recipe also survives 2.25× the task count: 94.6% average over 89 LIBERO-90 tasks at 0.995M parameters, single seed, 10 episodes per task, with a thin failure tail and no collapsed scene family.

Where it's soft. One simulator, one embodiment, one eval seed; the headline rows, LIBERO-90 and the distillation comparison are single runs inside that band. The π0.5 comparison is against a differently-measured number. No real-robot validation. The permutation probe cuts both ways: freezing the released 1M checkpoint and rotating only its task-ID mapping collapses 96.75% to 6.5%, with Spatial, Goal and Long landing almost exactly on the 1-in-10 chance line. LIBERO-Plus prices the rest — 46–56% under perturbation, photometric robustness ≤6.5% at every scale tested.

Steal list. (1) Measure your seed band before believing any ablation; three retrains is cheap here and invalidates most one-point deltas in the literature, several in this issue included. (2) Run the permutation probe — freeze weights, rewrite only the conditioning channel; if performance falls to chance, your conditioning is an index, not language. (3) Spend parameters on the encoder, not the action head: a token-mixing MLP matched self-attention at 26% fewer parameters, and moving that capacity into the CNN moved the long suite ~10 points at constant total. (4) Replan every step with ACT-style temporal ensembling (96.3%) rather than BID-style candidate selection (95.0%) or RTC soft inpainting (91.8%), which over-constrains an already-noisy velocity field; for sub-1M models drop the initial-noise temperature to 0.85, worth up to +2.25 points where the model is weakest and nothing at all above 1M.

Cost to reproduce. ~2 h per model on one consumer GPU, public LIBERO demos, no pretraining, no data collection. A seed-replicated ablation sweep is a weekend, not a cluster.

7 What this changes for a small build

Assume one arm, one GPU. Four things moved.

1. **Your LIBERO baseline is now a two-hour job.** MINERVA's checkpoints and recipe make seed-replicated ablations affordable, and hand you a ±1-point yardstick that most single-run deltas fall inside. Use a perturbation protocol before claiming robustness.
2. **A dexterous hand entered the printable price band.** $314, 374 g, validated MuJoCo transmission model, zero-shot sim-to-real from encoders alone — with commissioning time budgeted for the thumb, which carries the residual error.
3. **Physical evaluation got cheap**, via Peg-in-Bench, if your contact-rich results currently live on a bespoke fixture and you have been unable to compare them to anyone.
4. **Two inference-loop changes are implementable straight from the papers.** Entropy-plateau truncation needs no retraining and removes a tuning knob. One-pass L1 regression instead of ten Euler steps was 3.8× faster at no measured accuracy cost on this benchmark — worth testing on your own action head before assuming flow matching is buying you anything.

An existence proof at this scale also landed, in trade press only: a DIY SO-101 on a tracked base running π0.5 through LeRobot, Raspberry Pi on-robot with inference offloaded to a PC, reporting 96% on sock picking. Single build, no stated protocol — an anecdote, but on exactly the hardware envelope in question.

Nothing relevant appeared in hardware: no actuator, tactile-sensor, low-cost-arm, depth-camera or edge-compute release in window, and no releases at all from the major sim and middleware stacks.

8 Market signal

Visibly scaling: NVIDIA (buying the platform layer), Figure (buying training compute, supplier taking equity), Lyte (perception silicon), Wandercraft (raising). Last week's manipulation-specific buyers did not reappear; capital went to compute, sensing silicon and platform ownership rather than end-effectors or policy teams.

Three skill clusters recur in the work that got attention. **Execution-schedule engineering** — async inference loops, chunk stitching, one-step generation, adaptive horizons; knowing where a value gradient is even valid under async execution is now a specialization. **Training-time supervision at zero inference cost. Evaluation design as the contribution** — ZETA's protocol split, MINERVA's seed band, FailBench finding the best of 13 VLM success-judges reaches 0.77, and a physics-consistent assistive-care benchmark where zero-shot π0.5 scores 0.7% with no physics-valid successes.

One structural note under the funding: with graded, priced demonstration marketplaces appearing alongside purpose-built collection rigs, the scarce skill in data work shifts from collecting episodes to specifying what counts as a good one — the acceptance criteria and IK-feasibility filters corpora like NeoData now document as a pipeline stage rather than an afterthought.

Table stakes: code and checkpoints at submission, action chunking, a flow or diffusion action head, async inference, LIBERO ≥95%. Still scarce: seed-replicated ablations, RL loops that close on real hardware, tactile data at scale, and hardware whose files you can print. No credible compensation or levelling datapoints surfaced — the only sources that appear for robotics comp queries are SEO aggregator pages with no stated methodology, and reporting nothing beats laundering those.

9 Threads

THREAD	STATUS	NEXT REAL UPDATE
Does VLA scale buy language-conditioned control?	**ADVANCING** (MINERVA)	A sub-10M policy on *real* hardware, multi-task, vs. a published baseline
Benchmark validity in physical AI	**ADVANCING** (MINERVA capacity floor + permutation probe; FailBench)	A major lab reporting a perturbation protocol alongside standard LIBERO by default
Contact sensing without dedicated tactile hardware	**ADVANCING** (Blind Dexterity, soft-arm IMUs, ChainSplat)	Independent reproduction on different hardware; VISTA (W35) still has no code
Training-time supervision at zero inference cost	**NEW** (PHR-VLA, Temporal Forcing, GIFT, EGR)	One replicated on a second backbone independently, with a seed band
Inference latency as deployment bottleneck	**ADVANCING** (adaptive chunking, DriftingVLA, MINERVA at ≈5 ms CPU)	Latency as a default column beside success rate
Online correction as the last mile	**NEW** (SmoothRL 250 episodes; XR-2 DAgger 58→93%)	A third group showing correction data beats more expert data past saturation
World-action models as unified policy + simulator	**ADVANCING** (WCD, SolarWM release)	A *released* world model used for policy improvement by someone who didn't build it
Who owns the open robot-learning stack	**NEW** (NVIDIA/Hugging Face, $12.9B)	LeRobot's next release, and whether governance or format decisions visibly change
Low-cost open hardware as training substrate	**ADVANCING** (Aero Hand $314, BRIDGE $1.5K, Peg-in-Bench)	A third party training and deploying a policy on any of them

THREAD	STATUS	NEXT REAL UPDATE
Claimed open releases vs. actual artifacts	**CONTESTED**	For: MINERVA, Aero Hand, BRIDGE, SolarWM shipped. Against: OpenWAM has no card or license; StreamPI weights still pending since W35
Humanoid capital vs. demonstrated capability	**ADVANCING** (Figure $3.5B; Wandercraft; Galbot pre-order)	Still zero methods from humanoid *companies*; CMU's BRIDGE is the academic counterexample
Manipulation acquired rather than built	**STALLED**	W35's prediction of a second logistics buyer this quarter has ~7 weeks left

ALSO SEEN

VLAct — 20% of the data beats full-data GR00T-N1.6 on an unseen humanoid. Skipped: 16-GPU continued-pretraining budget, out of reach despite open weights.

Motus2 — shared-weight policy, simulator and evaluator in a closed improvement loop. Skipped: proprietary-scale data and no artifact, so the loop can't be inspected.

ZimaBlue — video-to-action curriculum, 30 Hz control from egocentric video, code released. Skipped: fleet-scale pretraining means the code reproduces the recipe, not the result.

Zeva — frozen policy retrieves action-effect transitions as an in-context causal prompt. Skipped: same gradient-free adaptation slot as WCD, with a less clean protocol.

DriftingVLA — one-step noise-to-chunk generation, 3.36× faster. Skipped: same axis MINERVA's L1-vs-flow result attacks more cheaply and with three seeds.

SA-WAM — frozen VAE tokenizes metric depth; geometry error flags 80% of failures. Skipped: no code stated, and the failure-flagging half has no detection baseline.

World-Coherent Decoding — ranks sampled futures by flow surprisal and action-path effort, frozen backbone. Skipped: no code stated, in a week already carrying a training-free method with broader eval.

MAGP — scale-equivariant augmentation recovers metric scale into an existing VLA. Skipped: plug-and-play claim with no released adapter.

Seeing the World and the Self — ego-adapted geometry backbone conditions a diffusion motion head. Skipped: code and dataset promised, not released; same unshipped metric-depth cluster as MAGP and VI3.

Contact-Guided Exploration — exploration critic seeded by grasp-sampler contacts, annealed to zero mid-training. Skipped: locomanipulation-specific, sim-to-real only, no released environment.

Non-Prehensile Throwing — RL over joint-jerk trajectories, zero-shot to a UR5e via jerk system identification. Skipped: single task, explicitly friction-sensitive, needs re-identification on your surface.

DemoMimic — contact-local geometry rewards, 71% over 16 objects from one demonstration. Skipped: no code stated, reward still hand-specified per task family.

Temporal robustness of imitation learning — ACT degrades far faster than its scripted expert as execution speed rises; code and data released. Skipped for space only; the week's cleanest negative result.

RoboCurve / GPT-6 Astra on real arms (trade press) — 95% bowl / 10% puzzle on dual YAM arms. Skipped: n=20 per task, no paper, so the task spread is the only usable signal.

10 Open question

Is the ±1-point LIBERO seed band MINERVA measured a property of *that* policy family below 10M parameters, or of the benchmark at every scale? Nearly every ablation delta in this issue — GIFT's +4.6 pp, adaptive chunking's +1.3 on RoboTwin, StreamPI's +2.6 from W35 — is a single run, and how many survive depends entirely on the answer. Settled by any group retraining a π0.5- or GR00T-class policy three times on identical data and publishing the spread. It costs three training runs, and nobody has.

Sources labeled inline. All arXiv items are preprints, unreviewed. Single-lab claims flagged where relevant.