

RACE WEEKLY INTELLIGENCE BRIEF

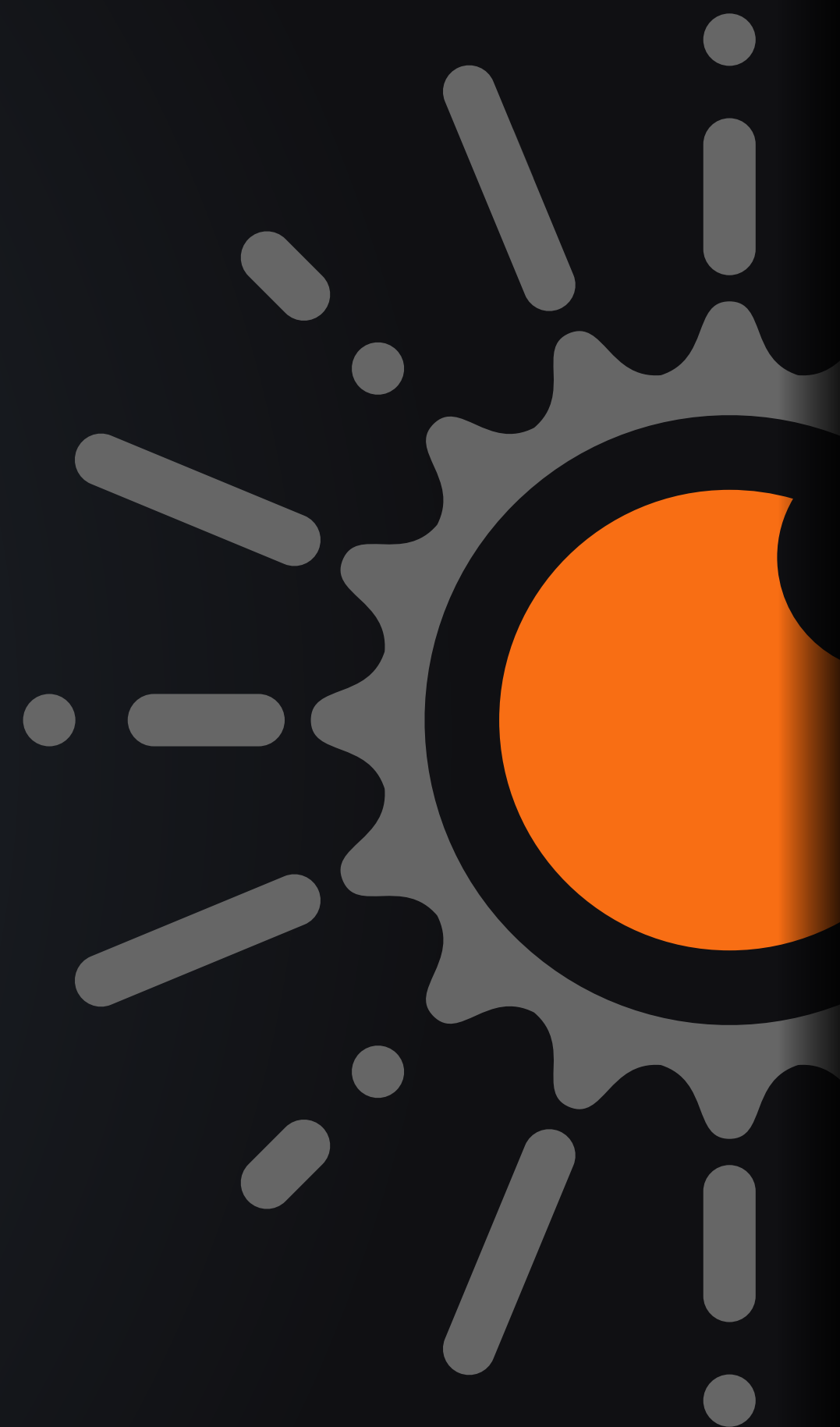
RETINA

AI · CYBERSECURITY · CLOUD · LEADERSHIP

THIS WEEK'S COVER:

AI JUST GREW A BODY

For three years, AI lived on a screen. In 2026 it started picking things up. Humanoid robots moved from demo reels to real shop floors, a handful of them, doing real work, for paying customers. The hype says fifty thousand. The receipts say a few hundred. Both numbers matter, and the gap between them is where a CXO should be looking. India is not watching this one from the stands, and neither is RACE. We built a humanoid of our own.



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FROM THE EDITOR'S DESK

Every RETiNA so far has treated AI as something that computes. This week it lifts, walks, and hands you a part.

2026 is the year the debate about humanoid robots stopped being about whether and became about how many, doing what, and at what real cost. The proof points are finally physical. Figure's robots have been working a BMW line in Spartanburg, reportedly contributing to the build of some 30,000 vehicles across more than 1,250 operational hours, running ten-hour days. Agility's Digit is in warehouse and automotive pilots. Boston Dynamics is leasing an all-electric Atlas. Nvidia's Jensen Huang calls physical AI a fifty-trillion-dollar opportunity and says robotics has already had its "ChatGPT moment."

And yet the honest picture demands a second sentence. As of mid-2026, no humanoid from any maker has been deployed above the low hundreds of units in a sustained commercial setting. The widely quoted figures; "50,000 Optimus," "10,000 Figure deployments", do not come from the companies they describe; the audited count is far smaller. The demo is not the deployment. For a leadership team, that gap is not a reason to look away. It is the exact window in which you learn the technology cheaply, before your competitor's press release forces you to learn it expensively.

India is inside this story, not outside it. A US ban on Chinese humanoid and quadruped imports has opened a lane, and Bengaluru- and Kerala-built physical-AI robots are moving into it, Ati Robotics, Svaya, and others, with the broader physical-AI robot market projected to pass one hundred billion dollars by 2030. Closer to home: RACE built RIA, an AI-powered humanoid, in-house, and unveiled it in January. This issue is written by people who have actually stood a robot up in a real building and watched it meet real people, which is exactly why it spends as much time on the boring, decisive numbers (cycles, uptime, interventions, incidents, liability) as on the vision.

THE WORLD IN 5

GLOBAL HEADLINES A CXO SHOULD BE ABLE TO REFERENCE

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Five signals from the past fortnight, worth a note at your next leadership table.

1. THE PROOF: a robot did real factory work, verifiably

The strongest evidence in humanoid robotics is no longer a stage demo. Figure's robots reportedly logged 1,250+ operational hours on BMW's Spartanburg line, contributing to roughly 30,000 vehicles: multiple units, ten-hour days, a Fortune 500 customer. Agility's Digit and Boston Dynamics' electric Atlas are in comparable early, paying deployments. This is the register that matters: not what a robot can do once, but what it does on the fifth day of the fifth week.

2. THE MONEY: physical AI is now a capital-allocation question

Nvidia's Jensen Huang has put a fifty-trillion-dollar opportunity on physical AI and says its business here already runs near \$10B a year with a path to \$100B. Goldman Sachs sizes the humanoid market at ~\$38B by 2035; Morgan Stanley at ~\$152B by 2040; Citi at \$14B by 2030 rising to \$1.1T by 2040. Whatever the true number, the estimates have moved from science fiction to line items, and the capital is rotating in ahead of the proof.

3. The Volume Leader isn't the one you'd guess

By units actually shipped, the leader is China's Unitree, roughly 5,500 humanoids in 2025, at about a tenth of Western prices. That cost curve is the real disruptor. But a US ban on Chinese humanoid and quadruped imports, on security grounds, has just fractured the market along geopolitical lines, turning "where is your robot from" into a procurement and compliance question, not only a spec one.

4. INDIA: building, not just buying

Bengaluru's Ati Robotics (\$37M raised) is launching an industrial humanoid that moves 25 kg bins autonomously and is setting up a US plant; Svaya Robotics is building general-purpose humanoids with a vertically integrated stack; a Kerala maker is already producing ~300 units a month with EY and SAP MoUs. ISRO's Vyommitra and Sirena Technologies' Nino; India's first educational humanoid, show the base runs deep. The physical-AI robot market is projected to pass \$100B by 2030, and Indian firms intend to supply it, not just consume it.

5. THE GOVERNANCE GAP: The Rules are Being Written Now

ISO 10218-1/2:2025 and ANSI/A3 R15.06-2025 cover industrial robots; a humanoid-specific standard (ISO 25785-1) is still being drafted. US workplaces fall under OSHA's General Duty Clause, there is no robot-specific rule yet. The emerging split matters for enterprises: the maker is the "provider," but the deploying company is the "deployer," carrying its own duties for oversight, monitoring and incident reporting. A humanoid on your floor is a new safety, insurance and cyber liability before it is a productivity gain.

Source:

<https://www.bmwgroup.com/en/news/general/2026/humanoid-robot-in-leipzig.html>

<https://www.technology.org/2026/07/18/humanoid-robots-in-2026-what-is-actually-deployed/>

<https://nvidianews.nvidia.com/news/nvidia-releases-new-physical-ai-models-as-global-partners-unveil-next-generation-robots>

<https://www.goldmansachs.com/insights/articles/the-global-market-for-robots-could-reach-38-billion-by-2035>

https://www.business-standard.com/amp/companies/start-ups/indian-startups-bet-on-physical-ai-robots-as-global-market-takes-shape-126081700773_1.html

<https://www.iso.org/standard/73933.html>

<https://www.osha.gov/laws-regs/standardinterpretations/2002-08-14>

 SIGNAL

THE EMBODIMENT OF AI BY THE NUMBERS

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~30,000

vehicles Figure's robots reportedly helped build at BMW Spartanburg; 1,250+ operational hours

Low 100s

the true ceiling: no humanoid is deployed above a few hundred units in sustained commercial use (mid-2026)

~5,500

humanoids Unitree shipped in 2025; the global volume leader, at ~1/10 Western price

\$50 tn

physical-AI opportunity, per Nvidia's Jensen Huang; its physical-AI business already ~\$10B/yr

\$38B–\$152B

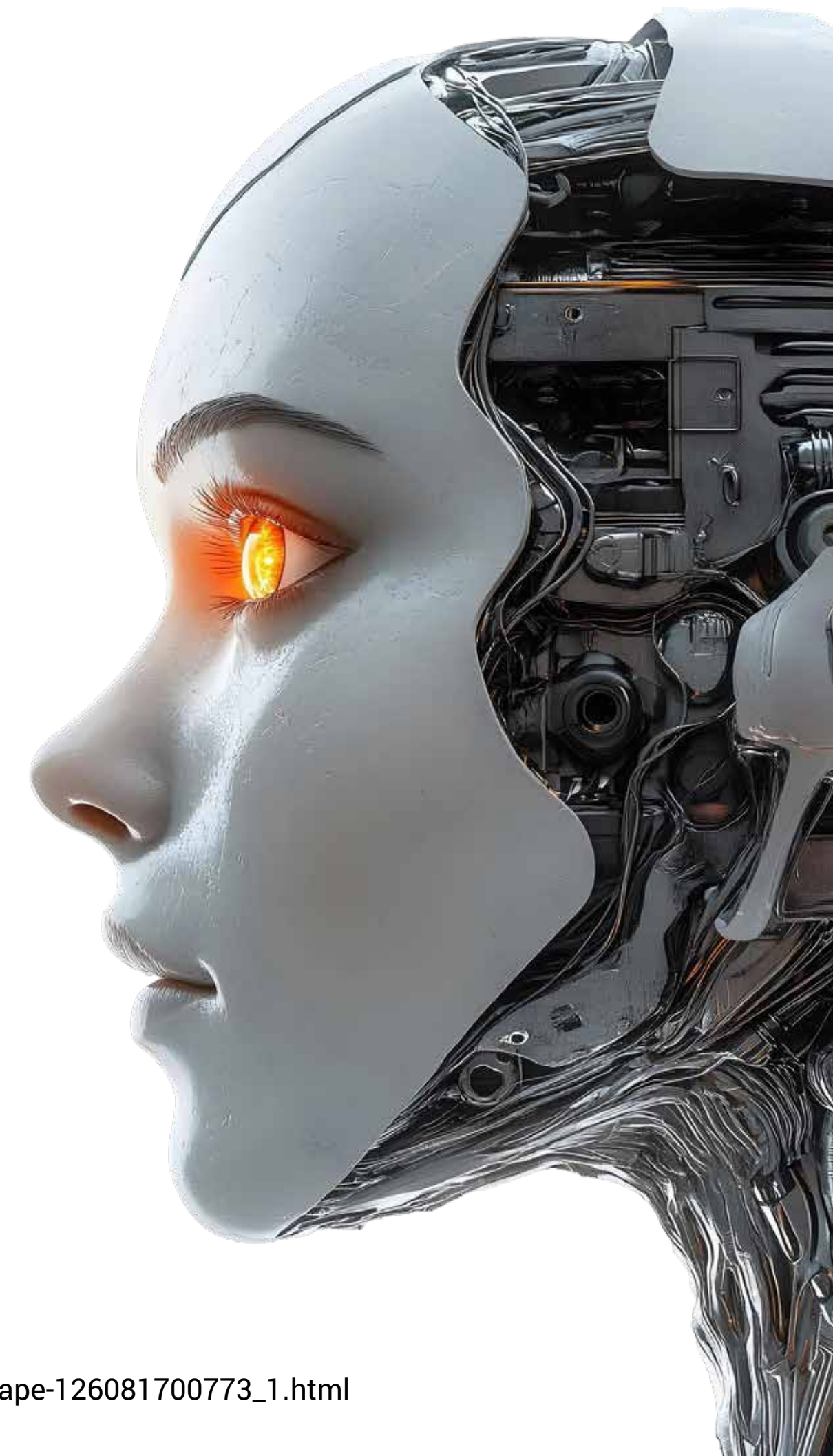
humanoid market size by 2035–40 (Goldman Sachs / Morgan Stanley estimates)

>\$100B

projected physical-AI robot market by 2030 – the lane India intends to supply

Source:

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- <https://www.bmwgroup.com/en/news/general/2026/humanoid-robot-in-leipzig.html>
- <https://nvidianews.nvidia.com/news/nvidia-releases-new-physical-ai-models-as-global-partners-unveil-next-generation-robots>
- <https://www.goldmansachs.com/insights/articles/the-global-market-for-robots-could-reach-38-billion-by-2035>
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HYPERFOCAL

WHAT BROKE THIS WEEK

The Demo Is Not the Deployment

Search for humanoid deployment numbers and you will find confident, enormous figures. Tens of thousands of units. Warehouses full of them. Almost none of it survives contact with the companies' own filings. Tesla has never published an audited Optimus count; the widely repeated "50,000" is not its number. "Figure has 10,000 deployments" is not Figure's number either. What is verifiable is smaller and, for a leader, far more useful: a Fortune 500 customer, a real production line, and a robot that showed up for 1,250 hours.

That gap between the announced and the audited is the single most important thing a CXO can understand about physical AI in 2026. The technology is real, general-purpose robots that learn a task from watching a human, rather than from months of bespoke

programming, genuinely arrived. But "real" and "ready at scale" are two different clocks. The first has struck. The second has not. Anyone selling you the second is selling you a press release.

So read a humanoid the way you would read any capital asset, not a magic trick. The questions that decide whether one earns its place on your floor are unglamorous: completed cycles per shift, how often a human has to intervene, uptime between faults, service response time when it breaks, incidents per thousand hours, and total cost including the integration and the safety cage you did not budget for. A robot that dazzles in a two-minute clip and needs a technician every forty minutes is a science project. A robot that is boring and runs is an operation. Your job is to tell them apart before the invoice, not after.

RETINA TAKE

The winners of the physical-AI era will not be the companies that believed the biggest number. They will be the ones that ran the smallest honest pilot early, measured cycles, interventions and incidents on their own floor, and so knew exactly what a robot could and could not do before their competitor found out the hard way.

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PANORAMA

FORCE **1**

Software Ate Programming; Now It's Eating Dexterity

What changed is not the metal; it is the brain. Imitation learning lets one robot acquire a new manual task from human demonstration in hours, not from months of specialist code. The same shift that made a chatbot general-purpose is making a robot general-purpose: one model, many tasks, adapting to a bin that moved or a part that arrived damaged. That is why the automotive line — structured, repetitive, injury-prone — is the proving ground, and why capability will spill from there into logistics, then services.

The Move: Stop evaluating robots as fixed machines bought per task. Evaluate the platform — how fast it learns a new job from demonstration — because reusability, not any single task, is where the economics live.

FORCE **2**

The Economics Pencil In; But Only in a Narrow Box

Enterprise lease pricing has reached ranges that make sense in high-labour-cost, high-injury, structured environments — and nowhere else yet. The first wave is automotive, warehousing, and hospital logistics for a reason: predictable layouts, repetitive motions, and a safety case you can actually write. General-purpose home autonomy remains unproven, and “humanoid” is often the wrong shape for a job an armless mobile base would do cheaper.

The Move: Pick the one process where labour is expensive, the environment is structured, and the injury or attrition cost is

THREE FORCES AND THE MOVE EACH ONE DEMANDS

real. Pilot there. Ignore the home-robot fantasy and the everything-everywhere pitch — both are how good budgets get wasted.

FORCE **3**

A Robot Is a New Liability and a New Attack Surface

The moment a humanoid shares space with your staff, you inherit obligations no spreadsheet warned you about. When a robot injures a worker, who is responsible; the manufacturer, the integrator, or you as deployer? Your general-liability policy may exclude it. A compromised robot is a cyber-physical incident, not just an IT one. And permanent camera coverage for safety can slide into surveillance if you let it. The governance frameworks RETiNA has argued for around software agents now apply to a machine that can move a 25 kg bin; or a person.

The Move: Before the robot arrives, settle three things in writing: the liability split with the vendor, an incident-reporting and lock-out procedure, and confirmation from your insurer. The robot is a privileged identity with a body — govern it like your most powerful admin account that can also lift.

Source:

<https://nvidianews.nvidia.com/news/nvidia-releases-new-physical-ai-models-as-global-partners-unveil-next-generation-robots>

<https://www.technology.org/2026/07/18/humanoid-robots-in-2026-what-is-actually-deployed/>

<https://roboticsbiz.com/iso-safety-standards-for-humanoid-robots-what-manufacturers-need-to-know-in-2026/>

<https://www.iso.org/committee/5915511/x/catalogue/>

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PERSPECTIVES

DEEP TECH — ANALYSIS BY THE RACE TEAM

We Built One. Here's What the Shop Floor Taught Us.



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In January this year, on Founder's Day, RACE unveiled RIA; the REVA Intelligent Assistant, an AI-powered humanoid our own team designed, built and stood up in a real building. I was its Project Lead; Dr. J. B. Simha was Chief Architect; Ayeed Ahmed, our MTech AI student and his batchmates built the software, Robotics and control came through our partner Sirena Technologies, a Bengaluru firm whose Nino is India's first educational humanoid. I write this column not as an observer of the physical-AI wave, but as someone who has watched a robot greet a stranger and answer a question it was never scripted for. That experience changed how I read every deployment headline.

The first lesson is the one the demo reels hide: the intelligence is the easy part now, and the embodiment is the hard part. Natural language, vision, speech, a knowledge base, those we could integrate. What consumes the effort is everything the body imposes: motor control, movement planning, the microcontroller that must never freeze at the wrong moment, the perception system that has to work under the room's actual lighting rather than the lab's. Building RIA was less an AI project than a systems-integration project with an AI inside it. Any leader who thinks buying a humanoid is like buying software is going to be surprised by the plumbing.

The second lesson is that a humanoid earns its keep through trust, not spectacle. RIA's value on campus is not that it walks; it is that a prospective student asks it a real question and gets a real, grounded answer, in the moment, in their language. The same brain drives the robot, and could drive a kiosk or an avatar: one persona, one knowledge base,

many faces. For an enterprise, that is the actual template: the robot is the most visible endpoint of an AI system, not a standalone gadget. Get the system right, and the body becomes a channel.

The third lesson is the sober one. We built RIA as a deployable system, tested against real constraints, precisely so our participants would learn what production actually demands: uptime, exception handling, maintenance, the unglamorous discipline of a machine that has to work on Monday. That is the same lens I would put on any humanoid pitched to your board. Ask for cycles, interventions, incidents and service response, not a highlight video. India's advantage in this wave is not cheaper robots; it is engineers who have built and run them, and who know the difference between a thing that demos and a thing that ships. We are choosing to build that muscle rather than import it. So should the enterprises that will depend on it.

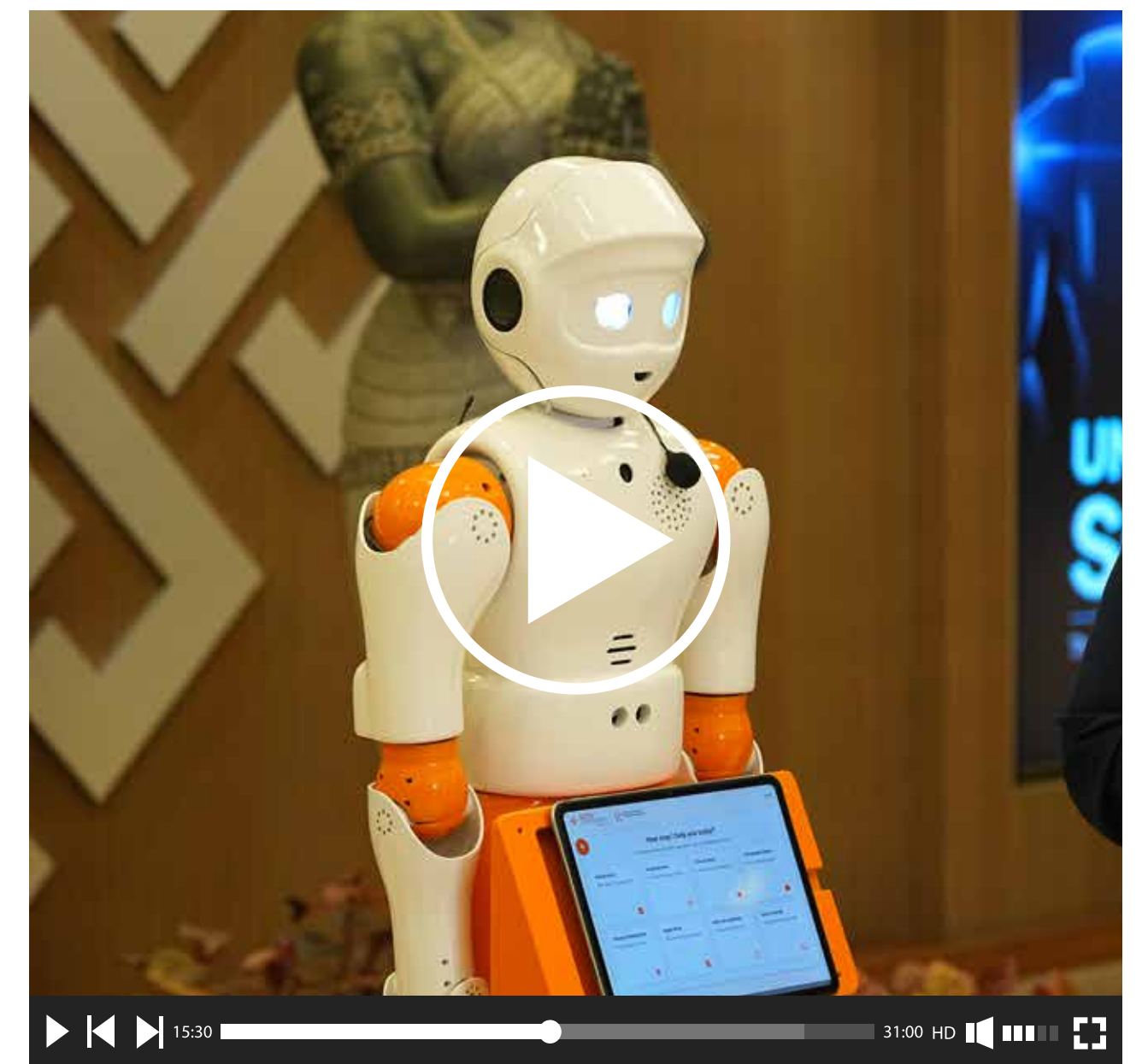
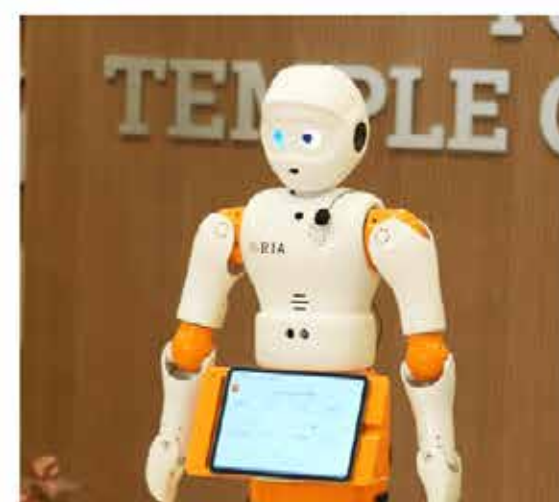
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DEEP TECH — ANALYSIS BY THE RACE TEAM

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RACE PERSPECTIVE

The organisations that win the embodied-AI decade will treat the robot as the last mile of an AI system they govern, not the first purchase of a novelty they admire. We built RIA to learn that lesson by doing. The cheapest place to learn it is a small pilot you run on purpose, the most expensive is a large one your competitor ran first.



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THE EMBODIMENT PLAYBOOK

PUTTING PHYSICAL AI TO
WORK WITHOUT GETTING PLAYED

Five moves, ordered from fastest to most strategic, that any leadership team can act on.

MOVE 1

SEPARATE THE DEMO FROM THE DEPLOYMENT

Before you react to any humanoid announcement, apply one test: is the number audited, and does it come from the company itself? Most do not. Build a one-page internal scorecard, verified units, paying customers, operational hours, tasks confirmed, and grade every vendor and headline against it. It will quietly disqualify most of the noise.

The Move: Judge robots on operational hours with paying customers, not press-release unit counts. If it isn't audited, it's marketing.

MOVE 2

PICK ONE STRUCTURED, HIGH-COST, HIGH-INJURY PROCESS

Physical AI pencils in exactly where labour is expensive, the environment is predictable, and the human injury or attrition cost is real, automotive-style lines, warehousing, hospital logistics. Choose that single process. Resist "humanoid for everything"; often an armless mobile base does the job cheaper.

The Move: Name the one process this quarter. A narrow, well-chosen pilot beats a broad, impressive-sounding programme every time.

MOVE 3

BUY THE PLATFORM, NOT THE TASK

The economics of physical AI live in reusability: how fast a robot learns a new job from human demonstration. Evaluate the learning pipeline and the brain, not just today's task. One system that acquires new tasks in hours beats a fleet of single-purpose machines you must re-buy.

The Move: Ask vendors to teach the robot a task you choose, live, and time it. Speed-to-new-task is the number that compounds.



THE EMBODIMENT PLAYBOOK

REBUILDING TRUST AS A PROCESS,
NOT A PERCEPTION

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MOVE 4

GOVERN THE ROBOT AS A PRIVILEGED IDENTITY WITH A BODY

Every humanoid you deploy is a new safety hazard, a new liability, and a new attack surface. Settle the liability split with the vendor in writing, confirm your insurer covers it, and treat a compromised robot as a cyber-physical incident with its own response plan. The agent register RETiNA has urged for software now needs a row that can lift 25 kilograms.

The Move: No robot on the floor without an owner, a written liability split, a kill switch, and an insurer who has said yes in writing.

MOVE 5

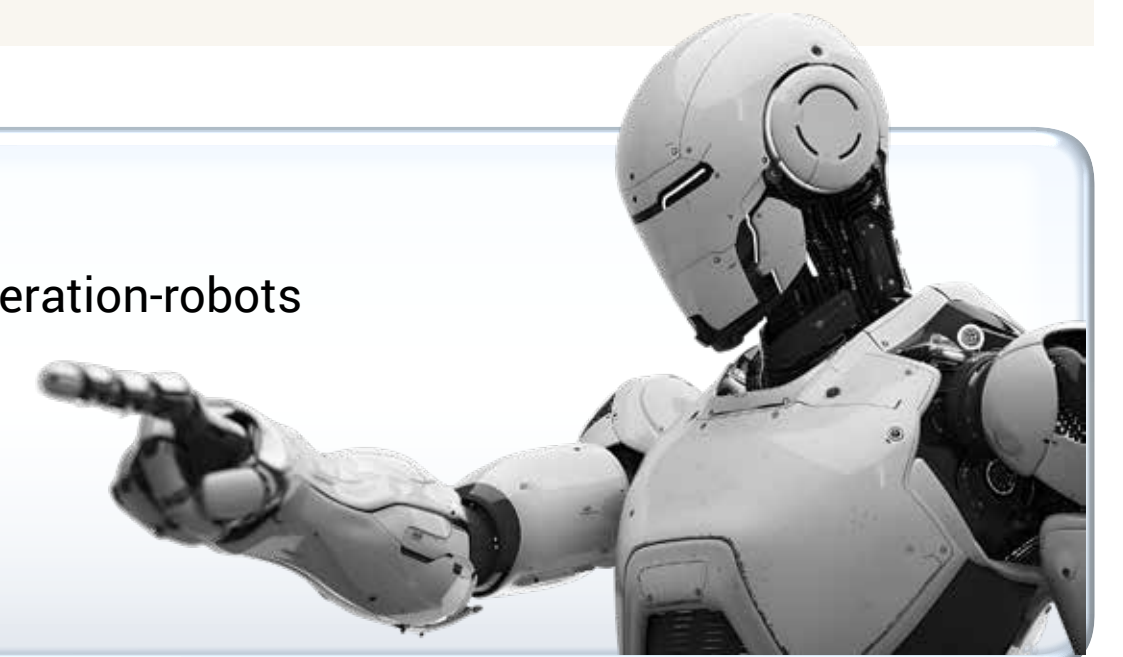
BUILD THE MUSCLE IN-HOUSE BEFORE YOU NEED IT

The scarce asset in this wave is not the robot; it is people who have built, deployed and run one and know production from demo. India's edge is exactly that engineering depth. Send a small team into a real integration — a pilot, a partnership, a build, so the capability lives inside your organisation rather than inside a vendor's invoice. RACE built RIA for precisely this reason.

The Move: Invest in engineers who have run a robot, not just bought one. The intuition they bring back is worth more than the pilot's ROI.

Source:

<https://nvidianews.nvidia.com/news/nvidia-releases-new-physical-ai-models-as-global-partners-unveil-next-generation-robots>
<https://www.technology.org/2026/07/18/humanoid-robots-in-2026-what-is-actually-deployed/>
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<https://www.iso.org/committee/5915511/x/catalogue/>
<https://race.reva.edu.in/race-lab/ria-reva-intelligent-assistant>



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METRIC OF THE WEEK

ONE NUMBER, PROPERLY UNDERSTOOD

Low Hundreds

The real number of humanoids in sustained commercial use, against headlines of tens of thousands

What it is: A July 2026 industry analysis found that no humanoid robot from any manufacturer has been deployed above the low hundreds of units in a sustained, productive commercial environment — despite widely circulated claims of 50,000 Optimus units and 10,000 Figure deployments, none of which come from the companies themselves.

Why it matters now: The distance between

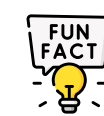
the announced number and the audited one is a map of where the risk and the opportunity sit. The capability is real; the scale is not — yet. That means the technology is learnable now, cheaply, by anyone willing to run an honest pilot, and dangerous later for anyone who mistook a headline for a delivery.

How leaders use it: Ask your operations lead one question — for any robot we are

considering, how many are running for a paying customer today, and for how many hours? If the honest answer is 'I only have the press release,' you have found your first pilot's job: get a real number.

Source:

<https://www.technology.org/2026/07/18/humanoid-robots-in-2026-what-is-actually-deployed/>



FUN FACT

SOMETHING TO REPEAT AT DINNER

Asked when robotics would have its breakthrough, Nvidia's Jensen Huang answered that it already happened: "The ChatGPT moment of robots happened a couple of years ago already." The catch is that most of us missed it, because it did not arrive as a viral chatbot everyone could try, it arrived quietly, on a battery line in South Carolina and a warehouse floor, watched mostly by the machines' own supervisors. The most consequential moment in robotics may have already passed without a single dinner-table conversation about it. This is that conversation.

Source: <https://ycombinator.podhood.com/53f3d56f-7d6f-47dd-8b17-878b6b807731>

<https://pod.wave.co/podcast/y-combinator-startup-podcast/jensen-huang-the-mindset-that-built-nvidia>

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CANDID



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Q1 A humanoid can now learn a manual task by watching a person, rather than being programmed for months. Does that change which jobs a board should expect to automate first, and does it change how you would plan a workforce transition?

Ans: Yes. If robots can learn tasks by observation, the first wave of automation is likely to move beyond highly structured, repetitive work and into the “messy middle” of physical jobs. Boards should look first at tasks that are labour-intensive, safety-critical or difficult to staff consistently. Workforce planning therefore needs to start earlier: reskill people for robot supervision, exception handling and higher-value work, rather than treating transition as a redundancy exercise after deployment.

Q2. The loudest deployment numbers in this field don't come from the companies they describe. How should a leadership team separate a real, running deployment from a well-produced demo before committing capital?

Ans: The test should be brutally simple: show me the robot doing the job, repeatedly, in my environment, against measurable KPIs. A demo proves that something is possible; a deployment proves that it is reliable, economical and maintainable. Before committing capital, leadership should ask for operating hours, intervention rates, uptime, task completion

rates, safety incidents, maintenance requirements and the cost per successful task, ideally from a customer site rather than a showroom.

Q3 When a humanoid shares a floor with employees, the liability, insurance and even surveillance questions arrive with it. What has to be settled, and by whom, before the first robot is switched on?

Ans: The robot shouldn't be treated simply as another piece of equipment. Before switch-on, the company needs clear answers on who is responsible when it causes harm, damages equipment or makes a bad decision; what insurance covers those scenarios; and what data the robot is collecting about employees. HR, legal, IT/security, operations, EHS and the insurer all need to sign off. The principle should be: no robot on the floor until accountability is as clear as the robot's operating envelope.

Q4 India is starting to build physical AI robots, not just buy them, and a US ban on Chinese humanoids has opened a lane. Is 'where is your robot from' becoming a genuine procurement and security question for enterprises?

Ans: Absolutely. “Where is your robot from?” is becoming a legitimate enterprise procurement question, much like it already is for critical software and infrastructure. It is not just about the country where the robot is assembled, but where its components, models, data pipelines, software updates and ownership sit. For India, this creates an interesting opportunity: domestic capability can offer enterprises greater control over supply chains, data and security, provided Indian-built robots can match global systems on reliability, economics and scale.

Note: CANDID features direct contributions from CXO leaders.
To contribute, contact: retina@reva.edu.in



BOOK SHELF

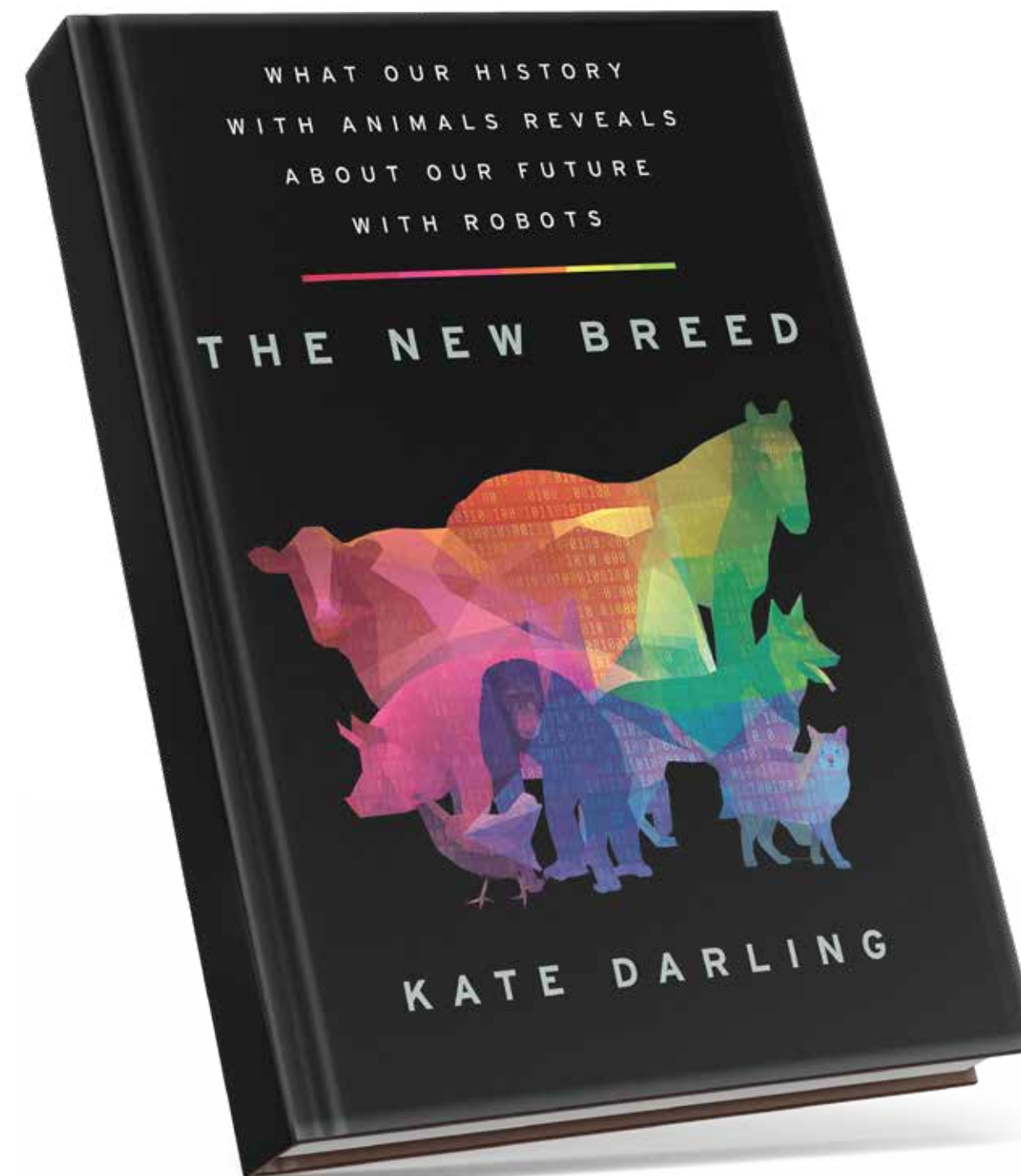
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RETINA RECOMMENDS · THIS WEEK'S THEME

The New Breed: What Our History with Animals Reveals about Our Future with Robots

Kate Darling · Henry Holt, 2021



MIT researcher Kate Darling makes an argument that becomes more useful the moment a robot has a body: stop comparing robots to humans, and start comparing them to animals. For millennia we have worked alongside non-human agents, oxen, horses, dogs, that were stronger or faster than us, that we integrated into labour and life without expecting them to be us. That, she argues, is the right mental model for humanoids: partners with different capabilities, not replacements measured against our own.

Read now, with RIA on one campus and Figure's robots on a BMW line, the book does something a spec sheet cannot. It reframes the workforce conversation away

from the sterile 'robots vs. jobs' binary and toward the more accurate 'how do humans and machines share work,' which is the question every one of this issue's Playbook moves quietly assumes. It also takes the anthropomorphism seriously: the fact that people trust and bond with a humanoid in ways they never do with a conveyor, which is both the technology's power and its risk.

It is not an engineering manual and will not tell you which robot to lease. What it gives a leadership team is the vocabulary to think clearly about a machine that walks and talks without either fearing it or falling for it. Read it before your first humanoid pilot, and before the first employee asks whether the robot is coming for their job.

- From the Editor's Desk
- The World in 5
- Signal
- Hyperfocal
- Panorama
- Perspectives
- The Embodiment Playbook
- Metric Of The Week
- Fun Fact
- Candid
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- **Research Radar**
- RACE Pulse
- RACE Programs



RESEARCH RADAR

RACE PUBLICATIONS THIS WEEK

EDITOR'S NOTE

Two new publications from RACE: one IEEE, one Springer, both on protecting sensitive healthcare data without slowing the people who need it. Standard format: a concise technology summary followed by clear enterprise relevance.

Healthcare · Data Privacy · Applied Cryptography

Enhancing Healthcare Data Privacy with Zero-Knowledge Proofs on AWS

Bhatt Vinayak Vishwanath; Nishanth Pathi; Shinu Abhi

Verifying a patient record usually means exposing it — and every exposure is a breach waiting to happen. This work applies Zero Knowledge Proof (ZKP), a cryptographic method that lets one party prove a statement is true without revealing the underlying data, to the exchange of medical records between doctors and laboratories. The protocol runs as a hybrid of cloud and local compute, with AWS Key Management Service handling encryption and decryption and a MySQL store holding the proofs. In testing, verifiers could confirm that clinical data was valid without ever seeing the data itself — cutting breach risk while leaving functionality intact.

2025 International Conference on Emerging Technologies in Computing and Communication (ETCC) · IEEE

<https://ieeexplore.ieee.org/document/11108626>

Healthcare · Encryption · AI-Driven Access Control

Securing Sensitive Data Using Quorum-Based Encryption in HealthCare

Sudhagar Chinnathambi; Sowmya Maity; Shinu Abhi

Locking data down and keeping it reachable in an emergency usually pull against each other. This paper's Quorum-Based Encryption (QBE) architecture splits decryption keys across several parties — patient, doctor, admin — so no record opens until a preset quorum agrees. The twist is an AI layer: a TensorFlow classifier reads real-time ECG values, and when it detects a pattern suggestive of a medical emergency, it automatically relaxes the quorum requirement to grant immediate access — security that tightens or loosens with clinical context rather than staying rigid.

Computational Intelligence in Data Science (ICCIDS 2025) · IFIP Advances in Information and Communication Technology, vol 750, pp 111–121 · Springer

https://link.springer.com/chapter/10.1007/978-3-031-98364-1_10

Explore the full RACE research archive at <https://raceresearch.reva.edu.in>. For collaboration, licensing or research-partnership enquiries: race@reva.edu.in

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9:30 AM – 2:00 PM
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12–24 Months

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AGENTIC AI | 4–6 weeks

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Multi-agent systems using LangChain, LangGraph, CrewAI. Capstone:
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AI ENGINEER | 8–12 WEEKS

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CLOUD | 8–12 WEEKS

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Multi-cloud, IaC, secure CI/CD on real AWS/Azure/GCP environments. Not
demos.

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AI · CYBERSECURITY · CLOUD · LEADERSHIP

THIS WEEK, ASK YOUR LEADERSHIP TEAM

"The robots doing real work today number in the hundreds, not the tens of thousands the headlines claim. If we ran one honest pilot this quarter, on our single most structured, high-labour process, what would we learn before our competitor does?"

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