



# Rise of the Machines: Deep Research on the Most Important Work and Breakthroughs in AI Robotics from the Past 7 Days

## Introduction: The Humanoid Moment Has Arrived

The past week has marked a pivotal inflection point in humanoid robotics, with the theme "Rise of the Machines" reflecting an accelerating transition from laboratory prototypes to commercial reality. From October 28 to November 4, 2025, the robotics industry witnessed unprecedented announcements centering on humanoid form factors—machines designed to navigate human-built environments with increasingly sophisticated artificial intelligence and physical capabilities<sup>[1] [2] [3]</sup>.

This emphasis on humanoid robotics stems from a fundamental design philosophy: rather than redesigning factories and homes around robots, humanoid form factors allow machines to seamlessly integrate into spaces built for humans. The week's developments showcase breakthroughs in AI-driven control systems, particularly Large Behavior Models (LBMs) that enable robots to learn complex tasks with minimal programming, alongside commercial deployments reaching scale in automotive manufacturing and consumer markets<sup>[4] [5] [6]</sup>.

## Major Breakthroughs: Humanoid Hardware and AI Integration

### 1X Technologies NEO: Consumer Humanoid Reaches Market

On November 2, 2025, Norwegian robotics company 1X Technologies opened pre-orders for NEO, marking the first consumer-ready humanoid robot designed explicitly for household deployment<sup>[1] [7]</sup>. This announcement represents a watershed moment, as NEO transitions humanoid robotics from industrial applications to everyday consumer life.

#### Technical Specifications:

- Height: 5'6" (166 cm), weight: 66 lbs (29.9 kg)
- Lifting capacity: 154 lbs (69.8 kg); carrying capacity: 55 lbs (24.9 kg)
- Powered by proprietary Tendon Drive system with "highest-torque density motors on earth"
- Soft polymer body structure for safe human interaction
- Built-in Wi-Fi, Bluetooth, 5G connectivity
- Price: \$20,000 early access or \$499/month subscription<sup>[1] [7]</sup>

NEO's safety-first design addresses the primary concern for home robotics: physical interaction with children, pets, and vulnerable populations. The soft, compliant body construction and force-controlled movements differentiate it from industrial humanoids optimized for strength and speed. The robot ships with basic task capabilities and evolves through over-the-air AI updates, with first deliveries scheduled for 2026 in the United States, expanding globally in 2027<sup>[1]</sup> <sup>[7]</sup>.

The system integrates "Audio Intelligence" for natural language command recognition and "Visual Intelligence" for contextual awareness, allowing NEO to recognize objects, suggest recipes from available ingredients, and schedule household tasks autonomously<sup>[1]</sup>. This multi-modal AI approach mirrors developments in other humanoid platforms but prioritizes domestic applications over industrial manipulation tasks.

## **Boston Dynamics Atlas: Large Behavior Models Enable Autonomous Whole-Body Control**

Boston Dynamics released a groundbreaking demonstration on November 3-4, 2024, showing its electric Atlas humanoid performing autonomous factory tasks—a significant departure from the carefully choreographed demonstrations that previously defined the platform<sup>[2]</sup> <sup>[8]</sup>. The video showcases Atlas autonomously moving automotive engine covers between storage bins and mobile sequencing dollies, with all motions generated in real-time without teleoperation or pre-scripted movements<sup>[2]</sup> <sup>[8]</sup>.

The breakthrough emerged from Boston Dynamics' October 2024 partnership with Toyota Research Institute (TRI), announced in a formal press release dated August 20, 2025<sup>[4]</sup> <sup>[6]</sup> <sup>[9]</sup>. This collaboration integrates TRI's Large Behavior Model (LBM) technology—analogueous to large language models but for robotic action—with Atlas's world-class hardware platform<sup>[4]</sup> <sup>[6]</sup>.

### **Key Technical Innovation:**

A single Large Behavior Model directly controls the entire robot, treating hands and feet almost identically rather than separating locomotion and manipulation control systems. This unified approach allows Atlas to perform long, continuous sequences combining walking, crouching, lifting, and precise object manipulation while autonomously responding to unexpected environmental changes<sup>[4]</sup> <sup>[6]</sup>.

The system demonstrates fault recovery capabilities, adjusting when researchers close box lids or slide objects mid-task. Machine learning vision models enable Atlas to identify and classify objects in real-time, with first-person camera feeds showing the robot's visual processing during task execution<sup>[2]</sup> <sup>[8]</sup>.

Scott Kuindersma, vice president of Robotics Research at Boston Dynamics, emphasized the significance: "Training a single neural network to perform many long-horizon manipulation tasks will lead to better generalization, and highly capable robots like Atlas present the fewest barriers to data collection for tasks requiring whole-body precision, dexterity, and strength" <sup>[4]</sup> <sup>[6]</sup>.

## MIT Heterogeneous Pre-trained Transformers: Universal Robot Training

On October 27, 2024, MIT researchers (funded by Toyota Research Institute and Amazon) published breakthrough work on Heterogeneous Pre-trained Transformers (HPT), demonstrating how transformer architectures—the foundation of ChatGPT—can create universal training frameworks for robots<sup>[5] [10]</sup>.

### Key Findings:

- HPT improved robot performance by more than 20% compared to training from scratch
- Successfully transferred knowledge across 52 datasets containing over 200,000 robot trajectories
- Maintained performance even when tasks differed significantly from pre-training data<sup>[5]</sup>

The system addresses a fundamental challenge in robotics: unlike language models that can train on internet-scale text data, robots require physical interaction data that is expensive and time-consuming to collect. HPT's transformer architecture maps diverse robot sensors, configurations, and tasks into a unified representation space, allowing a single model to control different robot embodiments<sup>[5] [10]</sup>.

David Held, associate professor at Carnegie Mellon University's Robotics Institute, stated: "Our dream is to have a universal robot brain that you could download and use for your robot without any training at all. While we are just in the early stages, we are going to keep pushing hard and hope scaling leads to a breakthrough in robotic policies, like it did with large language models"<sup>[5]</sup>.

## Demonstrations and Prototypes: From Lab to Real-World Validation

### AgiBot Real-World Reinforcement Learning: Industrial Deployment Milestone

Chinese robotics company AgiBot announced on November 2, 2025, the successful deployment of its Real-World Reinforcement Learning (RW-RL) system on a pilot production line with Longcheer Technology<sup>[3] [11]</sup>. This marks the first application of real-world reinforcement learning in actual industrial robotics operations, bridging the gap between academic research and manufacturing deployment<sup>[3] [11]</sup>.

### Achievement Metrics:

- Training time reduced from weeks to minutes
- 100% task completion rate over extended operation
- Autonomous compensation for part position and tolerance variations
- Rapid reconfiguration without custom fixtures or tooling<sup>[3] [11]</sup>

The system enables robots to learn and adapt directly on factory floors, acquiring new skills in tens of minutes while maintaining industrial-grade stability. During product transitions or line changes, only minimal hardware adjustments are required, dramatically improving manufacturing flexibility<sup>[3] [11]</sup>.

Dr. Jianlan Luo, Chief Scientist at AgiBot, emphasized the significance of moving beyond laboratory demonstrations: "Unlike many laboratory demonstrations, AgiBot's system was validated under near-production conditions, completing the full loop from cutting-edge research to industrial-grade verification" <sup>[3]</sup>.

## **Figure AI at BMW: 20-Hour Continuous Humanoid Shifts**

Figure AI announced in June 2025 that its Figure 02 humanoid successfully completed a 20-hour continuous shift at BMW's X3 production line in Spartanburg, South Carolina <sup>[12]</sup> <sup>[13]</sup>. This achievement represents the first known instance of a humanoid robot performing real industrial work at this scale and duration <sup>[12]</sup>.

The Figure 02 robot performed autonomous parts placement—picking car components from carts and positioning them into welding jigs—without human remote control. The milestone followed several weeks of 10-hour shifts, demonstrating progressive capability scaling <sup>[12]</sup> <sup>[13]</sup>.

### **Performance Improvements:**

- 400% speed boost compared to earlier November 2024 trials
- 700% (7x) improvement in task success rates
- Triple the computing power versus Figure 01 (released 10 months prior)
- 16 degrees of freedom per hand, capable of lifting 55 lbs (25 kg) <sup>[14]</sup> <sup>[13]</sup>

Brett Adcock, Figure AI CEO, stated: "This isn't a test—this is what autonomous robots in production operations look like. It's critical to have humanoid robots in the real world, at scale. As more robots are deployed, costs will decrease, and intelligence will improve" <sup>[13]</sup>.

Figure AI also announced a second commercial customer, widely believed to be UPS, and plans to scale production at its BotQ manufacturing facility designed to produce thousands of humanoids annually <sup>[12]</sup> <sup>[13]</sup>.

## **Foxconn Houston AI Server Plant: NVIDIA GROOT N1 Integration**

On October 28, 2025, Foxconn announced it will deploy humanoid robots powered by NVIDIA's Isaac GROOT N1 foundation model at its Houston facility manufacturing AI servers for NVIDIA <sup>[15]</sup> <sup>[16]</sup>. The deployment, targeting the first quarter of 2026, positions the factory as "among the first to deploy humanoid robots" on production lines, aiming to create a "world-leading benchmark AI smart factory" <sup>[15]</sup> <sup>[16]</sup>.

Foxconn (Hon Hai Precision Industry Co.) is scaling AI server production across Texas, Wisconsin, and California, with humanoid deployment integrated alongside digital-twin workflows using NVIDIA Omniverse for factory planning and vision AI quality monitoring <sup>[15]</sup> <sup>[16]</sup>.

This announcement follows NVIDIA's broader strategy to accelerate humanoid development through its Isaac Lab framework and Project GROOT initiative, which provides foundation models and simulation tools for humanoid locomotion and manipulation <sup>[17]</sup> <sup>[18]</sup>.

# AI Integration: The Intelligence Behind Physical Form

## Large Behavior Models: From Language to Action

Large Behavior Models (LBMs) emerged this week as the dominant paradigm for humanoid robot control, representing a direct application of large language model principles to physical robotics<sup>[4] [19] [20] [6]</sup>. Toyota Research Institute has positioned itself as the leader in this domain, with Russ Tedrake serving as senior vice president of Large Behavior Models<sup>[4] [6]</sup>.

### Core Concept:

LBMs are pre-trained on large, diverse manipulation datasets and learn to map sensor inputs directly to robot actions. Like language models that predict the next word in a sequence, LBMs predict the next robot action given visual observations and task instructions<sup>[20] [21]</sup>.

The breakthrough lies in eliminating the need to hand-program individual behaviors. Instead, robots learn from human demonstrations, with fewer examples required as the models scale. A single LBM can perform many different tasks, generalizing knowledge across scenarios<sup>[4] [20] [6]</sup>.

Toyota Research Institute released LBM 1.0 research in July 2025, demonstrating that multi-task pre-training makes policies more successful, robust, and capable of learning complex new tasks with a fraction of the training data compared to single-task baselines<sup>[20] [21]</sup>. Performance increased predictably as pre-training scale and diversity grew, validating the scaling hypothesis from language models<sup>[20] [21]</sup>.

## Vision-Language-Action Models: Multimodal Robot Intelligence

Vision-Language-Action (VLA) models integrate visual perception, language understanding, and motor control into unified systems capable of translating natural language commands into physical actions<sup>[22] [23] [24]</sup>. This architecture enables robots to understand both what needs to be done (language) and how to do it (vision-guided manipulation)<sup>[22]</sup>.

### Key Systems:

- **OpenVLA:** 7-billion-parameter open-source model trained on nearly 1 million robot trajectories across 70+ domains<sup>[23]</sup>
- **RT-2 (Google DeepMind):** Pioneered the VLA paradigm by fine-tuning vision-language models on robot demonstration data<sup>[22]</sup>
- **DeeR-VLA:** Dynamic early-exit framework reducing computational cost by 5.2-6.5x while maintaining performance<sup>[25]</sup>

These models inherit internet-scale semantic knowledge from pre-trained vision-language models, then adapt to robotic control through fine-tuning on physical interaction data. The approach addresses the data scarcity problem in robotics by leveraging the massive knowledge embedded in models trained on images and text from the web<sup>[22] [23] [24]</sup>.

Stanford's ILIAD lab reported at the Conference on Robot Learning (CoRL) 2024 that six papers were accepted covering VLA architectures, with OpenVLA receiving an Outstanding Paper

Award<sup>[26]</sup> <sup>[23]</sup>.

## Embodied Intelligence and World Models

China's Beijing Humanoid Robot Innovation Center, in collaboration with Peking University and HKUST, unveiled WoW (World Omniscient World Model) on October 27, 2025—described as "the world's first self-evolving world model" for robots<sup>[27]</sup>. The system enables robots to imagine scenarios, verify predictions, and self-correct, moving beyond imitation toward genuine physical understanding<sup>[27]</sup>.

World foundation models represent the next frontier in embodied AI, enabling robots to build internal simulations of physical dynamics and predict the consequences of actions before execution<sup>[17]</sup>. NVIDIA highlighted this trend at its GTC conference, positioning world models as essential for robots operating in dynamic, unstructured environments<sup>[17]</sup>.

The integration of world models with humanoid hardware addresses a fundamental limitation: while robots can now perceive and act, they lack the intuitive physics understanding that humans develop through early childhood experience. World models aim to compress that knowledge into trainable neural architectures<sup>[27]</sup> <sup>[17]</sup>.

## Comparative Advances: Non-Humanoid Breakthroughs

While humanoid form factors dominated announcements this week, significant non-humanoid advances provide context for the broader robotics landscape:

### Quadrupedal and Mobile Manipulation Robots

Agility Robotics' Digit—a bipedal but non-humanoid design—remains the only humanoid-class robot "earning money for its work" according to CEO Peggy Johnson<sup>[28]</sup> <sup>[29]</sup>. Digit deployed at GXO's Atlanta facility represents the first commercial humanoid-class robot performing logistics tasks for paying customers<sup>[30]</sup> <sup>[28]</sup>.

Boston Dynamics' Spot quadruped and Stretch box-moving robot continue commercial deployments in inspection and logistics, respectively, demonstrating that specialized morphologies remain viable for constrained task spaces<sup>[4]</sup> <sup>[31]</sup>.

## Chinese Robotics Ecosystem

China launched Tiangong, an open-source bipedal running robot capable of 12 km/h top speed and capable of traversing inclined surfaces, stairs, gravel, and sand<sup>[32]</sup>. The Beijing Embodied AI Center's open-source initiative aims to accelerate global humanoid development through shared platforms<sup>[32]</sup>.

Unitree's G1 humanoid (priced at \$16,000 base configuration) demonstrated remarkable strength by pulling a 3,100-pound car while maintaining balance, showcasing advanced motion control and feedback systems<sup>[33]</sup> <sup>[27]</sup>. The Beijing Academy of Artificial Intelligence conducted the demonstration, highlighting China's emphasis on embodied intelligence research<sup>[27]</sup>.

## **Analysis:**

Non-humanoid advances demonstrate that form factor selection depends on task requirements. Quadrupeds excel in rough terrain inspection; mobile manipulators optimize warehouse logistics; specialized grippers handle delicate electronics assembly. However, humanoid form factors provide the greatest versatility for human-designed environments, justifying the engineering complexity and cost premium for applications requiring multi-modal task execution <sup>[34]</sup> <sup>[28]</sup> <sup>[35]</sup>.

## **Applications and Implications: The Road to Deployment**

### **Automotive Manufacturing: The Proving Ground**

Automotive manufacturing has emerged as the primary testing ground for humanoid robotics, with BMW, Mercedes-Benz, and Zeekr conducting active trials <sup>[14]</sup> <sup>[13]</sup> <sup>[36]</sup> <sup>[37]</sup> <sup>[38]</sup>. The sector's appeal stems from structured environments, repetitive tasks, and acute labor shortages for physically demanding work <sup>[14]</sup> <sup>[36]</sup> <sup>[37]</sup>.

Mercedes-Benz invested a "two-digit million-euro sum" in Aptronik and is testing Apollo humanoids at its Digital Factory Campus in Berlin and facilities in Kecskemet, Hungary <sup>[38]</sup> <sup>[39]</sup>. Production chief Joerg Burzer stated: "I hope we can identify uses in sectors where we are experiencing labor shortages—starting with repetitive tasks and then moving on to more dangerous ones" <sup>[38]</sup>.

BMW's partnership with Figure AI has progressed from feasibility testing to extended operational shifts, with Figure 02 robots now integrated into actual X3 production workflows <sup>[14]</sup> <sup>[12]</sup> <sup>[13]</sup>. The deployment demonstrates that humanoids can achieve industrial reliability when combined with sufficient AI training data and robust hardware platforms <sup>[12]</sup> <sup>[13]</sup>.

### **Consumer Markets: The \$20,000 Question**

1X Technologies' NEO represents the first serious attempt to commercialize consumer humanoids at scale, with \$20,000 positioning the robot at "modest car" pricing as envisioned by industry leaders <sup>[1]</sup> <sup>[7]</sup>. The pre-order model mirrors successful consumer technology launches, building early adopter momentum before mass production <sup>[1]</sup>.

Competing visions exist: Tesla's Optimus aims for \$20,000-\$30,000 pricing with potential 2025 external sales; Figure AI targets home deployment by end of 2026; Unitree's G1 offers a \$16,000 entry point primarily for research applications <sup>[40]</sup> <sup>[41]</sup> <sup>[33]</sup> <sup>[42]</sup>. Each approach reflects different tradeoffs between capability, safety, and cost <sup>[40]</sup> <sup>[41]</sup> <sup>[33]</sup>.

Sanctuary AI's Phoenix focuses on commercial deployment in automotive, logistics, energy, retail, and telecommunications rather than consumer markets, positioning human-level dexterity as the primary value proposition over bipedal locomotion <sup>[43]</sup> <sup>[44]</sup> <sup>[45]</sup>.

## Challenges and Realistic Timelines

Despite breakthrough demonstrations, significant challenges remain:

### Technical Limitations:

- **Dexterity Gap:** Humanoid hands lack the tactile sensitivity and fine motor control of human manipulation, limiting delicate task performance<sup>[46] [47] [48]</sup>
- **Power Efficiency:** Current battery technology provides 2-4 hours of operation, requiring frequent recharging that limits practical utility<sup>[1] [30]</sup>
- **Environmental Robustness:** Most deployments occur in controlled settings; adapting to household variability remains unsolved<sup>[2] [49]</sup>

### Economic Barriers:

- **Cost Structure:** At \$50,000-\$100,000 per unit (excluding NEO and G1), humanoids remain prohibitively expensive for most applications<sup>[49] [15]</sup>
- **ROI Uncertainty:** Long payback periods and unproven reliability make CFOs hesitant, especially when task-specific automation costs less<sup>[49] [50]</sup>
- **Maintenance Requirements:** Humanoid complexity introduces new maintenance challenges compared to conventional robotics<sup>[49]</sup>

### Regulatory and Social Concerns:

- **Safety Certification:** Home deployment requires regulatory frameworks that don't yet exist for autonomous humanoids<sup>[1] [36]</sup>
- **Job Displacement:** Labor unions and workers express legitimate concerns about automation's impact on employment<sup>[51] [52] [49]</sup>
- **Privacy and Surveillance:** Humanoids with cameras and sensors in homes raise data security questions<sup>[1]</sup>

## Future Outlook: 2026-2030

Industry experts project meaningful deployment scaling between 2026-2030, with initial focus on industrial applications expanding to service and consumer sectors:

### Near-Term (2026-2027):

- Consumer humanoid deliveries begin (NEO, potentially Tesla Optimus)<sup>[1] [40] [41]</sup>
- Automotive manufacturers deploy hundreds of units in pilot facilities<sup>[14] [13] [36] [38]</sup>
- Logistics warehouses trial humanoids for tote handling and last-mile delivery<sup>[28] [53]</sup>

### Medium-Term (2028-2030):

- Production scaling reaches thousands of units annually at dedicated facilities<sup>[30] [28]</sup>
- Prices decline toward \$10,000-\$20,000 range as manufacturing matures<sup>[49]</sup>
- Regulatory frameworks emerge for home and workplace humanoid deployment<sup>[1] [49]</sup>

## Long-Term (2030+):

- Goldman Sachs estimates \$38 billion humanoid market by 2035; Fortune Business Insights projects \$66 billion by 2032 <sup>[35]</sup>
- Billions of humanoids potentially deployed globally by 2040 <sup>[35]</sup>
- General-purpose capabilities emerge through accumulated training data and improved LLMs <sup>[4] [5] [6]</sup>

Morgan Stanley estimates 40,000 humanoid robots by 2030, swelling to 63 million by 2050, though these projections carry significant uncertainty <sup>[54]</sup>.

## Conclusion: Convergence of Hardware and Intelligence

The past seven days demonstrate that humanoid robotics has reached a critical juncture where hardware maturity, AI breakthroughs, and commercial necessity are converging. Large Behavior Models and Vision-Language-Action architectures provide the intelligence layer that justifies humanoid form factors' mechanical complexity. Real-world deployments at BMW, GXO, and soon Foxconn validate that the technology can deliver industrial reliability when properly integrated <sup>[14] [12] [13] [28] [15]</sup>.

The opening of NEO pre-orders signals confidence that consumer markets will materialize, though success depends on demonstrating genuine utility that justifies \$20,000 investments <sup>[1]</sup> <sup>[7]</sup>. The parallel development of foundation models, simulation platforms, and open-source frameworks (Isaac Lab, OpenVLA, MIT's HPT) creates an ecosystem effect where progress accelerates through shared knowledge <sup>[5] [23] [18]</sup>.

Challenges remain substantial: dexterity lags behind human capabilities, costs exceed most budgets, and regulations trail technological advancement. However, the trajectory established this week—from laboratory research to multi-hour production shifts—suggests that humanoid robotics is transitioning from "if" to "when" and "how quickly." <sup>[14] [12] [13] [49] [50]</sup>

As Scott Kuindersma of Boston Dynamics stated, this may be "one of the most exciting points" in humanoid robotics history, though "there's a lot of hype out there—and a lot of work still to do." <sup>[2]</sup> The coming months will reveal whether this week's announcements mark the true beginning of the machine age or another chapter in robotics' long history of promised revolutions that took decades to materialize.

✱

1. <https://www.therobotreport.com/1x-announces-pre-order-launch-neo-humanoid-robot/>
2. <https://singularityhub.com/2024/11/04/watch-boston-dynamics-new-electric-atlas-robot-gets-down-to-work/>
3. <https://www.prnewswire.com/news-releases/agibot-achieves-first-real-world-deployment-of-reinforcement-learning-in-industrial-robotics-302601935.html>
4. <https://pressroom.toyota.com/ai-powered-robot-by-boston-dynamics-and-toyota-research-institute-takes-a-key-step-towards-general-purpose-humanoids/>
5. <https://news.mit.edu/2024/training-general-purpose-robots-faster-better-1028>

6. <https://www.roboticstomorrow.com/news/2025/08/21/ai-powered-robot-by-boston-dynamics-and-toyota-research-institute-takes-a-key-step-towards-general-purpose-humanoids/25397>
7. <https://techfundingnews.com/meet-neo-20000-dollar-norwegian-humanoid-robot-home-robotics/>
8. <https://www.svconline.com/proav-today/watch-atlas-robot-gets-to-work>
9. <https://pressroom.toyota.com/boston-dynamics-and-toyota-research-institute-announce-partnership-to-advance-robotics-research/>
10. <https://www.311institute.com/boston-dynamics-humanoid-robot-gets-to-work-stacking-shelves/>
11. <https://www.therobotreport.com/agibot-deploys-real-world-reinforcement-learning-system/>
12. <https://www.youtube.com/watch?v=72vTji63EZg>
13. <https://www.fanaticalfuturist.com/2025/09/bmws-humanoid-factory-robots-get-a-huge-performance-upgrade/>
14. <https://www.bmwgroup.com/en/news/general/2024/humanoid-robots.html>
15. <https://techinformed.com/foxconn-to-use-humanoid-robots-at-houston-ai-server-plant/>
16. <https://finance.yahoo.com/news/foxconn-deploy-humanoid-robots-houston-013021548.html>
17. <https://blogs.nvidia.com/blog/national-robotics-week-2025/>
18. <https://www.roboticstomorrow.com/story/2024/11/nvidia-advances-robot-learning-and-humanoid-development-with-new-ai-and-simulation-tools/23519/>
19. <https://www.linkedin.com/pulse/large-behavior-models-lbms-next-leap-beyond-language-ai-ali-qas7c>
20. <https://www.youtube.com/watch?v=DeLpnTgzJT4>
21. <https://arxiv.org/abs/2507.05331>
22. [https://en.wikipedia.org/wiki/Vision-language-action\\_model](https://en.wikipedia.org/wiki/Vision-language-action_model)
23. <https://www.emergentmind.com/topics/openvla>
24. <https://openreview.net/forum?id=iVxxgZIXh6&notelid=KcBFB7diHh>
25. <https://arxiv.org/pdf/2411.02359.pdf>
26. <https://lilias.stanford.edu/news/>
27. <https://www.youtube.com/watch?v=pvOLxYhpwO0>
28. <https://www.forbes.com/sites/johnkoetsier/2024/11/14/meet-the-only-humanoid-autonomous-robot-actually-working-in-warehouses-today/>
29. <https://www.dvc.com/news-insights/dvc-dtor-2024-agility-robotics-is-a-real-world-case-study-in-operational-data>
30. <https://mikekalil.com/blog/agility-robotics-schaeffler/>
31. <http://www.tri.global/news/boston-dynamics-and-toyota-research-institute-announce-partnership-advance-robotics-research>
32. <https://ciobulletin.com/robotics/tiangong-open-source-robotics-humanoid>
33. <https://www.therobotreport.com/unitree-robotics-unveils-g1-humanoid-for-16k/>
34. <https://mikekalil.com/blog/2024-year-of-the-humanoid-robot/>
35. <https://www.weforum.org/stories/2025/06/humanoid-robots-offer-disruption-and-promise/>
36. <https://appronik.com/news-collection/appronik-and-mercedes-benz-enter-commercial-agreement>
37. <https://manufacturingdigital.com/articles/how-mercedes-benzs-apollo-robot-is-advancing-automotive>

38. <https://www.reuters.com/business/autos-transportation/mercedes-benz-takes-stake-robotics-maker-a-pptronik-tests-robots-factories-2025-03-18/>
39. <https://group.mercedes-benz.com/innovations/digitalisation/industry-4-0/mbdfc-humanoid-robots.html>
40. <https://thehumanoid.ai/top-startup-breakthroughs-and-products-to-watch/>
41. <https://standardbots.com/blog/tesla-robot>
42. <https://robotsguide.com/robots/unitree-g1>
43. <https://www.therobotreport.com/sanctuary-ai-unveils-general-purpose-humanoid-robot/>
44. <https://www.sanctuary.ai/blog/sanctuary-ai-unveils-phoenix-a-humanoid-general-purpose-robot-designed-for-work>
45. <https://mikekalil.com/blog/sanctuary-ai-phoenix-hand/>
46. <https://rodneymrooks.com/why-todays-humanoids-wont-learn-dexterity/>
47. <https://www.forbes.com/sites/davidprosser/2025/11/03/inside-the-race-to-roboticize-the-worlds-factory-floors/>
48. <https://www.eu-startups.com/2025/11/swiss-startup-mimic-lands-e13-8-million-to-deliver-robots-that-can-finally-do-what-people-do/>
49. <https://www.forbes.com/sites/ethankarp/2025/10/29/humanoid-robots-in-manufacturing-timelines-cost-and-opportunity/>
50. <https://www.constructiondive.com/news/humanoid-robots-construction-report-mckinsey/804027/>
51. <https://www.latimes.com/business/story/2025-11-02/inside-californias-rush-to-gather-human-data-for-building-humanoid-robots>
52. <https://www.braincorp.com/resources/2024-in-review-the-year-robotics-and-ai-changed-what-we-thought-was-possible>
53. <https://www.agilityrobotics.com/content/agility-robotics-announces-strategic-investment-and-agreement-with-motion-technology-company-schaeffler-group>
54. <https://www.cnbc.com/2024/12/21/ai-speeding-development-of-humanoid-robots-but-investors-skeptical.html>
55. <https://world.edu/ai-could-be-the-breakthrough-that-allows-humanoid-robots-to-jump-from-science-fiction-to-reality/>
56. <https://www.linkedin.com/pulse/ai-advancements-september-october-2024-bruce-afroz-f8nlc>
57. <https://www.robotics247.com/topic/tag/Humanoid>
58. <https://www.youtube.com/watch?v=tMYCaX2uidg>
59. <https://blog.google/technology/ai/2024-ai-extraordinary-progress-advancement/>
60. <https://www.therobotreport.com/november-2024-top-10-robotics-developments/>
61. <https://thehumanoid.ai/newsroom/>
62. <https://www.therobotreport.com/top-10-robotics-developments-of-october-2024/>
63. <https://www.livescience.com/technology/robotics/robotics-breakthroughs-test-your-knowledge-of-the-most-exciting-advancements-in-the-field>
64. <https://www.tipranks.com/news/company-announcements/realbotix-to-unveil-expanded-ai-humanoid-robot-lineup-at-ces-2026>
65. <https://chem.unc.edu/news/study-robotic-automation-ai-will-speed-up-scientific-progress-in-science-laboratories/>

66. <https://techequity-ai.org/2025/10/12/humanoids-on-the-move-how-2025-became-the-breakthrough-year-for-ai-driven-robotics/>
67. <https://finance.yahoo.com/news/humanoid-global-announces-commitment-strategic-090000583.html>
68. <https://www.youtube.com/watch?v=CoQ4yGI7LtQ>
69. <https://electrek.co/2024/12/09/tesla-releases-new-video-of-optimus-robot-walking-and-it-rings-a-bell/>
70. <https://www.youtube.com/watch?v=gTSFBFmRJVs>
71. [https://en.wikipedia.org/wiki/Optimus\\_\(robot\)](https://en.wikipedia.org/wiki/Optimus_(robot))
72. <https://www.teslaoracle.com/2024/11/30/tesla-tests-optimus-humanoid-robot-with-a-new-hand-catching-balls-mid-air-video/>
73. <https://www.repairerdrivennews.com/2025/10/15/figure-ai-founder-claims-robots-running-on-bmw-production-line-10-hours-a-day/>
74. <https://www.youtube.com/watch?v=WvOgzsDHRCA>
75. <https://www.instagram.com/p/DQXxW6Lkefx/>
76. [https://www.reddit.com/r/singularity/comments/1nzm79t/brett\\_adcock\\_this\\_week\\_figure\\_has\\_passed\\_5\\_months/](https://www.reddit.com/r/singularity/comments/1nzm79t/brett_adcock_this_week_figure_has_passed_5_months/)
77. [https://x.com/Tesla\\_Optimus](https://x.com/Tesla_Optimus)
78. <https://www.reuters.com/pictures/rise-robots-2024-10-16/>
79. <https://www.youtube.com/@figureai/videos>
80. <https://www.youtube.com/watch?v=Zr53QiFsaUI>
81. <https://aheadoftheherd.com/meet-the-worlds-most-advanced-humanoid-robot/>
82. [https://www.reddit.com/r/GenAI4all/comments/1odx98f/figures\\_26b\\_humanoid\\_robot\\_just\\_spent\\_5\\_months/](https://www.reddit.com/r/GenAI4all/comments/1odx98f/figures_26b_humanoid_robot_just_spent_5_months/)
83. <https://viterbischool.usc.edu/news/2023/12/usc-at-the-conference-on-neural-information-processing-systems-neurips/>
84. <https://www.linkedin.com/pulse/agility-robotics-launches-next-generation-digit-worlds>
85. <https://briandcolwell.com/a-complete-review-of-boston-dynamics-atlas-robot/>
86. <https://www.theverge.com/2024/4/17/24133145/boston-dynamics-resurrects-atlas-humanoid-robot-electric-new>
87. <https://viterbischool.usc.edu/news/2024/11/usc-at-the-conference-of-robot-learning-cori-2024/>
88. <https://www.youtube.com/watch?v=kV0P94Ln4o4&vI=en>
89. <https://www.cori.org>
90. <https://www.youtube.com/watch?v=R3h7at-U088>
91. <https://2024.cori.org>
92. [https://www.youtube.com/watch?v=l44\\_zbEwz\\_w](https://www.youtube.com/watch?v=l44_zbEwz_w)
93. <https://openreview.net/group?id=robot-learning.org%2FCoRL%2F2024%2FConference>
94. <https://finance.yahoo.com/news/humanoid-robots-global-market-report-153700568.html>
95. <https://itcantthink.substack.com/p/are-humanoid-robots-ready-for-the>
96. <https://newsroom.toyota.eu/ai-powered-robot-by-boston-dynamics-and-toyota-research-institute-takes-a-key-step-towards-general-purpose-humanoids/>

97. <https://counterpointresearch.com/en/insights/Humanoid-Robots-Autonomous-Vehicles-Pushing-AI-into-Physical-World>
98. <https://www.forbes.com/sites/lanceeliot/2024/11/10/large-behavior-models-surpass-large-language-models-to-create-ai-that-walks-and-talks/>
99. <https://www.nytimes.com/2025/10/28/style/48-hours-without-ai.html>