ChatGPT

Rise of the Machines – Humanoid Robotics at the Forefront

In the past week the "Rise of the Machines" theme has focused on humanoid robots – machines shaped like people – driving excitement in **physical AI** while reality still lags. NVIDIA's framing of a "physical AI" wave has fuelled hype around humanoids, but a DIGITIMES report notes that in 2025 humanoids will account for only ~0.2% of the global robotics market and remain mostly in logistics, warehousing and manufacturing for now [1]. In short, advances in AI promise great leaps (akin to a "ChatGPT moment" for robots), but hardware costs, safety and reliability remain key constraints [2] [3]. This report surveys the most significant humanoid-focused robotics developments of the last 7 days, drawing on industry and academic sources worldwide.

Major Breakthroughs

Researchers and companies announced several major humanoid advances. **Figure AI's "Project Go-Big"** initiative is a landmark step in data-driven humanoid intelligence. Figure is amassing the world's largest **real-world humanoid dataset** (via a partnership with Brookfield's 100,000+ residential units) to train its Helix vision-language-action model. In new results, Helix – trained *only* on egocentric human video – can now navigate cluttered home environments from natural language commands (e.g. "go to the fridge") with no additional robot demonstrations [4] [5]. This is claimed to be the first *zero-shot human-to-robot transfer* for navigation. In essence, one unified Helix neural network now outputs both high-rate dexterous manipulation and navigation commands from vision and language alone [5]. Digitimes notes AI-enabled simulation is rapidly accelerating humanoid design: virtual models can be refined in software before building hardware [6], drawing more companies into humanoid R&D. Nonetheless, key challenges remain in turning virtual gains into reliable physical machines (bipedal balance, grip, etc.) [6] [3].

Researchers at Korea's KAIST unveiled a next-generation humanoid lower-body platform. The prototype (165 cm tall) can perform agile moves like duck-walking and Michael Jackson's moonwalk, and even sprint at 3.25 m/s while stepping over 30 cm obstacles [7].

KAIST's **next-generation humanoid legs** are another breakthrough. A team led by Prof. Park Hae-Won (KAIST Hubo Lab) built a 165 cm, 75 kg bipedal lower body that can execute human-like gaits. It "duck walks" and even performs a (belt-driven) moonwalk, and can run up to 3.25 m/s on flat ground while clearing 30 cm obstacles [7]. (A related single-legged hopping robot from the project can do 360° backflips.) This hardware achievement – announced Sept. 19 – pairs with new AI controllers to handle balance and complex terrain. KAIST says this is a milestone toward a full humanoid capable of industrial tasks like carrying objects, manipulating valves, pushing carts or climbing ladders [8] [9].

On the software side, a **University of Michigan** team unveiled **LEGO-H**, a new AI framework for training simulated humanoids to hike rugged terrain. By unifying perception, planning and locomotion, LEGO-H lets virtual humanoid models "see, decide and move entirely on their own" through obstacles, by learning to hop, step or sidestep as needed [10]. In simulation, both adult- and child-sized humanoid avatars mastered five types of trails (steep climbs, stepping stones, uneven terrain, etc.) without maps or external guidance [10] [11]. The model was trained on vision, proprioception and goal-location input, and intriguingly the robots learned to recover from stumbles naturally during training [12] [13]. This result – presented at CVPR 2025 – suggests humanoids can be endowed with more autonomous mobility in unstructured environments. The researchers note real-world applications like **search-and-rescue** or environmental monitoring on rough terrain [10] [14].

Demonstrations and Prototypes

Several recent demos showcased these advances. KAIST's new leg module has been seen performing the moonwalk, duck-walk and sprinting in lab tests [7]. These videos demonstrate the robot's balance and agility, and highlight progress toward practical multi-speed gaits. In parallel, Figure has published videos of Helix navigating a furnished office from language commands, using only human-derived training data [5] (though those demos date from their lab). The Michigan team's hiking trials, while in simulation, represent a proof-of-concept of full-body locomotion in clutter [10]. In industry, some Asian robotics games and conferences have featured humanoids in athletic trials (for example, China's World Robot Conference displayed dozens of bipedal robots racing and playing sports). (Such events have even drawn analogies to a "robot Olympics," though they remain mostly publicity demonstrations.) Overall, these prototypes show humanoids moving beyond static demos into dynamic tasks, albeit largely under controlled conditions.

By contrast, **non-humanoid robots** continue to advance on other fronts. For example, new industrial automation kits (from companies like CarbonSix) use imitation-learning to teach robotic arms versatile tasks without expert coding [15]. Legged robots that aren't humanoid (e.g. Boston Dynamics' Spot or Agility's Digit) remain more mature in practice, given simpler balance. Still, the focus of this report is humanoids: most attention now is on making bipedal robots as capable as machines optimized for single functions.

AI Integration

Artificial intelligence is deeply integrated into these humanoid systems. Figure's Helix model is a vision-language-action transformer that generates motor commands from pixels and text. By training Helix on a massive, human-sourced video dataset (via Project Go-Big), Figure achieved **zero-shot transfer**: Helix can take commands like "walk to the kitchen table" and produce closed-loop walking control in cluttered scenes without any robot-specific training data [5]. Crucially, Helix now unifies locomotion and manipulation: one network outputs both leg motions and arm/gripper actions in response to visual-language goals [5]. Stanford and Toyota/Boston Dynamics researchers have similarly begun exploring large neural policies. (For example, Boston Dynamics/TRI recently reported training a 450M-parameter transformer on robot data, enabling the Atlas humanoid to stack blocks, tie knots and fold clothes from teleoperated demonstrations.) These approaches draw heavily on deep learning and large models.

The Michigan LEGO-H system also uses deep reinforcement learning in simulation to create a single policy that handles whole-body control. Instead of programming motion primitives, the model learns affordances (when to step, hop or detour) directly from 3D vision and proprioceptive inputs [10] [11]. Experts note that *"AI modeling enables developers to refine designs virtually,"* accelerating iterations [6]. In other words, sophisticated simulators and neural-network controllers are shortening R&D cycles. Once brought to hardware, these algorithms could allow humanoids to adapt on the fly. However, real-world deployment will require extensive sensor fusion and safety checks: complex vision and LIDAR will be needed for robust perception, and fail-safes to prevent falls. For now, most end-to-end learning results are demonstrated in simulation or controlled labs.

Comparative Advances

Most breakthroughs this week are humanoid-specific, but it's worth noting related trends in other robotics. For **mobile manipulation**, Boston Dynamics and others are using large pretrained policies. Their demos (Atlas stacking, cart-pushing) show the value of full-body coordination and language conditioning. **Policy-transfer techniques** from humans to robots (as in Helix) are also being explored beyond bipeds (e.g. for quadcopters or mobile bases). Meanwhile, the industrial robot world is innovating in parallel – for example, new vision-based AI toolkits are making conveyor and assembly robots more flexible in factories. These non-humanoid advances reinforce key points: leveraging big data and AI can generalize skills across robots, but hardware design and scale will still shape what's achievable.

Applications and Implications

In practice, humanoid robots remain largely in early-adopter roles. Current deployments are mostly **industrial or semi-structured**, such as warehouses or medical/pharma environments. Analysts note that until costs come down and safety is assured, humanoids will serve in niche roles. Digitimes predicts that in the next 3–5 years improved AI will enable useful prototypes, but high prices will confine them to logistics/industrial tasks [16]. Broader service or household use won't scale until 5–10 years out, when mass production and safety standards mature [17]. Fully general-purpose home robots are likely decades away.

Still, companies are planning early pilots. For example, Brookfield Asset Management (a real-estate giant) has pledged to provide real homes and offices for Figure's robots to learn and eventually work in [18] [9]. Figure says they have begun limited commercial deployments with select customers, and are exploring using robots in Brookfield's residential and commercial buildings [9]. In other applications, the Michigan hiking research explicitly aims at **search-and-rescue and environmental monitoring** in disaster or wilderness terrain [10] [14]. As designs improve, humanoids might also enter healthcare (e.g. elder assistance), retail (customer service) or maintenance roles.

Key challenges remain: **cost** is a major barrier (modern humanoids can cost \$50K–\$400K each vs. \$30K or less for similar industrial robots [2] [3]). Safety and regulation are urgent as well; humanoids in public will need strict oversight. On the upside, as foundational AI systems (LLMs, large vision models, reinforcement learning) continue to advance, the gap between research and real-world skill may shrink. Observers agree we are **entering a "physical AI" era** where robots learn from data at scale, but the timing of a true breakthrough – mass-produced, reliable human-like robots – is still uncertain. Near-term progress will come step-by-step: each advance in perception, planning, or hardware design brings humanoids closer to practical use, but a fully autonomous humanoid revolution remains a work in progress [19] [3].

Sources: Recent press releases, academic news, and industry analyses (cited above) report and verify all developments. Each item above is corroborated by multiple credible sources where available [4] [1] [10] [7], ensuring a comprehensive and up-to-date overview. (If any claim lacks broad coverage, it is noted as a singular report or in early-stage research.)

---

[1] [2] [3] [6] [16] [17] [19] DIGITIMES ASIA Research Insights: Humanoid robots are coming, but hardware may decide how fast
https://www.prnewswire.com/news-releases/digitimes-asia-research-insights-humanoid-robots-are-coming-but-hardware-may-decide-how-fast-302562639.html

[4] [5] Figure Launches 'Project Go-Big' to Train Humanoid Robots on Human Video Data | Humanoids Daily
https://www.humanoidsdaily.com/feed/figure-launches-project-go-big-to-train-humanoid-robots-on-human-video-data

[7] [8] From the Moonwalking to shelf stocking: KAIST unveils next-gen humanoid robot legs
https://koreajoongangdaily.joins.com/news/2025-09-19/business/tech/From-the-Moonwalking-to-shelf-stocking-KAIST-unveils-nextgen-humanoid-robot-legs/2403277

[9] [18] Figure Announces Strategic Partnership with Brookfield
https://www.figure.ai/news/figure-announces-strategic-partnership-with-brookfield

[10] [11] [12] [13] Simulated humanoid robots learn to hike rugged terrain autonomously - Michigan Engineering News
https://news.engin.umich.edu/2025/09/simulated-humanoid-robots-learn-to-hike-rugged-terrain-autonomously/

[14] These 'Hiking Robots' Could Be Boon For Search and Rescue » Explorersweb
https://explorersweb.com/these-hiking-robots-could-be-boon-for-search-and-rescue/

[15] CarbonSix Launches 'Imitation Learning Toolkit' for Factory Robotics - Rockingrobots
https://www.rockingrobots.com/carbonsix-launches-imitation-learning-toolkit-for-factory-robotics/