Humanoid Horizons: Do Robots Have a PR Problem?

Humanoids (and many other robots) are frequently advertised as worker replacements before they've even replaced anyone. We feel strongly that the situation is not zero-sum. Social pushback, still in its early days, may prove to be a bigger barrier than technological factors.



Tech Diffusion

A Morgan Stanley Research
Key Theme of 2026

We provide our latest thoughts and key highlights across the robotics ecosystem:

- **Do Robots have a PR Problem?** Hyundai's labor dispute over the future use of Boston Dynamics' Atlas highlights a broader communications challenge for the sector. Even before any meaningful deployment, humanoids are often framed publicly (by both investors and companies) as direct substitutes for workers rather than tools for hazardous, repetitive or labor-constrained tasks. **The industry's social license to deploy may matter just as much as technical performance.** It is often easiest and most intuitive to frame the robotics TAM as workforce multiplied by wages (we have also been guilty of this), but this overlooks the potential for robots to positively augment human workers, relieve labor shortages, and make previously uneconomic greenfield facilities viable, supporting new jobs in operations, maintenance, and supervision. Scaling the industry would also likely require significant employment across robot manufacturing and a currently underdeveloped supply chain for actuators, motors, sensors, batteries, electronics, and software.
- **Potential Impending US Protectionism.** The bipartisan proposed GUARD Act would require national security agencies to review humanoid and quadruped robots produced by China and other foreign countries of concern.. Robots deemed risky, or not reviewed within one year, would be added to the FCC's Covered List and prohibited from entering the US market. This appears very similar to the FCC's December 2025 decision on drones, which blocked new foreign-made drones and critical components from receiving authorization, effectively restricting new products from Chinese leaders such as DJI while leaving previously approved models unaffected. The drone precedent suggests the GUARD Act, if enacted, may ultimately become a de facto import ban rather than simply a stricter review process. This could

provide meaningful protection for US robot manufacturers, but may also raise R&D costs (inexpensive China-made humanoids are heavily used for model research even in the US) or slow adoption if restrictions expand into Chinese-made components and manufacturing partnerships. From our conversations with those in the field, China-made robots (particularly Unitree) are used by a very large % of US research labs given their low cost and high availability.

- **Manufacturing Capacity Is Being Built Ahead of Proven Demand.** Tesla is preparing Fremont for Optimus production, XPeng is reportedly targeting capacity above 1,000 IRON robots. per month, Boston Dynamics is investing in a consolidated manufacturing and AI center, and Mitsubishi is exploring production of Highlanders' humanoids. Building capacity early may be necessary to improve actuator design, cut unit costs, and improve reliability and serviceability through production learning, ***but factory capacity should not be confused with shipments***. Many facilities are likely to operate below theoretical output until customer ROI and AI foundation model performance improve.

- **Commercial Adoption Is Broadening, but Remains Narrow and Early.** Figure's agreement with Catalyst Brands extends humanoid deployments into distribution centers, while recent Toyota-spinout Walden Robotics says its robots are already performing production work at Toyota. Mitsubishi, XPeng and Chinese government-backed programs are also targeting manufacturing, retail, logistics and public-service applications. The market is moving beyond just demonstrations, but progress is likely to remain scenario-specific. *Repeat orders and fleet expansion after initial pilots are more meaningful than the number of announced partnerships.*
- **Investors keep searching for proof of commercial ROI.** In our recent experience, investors have become harder to impress with polished videos and one-off demonstrations alone and are increasingly looking for tangible evidence of real-world ROI. Over the next several quarters, productive operating hours, intervention rates, maintenance costs, repeat purchases, customer payback periods and realized output should matter more than demonstrations, theoretical production capacity or non-binding orders.
- **Robot AI Approaches Seemingly Shift Every Few Months.** The industry has moved from models that directly turn camera inputs and instructions into actions toward " world action models" that try to predict what will happen before a robot moves (i.e. 'model based reasoning'). *To be intellectually honest, we do not know which exact approach will win, and even the best researchers do not seem to fully know either. However, if we had to guess*, the strongest systems will combine multiple approaches with a real-world recursive learning flywheel: deploy robots, collect data on successes and failures, improve the model, and redeploy. This suggests the lasting advantage may come less from any single architecture and more from access to real-world operating data, rapid learning, and tight integration between hardware and AI/software.
- **We lifted our 2026 China humanoid robot shipment forecast to 50k units**, from 28k, and expect 446k by 2030e, as integrators compete to leverage deployment scale to close the deployment-data loop. More companies in

China have announced mass production starting from late 2026, such as XPeng. In the deployment side, humanoid integrators, enterprise users, and government push commercial verification/adoption. For example, State Grid placed a Rmb6.8bn order for humanoid, quadruped, and dual-arm robots; SF Express and China Post are deploying Robotera's humanoids across logistics centers. For policy, the recent MIIT and SASAC's initiative is use-case driven, targeting 10k-level deployment capacity and >100 high-value applications by end-2026. Local governments and SOEs must identify operational sites (≥20/province, ≥10/central SOE) for humanoid training. Our supply-chain checks point to a constructive outlook for volume and the start of automated production lines.

- **WAIC 2026 reinforced our view that China's humanoid sector is moving from product demo toward real-world deployment**, with near-term adoption concentrated in relatively structured tasks such as industrial pick-and-place, logistics handling, inspection. Industry is continuously exploring new applications such as wire harnessing and component assembly, as well as household companionship robot with some house chores ability. However, limited model generalization and engineer-intensive integration should keep the market fragmented. Data remains the key bottleneck, outsourced collection is commoditizing, while differentiated capabilities in labeling, task decomposition, quality assessment and post-training should be the key competitive edge for integrators and model developers. *See our detail takeaways here - WAIC 2026 Takeaways: More Physical AI.*

- ***For a copy of our Global Robot Model with forecasts across the full range of embodied AI (not just humanoids), please reach out to your Morgan Stanley representative.***

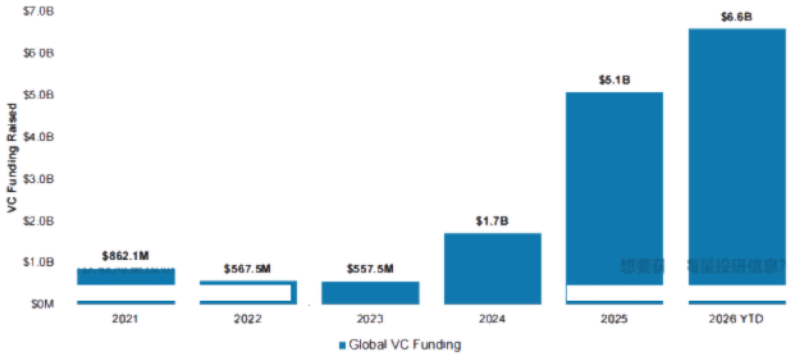
Humanoid 100 update: The equal-weighted Humanoid 100 is up 44% since its inception on 2/6/2025 (adjusting for additions and deletions), outperforming the S&P 500, MSCI Europe, and MSCI China, but underperforming MSCI Korea and MSCI Taiwan. Top performers YTD include Intel, Arm Holdings, Samsung Electronics, STMicro, Flex.

- **Adding Hesai (HSAI.US - Covered by Tim Hsiao) to the Humanoid 100:** Hesai is one of the world's largest LiDaR manufacturers with an ADAS pipeline from Li Auto, Xiaomi, Leap, BYD, Geely, Chang'an, and other EV players as well as emerging opportunities in robotaxis and humanoid robots. In addition to LiDaR, Hesai also supplies proprietary actuator modules with margins locked at 40-50% cost-plus (or 30-35% GpM). The company's Strategic Growth Initiatives 2026 annual revenue target of Rmb100mn (~US $14.8mn) with our team seeing upside potential to its humanoid-related revenue in the next 12-18 months. *For more details, see here: Hesai Group: From auto eyes to robotic eyes and muscles (24 Mar 2026)*
- *To make room for HSAI, we are removing ORCL from the list due to lack of relative materiality to the investment story.*

China Humanoid Value Chain update: In July MTD, the China Humanoid Value Chain

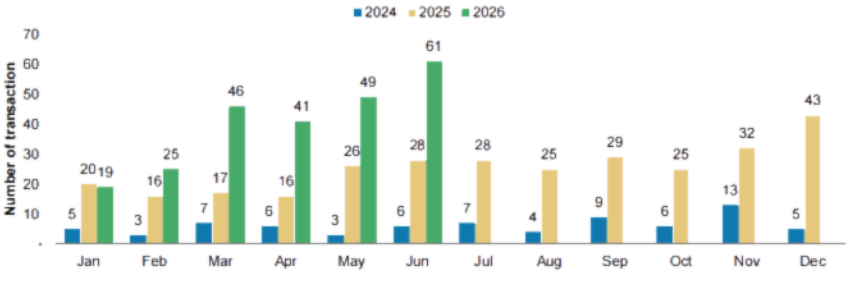
is down 11% on an equal-weighted basis, underperforming MSCI China (7%), amid the broader the AI sector weakness and muted sentiment awaiting further production update from leading integrator after the surge in May.

Exhibit 1: 2026 Global Venture Funding for Humanoid Robots Has Already Exceeded the Sum of 2025



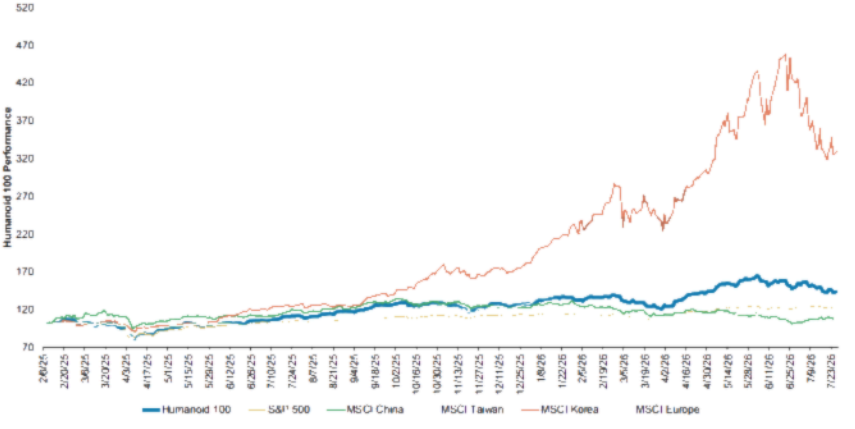
Note: As of 7/15/2026. Includes funding for companies classified under "Humanoid Robotics" in PitchBook.
Source: PitchBook, Morgan Stanley Research.

Exhibit 2: China Humanoids Financing Activities



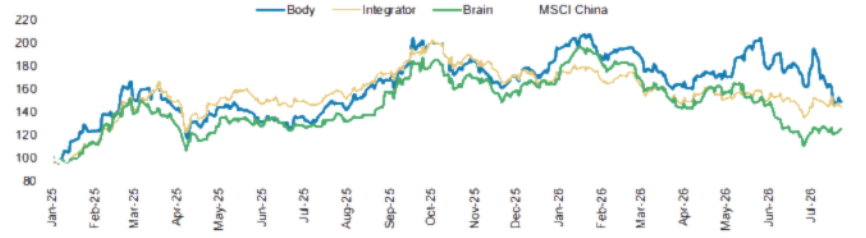
Note: Includes all notable funding disclosed based on our knowledge and research. However, there may still be some not captured. We updated number of transaction for previous months with transaction announced after our published previous Humanoids Horizon.
Source: Company announcement, GSIL Morgan Stanley Research.

Exhibit 3: Equal-Weighted Humanoid 100 Performance since 2/6/2025 (Date list was Established)



Note: Data as of 7/27/2026 close. Price returns only, does not account for dividend reinvestment or transaction costs.
Source: FactSet, Morgan Stanley Research.

Exhibit 4: Equal-weighted China Humanoid Value Chain Perf



Source: FactSet, Morgan Stanley Research Note: Data as of July 22 close. On June 23, 2025, we removes Guomai (covered by Sheng Zhong, 603015.SS), Xusheng (covered by Shelley Wang 603305.SS), and Zhongjun (not covered, 300779.SZ). Results shown represent return excluding dividends, brokerage commissions and transaction costs. These figures are not a guide. Past performance is no guarantee of future results. For important disclosures regarding companies that are the subject of this screen, please see the Morgan Stanley Research Disclosure Website at www.morganstanley.com/researchdisclosures.

Exhibit 5: The Humanoid 100- Morgan Stanley's list of Global Humanoid Enablers



Note: Public companies only. Not all inclusive.

Source: Morgan Stanley Research

Exhibit 6: China humanoid value chain (including public companies in our stock list - see Exhibit 25 and private players)



Source: Morgan Stanley Research

In this note you will find:

- Recent Robotics Updates & Developments
- China Policy Support Overview
- Humanoid 100 Performance
- China Humanoids Value Chain Performance
- Tracking Humanoid Progress
- US & China Humanoid TAM/Adoption Estimates

Further Reading

For Further Reading on Humanoids & Embodied AI:

- WAIC 2026 Takeaways: More Physical AI (20 Jul 2026)
- Humanoids: The Tide is Rising, Lifting 2026 Forecast (23 Jun 2026)
- Video: Asia Summer School: Asia Robotics and Humanoids (30 Jun 2026)
- Physical AI: The Morgan Stanley Robot Almanac (7 Dec 2025)
- Robotics: The Robot Almanac (Vol. 3): Humanoids & Industrial Robots (16 Dec 2025)
- China Industrials: 2026 Outlook – Humanoids: Commercialization (21 Jan 2026)
- Global Technology: Humanoid Tech – Grasping the Future (30 Nov 2025)
- China's Emerging Frontiers: From Wheels to Walkers – How Autos Morph into Humanoids (18 Jun 2025)
- China's Emerging Frontiers: Robotics Unleashed, A New Era (16 Jun 2025)
- Humanoids and Global Materials: The robots are coming...for critical minerals (21 May 2025)
- Humanoids: A $5 Trillion Global Market (29 Apr 2025)
- Humanoids: The Humanoid 100: Mapping the Humanoid Robot Value Chain (6 Feb 2025)
- Artificial Intelligence: Humanoids: Investment Implications of Embodied AI (26 Jun 2024)

Relevant Private Company Disruptor Profiles:

- Robotics: I Just Pre-Ordered a Humanoid Robot (4 Nov 2025)
- Embodied AI: AI Robotics Disruptors: Skild AI (23 May 2025)
- Embodied AI: Humanoid Disruptors: 1X Technologies (7 Apr 2025)
- Embodied AI: Humanoid Disruptors: Apptronik (24 Mar 2025)
- Embodied AI: Humanoid Disruptors: Mentee Robotics (2 Mar 2025)
- Embodied AI: Humanoid Disruptors: Unitree - Humanoids Starting at $16K (28 Jan 2025)

Previous Iterations of Humanoid Horizons:

- Humanoids: Humanoid Horizons: Humanoids Coming to Your Bloomberg Screen (29 May 2026)
- Robotics: Humanoid Horizons: Money Meets Machines (7 May 2026)
- Humanoids: Humanoid Horizons: National Priority, 'Brain', Unitree IPO (25 Mar 2026)
- Robotics: Humanoid Horizons: Can US and China Collaborate on Robots? (26 Feb 2026)
- Humanoids: Humanoid Horizons: Gaining Momentum Globally (22 Jan 2026)
- Robotics: Humanoid Horizons: What to Watch for 2026 (19 Dec 2025)
- Humanoids: Humanoid Horizons: Overhyped yet Underappreciated (1 Dec 2025)
- Humanoids: Humanoid Horizons: Big Tech 'Doing the Robot'... Softbank/ABB, Apple, Meta, Optimus v3 (26 Oct 2025)
- Humanoids: Humanoid Horizons: Closer to the Real World (19 Sep 2025)

- Humanoids: Humanoid Horizons: First World Humanoid Games, $5k Humanoids? (26 Aug 2025)
- Humanoids: Humanoid Horizons: An Adoption Race (24 Jul 2025)
- Humanoids: Humanoid Horizons: Who Will Build the Android for Androids? (26 Jun 2025)

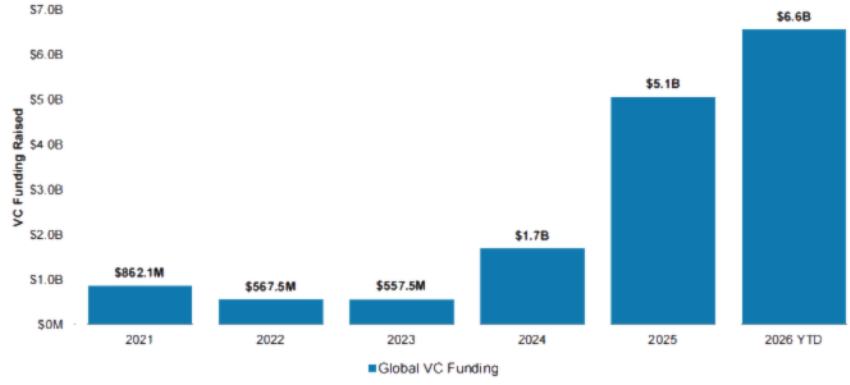


Recent Robotics Updates & Developments

New Funding:

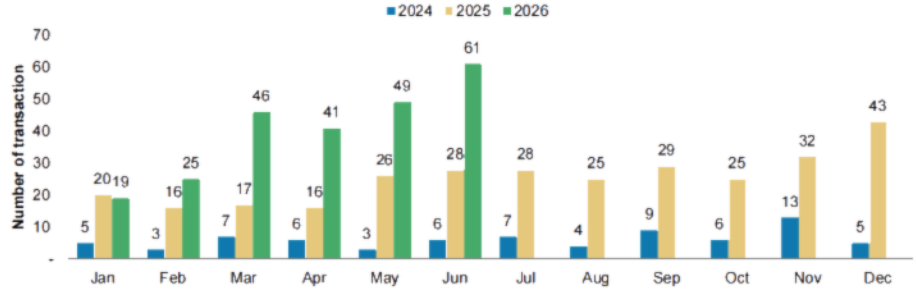
- **Toyota-backed Walden Robotics launches from stealth with $300mn at a $1.1bn valuation.** The seed round was co-led by Toyota and Deviation Capital, with participation from Nvidia, Boeing, Samsung Ventures, Prologis Ventures and CoreWeave Ventures. Walden, which emerged from the Toyota Research Institute in January 2026, is developing full-stack general-purpose robots for manufacturing and logistics and says its robots have been performing production work at a North American Toyota plant since February.
- **Agility Robotics advances its proposed $2.5bn SPAC transaction by confidentially submitting a draft Form S-4.** The submission represents a procedural step toward completing Agility's combination with Churchill Capital Corp XI and a potential listing under the ticker "AGLT." The transaction is expected to provide more than $620mn of gross proceeds, comprising $421mn held in the SPAC's trust (assuming no redemptions) and approximately $201mn of incremental financing. The transaction remains subject to SEC review, shareholder approval, redemptions and other closing conditions, meaning the proceeds have not yet been secured.
- **Multiple China humanoid companies accelerate preparations for public listings.** LimX Dynamics raised nearly $200mn in pre-IPO financing at a reported post-money valuation of Rmb15bn, or approximately $2.2bn, bringing its financing over the preceding six months to roughly $400mn. Unitree and several other Chinese robotics companies are also progressing toward domestic listings, reflecting the sector's growing capital requirements as development shifts from hardware prototypes toward AI models, training data and scaled manufacturing. *Public filings should provide greater visibility into revenue mix, industrial adoption, margins and the degree to which current demand remains concentrated in research, education and demonstrations.*
- **Hyundai reportedly plans to acquire SoftBank's remaining 9.65% interest in Boston Dynamics for $325mn.** According to Reuters, the transaction would make Boston Dynamics a wholly owned subsidiary of Hyundai Motor Group and its affiliates, which already own slightly more than 90% of the company. The rumored purchase arises from a put option established during Hyundai's original acquisition and could simplify decision-making as Boston Dynamics prepares Atlas for industrial deployment. At the time of the report, Hyundai and SoftBank had not publicly confirmed the transaction.

Exhibit 7: 2026 Global Venture Funding for Humanoid Robots Has Already Exceeded the Sum of 2025



Note: As of 7/15/2026. Includes funding for companies classified under 'Humanoid Robotics' in PitchBook
Source: PitchBook, Morgan Stanley Research

Exhibit 8: China Humanoids Financing Activities



Note: Includes all notable funding disclosed based on our knowledge and research. However, there may still be some not disclosed. We updated number of transaction in previous months with transaction announced after our published previous Humanoids Horizon
Source: Company announcement, SCIR, Morgan Stanley Research

Government & Public Events:

- **China launches a nationwide program intended to move humanoids from demonstrations into regular industrial and service deployment.** Local governments and state-owned enterprises were instructed to submit implementation plans by the end of June and progress reports by the end of November. The program targets more than 100 high-value applications and the deployment of 10,000 humanoid robots by the end of 2026 across manufacturing, logistics, healthcare and disaster-response settings. The initiative could accelerate testing and procurement, although state-supported deployment targets may not translate directly into sustainable commercial demand or attractive unit economics.
- **Bipartisan U.S. lawmakers introduce legislation that could restrict Chinese humanoid and quadruped robots.** The proposed GUARD Act would require national-security agencies to review robots produced by China and other designated foreign adversaries and place products presenting unacceptable risks on the FCC's Covered List, preventing their importation into the U.S. Products not reviewed within one year would be automatically added to the list (this proposed policy heavily mirrors that taken against China-made drones last year). The bill has only been introduced and has not become law, but it signals that robotics may face

trade and cybersecurity restrictions similar to those imposed on telecom equipment and commercial drones.

Manufacturing:

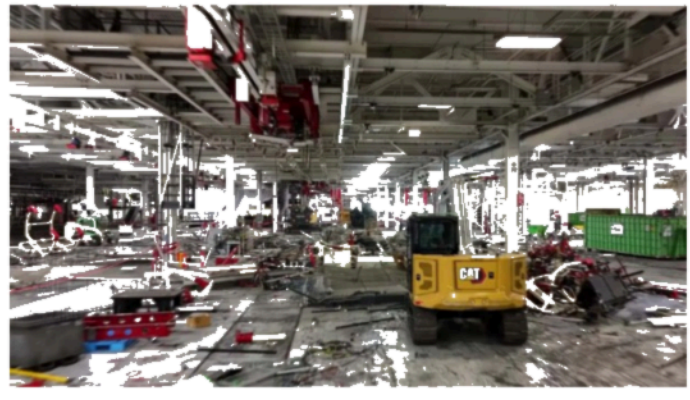
- **Tesla rapidly clears its former Model S and Model X assembly area as it prepares the Fremont site for Optimus production.** Tesla said the original vehicle line was decommissioned in 46 days, removing robotic equipment, conveyors and factory infrastructure. The space is expected to house a dedicated Optimus line, with initial production targeted for late July or August 2026. Tesla has discussed eventual capacity of up to one million robots annually at Fremont, but this remains a long-term design-capacity target rather than evidence of near-term output, yield or demand.
- **XPeng reportedly targets monthly IRON production capacity of more than 1,000 units by year-end.** The Chinese EV manufacturer plans to begin deploying IRON robots in its own stores before pursuing an international launch in 2027, according to people familiar with the plans. The target would make XPeng one of the more aggressive automotive entrants into humanoid manufacturing, although it refers to installed production capacity rather than confirmed sales or deliveries.
- **Boston Dynamics plans a $100mn robotics and AI center in Waltham, Massachusetts.** The company will reportedly transform a 323,000-square-foot facility into a center for manufacturing, R&D, AI development and workforce training, consolidating operations currently distributed across three nearby locations. Boston Dynamics expects to create 1,250 jobs, while Massachusetts approved $25mn of economic-development tax credits for the project. The investment provides tangible evidence of preparation for greater commercial scale across Boston Dynamics' robot portfolio, although the facility is not scheduled to begin phased occupancy until 2027.

Exhibit 9: Walden Robotics General Purpose Robot



Source: Walden Robotics

Exhibit 10: Tesla recently tore down the Model S and X line to make room for Optimus humanoid production



Source: Tesla

Public Reactions:

- **Humanoid automation becomes a formal labor-relations issue at Hyundai.** Unionized Hyundai workers in South Korea began a partial strike amid broader negotiations that included concerns about the future use of Boston Dynamics'

Atlas robot. The union stated that Atlas would not be permitted on production lines without worker agreement. The dispute illustrates that humanoid deployment timelines may increasingly depend on collective-bargaining agreements, workforce guarantees and retraining plans in addition to technical readiness and economics.

New Entrants:

- **Mitsubishi Motors partners with University of Tokyo spinout 'Highlanders' to develop and potentially manufacture humanoid robots.** The companies signed an MOU to test humanoids in Mitsubishi's manufacturing operations and explore production of Highlanders' robots at Mitsubishi's Kyoto plant. Mitsubishi will contribute expertise in mass-production engineering, quality assurance, durability, safety and mechatronics, with the partners evaluating whether production could begin in early 2027. Mitsubishi has already invested in Highlanders and indicated that additional investment may follow.

New Use Cases & Adoption:

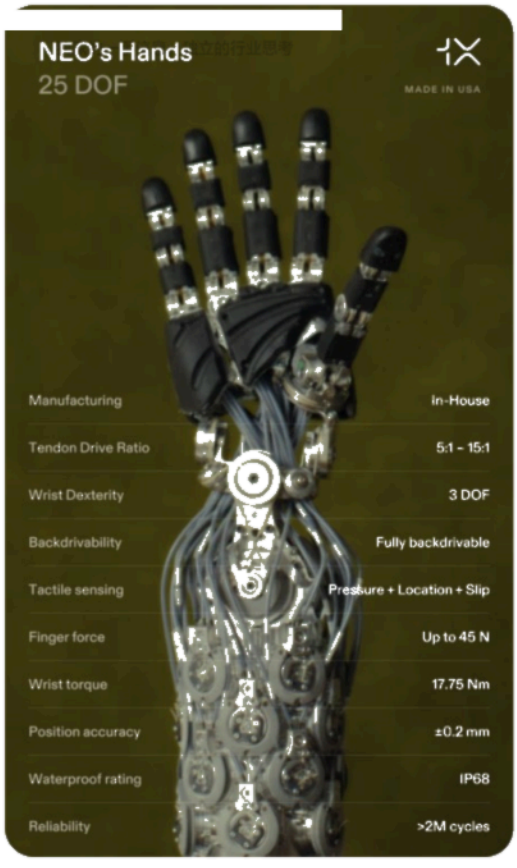
- **Figure signs a commercial agreement with Catalyst Brands for distribution-center operations.** Figure plans to deploy humanoids at Catalyst's Reno, Nevada logistics center, initially targeting physically demanding supply-chain tasks. Catalyst operates brands including JCPenney, Aéropostale and Brooks Brothers, providing Figure with an opportunity to demonstrate whether a common humanoid platform can operate across a multi-brand distribution network. Figure did not disclose the number of robots, financial terms, deployment timing or operational performance targets.
- **Nvidia, Unitree and Sharpa introduce an integrated humanoid reference platform for academic research.** The Isaac GR00T Reference Humanoid Robot combines Unitree's H2 Plus body, Sharpa's tactile five-finger hands, Nvidia Jetson Thor onboard compute and Nvidia's simulation, teleoperation, training and deployment software. Stanford, ETH Zurich, Ai2 and UC San Diego are among the institutions expected to use the system, which is scheduled to become available through Unitree in late 2026. The platform could reduce duplicated integration work and establish Nvidia's software and compute stack as a common research standard, although it is initially aimed at laboratories rather than commercial operations.

New Models & Hardware Improvements:

- **1X unveils a new 25-degree-of-freedom tendon-driven hand for its NEO home humanoid.** The design includes 22 actuated degrees of freedom across the fingers and palm, three at the wrist, force-transparent joints, tactile and shear sensing, IP 68 sealing and food-safe materials. 1X demonstrated tasks including handling screws and coins, installing light bulbs, operating tools, plugging in USB-C cables and manipulating fragile objects. The company says hundreds of hands have already been manufactured and that its production line can produce 10,000 during 2026, although the performance and manufacturing figures remain company- reported.

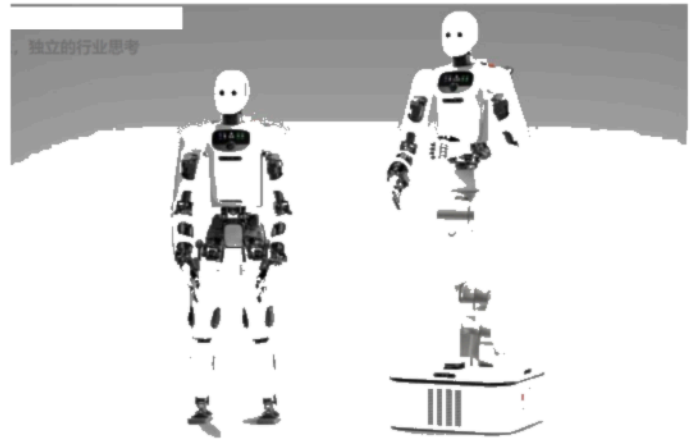
- **Apptronik introduces Apollo 2 alongside an expanded humanoid training facility.** Apollo 2 is available in bipedal and wheeled configurations and includes swappable batteries, modular mobility, dexterous manipulation, human-facing displays and Apptronik's vertically integrated actuator technology. The company's nearly 90,000-square-foot Robot Park uses Apollo 2 fleets, teleoperation, autonomous execution and simulation to collect real-world data for Google DeepMind's Gemini Robotics models and Apptronik's future Apollo 3 commercial fleet. Apollo 2 should therefore be viewed primarily as a training and deployment-development platform rather than the company's final high-volume commercial product.
- https://www.therobotreport.com/genesis-ai-launches-eno-general-purpose-robot/

Exhibit 11: New 25 DoF 1X NEO Hand



Source: 1X

Exhibit 12: Apptronik Apollo 2



Source: Apptronik

Software/AI Improvements:

- **Nvidia launches Halos for Robotics, a full-stack safety architecture for physical AI.** The platform combines IGX Thor compute, sensor connectivity, the Halos OS software stack, external safety agents and an accredited inspection laboratory intended to support eventual third-party certification. Agility Robotics is the first announced humanoid partner and plans to integrate parts of the system into Digit's human-detection and safety architecture. The development is notable because safety certification and validation are likely to become major gating factors as humanoids move from fenced demonstrations into shared industrial

environments.

- **Mistral AI enters robotics with Robostral Navigate, an 8bn-parameter navigation model using a single RGB camera.** Mistral reports that the model achieved a 76.6% success rate on unseen R2R-CE environments without LiDAR, depth sensors or multiple cameras and can operate across wheeled, legged and flying platforms. It was trained using approximately 400,000 simulated trajectories across 6,000 scenes, with a token-efficient training method and subsequent reinforcement learning. The result suggests that lower-cost vision-only navigation could broaden robot deployment, although benchmark performance and selected demonstrations do not yet establish reliability in safety-critical production environments.
- **Sunday Robotics previews 'ACT-2', reporting 99.1% autonomous laundry-folding success across unseen home environments.** The company evaluated ACT - 2 over 785 attempts spanning nine garment categories, varied starting configurations and previously unseen rooms, without home- or garment-specific adaptation. Sunday reports that 778 completed folds achieved an average quality score of 4.72 out of 5, with a median completion time of two minutes and 13 seconds. The central claimed advance is that broad pretraining allows behaviors learned from as little as one fine-tuning demonstration to transfer to unseen settings, potentially enabling faster post-training cycles as failures emerge in deployed fleets. Sunday also proposed a "Solve" evaluation framework that reports performance alongside the breadth of the tested environment and the deployment-specific adaptation required. The results suggest progress from isolated manipulation demonstrations toward repeatable household capabilities, although they remain company-reported, focus on a defined laundry-folding scope and have not been independently validated; cycle times also remain relatively slow for a routine household task.

China Policy Support Overview

Policy support is strengthening. In March 2026, the central government included robotics as a strategic emerging industry for the first time in the 15th five-year-plan (FYP). In June 2026, the Ministry of Industry and Information Technology (MIIT) and the State-owned Assets Supervision and Administration Commission (SASAC), announced a new nationwide initiative to push humanoids into real, operational environments. By end-2026, the government targets validated deployment in representative applications, forming 10k-level deployment capacity, alongside over 100 high-value application scenarios. Local governments and SOEs are required to identify real operational sites (≥20 per province, ≥10 per central SOE) and convert them into training environments for humanoids. MIIT and SASAC will evaluate case progress in November 2026. Support from state-owned enterprises is also materializing in actual orders. State Grid has placed a Rmb6.8bn (~US $940mn) order to procure 500 humanoid robots, 3k dual-arm robots, and 5k quadrupeds.

Exhibit 13: China national/provincial/municipal government have launched a series of policies to support humanoid/embodied AI development...

National Policies	Release Date	Target
MIIT: Guiding Opinions On The Innovative Development Of Humanoid Robots	2023.10	• By 2025, products reach internationally advanced levels and achieve mass production; cultivate 2–3 ecosystem companies with global influence
Standards System For Humanoid Robots And Embodied Intelligence	2026.2	• Covers six pillars: basic commonality, brain/intelligent computing, limbs and components, robots and systems, applications, and safety and ethics
15th Five-year Plan	2026.3	• Lists robots as a strategic emerging industry for the first time
2026 Humanoid Robots And Embodied Intelligence Real-world Training Special Initiative	2026.6	• By **end-2026**, humanoid robots complete application validation and routine deployment across a set of representative scenarios • Forming **100+ high-value applications**, driving the formation of **10k-unit-scale deployment capability** • At least **20 key scenario units per province** and **10 per central SOE**
Local Government Policies	**Release Date**	**2027 Target**
Zhejiang Province Implementation Plan For Innovative Development Of The Humanoid Robot Industry (2024-2027)	2024.9	• Province annual complete-machine output reaches **20,000 units**; • Core-industry scale of **RMB20bn**, related-industry scale **RMB50bn**
Shenzhen Embodied Intelligence Robot Technology Innovation And Industrial Development Action Plan (2025–2027)	2025.3	• Cultivate **10+ new companies valued over RMB10bn**, **20+ companies with revenue over RMB1bn**, achieve **50+ billion-yuan-scale application deployments**, related-industry scale reaches over **RMB100bn**
Shanghai Embodied Intelligence Industry Development Implementation Plan	2026.1	• Expand the industry scale to **RMB50bn** • 30% subsidy for model R&D (20% for application projects, 50% for ecosystem projects
Beijing Economic-technological Development Zone Measures To Promote Innovative Development Of Embodied Intelligence Robots	2025.8	• Form **10,000-unit-scale** mass-production capability for embodied intelligence robots • Build **tens-of-millions-scale** real-world embodied intelligence dataset
Hangzhou Embodied Intelligence Robot Chain Strengthening Action Plan (2026–2027)	2026.1	• Complete-machine enterprises' total industrial output exceeds **Rmb20bn** • Industry-chain total industrial output exceeds **Rmb50bn**

Note: Includes all notable funding disclosed based on our knowledge and research, not all inclusive. Source: Government Announcements, Morgan Stanley Research

Humanoid 100 Performance

The Humanoid 100 is Morgan Stanley's list of public companies currently involved in or otherwise materially exposed to the humanoid market. We compiled the list through a mix of discussions with our global team of analysts, conversations with clients on their preferred names to play, and our own proprietary research to find names that are involved in the value chain. We then divided the names into **Brain** (Semis/Software), **Body** (Industrial Components), and **Integrators** (Developing Full Humanoids). For every name in the Humanoid 100, we include details on size/liquidity, core business competencies,. rationale for inclusion, and current humanoid involvement if applicable.

For a copy of the underlying Humanoid 100 database or our Global Humanoid TAM model , please reach out to your Morgan Stanley representative.

See Initial Note: Humanoids: The Humanoid 100: Mapping the Humanoid Robot Value Chain (6 Feb 2025)

See Latest Update: Embodied AI: Who's Gonna Make the Bots? Adding Contract Manufacturers to the Humanoid 100 (26 Mar 2026)

Exhibit 14: The Humanoid 100- Morgan Stanley's List of Global Humanoid Enablers



Note: Public companies only. Not all inclusive

Source: Morgan Stanley Research

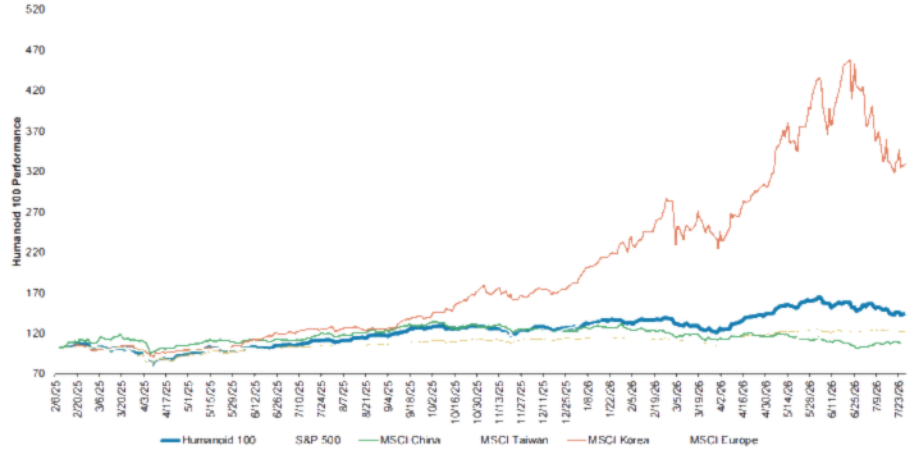
Exhibit 15: Top and Bottom Performing Stocks Since Each Stock's Date of Addition to the Humanoid 100 list

Top Performing Stocks (Since Addition Date)					
Rank	**Company**	**Date Added**	**Ticker**	**Country**	**Performance**
1	Intel	2/6/2025	INTC-US	USA	+376%
2	Samsung Electronics	2/6/2025	005930-KR	Korea	+362%
3	Teradyne	2/6/2025	TER-US	USA	+207%
4	Foxconn Industrial Internet (FII)	2/6/2025	601138-CN	Taiwan	+194%
5	Flex	2/6/2025	FLEX-US	USA	+168%
6	Lynas Rare Earths	2/6/2025	LYC-AU	Australia	+126%
7	STMicroelectronics	2/6/2025	STM-US	Switzerland	+126%
8	Amphenol	2/6/2025	APH-US	USA	+118%
9	Moog	2/6/2025	MOG.A	USA	+112%
10	LG Electronics	2/6/2025	066570-KR	Korea	+110%

Bottom Performing Stocks (Since Addition Date)					
Rank	**Company**	**Date Added**	**Ticker**	**Country**	**Performance**
1	Roblox	6/17/2025	RBLX-US	USA	(53%)
2	Mobileye	2/6/2025	MBLY-US	USA	(51%)
3	Dassault Systemes	2/6/2025	DSY-FR	France	(51%)
4	Robosense	2/6/2025	2498-HK	China	(41%)
5	Xusheng	2/6/2025	603305-CN	China	(39%)
6	Tuopu	2/6/2025	601689-CN	China	(39%)
7	Moons Electric	2/6/2025	603728-CN	China	(38%)
8	Xiaomi	2/6/2025	1810-HK	China	(34%)
9	Zhaowei	2/6/2025	003021-CN	China	(34%)
10	GAC Group	2/6/2025	2238-HK	China	(32%)

Note: Data as of 7/27/2026 close. Price returns only, does not account for dividend reinvestment. Source: FactSet, Morgan Stanley Research

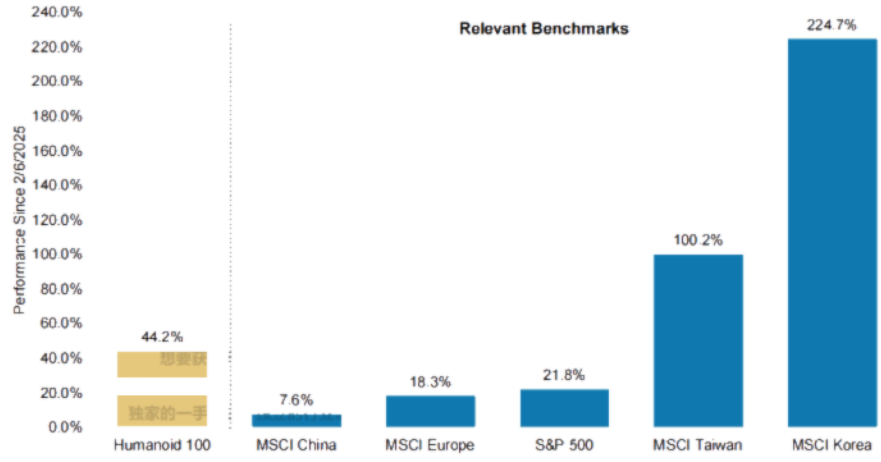
Exhibit 16: Equal-Weighted Humanoid 100 Performance since 2/6/2025 (Date list was Established)



Note: Data as of 7/27/2026 close. Price returns only, does not account for dividend reinvestment or transaction costs

Source: FactSet, Morgan Stanley Research

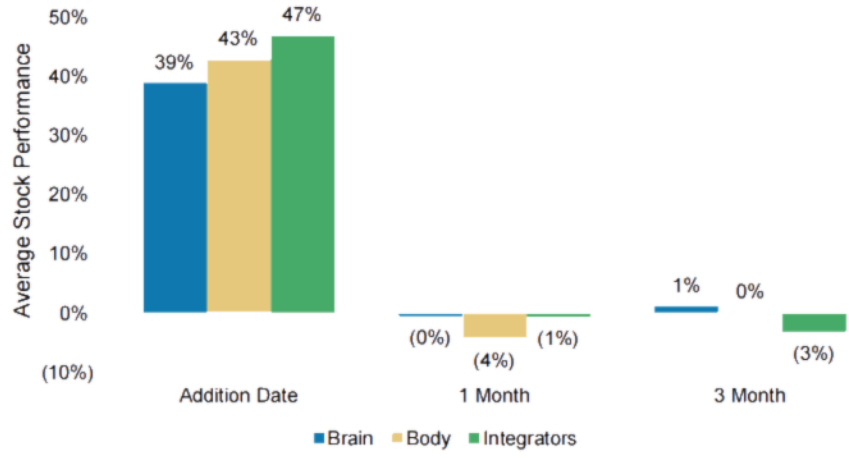
Exhibit 17: The equal-weighted Humanoid 100 is up 44% since 2/6/2025 (adjusting for additions and deletions), outperforming the S&P 500, MSCI Europe, MSCI China, but underperforming MSCI Taiwan and Korea.



Note: Data as of 7/27/2026 close. Price returns only, does not account for dividend reinvestment or transaction costs

Source: FactSet, Morgan Stanley Research

Exhibit 18: Average Stock Performance across Brain, Body, and Integrator Categories



Note: Data as of 7/27/2026 close. 1 month and 3 month performance does not adjust for companies added after beginning of measurement period. Price returns only, does not account for dividend reinvestment

Source: FactSet, Morgan Stanley Research

Exhibit 19: Performance Across Each Stock in the Humanoid 100 list

Ranked

General						Trading Data		Performance					
Company	Date Added	Ticker	Country	Analyst	MS Rating	Mkt Cap ($mn)	Price ($)	Addition Date	1 Month	3 Month	6 Month	1 Year	YTD
Intel	2/6/2025	INTC-US	USA	Joseph Moore		476,214	94.75	389%	129%	103%	135%	370%	156%
STMicroelectronics	2/6/2025	STM-US	Switzerland	Lee Simpson		46,813	52.67	131%	76%	98%	126%	143%	113%
Arm Holdings	2/6/2025	ARM-US	UK	Lee Simpson		214,195	201.89	20%	54%	100%	27%	84%	92%
Onsemi	2/6/2025	ON US	USA	Joseph Moore		38,884	98.86	89%	81%	68%	96%	154%	86%
Samsung Electronics	2/6/2025	005930-KR	Korea	Shawn Kim		1,002,329	152.87	319%	25%	37%	112%	297%	84%
Allegro Microsystems	2/6/2025	ALGM-US	USA	Joseph Moore		8,106	44.07	76%	73%	31%	80%	154%	84%
Hyundai	2/6/2025	005380-KR	Korea	Young Suk Shin		98,779	376.08	173%	13%	6%	100%	179%	79%
Teledyne	2/6/2025	TER-US	USA	Shane Brett		47,956	306.33	169%	24%	42%	94%	363%	77%
Texas Instruments	2/6/2025	TXN-US	USA	Joseph Moore		245,015	209.22	47%	51%	30%	75%	76%	62%
Hiwin Technologies	2/6/2025	2049-TW	Taiwan	Derrick Yang		3,457	9.77	-5%	27%	25%	42%	42%	61%
LG Electronics	2/6/2025	066570-KR	Korea	Shawn Kim		16,540	91.86	68%	30%	42%	61%	97%	53%
Regal Rexnord	2/6/2025	RRX	USA	NC		13,567	203.82	43%	21%	33%	46%	103%	53%
Lynas Rare Earths	2/6/2025	LYC-AU	Australia	Shannon Sinha		14,146	14.05	201%	-4%	28%	29%	122%	53%
Nlts	2/6/2025	NLX	USA	NC		33,311	90.60	105%	51%	45%	43%	167%	52%
Infineon	2/6/2025	IFX-DE	Germany	Lee Simpson		84,856	65.17	49%	53%	37%	96%	98%	51%
Renesas	2/6/2025	6723-JP	Japan	Kazuo Yoshikawa		33,090	18.24	26%	43%	25%	76%	82%	50%
Analog Devices	2/6/2025	ADI	USA	Joseph Moore		190,063	389.31	87%	33%	20%	73%	106%	48%
Jabil	2/6/2025	JBL	USA	NC		35,223	333.86	101%	36%	42%	52%	130%	48%
THK	2/6/2025	6481-JP	Japan	Lisa Jiang		4,066	36.32	53%	27%	28%	42%	67%	47%
Samsung SDI	2/6/2025	006770-KR	Korea	Shawn Kim		17,005	101.33	20%	29%	31%	9%	55%	44%
Rainbow Robotics	2/6/2025	277810-KR	Korea	NC		8,713	449.13	77%	23%	-9%	89%	145%	41%
Nabtesco	2/6/2025	6268-JP	Japan	Lisa Jiang		3,680	31.47	87%	32%	25%	34%	143%	39%
Harmonic Drive Systems	2/6/2025	6324-JP	Japan	Lisa Jiang		2,812	29.71	-1%	38%	54%	81%	56%	38%
RBC Bearings	2/6/2025	RBC US	USA	Kristine Liwag		18,481	584.49	60%	14%	20%	47%	82%	34%
Timken	2/6/2025	TKR-US	USA	Angel Castillo		7,433	106.53	31%	16%	19%	41%	73%	32%
MP Materials	2/6/2025	MP-US	USA	Carlos De Alba		10,891	61.30	154%	45%	12%	2%	173%	31%
TSMC	2/6/2025	TSM-US	Taiwan	Charlie Chan		2,042,506	393.83	87%	25%	20%	31%	136%	30%
NSK	2/6/2025	6471-JP	Japan	NC		3,744	7.65	92%	15%	18%	92%	103%	30%
Teledyne	2/6/2025	TDY-US	USA	Kristine Liwag		29,213	630.56	24%	11%	4%	25%	39%	26%
Keyence	2/6/2025	6861-JP	Japan	Yoshinao Ibara		112,064	462.07	18%	29%	26%	10%	19%	26%
Sensata	2/6/2025	ST-US	USA	NC		5,755	39.57	55%	25%	20%	29%	89%	25%
LG Energy Solution	2/6/2025	373220-KR	Korea	Young Suk Shin		74,866	310.94	38%	12%	16%	-5%	42%	25%
Melexis	2/6/2025	MELE-BE	Belgium	Ingrid van Putten		3,121	78.98	24%	38%	12%	0%	36%	24%
Moog	2/6/2025	MOG A	USA	Kristine Liwag		8,568	302.02	56%	9%	-1%	40%	80%	24%
Alphabet Inc	2/6/2025	GOOGL-US	USA	Brian Nowak		4,239,877	349.94	83%	41%	14%	37%	142%	23%
Pegatron	2/6/2025	4938-TW	Taiwan	Howard Kao		6,962	2.60	-15%	5%	18%	8%	2%	20%
Magna	2/6/2025	MGA-US	Canada	Andrew Percoco		17,224	61.78	61%	19%	25%	43%	83%	19%
CATL	2/6/2025	300750-CN	China	Jack Lu		295,141	65.12	76%	6%	25%	9%	88%	19%
Luxshare	2/6/2025	002475-CN	China	Sharon Shih		73,188	10.05	66%	37%	30%	3%	112%	18%
Leader Drive	2/6/2025	688017-CN	China	Sheng Zhong		5,756	31.47	22%	17%	-2%	40%	52%	17%
Northern Rare Earths	2/6/2025	600111-CN	China	NC		26,955	7.46	118%	13%	3%	0%	128%	15%
Amazon	2/6/2025	AMZN US	USA	Brian Nowak		2,828,811	263.04	10%	32%	11%	19%	44%	15%
Nidec	2/6/2025	6594-JP	Japan	Shoji Sato		17,024	14.85	-9%	21%	9%	23%	-5%	12%
EVE Energy	2/6/2025	300014-CN	China	Jack Lu		22,492	10.84	67%	5%	14%	-13%	77%	10%
Honeywell	2/6/2025	HON-US	USA	Chris Snyder		133,257	210.30	6%	-4%	-6%	7%	8%	10%
Amphenol	2/6/2025	APH	USA	NC		182,423	148.38	112%	24%	2%	6%	91%	9%
Novanta	2/6/2025	NOVT-US	USA	NC		4,314	126.89	-19%	15%	-4%	2%	9%	9%
NVIDIA	2/6/2025	NVDA-US	USA	Joseph Moore		5,084,775	209.25	63%	21%	4%	-2%	83%	7%
JL Mag	2/6/2025	0660-HK	China	Rachel Zheng		3,515	2.56	97%	1%	-11%	-21%	48%	6%
Siemens	2/6/2025	SIE-DE	Germany	Max Yates		220,064	288.70	10%	23%	-1%	2%	25%	6%
Cadence Design Systems	2/6/2025	CDNS-US	USA	Lee Simpson		81,067	329.95	9%	22%	11%	-2%	11%	5%
BYD	2/6/2025	002594-CN	China	Tim Hsiao		140,430	15.42	2%	-3%	13%	-1%	-13%	5%
Rockwell Automation	2/6/2025	ROK-US	USA	Chris Snyder		44,966	400.20	49%	17%	-3%	12%	65%	5%
Qualcomm	2/6/2025	QCOM-US	USA	Joseph Moore		164,424	156.00	-8%	41%	16%	1%	21%	5%
Leadshine	2/6/2025	002979-CN	China	NC		1,989	6.36	9%	24%	9%	0%	-8%	4%
Midea	2/6/2025	000333-CN	China	Lillian Lou		66,473	11.90	13%	12%	5%	8%	10%	4%
Synopsys	2/6/2025	SNPS-US	USA	Lee Simpson		92,193	481.22	-10%	28%	4%	9%	5%	3%
Foxconn Industrial Internet (FII)	2/6/2025	601138-CN	Taiwan	Sharon Shih		192,422	9.70	224%	28%	9%	-10%	248%	1%
Apple	2/6/2025	AAPL-US	USA	Erik Woodring		3,966,360	270.17	16%	10%	5%	0%	28%	0%
Palo Alto Networks	6/17/2025	PANW-US	USA	Keith Weiss		148,137	181.54	-10%	16%	1%	-18%	-4%	-3%
Ambarella	2/6/2025	AMBA-US	USA	Joseph Moore		2,687	65.94	-16%	41%	7%	-19%	43%	-3%
Baidu	2/6/2025	BIDU-US	China	Gary Yu		33,868	121.01	36%	19%	-17%	4%	44%	-3%
Schaeffler	2/6/2025	SHA0-DE	Germany	NC		8,512	9.01	82%	15%	-19%	15%	114%	-3%
Jiangsu Hengli	2/6/2025	601100-CN	China	Sheng Zhong		20,903	15.37	56%	8%	-3%	9%	41%	-4%
Shanghai Baosi	6/17/2025	603009-CN	China	NC		2,304	6.65	2%	1%	-17%	-6%	1%	-5%
Kuaishou	2/6/2025	603365-CN	China	Shelley Weng		2,536	2.21	-12%	5%	-14%	5%	20%	-5%
Hon Hai Precision (Foxconn)	2/6/2025	2317-TW	Taiwan	Sharon Shih		96,786	7.13	30%	13%	0%	-10%	55%	-5%
Aptiv	2/6/2025	APTV-US	USA	Andrew Percoco		12,433	58.33	8%	7%	-6%	-13%	25%	-7%
SKF	2/6/2025	SKF b-SE	Sweden	Michael Harleaux		11,188	24.57	3%	5%	-1%	-8%	21%	-7%
TE Connectivity	2/6/2025	TEL	USA	NC		56,912	205.25	40%	7%	-5%	-13%	45%	-7%
Meta	2/6/2025	META-US	USA	Brian Nowak		1,668,240	668.12	-6%	14%	-15%	-8%	11%	-7%
Hota	2/6/2025	1536-TW	Taiwan	Cindy Huang		455	1.03	-15%	3%	-17%	-16%	-19%	-8%
Estun	2/6/2025	002747-CN	China	Sheng Zhong		2,946	3.04	3%	9%	-7%	10%	9%	-8%
Shenzhen Inovance	2/6/2025	300124-CN	China	Sheng Zhong		26,526	9.89	-3%	-7%	-8%	-11%	-4%	-9%
Roboterse	2/6/2025	2498-HK	China	NC		2,004	4.24	-11%	-4%	-2%	-6%	-12%	-9%
Hexagon	2/6/2025	HEXA B-SE	Sweden	Adam Wood		28,688	10.89	-21%	11%	-1%	-15%	6%	-9%
Toyota	2/6/2025	7203-JP	Japan	Shinji Kakiuchi		253,952	19.48	7%	-6%	-14%	-5%	11%	-10%
Alibaba	2/6/2025	BABA-US	China	Gary Yu		312,908	130.43	30%	8%	-22%	-24%	10%	-10%
Naver	2/6/2025	035420-KR	Korea	Seyon Park		22,258	148.81	-5%	2%	-23%	-17%	5%	-12%
Tesla	2/6/2025	TSLA-US	USA	Andrew Percoco		1,400,132	372.80	0%	7%	-11%	-13%	-36%	-15%
Sanhua	2/6/2025	002050-CN	China	Shelley Wang		27,563	6.56	27%	9%	-8%	-8%	75%	-15%
Microsoft	2/6/2025	MSFT-US	USA	Keith Weiss		3,153,072	424.46	2%	14%	-5%	-22%	3%	-16%
UBTech	2/6/2025	9880-HK	China	NC		6,779	13.49	29%	21%	-24%	-25%	22%	-16%
Horizon Robotics	2/6/2025	9660-HK	China	Tim Hsiao		13,592	0.93	33%	7%	-12%	-20%	11%	-16%
Take-Two	6/17/2025	TTWO-US	USA	Matthew Cost		38,870	215.34	-9%	11%	-3%	-15%	-8%	-17%
Mobileye	2/6/2025	MBLY-US	USA	Andrew Percoco		7,352	8.73	-47%	32%	-3%	-32%	-40%	-17%
Shuanghuan	2/6/2025	002472-CN	China	Sheng Zhong		4,721	5.80	1%	9%	-5%	-9%	17%	-17%
Oracle	2/6/2025	ORCL-US	USA	Keith Weiss		471,183	163.83	-5%	16%	-2%	-39%	15%	-17%
Moons Electric	2/6/2025	603728-CN	China	NC		3,583	8.55	-22%	3%	-15%	-17%	-10%	-18%
XPENG	2/6/2025	XPEV-US	China	Tim Hsiao		12,303	15.86	-7%	-3%	-9%	-29%	-12%	-20%
Dassault Systèmes	2/6/2025	DSY-FR	France	Adam Wood		29,275	22.17	-53%	13%	-18%	-22%	-42%	-20%
Palantir	2/6/2025	PLTR-US	USA	Sanjit Singh		329,979	137.97	24%	1%	-5%	-28%	17%	-22%
Tencent	2/6/2025	700-HK	China	Gary Yu		563,038	61.15	14%	-3%	-23%	-28%	-2%	-22%
OmniPlegia	2/6/2025	603501-CN	China	Charlie Chan		18,891	14.67	-11%	-2%	-19%	-20%	-25%	-22%
Tuopu	2/6/2025	601689-CN	China	Shelley Wang		14,644	8.43	-23%	5%	-17%	-14%	15%	-22%
Zhaowei	2/6/2025	003021-CN	China	NC		3,667	13.74	-15%	-1%	-17%	-18%	-24%	-22%
Xiaomi	2/6/2025	1810-HK	China	Andy Meng		86,826	3.85	-26%	-10%	-18%	-34%	-42%	-26%
GAC Group	2/6/2025	2238-HK	China	Joey Xu		3,814	0.38	-7%	-6%	-23%	-15%	3%	-31%
Roblox	6/17/2025	RBLX-US	USA	Matthew Cost		40,265	56.26	-44%	6%	-16%	-51%	-18%	-32%
Unity	6/17/2025	U-US	USA	Matthew Cost		11,393	26.11	11%	25%	-9%	-27%	25%	-40%
Average								41%	20%	9%	14%	68%	15%

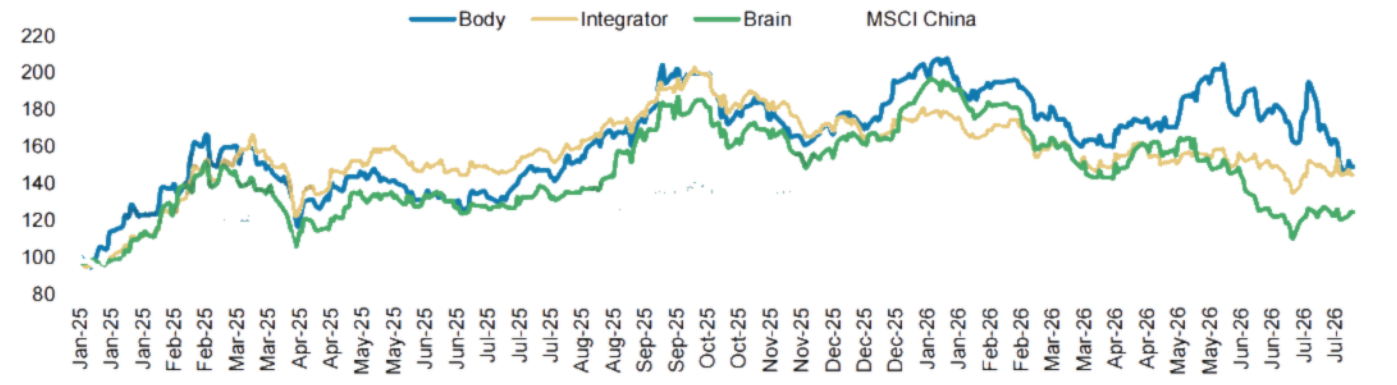
Note: Data as of 7/27/2026 close. Price returns only, does not account for dividend reinvestment

Source: FactSet, Morgan Stanley Research

China Humanoids Value Chain Performance

Note: In the report - Humanoids: The Tide is Rising, Lifting 2026 Forecast, published in June 2026. We add Kedali and Lens, remove Guomao, Xusheng, and Zhongjian.

Exhibit 20: Equal-weighted China Humanoid Value Chain Perf



Source: FactSet, Morgan Stanley Research Note. Data as of July 22 close. Results shown represent return excluding dividends, brokerage commissions and transaction costs. These figures are not adjusted. Past performance is no guarantee of future results. For important disclosures regarding companies that are the subject of this screen, please see the Morgan Stanley Research Disclosure Website at www.morganstanley.com/researchdisclosures.

Exhibit 21: China Humanoid Value Chain list: 45 stocks in total, including three in brains, 32 in body components, and 10 integrators.

#	Ticker	Company	Analyst	Market Cap	Last Close (LCY)	Price Change 1W	3M	YTD	1Y	Notes
Brain	688UUS	Baidu	Yu, Gary	31,395	108.2	(3%)	(11%)	(17%)	12%	ERNIE 5.0, a natively multimodal foundation model that supports the "brain/platform" layer
Brain	002230-CN	iFlytek	Shih, Sharon	13,491	40.8	(1%)	(16%)	(19%)	(14%)	Discussed cooperation with Beijing Humanoid Innovation Center, and delivered the first ~100-unit soft-robot order
Brain	9660-HK	Horizon Robotics	Hsiao, Tim	7,118	4.8	7%	(36%)	(41%)	NA	Li-Hotebots' HSK S 160/5200 platforms target on-device robotics workloads including humanoids
Actuator	002050-CN	Sanhua	Wang, Shelley	27,606	38.6	(6%)	(15%)	(31%)	39%	One of Tesla tier-1 suppliers, co-developing humanoid actuators
Actuator	601689-CN	Tuopu	Wang, Shelley	12,594	49.5	(9%)	(15%)	(30%)	2%	One of Tesla tier-1 suppliers, co-developing humanoid actuators
Battery	300750-CN	CATL	Lu, Jack	257,870	372.3	(0%)	(15%)	1%	30%	Geely of Sr has reportedly entered CATL's production line, and CATL announced last Geely financing
Battery	002245-CN	Auxar	NC	4,097	18.9	(18%)	18%	41%	75%	Auxar supplies robot batteries to Unitree, Deep Robotics, Inovxen and others
Bearing	300718-CN	Changcheng	NC	3,507	14.3	(8%)	(20%)	(35%)	(43%)	Provides bearing products, some prototypes under R&D/sample stage, in collaboration with Unitree
Exterior	300403-CN	Lens	Yang, Derrick	29,621	30.8	(5%)	38%	22%	54%	Supplies domestic customers with joint-module/robot structural components, and diverse task clients with head modules
Hands	603021-CN	Zhaowei	NC	4,504	77.0	(6%)	(21%)	(38%)	(38%)	Offers dexterous hands, motors and modules; guides revenue to double in 2026. Thailand capacity at targets ready
Hands	002979-CN	Leadshine	NC	7,542	57.7	(7%)	38%	37%	33%	Frameless torque motor shipments increased to ~120k units in 2025, targeting the million-unit level in 2026
LiDAR	HSAI-US	Hesai	Hsiao, Tim	2,094	15.3	(4%)	(27%)	(32%)	(28%)	1Q26 robotics LiDAR shipments were 118k units, up 137.8% YoY
LiDAR	2498-HK	Robosense	NC	1,415	23.0	2%	(32%)	(37%)	(29%)	1Q26 robotics LiDAR shipments were 189k units, up 1456.8% YoY
Magnets	300768-CN	JL Mag	Zhang, Rachel	4,868	25.7	(4%)	(20%)	(26%)	(4%)	Investing US$74mn in Mexico magnetic-component project, to improve competitiveness in humanoid and EVs
Motor	300124-CN	Inovance	Zhong, Sheng	21,811	81.6	1%	(6%)	(18%)	(5%)	--
Motor	600580-CN	Wolong	NC	6,795	29.2	(7%)	(23%)	(41%)	21%	Received small order for frameless torque motor, partnership with Zhongqing humanoid center
Motor	603728-CN	Moons	NC	3,006	69.1	(10%)	(15%)	(32%)	(21%)	Offers coreless motor, frameless torque motor, encoder, reducer products for humanoids
Motor	688698-CN	Vesync	NC	1,437	44.4	(12%)	(33%)	(35%)	(17%)	Formed JV with Kongzhe in Thailand for robotics products
Motor	688160-CN	Kinco	NC	1,475	103.0	(10%)	(7%)	(32%)	5%	Offers frameless torque motor and modules, collaborating with leading humanoid players
Reducer	002472-CN	Shuanghuan	Zhong, Sheng	4,166	37.0	(13%)	(3%)	(22%)	9%	Leading supplier of gears, developing new type of reducer for humanoids with a key North American client
Reducer	688017-CN	Leaderdrive	Zhong, Sheng	8,850	316.7	(18%)	55%	55%	143%	Monthly shipment reached c.10k units, and capacity expansion continues, involve on most developed projects
Reducer	002896-CN	Kedali	Zhong, Sheng	7,736	176.2	(9%)	(14%)	12%	64%	Confident in getting orders from leading humanoid integrator. Harmonic reducer has faster progress.
Reducer	002896-CN	Zhongdali Leader	NC	1,858	62.5	(12%)	(12%)	(30%)	(29%)	Certified supplier for a key domestic integrator, announced to invest Rmb200mn for precision core components
Reducer	301150-CN	Sling	NC	2,322	75.3	(10%)	(38%)	(21%)	70%	Claims its harmonic reducer will take a significant share in the North American integrator
Screw	601100-CN	Hengli Hydraulic	Zhong, Sheng	21,113	104.1	(6%)	4%	(5%)	29%	Hengli's share in body screw products is indicated at 70%+. The capacity is being prepared mainly in Mexico
Screw	300100-CN	Shuanglin	NC	1,973	22.5	(6%)	(29%)	(43%)	(52%)	Developed roller screw and grinding machine for humanoid, 10-unit capacity was planned for Jun-2026
Screw	603119-CN	Rongtai	NC	1,324	48.0	(13%)	(20%)	(40%)	22%	To invest US$75mn in Thailand for 7mn sets of robotics components, formed JV with Vesync in Thailand for robots
Screw	603667-CN	3-DC	NC	3,135	53.6	(10%)	(21%)	(27%)	60%	To invest Rmb1.5bn for a new plant with an annual capacity of 60k sets of planetary roller screws
Semi	603501-CN	OmniVision	Chan, Charlie	18,868	162.0	(8%)	10%	(19%)	(16%)	Its existing sensor technology can be easily applied to humanoid's vision
Semi	688279-CN	Fortior	NC	2,884	183.2	(13%)	(7%)	(10%)	(8%)	Offers motor ASIC, driver IC, MCU, and established JV with Sanhua to develop dexterous hands
Sensor	600509-CN	Jeyson	Wang, Shelley	4,340	20.0	(4%)	(32%)	(36%)	13%	Developed 6-axis force sensors, tactile sensors, IMU, and has placed commercial orders for humanoid robots
Sensor	603662-CN	Kwb	NC	2,106	49.1	(16%)	(12%)	(32%)	(27%)	Developed 6-axis force sensor, and deploying humanoid robots in production line
Sensor	300007-CN	Hanvon	NC	1,543	30.8	(13%)	(38%)	(43%)	(27%)	Focus on soft, flexible sensor, cooperating with multiple leading integrators
Vision	688322-CN	Orbbec	NC	3,726	93.6	(18%)	17%	4%	34%	A key structured light camera supplier following domestic players
Vision	688609-CN	Luster LightTech	NC	3,203	44.6	(12%)	(5%)	5%	49%	Providing motion capturing solution + LX Motion for Unitree
Integrator	700-HK	Tencent	Yu, Gary	545,521	440.0	(7%)	(11%)	(20%)	(16%)	Tencent established a Robotics X lab in Shenzhen in 2018, unveiled KuaiWu
Integrator	BABAUS	Alibaba	Yu, Gary	286,125	118.0	0%	(10%)	(20%)	0%	Released Qwen Studio, a foundation model for universal intelligence; Ant Group's Robobrain unveiled LingBot-VA
Integrator	1810-HK	Xiaomi	Meng, Andy	74,820	28.7	3%	(14%)	(32%)	(54%)	Unveiled Xiaomi-Robotics-0, an open-source VLA model
Integrator	1211-HK	BYD	Hsiao, Tim	90,780	97.9	1%	(15%)	(8%)	(35%)	Developing humanoid project - Yao Shun Yu, leading U8TECH humanoid; invested in Pasini
Integrator	300-HK	MideaKUKA	Lee, Lillian	93,232	94.9	3%	6%	12%	NA	The self-developed 6-arm wheel-based humanoid Robot Ultra has entered its washing machine factory
Integrator	XPEVUS	XPENG		10,374	13.3	(3%)	(16%)	(24%)	(29%)	Its humanoid robot IRON is executed to enter mass production stage by end-2026
Integrator	002747-CN	Eaton		4,007	33.0	(13%)	58%	39%	66%	Cleanet IE was unveiled in Jun-2025 for flexible manufacturing
Integrator	9880-HK	UBTECH	NC	4,086	83.5	(3%)	(20%)	(34%)	(2%)	Walker S2 has begun mass production and delivery, targeting 5,000 annual industrial humanoids by 2026
Integrator	3408-HK	Dobot	NC	1,288	25.2	2%	(21%)	(33%)	NA	Dobot started mass production and delivery of the third batch of industrial humanoid ATOM robots in Feb-2026
ODM	603960-CN	Lingyi iTech	Shih, Sharon	13,839	12.1	(5%)	(17%)	(27%)	34%	ODM for multiple integrators, first humanoid robots rolled off Lingyi's Beijing Super Factory

Source: FactSet, Morgan Stanley Research Note. Data as of July 22 close. This is a constantly evolving list of Chinese companies involved in humanoids. Companies are included based on the following criteria: 1) MS covered companies, 2) Non-MS covered companies - either announced cooperation with key humanoid companies, or a certain revenue level in products to be applied in humanoid robots. Results shown

Humanoid Company Mentions

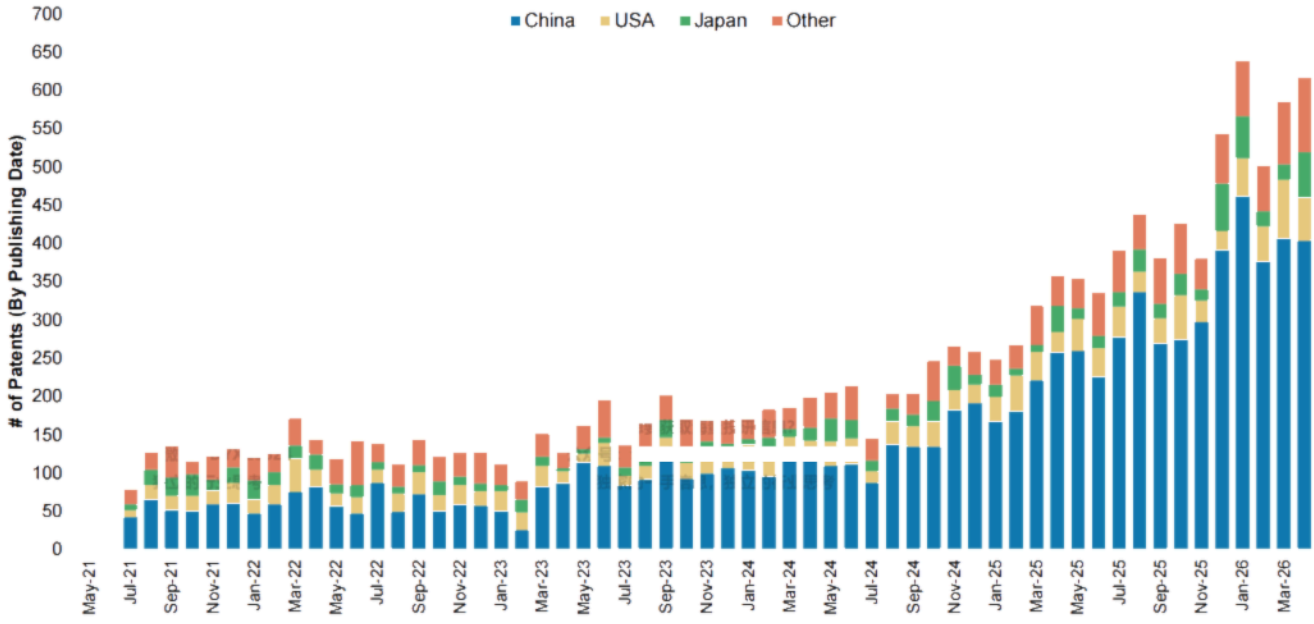
Exhibit 22: Public Companies Mentioning the Word "Humanoid" over Past 1 Year in Public Material by # Mentions

Rank	Company	Ticker	Document C	Region	Domicile Country
1	Realbotix Corp	XBOT.CA	157	Toronto	Canada
2	Faraday Future	FFAI	135	Gardena-CA	United States
3	Humanoid Global Holdings Corp	0XM1.DE	101	Vancouver	Canada
4	Schaeffler AG	SHA0.DE	78	Herzogenaurach	Germany
5	NVIDIA Corp	NVDA	57	Santa Clara-CA	United States
6	Shoucheng Holdings Ltd	697.HK	46	Hong Kong	Hong Kong
7	Infineon Technologies AG	IFX.DE	42	Munich	Germany
8	Mobileye Global Inc	MBLY	39	Jerusalem	Israel
9	XPeng Inc	9868.HK	36	Guangzhou	China
10	Hastings Technology Metals Ltd	HAS.AU	33	Perth	Australia
11	Minebea Mitsumi Inc	6479.JP	33	Tokyo	Japan
12	SiTime Corp	SITM	33	Santa Clara-CA	United States
13	Johnson Electric Holdings Ltd	179.HK	31	Hong Kong	Hong Kong
14	Vishay Precision Group Inc	VPG	31	Malvern-PA	United States
15	Hexagon AB	0GRX.GB	29	Stockholm	Sweden
16	Hesai Group	HSAI	29	Shanghai	China
17	Sona BLW Precision Forgings Ltd	EQSONACOMS.IN	28	Gurugram	India
18	Indie Semiconductor Inc	INDI	26	Aliso Viejo-CA	United States
19	Robosense Technology Co Ltd	2498.HK	25	Shenzhen	China
20	Fortuna Metals Ltd	FUN.AU	24	Perth	Australia
21	Hyundai Motor Co	005380.KR	24	Seoul	South Korea
22	Zhen Ding Technology Holding Ltd	4958.TW	24	Taoyuan	Taiwan
23	YASKAWA Electric Corp	6506.JP	24	Kitakyushu	Japan
24	STMicroelectronics NV	STMPA.FR	24	Geneva	Switzerland
25	Ubtech Robotics Corp Ltd	9880.HK	24	Shenzhen	China
26	Infosys Ltd	EQINFY.IN	23	Bengaluru	India
27	Hon Hai Precision Industry Co Ltd	2317.TW	23	New Taipei	Taiwan
28	Shenzhen Dobot Corp Ltd	2432.HK	22	Shenzhen	China
29	Virtuix Holdings Inc	VTIX	21	-	-
30	AJJ Medtech Holdings Ltd	584.SG	21	Singapore	Singapore

Source: AlphaSense, Morgan Stanley Research

Global Patents

Exhibit 23: Monthly Patent Applications Mentioning "Humanoid" by Country



Note: Ordered by publishing date. According to Google Patents, may not capture 100% of patents

Source: Google Patents, Morgan Stanley Research

Exhibit 24: Global Patent Applications Mentioning "Humanoid" by Office Over the Past 5 Years *(According to Google Patents, may not capture all)*

Patents Mentioning "Humanoid" By Office (Past 5 Years)

Rank	Patent Office	# Count
1	China	8,629
2	United States	1,659
3	Japan	1,105
4	World Intellectual Property Organization (WIPO)	1,105
5	South Korea	331
6	European Patent Office (EPO)	223
7	Taiwan	203
8	Germany	131
9	Australia	27
10	Brazil	23
11	Canada	18
12	Poland	16
13	Turkey	15
14	Great Britain	11
15	France	10
16	Italy	10
17	Spain	6
18	Eurasian Patent Organisation (EAPO)	6
19	Sweden	4
20	Romania	2

Note: Exhibit limited to top 20

Source: Google Patents, Morgan Stanley Research

Exhibit 25: US Patent Applications Mentioning "Humanoid" by Assignee Over the Past 5 Years *(According to Google Patents, may not capture all)*

Top US "Humanoid" Patent Filers (Past 5 Years)

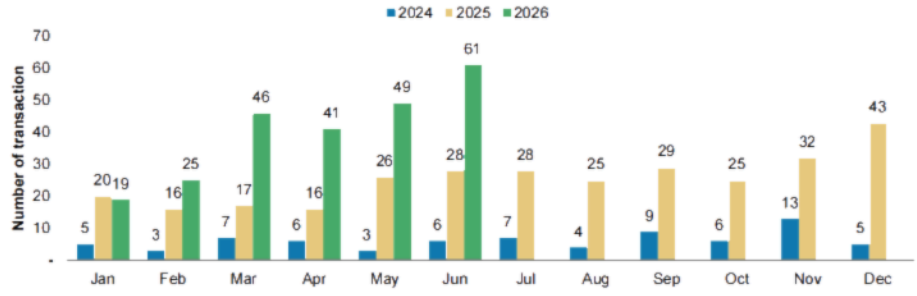
Rank	Patent Assignee	# Count
1	Boston Dynamics, Inc.	90
2	Roblox Corporation	85
3	Sanctuary Cognitive Systems Corporation	64
4	Figure Ai Inc.	39
5	Ubtech Robotics Corp Ltd	36
6	Honda Motor Co., Ltd.	34
7	Unity Technologies Sf	32
8	Google Llc	30
9	Sony Group Corporation	27
10	Nvidia Corporation	26
11	Samsung Electronics Co., Ltd.	23
12	Sony Interactive Entertainment Inc.	21
13	Toyota Jidosha Kabushiki Kaisha	21
14	Sarcos Corp.	19
15	Nuance Communications, Inc.	19
16	Tencent Technology (Shenzhen) Company Limite	18
17	Fanuc Corporation	18
18	Tesla, Inc.	17
19	Meta Platforms Technologies, Llc	17
20	Apple Inc.	13

Note: Exhibit limited to top 20

Source: Google Patents, Morgan Stanley Research

China Financing Activity

Exhibit 26: China Humanoids Financing Activities



Note: Includes all notable funding disclosed based on our knowledge and research. However, there may still be some not captured. We updated number of transaction in previous months with transaction announced after our published previous Humanoids Horizon.

Source: Company announcement, GGII Morgan Stanley Research

Tech Firms Supporting the Development of Humanoids

Exhibit 27: Humanoid or Robotics Involvement of Major Tech Firms in the US & China

Humanoid or Robotics Involvement of Big Tech Firms

Company	Involvement
Alibaba / ANT GROUP	In Sept, ANT Group's robotics unit, Robbyant, unveiled 'R1' robot at trade show in Shanghai
amazon	Major in-house robotics team and deep experience with automation. Backer and partner of Agility Robotics. FAR (Frontier AI Robotics) Team building Robot Foundation models.
Apple	Reportedly planning a tabletop robot and have explored humanoid designs. Have released numerous AI frameworks & datasets for humanoid and non-humanoid robots.
Baidu 百度	UBTech's humanoids leverage Baidu's Ernie AI model. DEEPX leverages Baidu PaddlePaddle deep learning framework.
ByteDance	Unveiled general purpose VLA model ('GR3') and ByteMini robot
Google	Google Deepmind partnered with Apptronik and Others. Gemini Robotics is a major focus within Google Deepmind. Also develop MuJoCo physics engine for robotics.
HUAWEI	Embodied AI Innovation Center' in Shenzhen. Develop CloudRobo embodied intelligence platform based on Pangu AI model. Partnered with UBTech.
Meta	Reportedly forming new team within Reality Labs to conduct robotics work. CTO Andrew Bosworth described humanoids as 'next AR-sized bet'.
Microsoft	Partner and backer of Figure AI. Have an internal autonomous systems & robotics research team.
NVIDIA	Partnered with majority of humanoid developers under Project Gr00t. Bulk of humanoid players leverage Isaac Lab, Gr00t Models, Cosmos, or other tools.
Tencent 腾讯	In-house robotics team working on humanoid and non-humanoid robots. Tencent Cloud has partnership with Dobot.
TESLA	Developing 'Optimus' humanoid.
xiaomi	Developing 'CyberOne' humanoid

Source: Company announcements, Bloomberg, Reuters, Morgan Stanley Research

US & China Humanoid TAM/Adoption Estimates

Note: The underlying Excel file for the TAM model discussed in this section is available upon request. Please reach out to your Morgan Stanley representative to obtain the model.

Global Adoption Estimates

According to Our Estimates:

- **By 2036, ~28.1 million (~2.8% of ~1 billion total) humanoid adoptions will have occurred.**
  - Low Income Countries: ~0.2 million (~1.8% of ~14 million total) humanoids have been adopted.
    - LI Countries Include: Rwanda, Ethiopia, Madagascar, Afghanistan, Yemen, etc.
  - Lower Middle Income Countries: ~3.7 million (~1.8% of ~204 million total) humanoids have been adopted.
    - LMI Countries Include: India, Honduras, Vietnam, Zimbabwe, Egypt, etc
  - . Upper Middle Income Countries (Inc. China): ~16.7 million (~3.3% of ~504 million total) humanoids have been adopted.
    - UMI Countries Include: China, Brazil, Belarus, Indonesia, South Africa , Mexico, etc.
  - High Income Countries (Inc. US): ~7.4 million (~2.5% of ~296 million total) humanoids have been adopted.
    - HI Countries Include: USA, Australia, Germany, Canada, United Arab Emirates, Japan, etc.
- **By 2040, ~138.5 million (~13.6% of ~1 billion total) humanoid adoptions will have occurred.**
  - Low Income Countries: ~1.1 million (~7.8% of ~14 million total) humanoids have been adopted.
  - Lower Middle Income Countries: ~16.2 million (~7.9% of ~204 million total) humanoids have been adopted.
  - Upper Middle Income Countries (Inc. China): ~81.4 million (~16.1% of ~ 504 million total) humanoids have been adopted.
  - High Income Countries (Inc. US): ~39.7 million (~13% of ~296 million total) humanoids have been adopted.
- **By 2044, ~430 million (~42.2% of ~1 billion total) humanoid adoptions will have occurred.**
  - Low Income Countries: ~3.9 million (~27.9% of ~14 million total) humanoids have been adopted.
  - Lower Middle Income Countries: ~57.6 million (~28.1% of ~204 million total) humanoids have been adopted.
  - Upper Middle Income Countries (Inc. China): ~245.7 million (~48.7% of ~ 504 million total) humanoids have been adopted.
  - High Income Countries (Inc. US): ~123.2 million (~41.6% of ~296 million total) humanoids have been adopted.
- **By 2050, ~1 billion humanoid adoptions will have occurred.**

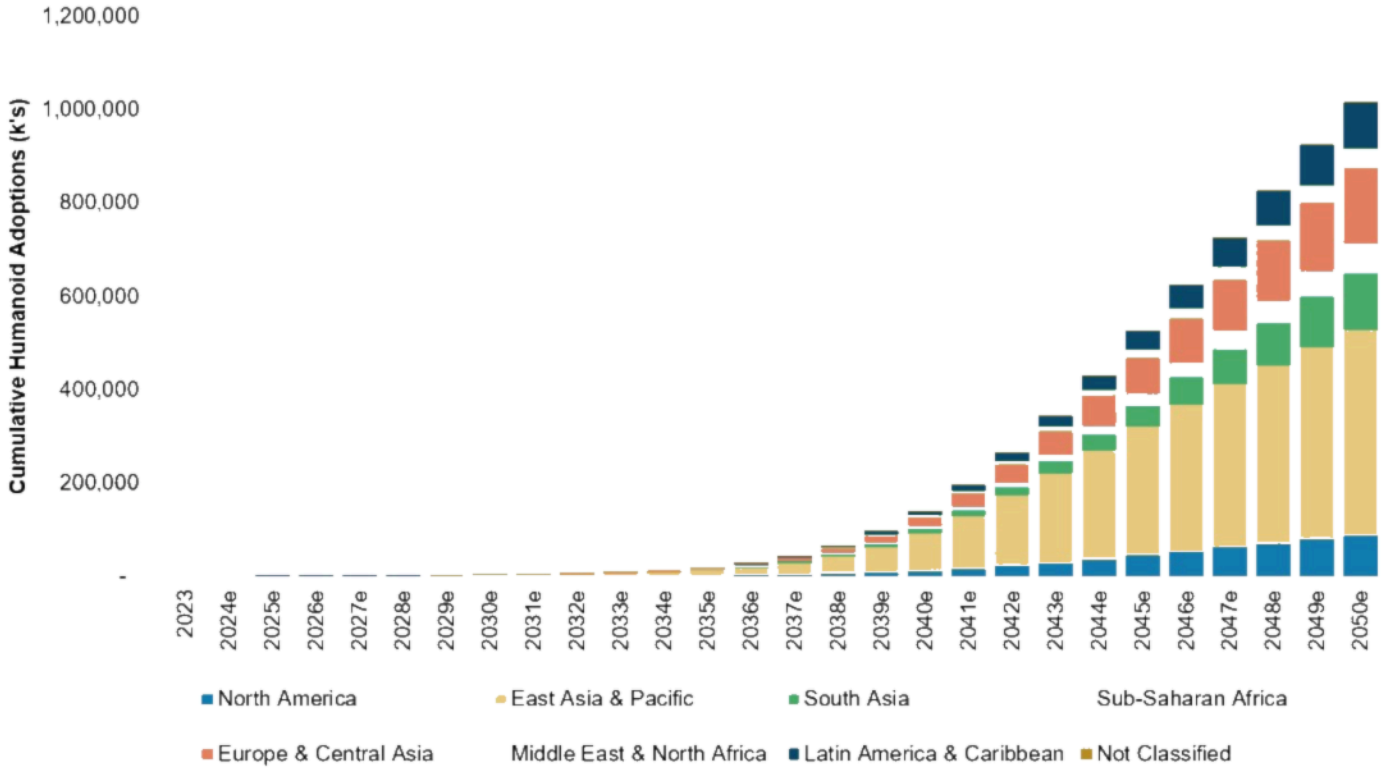
- Low Income Countries: ~14 million humanoids have been adopted.
- Lower Middle Income Countries: ~204 million humanoids have been adopted.
- Upper Middle Income Countries (Inc. China): ~504 million humanoids have been adopted.
- High Income Countries (Inc. US): ~296 million humanoids have been adopted.

Exhibit 28: Key Adoption Estimates

Cumulative Adoptions (k's)				
Classification	**2036**	**2040**	**2044**	**2050**
Low Income	246	1,099	3,901	14,006
Lower Middle Income	3,745	16,248	57,553	204,498
Upper Middle Income	16,739	81,411	245,743	504,307
High Income	7,363	39,714	123,249	296,427
North America	2,159	11,512	35,816	86,866
East Asia & Pacific	15,872	78,971	234,002	439,936
South Asia	2,258	9,797	34,705	122,733
Sub-Saharan Africa	1,137	4,967	17,617	62,938
Europe & Central Asia	3,902	20,617	64,798	163,370
Middle East & North Africa	861	4,146	13,871	42,532
Latin America & Caribbean	1,862	8,289	29,032	98,361
Not Classified	41	173	607	2,501
USA	1,934	10,289	32,017	77,703
China	13,002	65,131	187,937	302,316
Other	13,157	63,051	210,492	639,219
Commercial	26,475	131,799	409,823	935,052
Household	1,618	6,673	20,623	84,185
Global	**28,093**	**138,471**	**430,447**	**1,019,238**

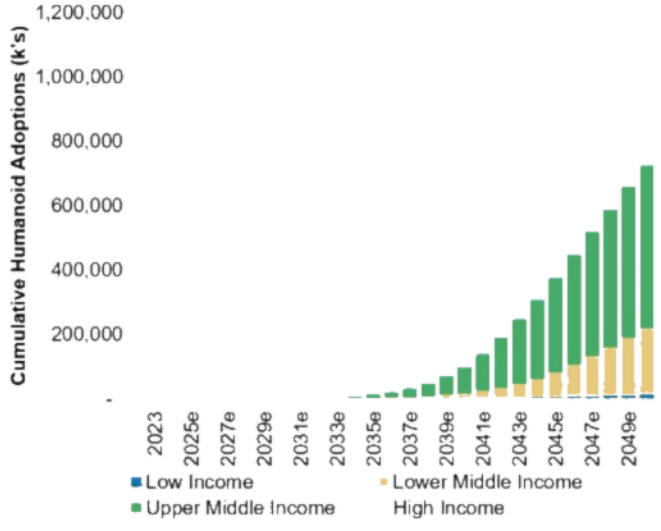
Source: Morgan Stanley Research estimates

Exhibit 29: Cumulative Humanoid Adoptions by Region



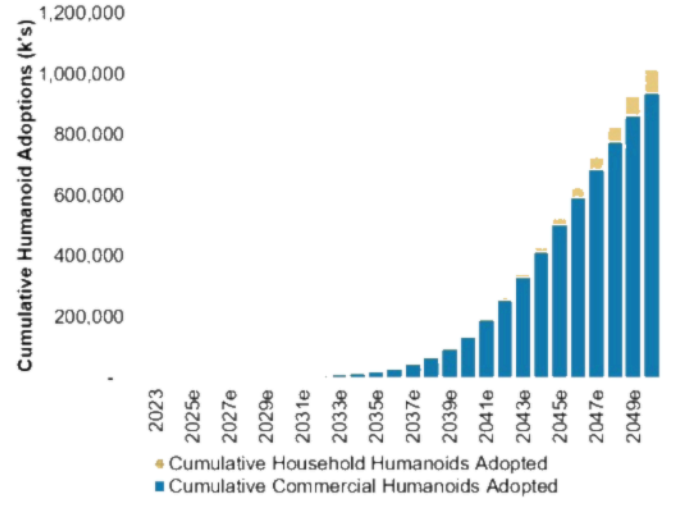
Source: Morgan Stanley Research estimates

Exhibit 30: Cumulative Humanoid Adoptions by Country Income vs. Classification (United Nations)



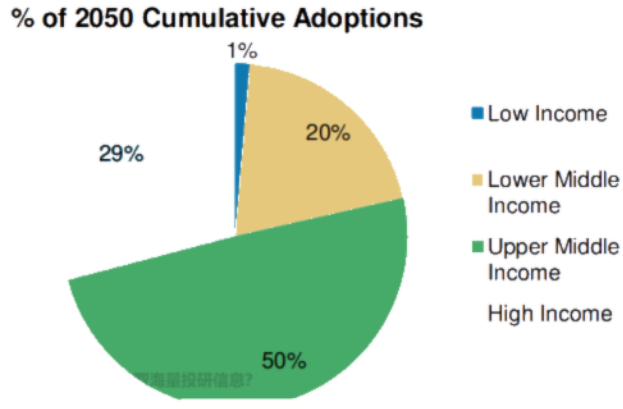
Source: Morgan Stanley Research estimates

Exhibit 31: Cumulative Humanoid Adoptions: Household Commercial End-Markets



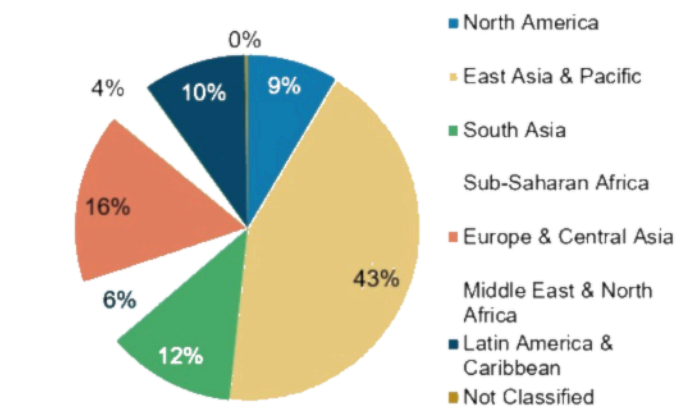
Source: Morgan Stanley Research estimates

Exhibit 32: 2050 Cumulative Adoptions by Income Classifications



Source: Morgan Stanley Research estimates

Exhibit 33: 2050 Cumulative Adoptions by Region



Source: Morgan Stanley Research estimates

Sizing the Global Market

We estimate that the global humanoid market could reach $7.5 trillion in annual revenue by 2050. Assuming a 6 year replacement cycle and the below ASP assumptions, we estimate that the global humanoid market could reach $7.5 trillion in annual revenue by 2050 ($336 billion by 2035 and $2.0 trillion by 2040). For comparison, in 2024, the 20 largest global auto makers booked an aggregate of ~$2.5 trillion in revenue.

Average Selling Price (ASP) assumptions:

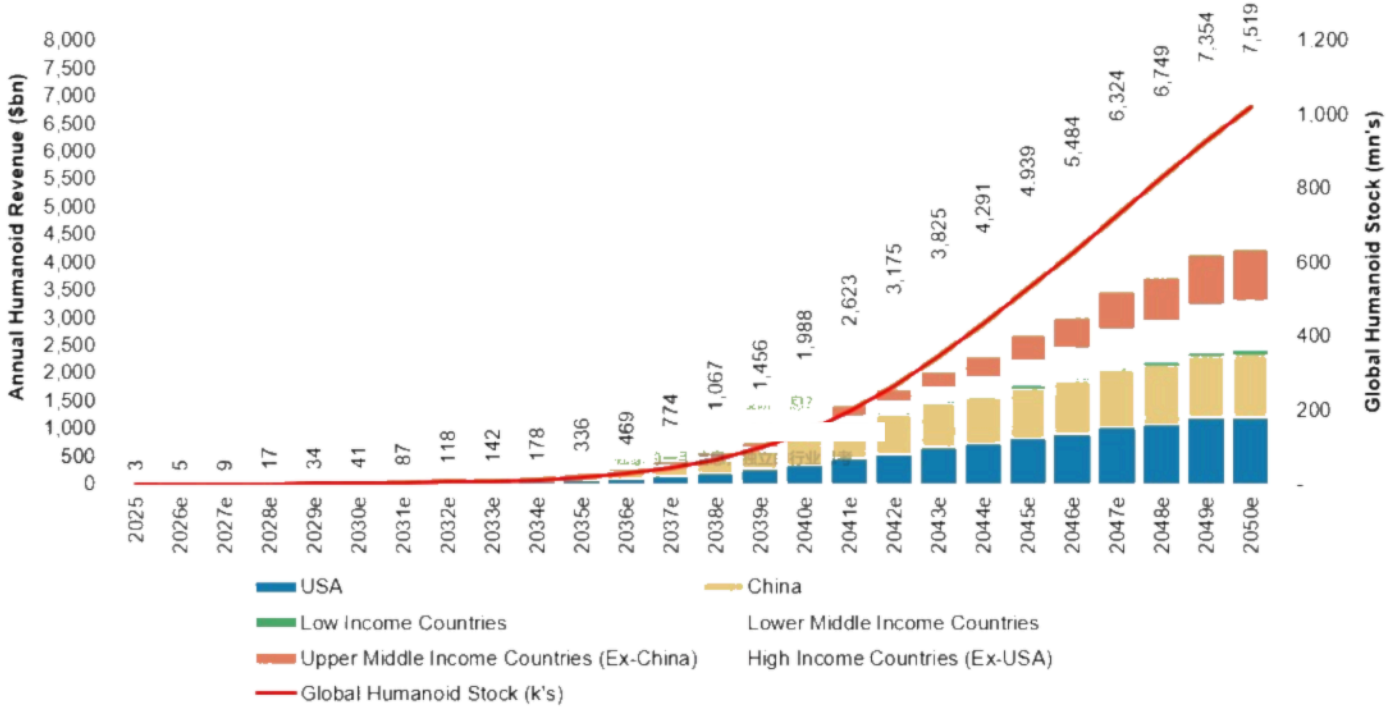
- High Income Countries: We assume that the initial ASP of humanoids was $200k in 2024 (largely research-oriented humanoids), with this declining to $150k each by 2028, and further declines to ~$93k by 2040 and ~$75k by 2050 driven by supply chain development and improvements in mass-production. Assume initial ASPs are inflated given the current lack of domestic supply chains, which get mitigated overtime with onshoring of AI/robotics-enabled manufacturing.
- Upper Middle/Lower Middle/Low Income Countries: We assume these humanoids are lower-cost with greater benefits of mass-production, localized supply chains, and production based in cost-efficient countries. Assume meaningful price deflation throughout 2050. We assume an initial ASP of ~$50k (Rmb350k) in 2024, declining to ~$21k (~Rmb150k) by 2050.

Exhibit 34: Global Humanoid Market / Revenue Estimates Through 2050 (Assumes 6 Year Replacement Cycle)

Market Size Analysis																	
USA	**2024**	**2025e**	**2026e**	**2027e**	**2028e**	**2029e**	**2030e**	**2032e**	**2034e**	**2036e**	**2038e**	**2040e**	**2042e**	**2044e**	**2046e**	**2048e**	**2050e**
New Humanoid Units Adopted (mn)		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Replacement Units (mn)								0.0	0.0	0.1	0.2	0.2	0.7	1.8	3.5	5.8	8.3
Total Humanoid Units Sold (mn)	-	0.003	0.005	0.008	0.020	0.038	0.065	0.167	0.225	0.722	1.8	3.5	5.8	8.3	10.9	13.4	15.7
Average Selling Price Per Humanoid ($k)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
USA Revenue ($bn)	-	**0.6**	**0.9**	**1.3**	**2.9**	**5.3**	**8.5**	**20.4**	**25.9**	**78.2**	**182.1**	**334.7**	**520.5**	**702.7**	**888.5**	**1,051.1**	**1,178.9**
China	**2024**	**2025e**	**2026e**	**2027e**	**2028e**	**2029e**	**2030e**	**2032e**	**2034e**	**2036e**	**2038e**	**2040e**	**2042e**	**2044e**	**2046e**	**2048e**	**2050e**
New Humanoid Units Adopted (mn)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Replacement Units (mn)							0.0	0.0	0.2	0.4	1.0	2.0	4.9	11.2	22.3	36.3	43.1
Total Humanoid Units Sold (mn)	0.0	0.0	0.0	0.1	0.2	0.3	0.4	1.0	2.0	4.9	11.2	22.3	36.3	43.1	47.2	51.6	54.6
Average Selling Price Per Humanoid ($k)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
China Revenue ($bn)	**0.1**	**0.6**	**1.9**	**4.0**	**7.3**	**11.2**	**14.9**	**28.2**	**49.7**	**108.3**	**240.5**	**465.8**	**742.6**	**864.1**	**965.7**	**1,077.2**	**1,161.5**
Low Income Countries	**2024**	**2025e**	**2026e**	**2027e**	**2028e**	**2029e**	**2030e**	**2032e**	**2034e**	**2036e**	**2038e**	**2040e**	**2042e**	**2044e**	**2046e**	**2048e**	**2050e**
New Humanoid Units Adopted (mn)							[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Replacement Units (mn)										0.0	0.0	0.0	0.1	0.2	0.3	0.7	1.2
Total Humanoid Units Sold (mn)	-	-	-	-	-	-	0.0	0.0	0.0	0.1	0.2	0.3	0.7	1.2	1.8	2.5	3.0
Average Selling Price Per Humanoid ($k)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LI Country Revenue ($bn)	-	-	-	-	-	-	**0.1**	**0.3**	**1.1**	**2.2**	**4.3**	**7.2**	**14.1**	**23.9**	**37.6**	**52.3**	**63.3**
Lower Middle Income Countries	**2024**	**2025e**	**2026e**	**2027e**	**2028e**	**2029e**	**2030e**	**2032e**	**2034e**	**2036e**	**2038e**	**2040e**	**2042e**	**2044e**	**2046e**	**2048e**	**2050e**
New Humanoid Units Adopted (mn)					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Replacement Units (mn)									0.0	0.0	0.2	0.6	1.5	2.8	5.1	10.2	17.3
Total Humanoid Units Sold (mn)	-	-	-	-	0.0	0.0	0.0	0.2	0.6	1.5	2.8	5.1	10.2	17.3	27.0	36.7	43.0
Average Selling Price Per Humanoid ($k)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LMI Country Revenue ($bn)	-	-	-	-	**0.8**	**1.6**	**1.5**	**5.1**	**15.7**	**32.7**	**59.2**	**106.0**	**209.6**	**346.7**	**551.5**	**764.9**	**915.0**
Upper Middle Income Countries (Ex-China)	**2024**	**2025e**	**2026e**	**2027e**	**2028e**	**2029e**	**2030e**	**2032e**	**2034e**	**2036e**	**2038e**	**2040e**	**2042e**	**2044e**	**2046e**	**2048e**	**2050e**
New Humanoid Units Adopted (mn)					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Replacement Units (mn)									0.0	0.0	0.2	0.6	1.5	2.8	5.1	10.3	17.4
Total Humanoid Units Sold (mn)	-	-	-	-	0.0	0.0	0.0	0.2	0.6	1.5	2.8	5.1	10.3	17.4	26.9	36.4	42.0
Average Selling Price Per Humanoid ($k)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UMI Country Revenue ($bn)	-	-	-	-	**0.8**	**1.3**	**1.6**	**5.3**	**15.5**	**32.8**	**59.9**	**105.9**	**209.9**	**349.7**	**549.7**	**760.6**	**894.6**
High Income Countries (Ex-USA)	**2024**	**2025e**	**2026e**	**2027e**	**2028e**	**2029e**	**2030e**	**2032e**	**2034e**	**2036e**	**2038e**	**2040e**	**2042e**	**2044e**	**2046e**	**2048e**	**2050e**
New Humanoid Units Adopted (mn)		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Replacement Units (mn)								0.015	0.038	0.110	0.478	0.609	1.984	5.110	10.096	16.394	23.615
Total Humanoid Units Sold (mn)	-	0.010	0.015	0.024	0.038	0.104	0.110	0.478	0.609	1.984	5.110	10.096	16.394	23.615	30.562	38.873	43.964
Average Selling Price Per Humanoid ($k)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
HI Country Revenue ($bn)	-	**1.8**	**2.6**	**4.0**	**5.7**	**14.2**	**14.3**	**58.5**	**70.1**	**214.9**	**520.6**	**967.9**	**1,478.7**	**2,004.2**	**2,491.0**	**3,043.0**	**3,305.2**
Global	**2024**	**2025e**	**2026e**	**2027e**	**2028e**	**2029e**	**2030e**	**2032e**	**2034e**	**2036e**	**2038e**	**2040e**	**2042e**	**2044e**	**2046e**	**2048e**	**2050e**
New Humanoid Units Adopted (mn)	0.0	0.0	0.1	0.1	0.3	0.5	0.7	1.9	3.8	10.0	21.9	42.3	69.0	87.0	97.9	99.9	91.3
Replacement Units (mn)							0.0	0.1	0.3	0.7	2.0	4.1	10.7	23.9	46.4	79.7	110.9
Total Humanoid Units Sold (mn)	0.0	0.03	0.1	0.1	0.3	0.5	0.7	2.0	4.1	10.7	23.9	46.4	79.7	110.9	144.3	179.5	202.2
Average Selling Price Per Humanoid ($k)	49.0	119.2	77.0	70.5	64.1	65.3	57.0	59.3	43.4	43.9	44.6	42.8	39.9	38.7	38.0	37.6	37.2
Global Revenue ($bn)	***0.1***	***3.0***	***5.3***	***9.3***	***17.4***	***33.6***	***40.9***	***117.7***	***178.0***	***469.0***	***1,066.7***	***1,987.5***	***3,175.5***	***4,291.3***	***5,484.0***	***6,749.0***	***7,518.6***
Global Humanoid Stock (k's)	***0***	***0***	***0***	***0***	***1***	***1***	***2***	***5***	***11***	***28***	***65***	***138***	***264***	***430***	***624***	***827***	***1,019***

Source: Morgan Stanley Research estimates

Exhibit 35: Global Humanoid Revenue by Year (Hardware Sales Only)



Source: Morgan Stanley Research estimates

Notes

Public companies mentioned

Google, Amazon, Meta (covered by Brian Nowak)

Alibaba, Baidu, Tencent (Gary Yu)

UBTech (not covered)

NVIDIA (Joe Moore)

Microsoft (Keith Weiss)

Hyundai (Young Suk Shin)

Tesla (Andrew Percoco)

Apple (Erik Woodring)

Toyota Motor (Hiroto Segawa)