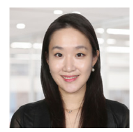
Morgan Stanley
INVESTMENT MANAGEMENT

From Electric Vehicles to Humanoids: China's Next Manufacturing Leap

TALES FROM THE EMERGING WORLD | EMERGING MARKETS EQUITY TEAM | August 2026

AUTHORS

JERRY PENG
Vice President,
Emerging Market Equities



ROSE KIM
Executive Director,
Emerging Market Equities

Three backflips in three seconds, filmed in a lab and viewed millions of times on TikTok, made China's G1 humanoid robot an overnight internet star. That was where the robotics industry stood a year ago. Today, China's humanoid robots are beginning to move out of televised spectacles, such as synchronized dancing and kung fu performances, to active manufacturing and commercial roles.

China is already the largest global supplier of humanoid robots, with shipments estimated at around 13,000 units last year. While many shipments are used for demonstrations, academic research or testing, the country is pushing for wider adoption of humanoids in real working environments.

Beijing is building infrastructure to train physical artificial intelligence (AI) at a national scale. In June, the Ministry of Industry and Information Technology (MIIT) and the State-owned Assets Supervision and Administration Commission issued a special work plan for training humanoid and embodied-AI robots in work settings. The plan calls for deployment across more than 100 high-value scenarios and 10,000-unit-scale "work mode" deployment capability by the end of 2026.

The early evidence is beginning to appear in controlled environments where tasks are repetitive. Use cases are emerging across warehousing, manufacturing, research and healthcare. Manufacturing and transportation companies have started testing humanoids for material handling, sorting and inspection, while local startups such as Galbot and AgiBot have secured partnerships to deploy robots in industrial environments over the next three years.

Industrial robots are currently common across the globe, with mechanized arms welding sheet metal and mixing paint. But humanoids are now being tested for more complex tasks, such as connecting cables and conducting quality inspections at Chinese auto companies including BYD, Geely, FAW-VW and Audi FAW. BYD's deployment of approximately 100 UBTECH humanoids appears to be the largest known commercial humanoid installation globally. Other deployments remain at the pilot level.

Healthcare and eldercare are another focus, given China's rapidly aging population and rising demand for care. National programs are exploring rehabilitation assistance, elderly companionship and emergency response. Care settings are less structured than factories, where adoption may take longer than the policy mandate anticipates.

The Scale Advantage

China already accounts for more than 90% of global humanoid robot production by volume. In addition, the country has the world's largest industrial robot base, with more than two million units installed, including roughly 295,000 in 2025.

China's humanoid shipments are forecast to rise to around 28,000 units this year, while the U.S. and the rest of the world are ramping up as well, pushing the global 2026 output above 50,000 units.[1]

Where will those units be put to work? Initial adoption is likely to follow the ministry's priority list, with manufacturing, logistics and inspection leading the first wave. As both hardware and software improve, humanoids will enter into consumer-facing services and household scenarios, which could create a far larger total addressable market (TAM).

Morgan Stanley projects that cumulative humanoid robot adoption could reach one billion units by 2050, with China accounting for about 30% of that volume. Accordingly, it is also estimated that market TAM could reach $7.5 trillion in annual revenue by 2050 (Display 1).

China Hardware vs. U.S. Software

The competitive landscape has been described as "China Hardware vs. U.S. Software." Humanoid robots sit at the intersection of hardware, AI, manufacturing, real-world data and customer integration. Early commercialization may reward hardware scale and deployment speed, whereas longer-term value may depend more on intelligence, software and fleet learning.

China's biggest advantage is hardware scale. It has the world's largest industrial robot market and deep electric vehicle (EV) and electronics supply chains. Component clusters are dense, prototyping cycles are fast and local governments and state-owned enterprises are willing to provide test environments.

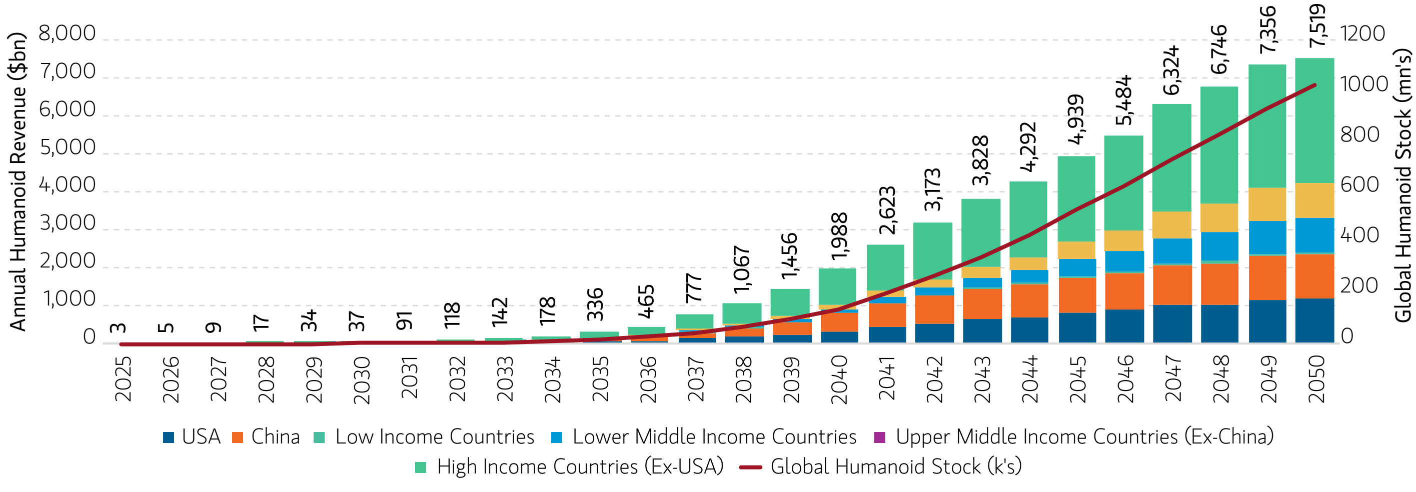
Publicly-listed Unitree and local startups AgiBot, UBTECH and Leju have already shown stronger shipment volumes than U.S. peers, while U.S. companies such as Figure, Tesla, Agility and Apptronik remain at significantly lower levels. However, not all humanoid robots are created equal, as volume numbers don't capture versatility, or value per unit.

Chinese firms are well positioned to win the "good-enough hardware at a falling cost" race. Local parts make Chinese humanoids much cheaper on average than foreign models. China holds roughly a third of global rare-earth reserves but dominates downstream refining. The country currently controls roughly 63% of the global market for core

DISPLAY 1

The Humanoid Robot Market Is Expected to Soar

Estimated Global Humanoid Market Size and Stock



Source: Morgan Stanley Research. As of 6/23/2026. Forecasts/estimates are based on current market conditions, subject to change and may not necessarily come to pass.

[1] *Humanoids: The Tide is Rising, Lifting 2026 Forecast*. Morgan Stanley Research. As of May, 2026.

mechanical components, including actuators, motors and reducers, and about 90% of heavy rare-earth processing required for joint motor magnets.

The U.S. retains a clear lead in frontier AI, chips, simulation software and robot foundation-model ecosystems. NVIDIA's humanoid stack, foundation models such as its Generalist Robot 00 Technology (GR00T), and the broader U.S. AI ecosystem around large models, GPUs, simulation and reinforcement learning all remain highly influential.

China's hardware lead is real. The long-term value pool, however, may shift toward robot intelligence, task generalization, data flywheels and fleet-management software, rather than the mechanical body itself.

Furthermore, China consistently leads the U.S., Japan and other countries in monthly patent applications mentioning "humanoid." That lead has widened sharply since late 2024, offering evidence that China's software and AI efforts are scaling alongside its hardware advantage (Display 2).

A Key Investment Theme

By 2027–28, the key markers will be whether profitability broadens beyond Unitree and AgiBot, and whether the government's 10,000-unit "work mode" deployment target translates into real operating use.

Humanoid robotics has already become a major investment theme in the China A-share market. Policy support, localization, large manufacturing base, AI-to-physical-world narratives and IPO catalysts are lifting investor interest. The continued advance of AI strengthens the case for humanoid robotics because it expands what machines can perceive, plan and execute.

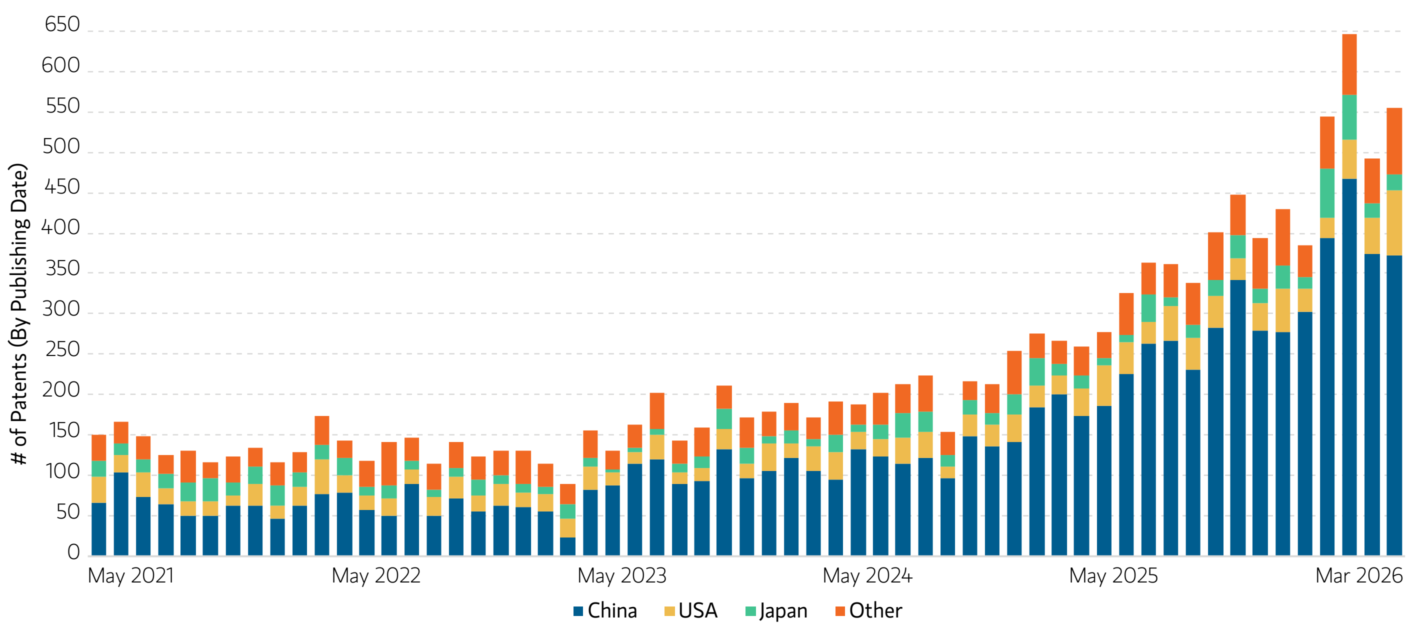
Several Chinese companies are emerging as leaders across critical parts of the supply chain, ranging from reducers and motors to servo drivers, actuators, tactile sensors, vision and light detection and ranging (LiDAR). These areas were historically dominated by developed market companies. In critical areas such as battery, magnets, materials and edge computing, we expect some local Chinese firms to become leaders domestically and also globally.

China is likely to be one of the first markets to test humanoid commercialization at scale. Its advantages are clear: supply chains, cost, manufacturing depth, policy support and real-world testing environments. The open question is whether we can predict who the ultimate winner in this race might be. Much like EVs, where China saw the emergence of more than a hundred brands, we think the humanoid robotics sector will also get quite crowded before the winners emerge.

DISPLAY 2

China Is Well Ahead in Humanoid Patents

Monthly Patent Applications Mentioning "Humanoid" by Country



Source: Google Patents, Morgan Stanley Research. As of 3/31/2026. The data may not capture 100% of patents.

RISK CONSIDERATIONS

There is no assurance that a portfolio will achieve its investment objective. Portfolios are subject to market risk, which is the possibility that the market values of securities owned by a portfolio will decline and that the value of portfolio shares may therefore be less than what you paid for them. Market values can change daily due to economic and other events (e.g. natural disasters, health crises, terrorism, conflicts and social unrest) that affect markets, countries, companies or governments. It is difficult to predict the timing, duration, and potential adverse effects (e.g. portfolio liquidity) of events. Accordingly, you can lose money investing in a portfolio. Please be aware that a portfolio may be subject to certain additional risks. In general, **equities securities'** values also fluctuate in response to activities specific to a company. Investments in **foreign markets** entail special risks such as currency, political, economic, market and liquidity risks. The risks of investing in **emerging market countries** are greater than the risks generally associated with investments in foreign developed countries.

Outside the EU, MSIM materials are issued by Morgan Stanley Investment Management Limited (MSIM Ltd) is authorised and regulated by the Financial Conduct Authority. Registered in England. Registered No. 1981121. Registered Office: 25 Cabot Square, Canary Wharf, London E14 4QA.

In Switzerland, MSIM materials are issued by Morgan Stanley & Co. International plc, London (Zurich Branch) Authorised and regulated by the Eidgenössische Finanzmarktaufsicht ("FINMA"). Registered Office: Beethovenstrasse 33, 8002 Zurich, Switzerland.

Italy: MSIM FMIL (Milan Branch), (Sede Secondaria di Milano) Palazzo Serbelloni Corso Venezia, 16 20121 Milano, Italy. The **Netherlands:** MSIM FMIL (Amsterdam Branch), Rembrandt Tower, 11th Floor Amstelplein 1 1096HA, Netherlands. **France:** MSIM FMIL (Paris Branch), 61 rue de Monceau 75008 Paris, France. **Spain:** MSIM FMIL (Madrid Branch), Calle Serrano 55, 28006, Madrid, Spain. **Germany:** MSIM FMIL, Frankfurt Branch, Grosse Gallusstrasse 18, 60312 Frankfurt am Main, Germany (Gattung: Zweigniederlassung (FDI) gem. § 53b KWG). **Denmark:** MSIM FMIL (Copenhagen Branch), Gorrissen Federspiel, Axel Towers, Axeltorv2, 1609 Copenhagen V, Denmark.

MIDDLE EAST:

Dubai International Financial Centre: This information does not constitute or form part of any offer to issue or sell, or any solicitation of any offer to subscribe for or purchase, any securities or investment products in the UAE (including the Dubai International Financial Centre and the Abu Dhabi Global Market) and accordingly should not be construed as such. Furthermore, this information is being made available on the basis that the recipient acknowledges and understands that the entities and securities to which it may relate have not been approved, licensed by or registered with the UAE Central Bank, the Dubai Financial Services Authority, the UAE Securities and Commodities Authority, the Financial Services Regulatory Authority or any other relevant licensing authority or government agency in the UAE. The content of this report has not been approved by or filed with the UAE Central Bank, the Dubai Financial Services Authority, the UAE Securities and Commodities Authority or the Financial Services Regulatory Authority. **Abu Dhabi Global Market ("ADGM"):** This material is sent strictly within the context of, and constitutes, an Exempt Communication. This material relates to content which is not subject to any form of regulation or approval by the Financial Services Regulatory Authority of the Abu Dhabi Global Market (the "FSRA").

U.S.: NOT FDIC INSURED. OFFER NO BANK GUARANTEE. MAY LOSE VALUE. NOT INSURED BY ANY FEDERAL GOVERNMENT AGENCY. NOT A DEPOSIT.

Latin America (Brazil, Chile Colombia, Mexico, Peru, and Uruguay)

This material is for use with an institutional investor or a qualified investor only. All information contained herein is confidential and is for the exclusive use and review of the intended addressee, and may not be passed on to any third party. This material is provided for informational purposes only and does not constitute a public offering, solicitation or recommendation to buy or sell for any product, service, security and/or strategy. A decision to invest should only be made after reading the strategy documentation and conducting in-depth and independent due diligence.

ASIA PACIFIC:

Hong Kong: This document has been issued by Morgan Stanley Asia Limited, CE No. AAD291, for use in Hong Kong and shall only be made available to "professional investors" as defined under the Securities and Futures Ordinance of Hong Kong (Cap 571). The contents of this document have not been reviewed nor approved by any regulatory authority including the Securities and Futures Commission in Hong Kong. Accordingly, save where an exemption is available under the relevant law, this document shall not be issued, circulated, distributed, directed at, or made available to, the public in Hong Kong. **Singapore:** This material is disseminated in Singapore by Morgan Stanley Investment Management Company, Registration No. 199002743C. This material should not be considered to be the subject of an invitation for subscription or purchase, whether directly or indirectly, to the public or any member of the public in Singapore other than (i) to an institutional investor under section 304 of the Securities and Futures Act, Chapter 289 of Singapore ("SFA"), (ii) to a "relevant person" (which includes an accredited investor) pursuant to section 305 of the SFA, and such distribution is in accordance with the conditions specified in section 305 of the SFA; or (iii) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA. This material has not been reviewed by the Monetary Authority of Singapore. **Australia:** This material is provided by Morgan Stanley Investment Management (Australia) Pty Ltd ABN 22122040037, AFSL No. 314182 and its affiliates and does not constitute an offer of interests. Morgan Stanley Investment Management (Australia) Pty Limited arranges for MSIM affiliates to provide financial services to Australian wholesale clients. This material will not be lodged with the Australian Securities and Investments Commission.

Japan: For professional investors, this material is circulated or distributed solely for informational purposes. For non-professional investors, this material is provided in connection with Morgan Stanley Investment Management (Japan) Co., Ltd. ("MSIMJ")'s business with respect to discretionary investment management agreements ("IMA") and investment advisory agreements ("IAA"). This does not constitute a recommendation or solicitation of transactions nor offers any particular financial instruments. Under an IMA, with respect to the management of client assets, the client prescribes basic management policies in advance and commissions MSIMJ to make all investment decisions based on an analysis of the value, etc. of the securities, and MSIMJ accepts such commission. The client shall delegate to MSIMJ the authorities necessary to make such investment decisions. MSIMJ exercises these delegated authorities accordingly, and the client shall not make individual instructions. All investment profits and losses belong to the clients; principal is not guaranteed. Please consider the investment objectives and nature of risks before investing. As an investment advisory fee for an IAA or an IMA, the amount of assets subject to the contract multiplied by a certain rate (the upper limit is 2.20% per annum (including tax)) shall be incurred in proportion to the contract period. For some strategies, a contingency fee may be incurred in addition to the fee mentioned above. Indirect charges also may be incurred, such as brokerage commissions for underlying securities. Since these charges and expenses vary by contract and other factors, MSIMJ cannot present the rates, upper limits, etc. in advance. All clients should read thoroughly the Documents Provided Prior to the Conclusion of a Contract carefully before executing an agreement. This material is distributed in Japan by MSIMJ, Registered No. 410 (Director of Kanto Local Finance Bureau (Financial Instruments Firms)), Membership: the Japan Securities Dealers Association, the Investment Management Association of Japan and the Type II Financial Instruments Firms Association.

RO 5731666 Exp. 7/31/2028 26Q30098 LTR