

Regional Industry Focus

Robotics Sector

Refer to important disclosures at the end of this report

DBS Group Research . Equity

21 Mar 2025

Great Wall of Robots: A self-sustained rise

- **China's humanoid robot market is projected to reach RMB574bn by 2035 (47% CAGR), as 50% adoption could cut labour costs by 45%**
- **Being overlooked in the humanoid robot trend, consumer electronics suppliers can leverage on supply chain overlap to enter robotics**
- **China's electronics hub is shifting to robotics, with in-house adoption driving cost savings; Xiaomi's 22% cut in labour cost by FY26 a case in point**
- **Prefer robot producers, [Xiaomi](#) and [BYDE](#), over component suppliers, with their established presence and visibility to drive a re-rating**

China's humanoid robot market expected to soar, in line with global growth. With Tesla aiming for mass production of humanoid robots by late 2025, global peers are ramping up investments in this area. Manufacturing, especially in labour-intensive China, will lead the adoption. At 50% penetration, labour costs could fall by up to 45%. We project China's humanoid robot market to reach RMB574bn in value by 2035, with a 2025-35 CAGR of 47%, in line with global growth of 45%. China's humanoid robot market is still in early development, with over 60 manufacturers and no clear dominant leader. Although UBTECH and XPeng enjoy early market presence and first-mover advantages, it is the ability to manufacture and deploy robots for diverse applications that ultimately determines success.

Significant overlap in supply chains of consumer electronics and humanoid robots, with robots using more optic sensors than EVs, benefiting supply chain players. China's electronics hub is shifting to robotics, with Xiaomi and BYDE leading the transition. Xiaomi has the best chance to commercialise humanoid robots among Chinese players, leveraging its expertise in heavy manufacturing, AI investment, and ecosystem integration. Its humanoid robots could cut labour costs by c.22% in FY26. BYDE's internal deployment could boost FY26F earnings by 4%, while Xiaomi may gain 9%.

Robotics valuations still attractive amid boom. Despite AI stocks doubling since AI's rise at 2019, humanoid robotics valuations remain reasonable, with Chinese players trading at ~33x forward P/E. Xiaomi is trading at 1.2 FY25 PEG vs. 1.6 for global peers. BYDE and supply chain players like AAC and Sunny are trading at 13-27x P/E with 31%-40% FY24-26F earnings CAGR, more attractive vs global peer Keyence's c.35x P/E and 9% CAGR.

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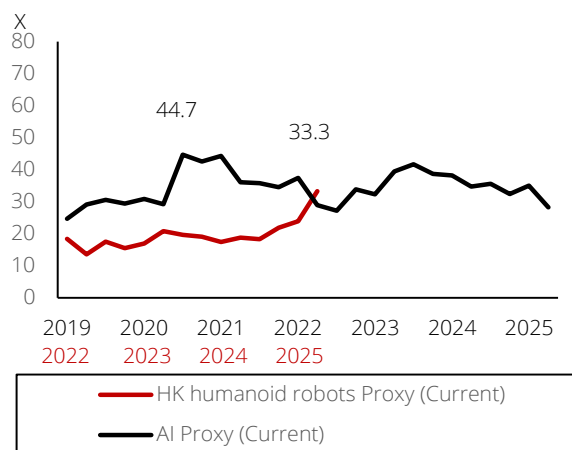
Recommendation & valuation

Company	Price HK\$	Target Price HK\$	Recom	Mkt Cap US\$m
BYD Electronic (285 HK)	48.80	70.00	BUY	14,127
Xiaomi (1810 HK)	56.50	80.00	BUY	182,293
Sunny Optical (2382 HK)	86.35	110.00	BUY	12,146
AAC Technologies (2018 HK)	52.05	61.00	BUY	7,947

Source: Thomson Reuters, DBS Bank (Hong Kong) Limited ("DBS HK")

Based on closing prices as at 20 Mar 2025

Comparison of forward PE of AI boom and now



Source: DBS, Bloomberg

Introduction

Open-source AI is the last piece of the puzzle for humanoid robot development

The emergence of open-source artificial intelligence (AI) addresses the primary barrier hindering the development of humanoid robots – lack of standardised model architectures. Unlike large language models (LLMs), the area of robotics AI has suffered from fragmented approaches and limited model standardisation, leaving the industry largely experimental and prompting major corporations to adopt a cautious stance. However, this period of experimentation presents a strategic opportunity for China: Leveraging open-source AI models can significantly lower technical hurdles, accelerate innovation cycles, and foster wider developer engagement.

With Tesla targeting large-scale production of humanoid robots by late 2025, we anticipate a rapid increase in global investment and competition in this sector. According to industrial research, humanoid robot adoption could substantially enhance productivity by 20%-40%. Meanwhile, it can reduce labour costs by up to 48% with a 50% adoption rate in the US.

Cost optimisation by humanoid robots in US

	Humans (2024)	50% manufacturing value by humans	Humanoid Robots (50% adoption; humanoid robots price at USD 25,000)	Total cost cut
Hours Per Week	40	40	80	
Weeks Per Year	50	50	50	
Annual Hours	2,000	2,000	4,000	
Total				
Manufacturing Employees (mn)	11.7	5.9	3.0	
Total Hours (bn)	23	11.8	11.8	
Annual Payroll (bn USD)	785	392.5	14.75	-48.1%
Production value per labour (USD/hr)	102	102	102	
Annualized Manufacturing Value (bn USD)	2,400	1,200	1,200	

Source: DBS Bank

Assumption: Robot Price at USD25,000, annual cost at USD5,000 assuming 5-years depreciation and 50% adoption of humanoid robots

Robotics Sector

China's humanoid robot outlook

Strategic imperative: Building China's independent humanoid robot ecosystem

Humanoid robots represent a critical competitive frontier among global powers, alongside advanced semiconductors and AI, due to their transformative impact on manufacturing and potential military applications. Given escalating geopolitical tensions, particularly with the US, export bans on humanoid robots and related technologies are likely to be imposed, similar to restrictions observed in other strategic sectors. Consequently, it is essential for China to cultivate an autonomous ecosystem to innovate and produce humanoid robots domestically.

Over 72% of components could be domestically produced

China already exhibits strong manufacturing capabilities in mechanical and electronic components essential for humanoid robots, excluding advanced logic chips. Domestic enterprises have successfully localised more than 72% of their robot components, including sensors, mechanical parts, and semiconductors. Additionally, over 80% of chips used in humanoid robots are based on mature semiconductor nodes, reducing reliance on foreign high-end technology as China moves toward self-sufficiency in mature-node chips. Nevertheless, advanced AI functionalities continue to rely on foreign chips, such as Nvidia GPUs and Intel CPUs.

Domestic AI chip advancements narrowing gaps

China's semiconductor sector is progressively advancing its capabilities in AI chip production, thereby further reducing foreign dependency. Notably, Huawei and SMIC have developed the Ascend 910C AI chip, which achieves approximately 60% of the performance of Nvidia's cutting-edge H100 GPU. Rapid advances in China's domestic AI chip development are expected to significantly narrow the technological gap, enabling near self-sufficiency in humanoid robot supply chains over the next decade.

Initial applications: Manufacturing and industrial sectors

Humanoid robots in China are initially expected to gain traction primarily within the manufacturing and industrial sectors, given the high reliance on labour-intensive manufacturing. This adoption is driven by rising labour costs, workforce shortages, and robust government support for technological advancement. Key industries include automotive manufacturing (4.5% of China's GDP), electronics manufacturing (5.5%), mining operations (2.5%), and chemical and nuclear industries (3.5%), collectively contributing significantly to China's economy. We forecast substantial labour cost savings, of up to 45%, assuming a humanoid robot adoption rate of 50%.

Domestic share of humanoid robots in China

Component Category	Estimated Cost Share (%)	Estimated Domestic Share (%)	Domestic Cost Contribution (%)
Mental Plane	23	40	9.2
Sensing Plane	15	50	7.5
Movement Plane	55	90	49.5
Power Plane	7	80	5.6
Total	100	0	71.8

Source: DBS, Trendforce

Robotics Sector

Expected scenarios for humanoid robot applications in China

Scenario	Applications	Impact	% of GDP
Automotive manufacturing	Welding, painting, assembling components	Enhance productivity, reduce defects, lower operational costs	4%-5%
Electronics manufacturing	Assembling delicate components, quality checks, packaging	Improve accuracy, speed up production cycles, ensure consistent quality	5%-6%
Mining operations	Drilling, excavation, inspecting hazardous zones, managing toxic materials	Reduce risks to human workers, increase safety, improve efficiency	2%-3%
Chemical and nuclear industries	Managing dangerous substances, maintenance in high-risk zones, assisting in chemical processing	Minimise human exposure to danger, strengthen safety measures, enable continuous operations	3%-4%

acceptance of domestically produced robots, supported by favourable public reception and an expected 39% decline in average prices.

Source: International Federation of Robotics

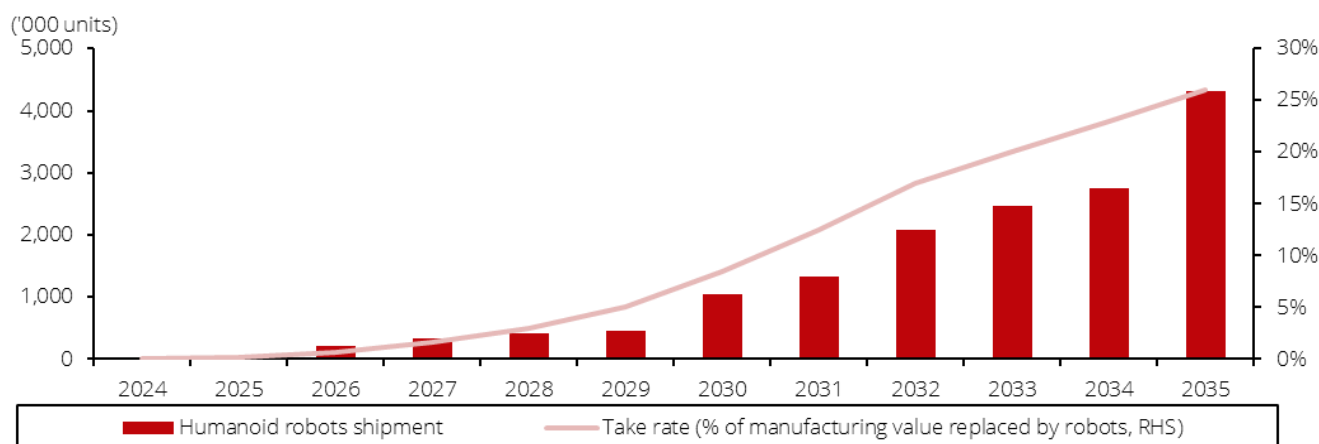
By 2035, China's humanoid robot market size is projected to reach RMB574bn, reflecting a CAGR of 46.9% from 2025-2035, consistent with global market growth projections. We expect humanoid robot adoption in China's manufacturing sector to reach approximately 26% by 2035. Additionally, we anticipate this adoption rate to further rise to approximately 50% by 2040.

Rapid shipment growth post-2026

We anticipate a significant increase in domestic humanoid robot shipments, starting in 2026 and accelerating through 2030 due to the first major replacement cycle. Shipments are expected to reaccelerate during 2030-2035, driven by the replacement of first-generation robots and a broader

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China's humanoid robot production forecast (2025-2035)



Source: DBS

China's humanoid robot production forecast assumptions

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Take rate (% of manufacturing value replaced by robots)	0.00%	0.2%	0.7%	1.6%	3.0%	5.0%	8.5%	12.5%	17%	20%	23%	26%
Total manufacturing robots need ('000 unit)		56	261	590	997	1,448	2,438	3,415	4,600	5,360	5,670	6,348
Replacement of old robots ('000 unit)		-	-	-	-	-	56	261	590	914	1,448	2,438
Manufacturing robots shipment ('000 unit)		56	204	330	406	451	1,047	1,237	1,776	1,757	1,757	3,117
Domestic robots shipment ('000 unit)		-	-	-	-	-	-	100	300	800	1,000	1,200
Humanoid robot shipment ('000 Unit)		56	204	330	406	451	1,047	1,337	2,076	2,474	2,757	4,317
Growth %			262.2	61.3	23.3	11.0	131.9	27.8	55.2	23.2	7.8	56.6
ASP ('000 RMB)		217.5	181.3	163.1	155.0	155.0	151.1	151.1	147.3	143.6	140.0	133.0
Humanoid robot sales (RMB bn)		12.3	37.0	53.8	63.0	69.9	158.1	202.1	305.8	355.4	386.1	574.3
Growth %			201.9	45.2	17.1	11.0	126.1	27.8	51.3	16.2	8.7	48.7
Cost share of sensing plane		15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Humanoid robot sensing plane market (RMB bn)		1.8	5.6	8.1	9.4	10.5	23.7	30.3	45.9	55.1	57.9	86.1

Source: DBS

Robotics Sector

Key Beneficiaries

Key beneficiaries in China: Humanoid robot producers

Producers in China's humanoid robot market are the direct beneficiaries. They capture greater value by differentiating their product offerings, leveraging China's robust manufacturing capabilities, and utilising substantial government incentives, such as tax relief and special equipment deductions. Additionally, they are well positioned to benefit from a potential market re-rating as increased capital inflows target this growing industry. Their established presence and visibility further enhance their appeal to investors.

Competitive landscape: Notable producers

China's humanoid robot market is still in early development, with over 60 manufacturers active as of 2023 and no clear dominant leader. Most robots offer similar capabilities, and companies are exploring diverse applications to identify optimal use cases.

Comparison of notable producers

Company	Notable Project/Product	Focus/Applications	Additional Information
UBTECH (9880HK)	Walker X	Quality inspections, light assembly in EV factories (NIO, BYD)	-
Xpeng (9868HK)	Iron	Precision tasks: Welding, painting	First-mover advantage, market still exploratory
Xiaomi (1810HK)	Second-generation robot of CyberOne	General-purpose robot, inspired by Tesla's model	Planning mass launch
Tencent (700HK)	The Five (Xiaowu)	Versatile industrial and service robots	Advancing through "Tencent Robotics X"
AgiBot	Humanoid robots	Advanced AI-powered robots for various applications	Start-up founded by former Huawei engineers, focused on commercialisation
BYDE (285HK)	Potential robots for internal production and future EV manufacturing	Used in consumer electronics production; planned for BYD's EV manufacturing in two years	Leveraging expertise to expand into EV robotics
Dobot (2432HK)	Dobot Atom	Applications in automotive manufacturing, electronics production, and hospitality services	Dexterous manipulation and straight-leg walking at RMB199K. Mid-year production through auto, electronics, hospitality partnerships

Source: DBS Bank, Company data

Government support and industry growth strategy

The Ministry of Industry and Information Technology (MIIT) issued a significant policy on "Guiding Opinions on the Innovation and Development of Humanoid Robots" in 2023, emphasising:

- Cultivating two to three globally influential humanoid robotics companies by 2025.
- Establishing a robust domestic innovation ecosystem with breakthroughs in critical technologies, including AI, motion control, and hardware components.

Which companies are most likely to become influential players in the humanoid robotics industry?

Key success factors will include integrated expertise in AI modelling, electronics-mechanics integration, and commercialisation, plus extensive overseas sales channels. Although UBTECH and XPeng enjoy early market presence and first-mover advantages, these may prove less significant as the market is still exploring the optimal application scenarios for humanoid robots.

Among the contenders, Xiaomi is uniquely positioned to leverage its extensive manufacturing experience in smartphones, IoT, and electric vehicles. Xiaomi's proven capabilities in heavy manufacturing, self-developed SoC (System-on-Chip) technology, and aggressive advancements in LLM development – plus the recruitment of DeepSeek's core developer in late 2024 – significantly bolster its competitive advantage. Xiaomi's strategic alignment with Tesla's late-2025 launch of its second-generation humanoid robot, positions it for substantial commercial success across diverse applications, from home and office to heavy industrial manufacturing.

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Beneficiaries: Humanoid robot component suppliers – sensors

Movement plane-related stocks and sensor suppliers

A key markets segment for humanoid robotics is the supply of movement plane-related components, including actuators, joints, motors, and structural parts. Movement plane suppliers and producers were among the earliest beneficiaries identified in China’s humanoid robot market, with their valuations significantly increasing, ranging from Inovance’s 33x FY25F PE to Estun Automation’s 121x PE. Conversely, sensor suppliers have seen slower gains, with valuations currently ranging between 13x-27x FY25F PE. Sensor suppliers seem to be the laggards in the humanoid robot supply chain, trailing behind other component suppliers in terms of valuation growth and early adoption.

Significant overlap in supply chains of humanoid robots and consumer electronics

There is a notable overlap in the supply chains of humanoid robots and consumer electronics. Humanoid robots require similar optical & imaging sensors, chips, displays & touch panels, connectivity & communication modules, sensors & micro-electro-mechanical system (MEMS) components, and acoustic & haptics components – essential for data collection and processing in both markets. Sensors alone are expected to account for approximately 15% of the total manufacturing cost of humanoid robots. While the entry barrier for consumer electronics suppliers is relatively low for those with expertise in advanced optical sensors, humanoid robots require higher end components that are more precise, durable, and specialised to support complex, mission-critical tasks in dynamic environments.

Sensor suppliers set to penetrate the humanoid robot market, mirroring EV success

Sensor suppliers are positioned to replicate their successful penetration of the EV supply chain in the emerging humanoid robot sector. Over recent years, these suppliers have refined strategies to integrate into the EV ecosystem – a model we expect to be adopted for humanoid robotics. The demand for optical sensors in humanoid robots significantly exceeds that in EVs: A typical humanoid robot requires twice the number of optical sensors found in a BYD EV and approximately 10 times those in a Tesla EV. This increased sensor intensity carries substantial cost implications. For instance, the dollar value of sensors in a mid-range humanoid robot (USD500-1,500) surpasses that

of a Tesla EV and approaches the sensor costs of Advanced Driver Assistance Systems (ADAS)-equipped vehicles. This trend presents a compelling opportunity for consumer electronics suppliers with established EV supply chain expertise to leverage their experience and expand into the humanoid robot market.

Optical sensor cost comparison

Category	System	Cost Range
Humanoid robot systems	Mid-Range (Stereo + ToF + IR)	USD500-1,500
	Advanced (LiDAR + multiple depth cameras)	USD2,000-10,000+
Automotive systems	Tesla Vision (Camera-Only)	USD160-630
	Basic ADAS (Cameras + Radar + Ultrasonics)	USD800-2,500
	Mid-Range (Adding LiDAR or Advanced Radar)	USD3,000-6,000
Consumer electronics	Smartphone	USD50-150

Source: DBS Bank

Overlapping in consumer electronics' and humanoid robots' supply chain

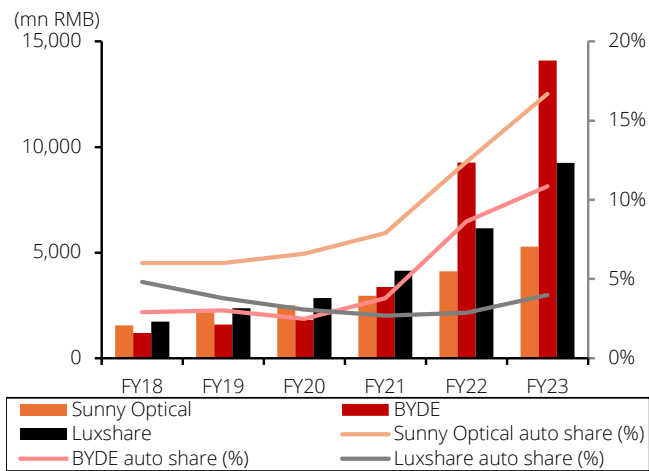
Component Category	Suppliers Overlapping	Humanoid Robots Use	Consumer Electronics Use
Common Components		Various uses like cameras, AI chips, displays, batteries, connectivity, sensors, PCBs, assembly, acoustics	Similar uses in smartphones, AI PCs, tablets, wearables, etc.
Optical & Imaging Sensors	Sony, OmniVision, Sunny Optical, Largan Precision, AAC Tech	RGB cameras, depth sensors for navigation	Smartphone cameras, AI photography
Semiconductor Chips & AI Processors	TSMC, Samsung, Qualcomm, NVIDIA, MediaTek	AI chips for vision, decision-making, motor control	AI accelerators for smartphones, tablets, AI PCs
Displays & Touch Panels	BOE, LG Display, Samsung Display, AU Optronics	Display interfaces, touchscreen panels	Smartphone OLED displays, AI PC touchscreens
Batteries & Power Management	CATL, BYD, LG Energy Solution, Panasonic	High-density Li-ion batteries for mobility	Smartphone and laptop batteries, fast-charging
Connectivity & Communication Modules	Qualcomm, Broadcom, Murata, MediaTek	5G/Wi-Fi modules for cloud connectivity	Wireless communication for smartphones, laptops, tablets
Sensors & MEMS Components	STMicroelectronics, Bosch, TDK InvenSense, Alps Alpine	IMU, LiDAR for movement and spatial awareness	Gyroscopes, accelerometers for motion sensing
PCBs & Electronic Components	Hon Hai (Foxconn), Pegatron, Jabil, Wistron, BYDE	Circuit boards for AI processing and motor control	Smartphone and AI PC motherboards, SoC integration
Precision Manufacturing & Assembly	Foxconn, Luxshare Precision, BYDE, Goertek	Assembly of robotic arms, actuators, AI systems	Manufacturing of smartphones, laptops, wearables
Acoustic & Haptics Components	AAC Tech, Goertek, Knowles, Cirrus Logic	Microphones, haptic actuators for interaction	Speakers, haptic feedback for AI PCs, smartphones
Humanoid Robot-Specific Components			
Robotic Actuators & Motors	-	Precision motor systems for movement and dexterity	-
Exoskeleton & AI-powered Joints	-	High-torque actuators for joint movements	-
Humanoid AI Training & NLP	-	Custom AI models for human-like behavior and decision-making	-

Source: DBS Bank, Company Data

Third growth wave for consumer electronics suppliers

Consumer electronics component suppliers have demonstrated a significant capacity for integration within the EV supply chain, achieving an impressive 28%-64% CAGR in automotive-related revenue from 2018 to 2023, reaching approximately 17% of total revenue by 2023. As the adoption of humanoid robots accelerates, these suppliers are well positioned to mirror their EV-related success, applying their proven strategies and technological capabilities to the robotics domain. We anticipate this market expansion into humanoid robots will represent the third significant growth trajectory for these suppliers, following the earlier growth phases driven by smartphones and EVs.

Component suppliers' penetration into EV during 2018-23



Source: DBS, company data

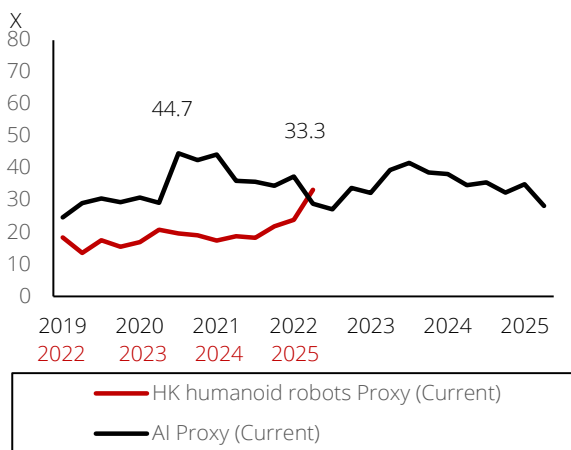
Valuations & stock implications

Valuations

Valuations in the humanoid robotics sector appear modest when compared to the recent AI boom, suggesting potential undervaluation. AI stocks' valuation has nearly doubled since generative AI emerged. In contrast, China's humanoid robotics sector, still at an early stage, has not seen similar spikes, indicating significant upside.

Humanoid robots are set to disrupt industries like manufacturing, healthcare, and services on a scale rivalling the internet and AI. This potential makes China's robotics sector a compelling growth opportunity for investors.

Comparison of forward PE during AI boom and now



Source: DBS, Bloomberg

HK robots Proxy: BYDE, Xiaomi, Sunny Optical, AAC Tech, SANY INT'L, Tsugami Precision, JL Mag, Shanghai Electric and Johnson Electric
 AI Proxy: AVGO, MRVL, MU, AMD, NVDA, TSM, MSFT, GOOG, AI, ORCL, AMZN, EBAY

Subsector valuation insights

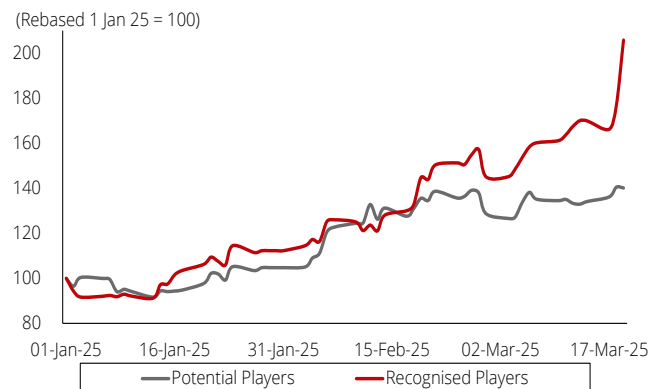
In China's humanoid robotics market, movement plane suppliers such as Inovance Technology (33x FY25F PE) and Estun Automation (121x FY25F PE) command premium valuations due to their critical role. Sensor suppliers trade at lower multiples of 18x-27x FY25F P/E, with 28%-40% FY24-26F earnings CAGR, vs. global peer Keyence's ~35x P/E and 9% CAGR, suggesting room to catch up.

Valuations for robot producers vary based on product application scenarios and market recognition as humanoid robot-related stocks. Despite rising valuations, the sector still lags behind the AI boom. The potential for widespread industry disruption, combined with relatively tempered valuations in subsectors like sensors, points to substantial upside. Investors may find compelling opportunities in areas where market enthusiasm has yet to fully materialise.

Potential players poised to close the performance gap

Well-recognised humanoid robot players, including UBTech, Xpeng, Dobot, and Robosense, have already led stock performance, surging 106% YTD on average, while potential players (Xiaomi, BYDE, AAC Tech and Sunny Optical) have lagged, rising only 40% YTD on average. We expect this performance gap to narrow as capital inflows into humanoid-related stocks in China and Hong Kong accelerate once the market fully recognises their role as beneficiaries of the robot boom.

YTM stocks performance (recognised robot players vs. potential robot players)



Source: DBS, Thomson Reuters

Potential Players: AAC Tech, Sunny Optical, BYDE and Xiaomi
 Recognised players: Ubtech, Xpeng, Dobot, and Robosense'

Stock implications**Prefer humanoid robot producers**

We generally prefer Chinese humanoid robot producers over component suppliers because:

1. Their established presence and visibility position them to benefit from potential market re-rating.
2. by internally deploying self-designed robots customized for their manufacturing process in the initial stages of humanoid robot development, they optimise costs e.g., a 19%/ 22% labour cost cut for Xiaomi in FY25/26F. Meanwhile, the external market would take time to adopt robots in various scenarios.

Robot producers**Xiaomi (BUY; TP: HKD80.0)**

Xiaomi's expertise in heavy manufacturing, strong research capabilities, and extensive product ecosystem are expected to position it as a globally influential company in humanoid robotics over the next decade. While we expect the fundamental impact to be primarily on cost optimisation in FY25/FY26 through robotic automation in its consumer electronics and EV manufacturing processes, external robot sales should begin contributing in FY26 and become more significant by FY27, reaching 4% of total revenue. With humanoid robots expected to cut Xiaomi's labour costs by c. 18.8%/21.9% in FY25/26F, we raise our earnings forecasts by 7.4%/11.3% in FY25/26F and project earnings growth of 24.3% in FY27F.

We maintain BUY and revise the TP to HKD80.0, shifting Xiaomi's valuation multiple to benchmark against global electronics players with cross-sector exposure to home appliances, consumer electronics, EVs, and internet services. Our target valuation multiple is 1.6 FY25F PEG, aligned with the mean (1.64) and median (1.62) valuation of global peers (refer to the detailed valuation table below). This implies a 52x FY25F PE, consistent with Xiaomi's historical upcycle valuation peak.

We anticipate a continuous stock re-rating, supported by:

1. Potential in Xiaomi's humanoid robotic space has not yet been fully factored in, which can be catalysed by progress updates on Xiaomi's humanoid robot launch and
2. Sustained market share gains across smartphones, IoT, and EVs worldwide.

BYDE (BUY; TP: HKD70.0)

Leveraging its parent company, the world's largest EV manufacturer, BYDE's humanoid robots already have access to a large-scale production scenario. BYDE is positioned as both a producer and a structural component supplier, with its initial production expected to support its in-house consumer electronics and automotive electronics manufacturing. We anticipate sales to its parent company to begin contributing to revenue in FY26. We raise our earnings forecasts by 1.6%/4.4% for FY25F/FY26F. We maintain BUY on the counter on the robust growth profile of 49.8% FY24-26F earnings CAGR. We slightly revise the TP upwards to HKD70, based on a higher valuation of 18x FY25F, 0.8SD above its historical mean, pegged to its upcycle valuation. We expect a continuous stock re-rating, driven by capital inflows seeking laggards in this emerging segment, catalysed by news about its supply of humanoid robots to BYD.

PEG comparison of Xiaomi's global peers

Global peers	AAPL	ASUS	Lenovo	LG	Samsung	Sony	Tesla	TCL	Xiaomi
FY25F ROE	180%	14.8%	27.2	4.3%	7.1%	13.4%	12.1%	8.6%	17.4%
FY25F PE (x)	29.1	13.0	9.0	7.8	13.7	19.8	94.9	11.8	37.7
FY24-FY27 EPS CAGR	13.7%	5.4%	36.1%	18.8%	12.3%	8.5%	24.5%	19.5%	32.7%
FY25F PEG	2.12	2.42	0.25	0.41	1.11	2.25	3.87	0.60	1.15
Mean								1.64	
Median								1.62	

Source: Visible Alpha, DBS Bank

Sensor suppliers**Sunny Optical (BUY; TP: HKD 110.0)**

As China's leader in optical technology, Sunny Optical is expected to benefit significantly from the growing humanoid robot sensor market. It has developed advanced solutions such as SLAM (Simultaneous Localisation and Mapping) visual solutions and active stereo depth cameras, which enhance spatial sensing and depth perception – essential features for humanoid robots to navigate and interact with their environment. We expect its penetration into the humanoid robot optics market to boost ASP and gross margins, given the higher value premium lenses required for humanoid robots compared to smartphones. We raise our earnings forecasts by 3% and 7% in FY25F and FY26F, respectively, to factor in ASP and margin improvements. We maintain BUY on the counter and revise the TP upwards to HKD110.0, based on the same valuation multiple of 25x FY25F, lower than the historical mean of 27.5x, catalysed by improving sentiment in the sensor segment.

AAC Tech (BUY; TP: HKD61.0)

AAC Tech is a key supplier of acoustic components, such as MEMS microphones and haptic solutions, for premium consumer electronics, including iPhones and high-end Android models. It has pioneered advanced audio and haptic solutions, including AI-powered noise cancellation and graphene diaphragm speakers, delivering premium audio experiences. Humanoid robots are expected to rely

heavily on voice commands, unlike smartphones, which have touch interfaces, and EVs, which have mechanical controls. The number and quality of microphones and speakers in humanoid robots are anticipated to be significantly higher than in consumer electronics. We anticipate the increasing demand for micro high-thrust stepper motors for robotics and high-precision hollow cup motors for service robots to boost the company's electromagnetic drives and precision mechanics segment. We expect the robot-related sales to contribute 6% of revenue in FY26F.

We also expect the rising demand for acoustic sensors in the humanoid robot market to drive ASP and margin expansion for AAC Tech. We maintain BUY on a solid growth profile of 31% FY24-26F earnings CAGR. We raise our earnings forecasts by 9.6% and 23.1% for FY25F and FY26F, respectively. We revise the TP upwards to HKD61.0, based on the same valuation multiple of 22x FY26F PE, slightly above its historical mean of 19x, pegged to its upcycle valuation, catalysed by improving sentiment in the humanoid robot sensor segment.

Comparison of supplier overlap in the humanoid robot and consumer electronics supply chains

Company Name	Code	Price Local\$	Mkt Cap US\$m	Fiscal Yr	PE 25F x	PE 26F x	Yield 25F %	Yield 26F %	P/Bk 25F x	P/Bk 26F x	EV/EBITDA 25F x	EV/EBITDA 26F x	ROE 25F %	ROE 26F %	
Optical & Imaging Sensors															
Sony Group Adr 1:1#	SONY US	USD	24.89	153,069	Mar	19.0	18.8	0.6	0.7	n.a.	n.a.	9.8	9.3	11.2	n.a.
Sunny Optical Tech.(Gp.)*	2382 HK	HKD	86.35	12,146	Dec	20.9	15.6	0.7	1.0	3.1	2.6	9.2	6.9	15.7	18.2
Largan Precision	3008 TT	TWD	2500	10,345	Dec	13.5	12.6	3.8	4.0	1.7	1.6	6.6	6.2	13.1	12.9
Aac Technologies Hdg.*	2018 HK	HKD	52.05	7,947	Dec	19.1	15.9	1.6	1.9	2.2	2.0	9.2	8.2	12.3	13.5
Semiconductor Chips & AI Processors															
Taiwan Semicon.Spn.Adr 1:5	TSM US	USD	177.47	4,602,283	Dec	19.5	16.7	1.5	1.7	5.4	4.3	n.a.	n.a.	30.3	29.5
Samsung Electronics	005930 KS	KRW	60200	299,058	Dec	13.1	10.0	2.4	2.6	1.0	0.9	3.3	2.7	7.7	9.5
Qualcomm	QCOM US	USD	157.95	174,693	Sep	13.4	13.0	2.3	2.1	6.2	5.4	10.9	10.7	45.2	39.9
Nvidia#	NVDA US	USD	118.53	2,892,132	Jan	26.2	20.6	0.0	0.0	17.2	10.0	26.9	20.8	85.2	63.1
Mediatek	2454 TT	TWD	1485	73,744	Dec	20.5	17.2	4.2	4.6	5.5	4.8	16.1	13.1	27.8	31.0
Displays & Touch Panels															
Boe Tech.Gp.'A'	000725 CH	CNY	4.31	22,267	Dec	17.4	13.1	2.2	2.5	1.2	1.1	5.7	5.2	7.1	7.9
Lg Display Adr 2:1	LPL US	USD	3.21	1,605	Dec	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Auo	2409 TT	TWD	15.35	3,649	Dec	43.7	24.1	2.4	2.2	0.8	0.8	3.3	2.9	1.4	3.3
Batteries & Power Management															
Contemporary Ampere 'A'	300750 CH	CNY	262.15	158,423	Dec	17.9	14.6	2.2	2.6	4.0	3.4	9.2	7.7	23.1	24.0
Byd 'H'*	1211 HK	HKD	424.2	166,343	Dec	24.0	20.3	1.3	1.5	4.8	4.1	9.6	8.3	23.7	21.6
Lg Energy Solution	373220 KS	KRW	334500	57,729	Dec	117.7	42.7	0.0	0.0	3.6	3.3	14.7	10.2	3.4	8.3
Panasonic Holdings#	6752 JP	JPY	1868.5	29,349	Mar	11.7	9.4	2.4	2.8	0.9	0.8	5.5	4.8	7.7	8.8
Connectivity & Communication Modules															
Qualcomm	QCOM US	USD	157.95	174,693	Sep	13.4	13.0	2.3	2.1	6.2	5.4	10.9	10.7	45.2	39.9
Broadcom	AVGO US	USD	190.54	895,909	Oct	29.0	24.6	1.2	1.4	10.1	7.8	22.6	19.3	33.8	37.2
Murata Manufacturing#	6981 JP	JPY	2519.5	31,651	Mar	16.8	14.8	2.4	2.7	1.7	1.6	6.6	6.0	10.2	10.8
Sensors & MEMS Components															
Stmicroelectronics Adr 1:1	STM US	USD	24.4	22,235	Dec	31.0	14.5	1.4	1.4	1.2	1.1	13.5	9.7	5.6	8.7
Tdk#	6762 JP	JPY	1623	20,190	Mar	16.3	14.3	2.0	2.2	1.6	1.5	4.8	4.4	10.1	10.9
Alps Alpine#	6770 JP	JPY	1606	2,254	Mar	14.8	12.6	3.7	3.7	0.8	0.8	3.7	3.4	4.9	5.2
PCBs & Electronic Components															
Hon Hai Precn.Ind.	2317 TT	TWD	166	71,498	Dec	11.5	10.1	4.3	5.0	1.3	1.1	6.0	5.1	11.0	11.5
Pegatron	4938 TT	TWD	91.8	7,580	Dec	13.5	12.4	5.0	5.2	1.2	1.1	6.1	5.7	8.6	9.3
Jabil	JBL US	USD	143.83	15,754	Aug	16.4	14.1	0.2	0.2	11.0	9.9	8.0	7.4	68.3	90.8
Wistron	3231 TT	TWD	105	9,423	Dec	12.5	10.3	5.0	6.1	2.3	1.9	5.7	4.9	18.6	19.0
Byd Electronic (Intl.)*	285 HK	HKD	48.8	14,127	Dec	13.0	9.6	2.3	3.1	2.7	2.3	7.2	5.9	22.3	25.4
Precision Manufacturing & Assembly															
Hon Hai Precn.Ind.	2317 TT	TWD	166	71,498	Dec	11.5	10.1	4.3	5.0	1.3	1.1	6.0	5.1	11.0	11.5
Luxshare Precn.Ind.'A'	002475 CH	CNY	40.42	40,150	Dec	16.7	13.7	1.1	1.3	3.3	2.8	10.7	9.1	20.7	20.9
Byd Electronic (Intl.)*	285 HK	HKD	48.8	14,127	Dec	13.0	9.6	2.3	3.1	2.7	2.3	7.2	5.9	22.3	25.4
Goertek 'A'	002241 CH	CNY	27.7	13,214	Dec	24.9	21.2	0.8	1.1	2.6	2.4	10.6	9.6	10.4	11.2
Acoustic & Haptics Components															
Aac Technologies Hdg.*	2018 HK	HKD	52.05	7,947	Dec	19.1	15.9	1.6	1.9	2.2	2.0	9.2	8.2	12.3	13.5
Goertek 'A'	002241 CH	CNY	27.7	13,214	Dec	24.9	21.2	0.8	1.1	2.6	2.4	10.6	9.6	10.4	11.2
Knowles	KN US	USD	16.11	1,413	Dec	15.1	12.0	0.0	0.0	n.a.	n.a.	n.a.	n.a.	0.3	n.a.
Cirrus Logic#	CRUS US	USD	99.87	5,308	Mar	14.6	13.0	0.0	0.0	n.a.	n.a.	n.a.	n.a.	13.5	n.a.

FY25: FY26; FY26: FY27

Source: Thomson Reuters, *DBS HK

Robotics Sector

Peers valuation

Company Name	Code	Price Local\$	Mkt Cap US\$m	Fiscal Yr	PE	PE	Yield	Yield	P/Bk	P/Bk	EV/EBITDA	ROE	ROE		
					25F x	26F x	25F %	26F %	25F x	26F x	25F x	26F x	25F %	26F %	
H-share															
Aac Technologies Hdg.*	2018 HK	HKD	52.05	7,947	Dec	19.1	15.9	1.6	1.9	2.2	2.0	9.2	8.2	12.3	13.5
Sany Heavy Equ.Intl.	631 HK	HKD	4.98	2,056	Dec	6.7	5.7	4.7	5.1	1.0	n.a.	5.1	4.4	16.3	16.8
Robosense Technology	2498 HK	HKD	46.65	2,696	Dec	n.a.	195.8	0.0	0.0	7.2	7.3	(4.2)	(45.3)	(5.0)	0.8
Precision Tsugami#	1651 HK	HKD	29.5	1,442	Mar	13.6	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	21.9	n.a.
Shanghai Elec.Gp.Co.'H'	2727 HK	HKD	2.83	14,854	Dec	23.2	35.3	0.8	0.9	0.8	0.8	19.3	17.7	2.0	2.2
Johnson Electric Hdg.#	179 HK	HKD	17.92	2,151	Mar	7.6	7.2	3.7	3.6	0.7	0.7	2.5	2.4	9.5	9.3
Haitian Intl.Holdings	1882 HK	HKD	22.05	4,521	Dec	9.7	8.9	4.0	4.4	1.4	1.3	5.8	5.3	15.0	14.7
Ubtech Robotics 'H'	9880 HK	HKD	94.3	8,130	Dec	n.a.	n.a.	0.0	0.0	13.7	9.0	n.a.	n.a.	(21.8)	(8.0)
Shenzhen Dobot 'H'	2432 HK	HKD	74.3	3,858	Dec	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Horizon Robotics*	9660 HK	HKD	7.53	10,715	Dec	n.a.	n.a.	93.5	105.3	(3.0)	(2.8)	(22.8)	(40.5)	n.a.	n.a.
A-share															
Nanjing Estun Atmtn.'A'	002747 CH	CNY	24.46	2,910	Dec	126.7	67.8	0.2	0.4	8.6	7.8	46.7	33.8	6.5	11.6
Hgzo.Jingye Intel. Tech. 'A'	688290 CH	CNY	61.61	864	Dec	n.a.	n.a.	0.9	n.a.	4.3	n.a.	16.7	n.a.	11.9	n.a.
Shenzhen Inovance Tech. 'A'	300124 CH	CNY	71.52	26,449	Dec	32.5	27.5	0.8	0.9	5.8	5.0	26.0	22.3	18.6	18.7
Hefei Jingsong Intel. Tech.'A'	688251 CH	CNY	24.77	295	Dec	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Zhejiang He Chuan 'A'	688320 CH	CNY	46.07	955	Dec	94.0	74.3	0.0	0.2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ningbo Pia Automation 'A'	688306 CH	CNY	12.07	2,035	Dec	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Yantai Zhenghai Magnetic 'A'	300224 CH	CNY	14.08	1,619	Dec	30.6	25.6	n.a.	n.a.	2.7	2.5	n.a.	n.a.	9.0	10.0
Zhej.Fore Intel. Tech. 'A'	301368 CH	CNY	84.49	1,393	Dec	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Supcon Technology 'A'	688777 CH	CNY	55.33	6,003	Dec	28.8	23.6	1.5	1.7	3.5	3.2	25.4	20.6	13.0	14.0

FY25: FY26; FY26: FY27

Source: Thomson Reuters, *DBS HK

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BUY (>15% total return over the next 12 months for small caps, >10% for large caps)

HOLD (-10% to +15% total return over the next 12 months for small caps, -10% to +10% for large caps)

FULLY VALUED (negative total return, i.e., > -10% over the next 12 months)

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*Share price appreciation + dividends

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