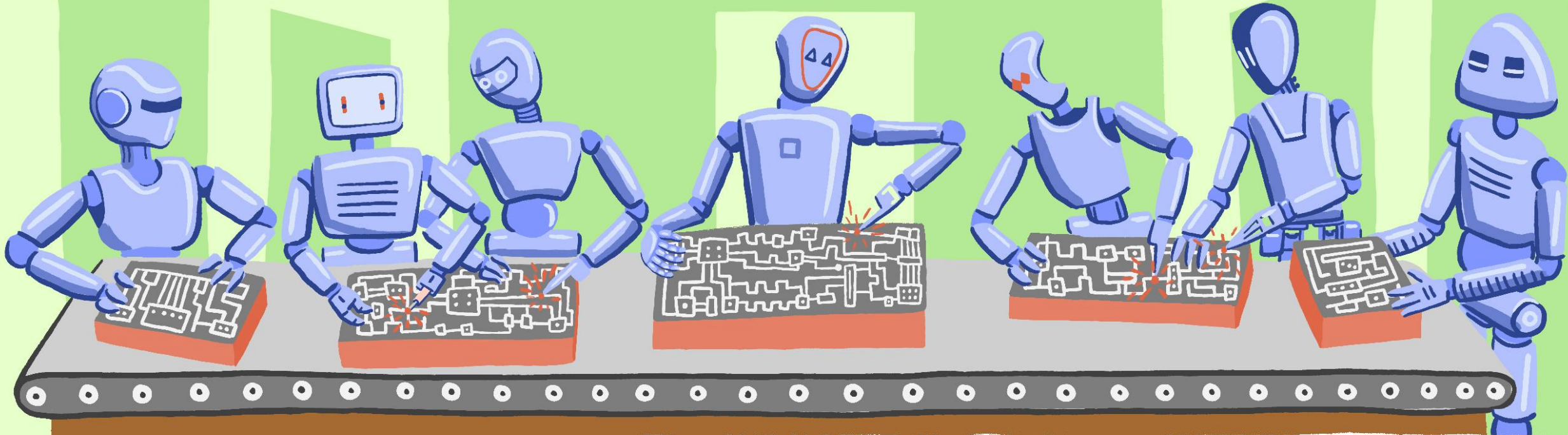


HUMANOIDS 2026

LIMBED ROBOTS | BIPEDAL / WHEELED HUMANOIDS | QUADRUPEDS | SYNTHETIC HUMANS | 2026



Humanoids 2026 (Feb)
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EXEC SUMMARY: ROCKETING VENDOR NUMBERS MAY ALREADY HAVE SATURATED A NASCENT HUMANOID MARKET. EARLY SIGNS OF SEGMENTS APPEARING

ROCKETING VENDOR LANDSCAPE

- Public funding in the sector reached just shy of \$5bn in 2025 and the number of vendors announcing a humanoid or related software product has doubled from STIQs [2025 report](#)
- While there are a similar number of bipedal and wheeled humanoid vendors globally, bipedal vendors have attracted 4X more funds
- Asian companies have attracted c.60% of all funding globally

AN ALREADY SATURATED MARKET

- With nearly 200 vendors globally there is a sense the market is already saturated with limited signs of commercial traction
- Core humanoid technologies, such as motors are developed rapidly at well funded startups, some of which are also diversifying into component suppliers

HUMANOIDS, NOT THE ONLY TRICK

- Humanoids attract large audiences and plenty of coverage in traditional and new media channels, and it can often be difficult to see through the hype

- This often obscures the fact that there are plenty of established competing products and solutions
- Attractive use cases for humanoids will likely be interesting for such competitors, unless these are so specific or niche that they can only economically be executed by a humanoid

HUMANOID SEGMENTS APPEARING

- Four early-stage segments are developing in the humanoids industry: Toys/ Entertainment, Butler, Light Industrial and Heavy Industrial
- Toys & Entertainment and Butler target domestic environments while entertainment humanoids veer more towards B2B use cases
- A large proportion of vendors are focusing on Light Industrial humanoids targeting warehouse and industrial applications
- Heavy Industrial humanoids are likely to appear as the Light Industrial space becomes even more saturated

SAFETY, A KEY MARKET INHIBITOR

- Safety aspects of humanoids are paramount, especially in domestic uncontrolled settings

- While humanoid standards are slowly evolving, liability issues are likely to inhibit market growth in the short term

IMMEDIATE FUTURE OF HUMANOIDS

- There is widespread optimism, but continued trials and POCs are the most likely short-term development before safety issues are solved
- Some humanoid vendors will likely pivot into pure component suppliers while others may explore the entertainment angle, possibly with public competitions, such as boxing fights, etc.

FOR BUYERS & USERS OF HUMANOIDS:

STIQ offers a free 30min debrief/Q&A session for this report as part of the sponsorship. Contact us to arrange a confidential “ask us anything” session

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THE CURRENT STATE OF THE HUMANOIDS MARKET APPEARS TO FOCUS ON SALES TO ACADEMIA + GOVERNMENTS. ENTERTAINMENT & PR ANGLE REMAINS IMPORTANT

HUMANOID BOXING RING AT TRADE SHOW



Source: STIQ Ltd from Robotworld 2025 (South Korea). Trade show event review available (\$)

CURRENT STATE OF THE HUMANOID MARKET

- Nearly all analyst estimates of the global humanoid market opportunity appear to focus on the longer-term future, often with multi-\$10bn's valuations
- While there are plenty of ongoing trials with humanoids in factories, warehouses and other industrial processes, the primary market appears to be largely made up from academic and/or government institutes

“Unitree Robotics is one of the leading companies in the domestic legged robot and humanoid robot market. The company stated that in 2024, sales of quadruped robots, humanoid robots, and component products accounted for approximately 65%, 30%, and 5%, respectively. Approximately 80% of quadruped robots are used in research, education, and consumer fields, while the remaining 20% are used in industrial fields such as inspection and firefighting; humanoid robots are used entirely in research, education, and consumer fields.”
[Venture Capital Daily, [source](#)]

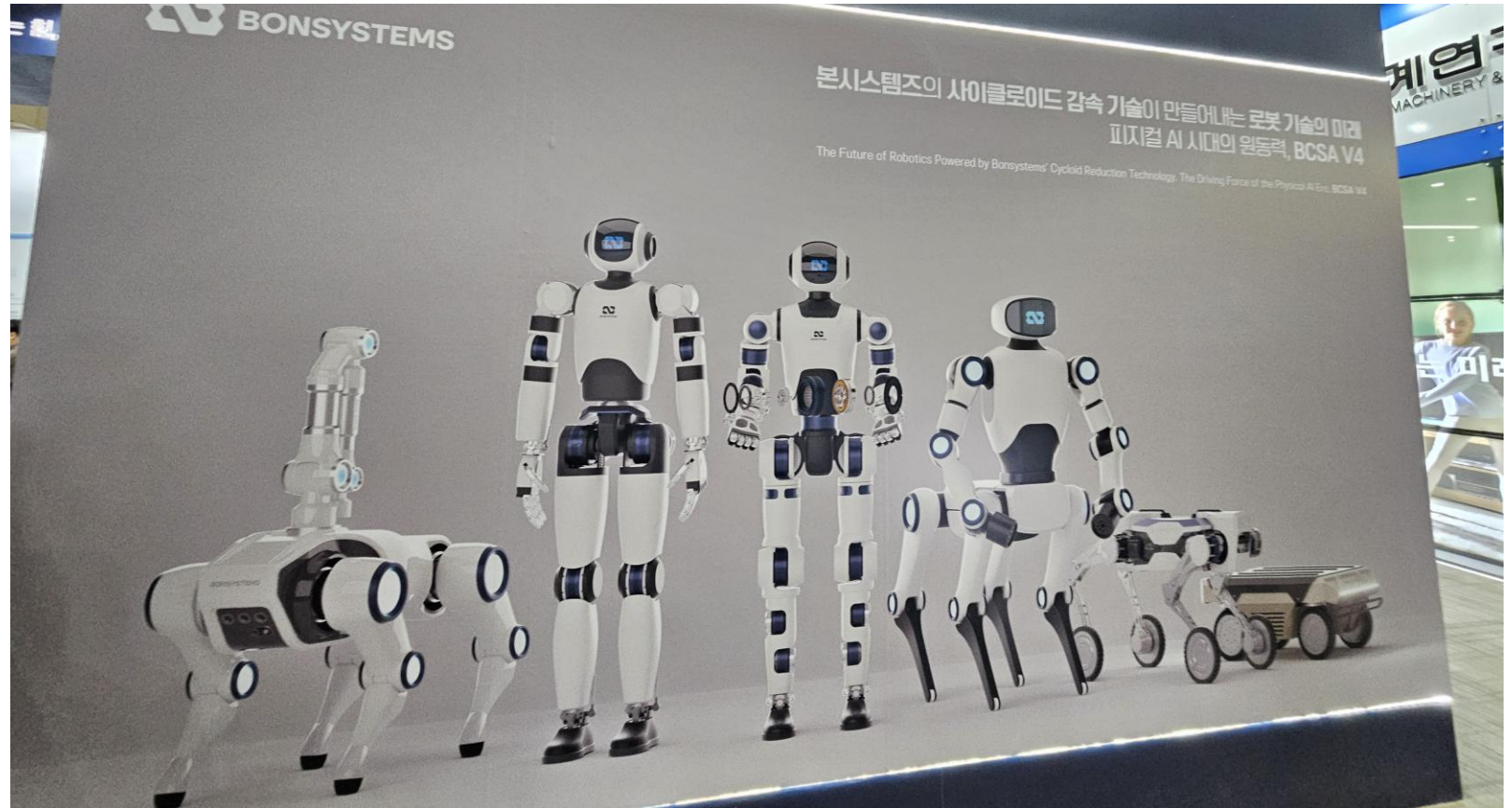
- Furthermore, the entertainment appeal of humanoids appears to be a growing focus for some of the current leading vendors
- The latter may be a result of the many videos circulating on YouTube and other platforms of humanoids doing parkour exercises, being kicked and so on

PLENTY OF STAKEHOLDERS ARE INVESTING SIGNIFICANT CAPITAL AND/OR RESOURCES ON A HYPOTHETICALLY MASSIVE HUMANOID MARKET

INVESTORS AND SUPPLIERS ROLLING IN

- Significant influx of VC money in the sector combined with relatively low barriers to entry in the space (partly due to a lack of definitions/standards) have caused the number of vendors to balloon
- Plenty of component suppliers are also keen to exploit the humanoid opportunity and actively market products, systems and solutions to the emerging sector
- Some of the key suppliers includes motor/actuator and IMU vendors and there are plenty of these with varying degrees of investment in the humanoids space
- A few only include references in adverts, while others may market complete body parts, such as arms, torso, hands, etc.
- This has also removed some of the barriers to entry in the humanoid space
- However, what it has not done is to completely remove the requirement for vastly improved mechatronics, sensors, etc.
- The primary result of investment and supplier involvement has been a surge in the number of companies offering humanoids, both bipedal and wheeled

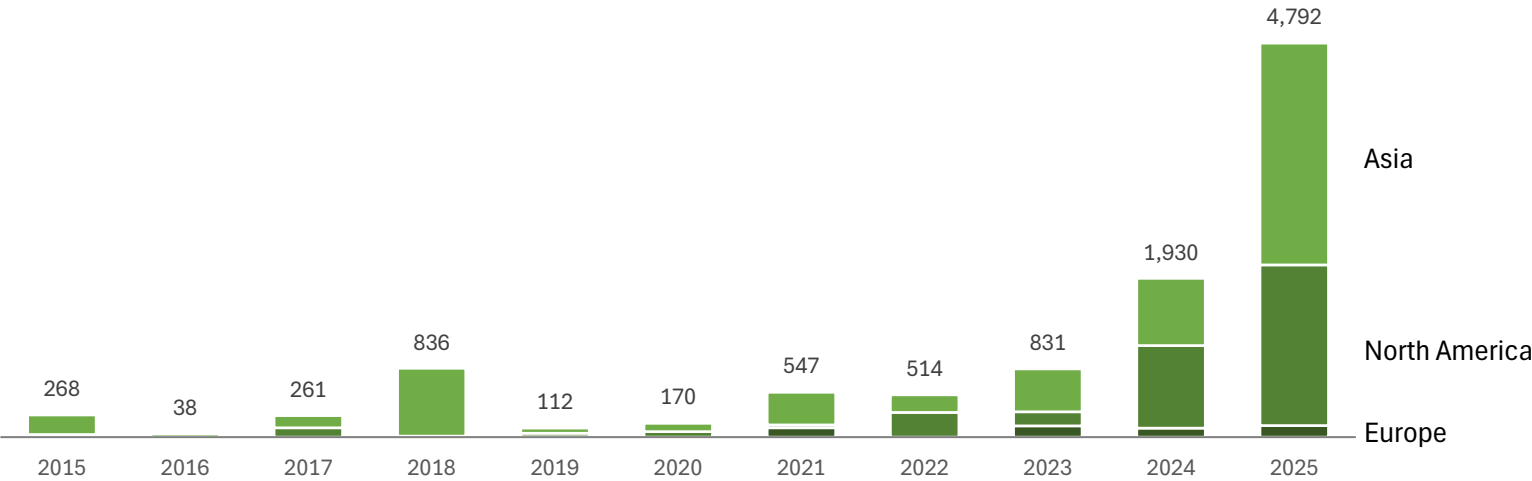
COMPONENT SUPPLIERS INCREASINGLY MARKETING THE HUMANOID OPPORTUNITY



Source: STIQ Ltd from Robotworld 2025 (South Korea). Trade show event review available (\$)

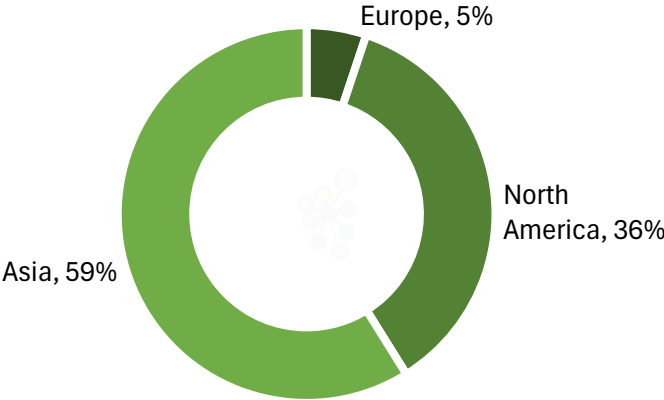
HUMANOID RELATED FUNDING IS SKYROCKETING, POTENTIALLY FUELED BY AN ASSOCIATION WITH AI OFTEN DESCRIBED AS ‘EMBODIED AI’ OR ‘PHYSICAL AI’

ANNUAL HUMANOID RELATED FUNDING, 2015-2025 (\$M)



Source: STIQ Ltd Research & Analysis. Focus on companies with a hardware component

SHARE OF ALL HUMANOID RELATED FUNDING, 2015-2025 (%)



FUNDRAISING CAVEAT

- Note this fundraising is based on publicly available information and actual funds raised
- Furthermore, there are several instances where companies (or media reporting) appears to have confused raised capital with targeted amounts raised, for example ‘we aim to raise \$100m’ is conflated with ‘we raised \$100m’
- While there is a reasonable level of confidence in fundraising levels, STIQ recommends anyone interested to do their own research

HUMANOID COMPANIES RAISED >\$10BN

- Cumulative funds raised for humanoid related companies exceeds \$10bn since 2015
- This does not include funds invested by enterprises that have announced humanoid developments, such as Tesla, Xiaomi, etc.
- Furthermore, there have been several rounds where the amount raised is not disclosed

ASIAN COMPANIES ATTRACTS MOST FUNDING

- Asian companies represent 59% of all funds raised to end 2025 with North American companies accounting for 36% and European for 5%

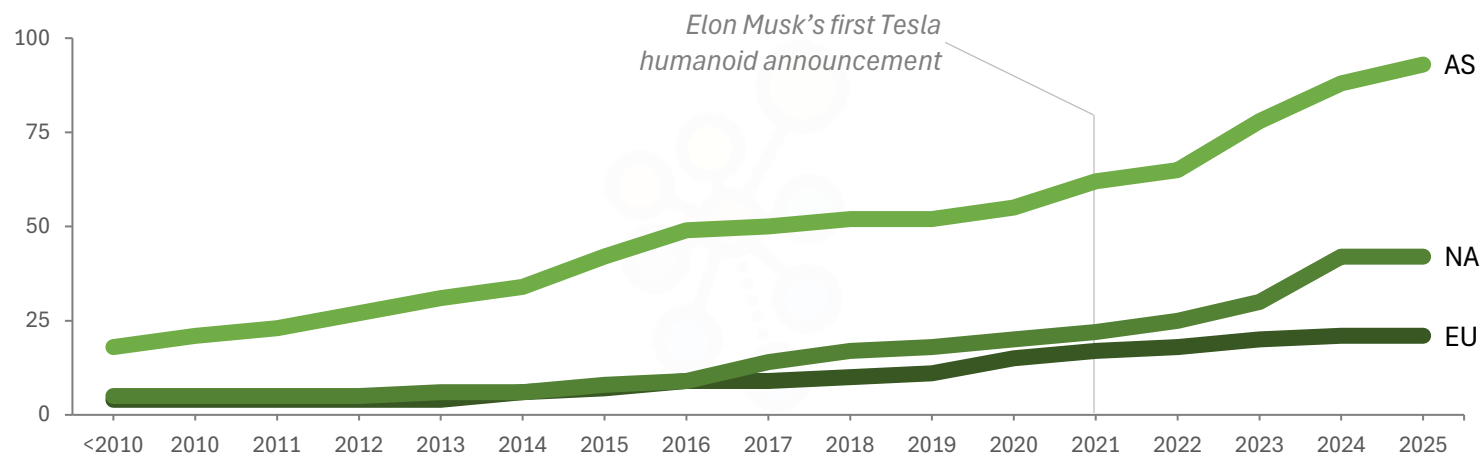
GROWING NUMBER OF \$100M+ ROUNDS

- In 2023 there was a single round over \$100m vs nine rounds in 2024 and 14 in 2025



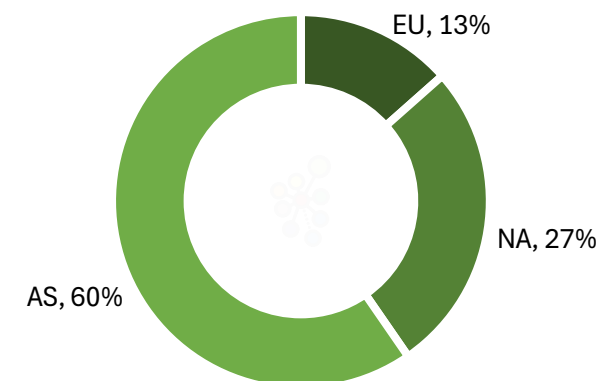
VAGUE DEFINITIONS OF ‘HUMANOID’ AND LOWER BARRIERS TO ENTRY HAVE ACCELERATED VENDOR NUMBERS.

BIPEDAL & WHEELED HUMANOID VENDORS GLOBALLY BY CONTINENT, 2010-2025 (#)



Source: STIQ Ltd Research & Analysis. Year company founded, may be different to adding humanoid product

SHARE OF HUMANOID VENDORS BY CONTINENT, 2025



HUMANOID BARRIERS COMING DOWN

- While the definition of humanoid remains somewhat opaque, barriers to entry in the sector are gradually coming down and being replaced by more advanced technology table stakes
- For example, creating a rudimentary functioning H1 humanoid from existing off-the-shelf components and open-source software is relatively simple
- However, developing a more advanced H2+ humanoid requires significant proprietary developments

GLOBAL NUMBER OF VENDORS

- STIQ tracks between 150-200 humanoid vendors (bipedal and wheeled)
- Asian vendors represent 60% of all global vendors by quantity while North American account for 27% and European 13%

ASIAN/ CHINESE VENDORS DOMINATING

- Asian vendors are dominated by Chinese companies representing nearly 80% of all (Asian) vendors

- While c.80 Chinese humanoid vendors place China at the forefront of the sector, such saturation is also likely to promote hyper competitive market dynamics manifesting as significant early price pressures
- Furthermore, quantity of vendor leadership at this nascent stage may simply deter further investments and with it, the development of more advanced technological evolution
- However, there appears to be strong political incentives to promote robotics, including humanoids, in China which may allow leaders to emerge and prosper



PRIMARILY BIPEDAL HUMANOID VENDORS AMONG THE TOP 10 MOST FUNDED COMPANIES. ARE WHEELED HUMANOID VENDORS LESS EXCITING FOR INVESTORS?

TOP FUNDED HUMANOID AND RELATED COMPANIES

Company	Year Founded	Country	Total Raised (\$m) *	Product Range
Figure AI	2017	US	1,754	Humanoid (bipedal)
UBTech	2012	China	1,400	Humanoid (bipedal), other robots
Unitree	1995	China	1,164	Humanoid (bipedal), quadruped
Physical Intelligence	2024	US	1,000	Software
Apptronik	2015	US	962	Humanoid (bipedal)
Agility Robotics	2015	US	729	Humanoid (bipedal)
Skild AI	2023	US	400	Software
Neura Robotics	2019	Germany	297	Humanoid (wheeled), other robots
X Square Robot	2023	China	260	Humanoid (bipedal and wheeled)
Rainbow Robotics	2011	South Korea	255	Humanoid (bipedal)

Source: STIQ Ltd Research & Analysis. Details such as funding and product ranges may not be exhaustive. * Publicly known

- There is no exclusively wheeled humanoid vendor among the top 10 funded companies despite an equal number of total vendors tracked by locomotion (bipedal vs wheeled)
- Vendors with bipedal form factors manage to attract 4X funds compared to wheeled humanoid companies
- Such funding discrepancy may be due to wheeled humanoids capturing less attention or lacking the excitement that videos of humanoids running around doing parkour (and other) exercises may elicit
- Note a few wheeled humanoid vendors have raised funding for other robot products and added a humanoid in recent years to potentially push up EV
- The two software companies in the list are likely benefitting from the popularity of general investments in AI businesses

TOP 10 FUNDED VENDORS

- STIQ actively tracks c.250 companies in the wider humanoids sector
- These companies raised a total of c.\$14bn (the entire space including hardware and/or software companies) to the end of Feb 2026

- The top 10 companies have raised combined c.\$8bn

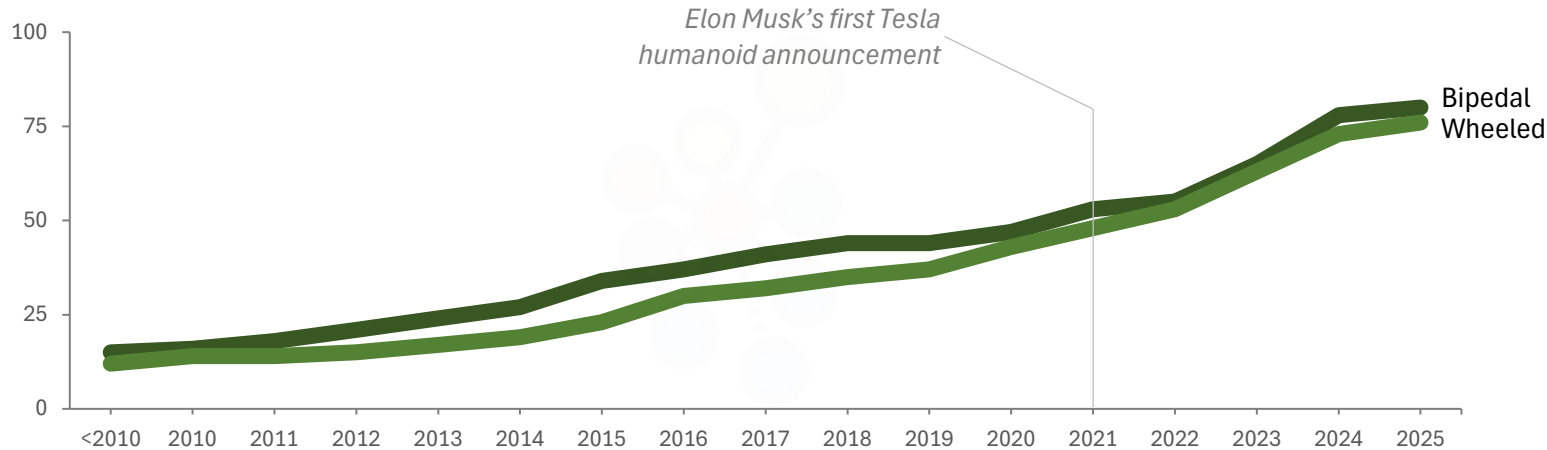
BIPEDAL HUMANOID ATTRACTING MOST FUNDS

- Of the top 10 funded humanoid related companies seven produce bipedal locomotion humanoids with only a single company also producing a wheeled humanoid



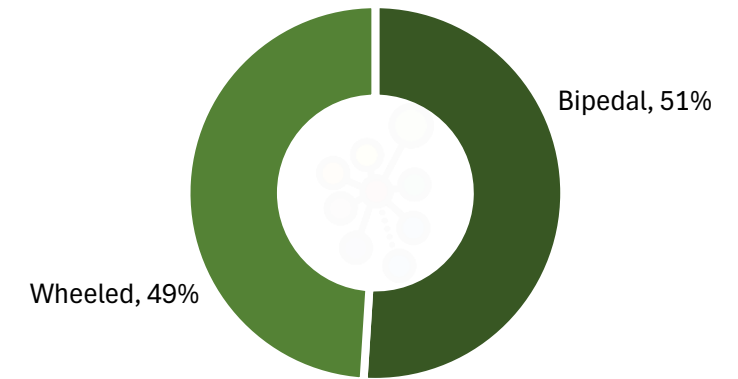
BIPEDAL OR WHEELED LOCOMOTION? THE ECOSYSTEM APPEARS DIVIDED DESPITE THE GREATER FUNDING FOR BIPEDAL HUMANOIDS

BIPEDAL & WHEELED HUMANOID VENDORS GLOBALLY, 2010-2025 (#)



Source: STIQ Ltd Research & Analysis. Year company founded, may be different to adding humanoid product

SHARE OF ALL HUMANOID VENDORS BY LOCOMOTION, 2025



Source: STIQ Ltd Research & Analysis

BIPEDAL OR WHEELED LOCOMOTION

- The number of vendors focusing on either locomotion factor – bipedal or wheeled – is split evenly among all vendors
- There is a limited overlap with c.10 vendors offering both bipedal and wheeled locomotion humanoids
- Both form factors have perceived advantages and disadvantages with the market remaining undecided if one of these will win out in the longer term

BIPEDAL MORE 'HUMANLIKE'

- The bipedal locomotion form factor looks and feels more 'human' and many vendors have produced bipedal locomotion that closely replicates a human walk
- One of the advantages of bipedal locomotion is that these robots may be able to easily move on stairs and avoid other similar obstacles
- The disadvantage is moving legs adds more complexity to the robot

WHEELED BASE EASIER TO MOVE ON FLOORS

- A wheeled (mobile robot) base is currently cheaper to produce compared to bipedal base
- Furthermore, mobile robots are relatively mature technology with an existing supplier ecosystem and developing standards references

HUMANOID COMPONENT & SOFTWARE ECOSYSTEM EMERGING. LEGACY VENDORS ARE ALSO BEING ASKED TO PREPARE TO INTEGRATE WITH HUMANOIDS (FOR TRIALS)

COMPONENT AND SOFTWARE SUPPLIER ECOSYSTEM EMERGING FOR HUMANOIDS

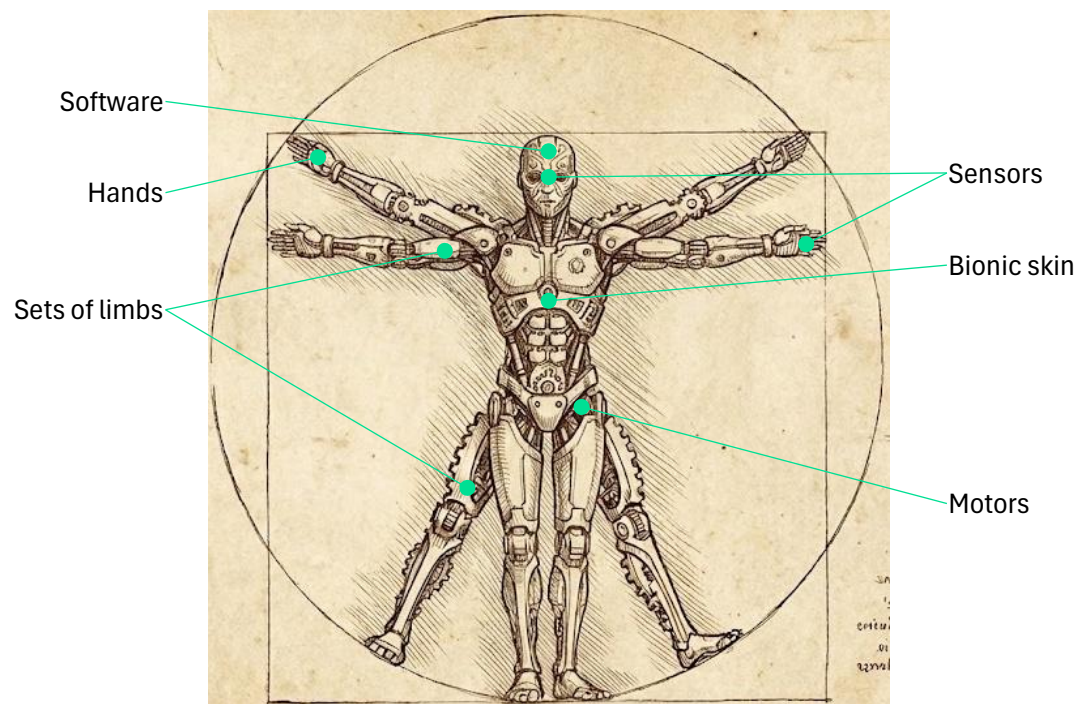
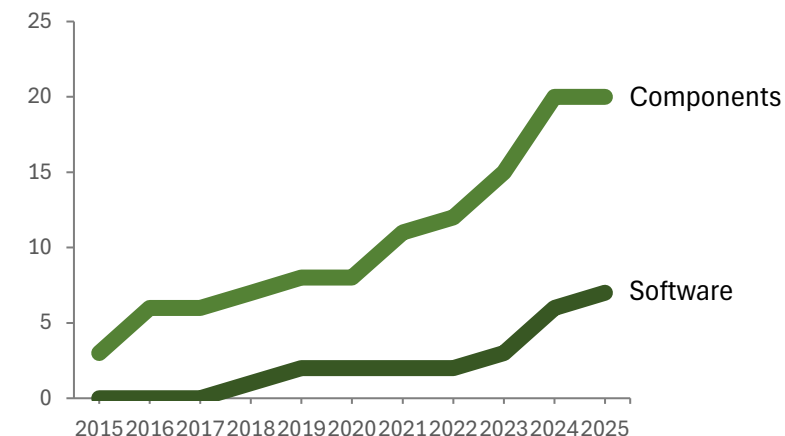


Image source: Google Gemini, STIQ Ltd prompt

HUMANOID SUPPLIER ECOSYSTEM EMERGING

- In the wake of huge funding rounds and growth in the number of humanoid vendors, there has been a relatively quick emergence of a component and software supplier ecosystem
- Existing vendors of industrial computers, motors, batteries and other key components have been quick to market their products to humanoid vendors and use humanoid imagery in their promotional materials
- In addition, a new breed of software vendors is emerging targeting a wide range of 'embodied AI' applications

EMERGENCE OF A COMPONENT & SOFTWARE ECOSYSTEM TARGETING HUMANOIDS



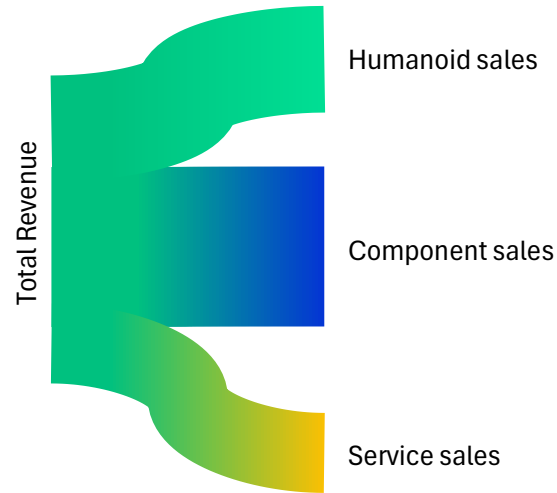
Source: STIQ Ltd Research & Analysis. Year company founded, may be different to adding humanoid product

- Vendors already supplying factories are also increasingly being asked by customers to integrate with humanoids and/or to prepare to manage humanoid fleets as a part of future proofing software stacks
- As more dedicated component and software suppliers are entering, the barriers to entry in the humanoids space are dropping, potentially adding further confusion to the question of what a humanoid robot actually is (or is not)



COMPONENT DEVELOPMENTS BY HUMANOID VENDORS ARE OPENING UP ADDITIONAL REVENUE STREAMS (AND A POTENTIAL SPIN OFF EXIT AVENUE)

HUMANOID VENDOR REVENUE STREAMS (NOT TO SCALE)



Source: STIQ Ltd Research & Analysis. Note component sales have been confirmed as a major source of revenue for some humanoid vendors

COMPONENTS, A KEY REVENUE STREAM

- Analysis of some humanoid vendor's accounts hint at component sales being a significant focus for development and a key source of revenue
- At this stage, the primary component development work and sales revenue appears to have focused on motors and/or actuators

MOTOR LOCATIONS

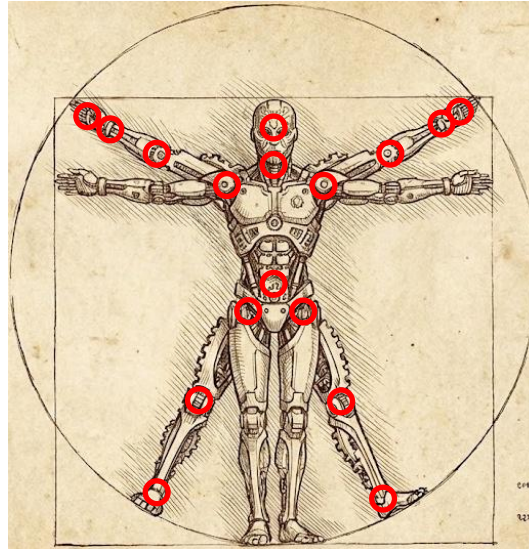


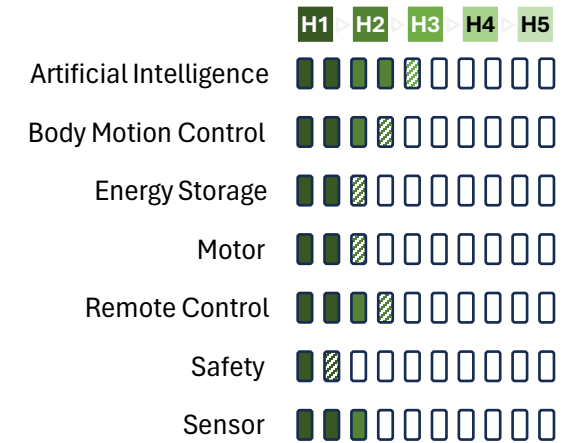
Image source: Google Gemini, STIQ Ltd prompt

- This has likely been a key focus area for many of the better funded humanoid vendors in the sector as a bipedal humanoid chassis may include 25-45 motors
- More fluid movements (similar to humans) can often be achieved with more motors

FURTHER DEVELOPMENTS REQUIRED FOR H3+

- Many humanoid technologies (some may be proprietary to a specific vendor) remain adequate for H1/H2 level

CURRENT STATE OF HUMANOID COMPONENT & PROCESS DEVELOPMENTS (SIMPLIFIED)



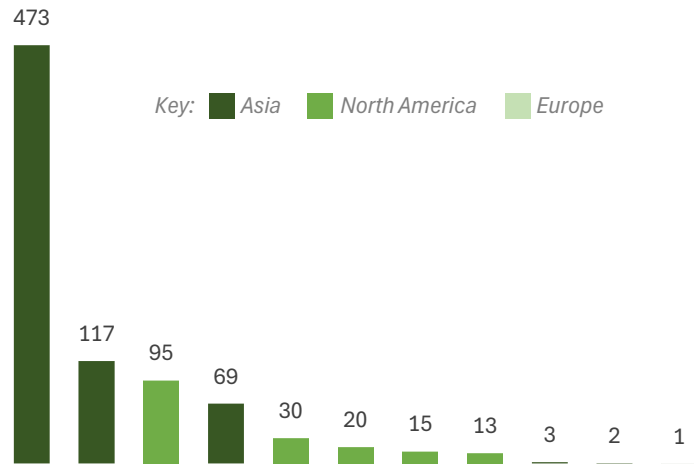
Source: STIQ Ltd Research & Analysis. Simplified and not exhaustive. Future developments may be separate to reach >H3. See page 34 for humanoid levels

- However, to achieve beyond H2, technologies will likely have to evolve further
- Reaching above H3 may also include development of technologies not currently available today, for example reflex movements, spinal cortex, etc.



ASIAN HUMANOID VENDORS APPEAR TO BE MORE ACTIVE PATENT FILERS COMPARED TO NORTH AMERICAN AND EUROPEAN PEERS

PATENTS BY SELECTED HUMANOID VENDORS IN ASIA, NORTH AMERICA AND EUROPE ¹



Source: STIQ Ltd Research & Analysis. Google Patent database by assignee and featuring word 'humanoid'. May be different to actual relevant IP and some vendors may also use 'IP proxies' to avoid easy scrutiny

¹ Limited selection focus on most well funded companies

HUMANOID INTELLECTUAL PROPERTY

- There are c.72,500 patents mentioning or referencing 'humanoid' on the Google Patents database ([source](#)) up to the end of 2025

HUMANOID VENDORS NOT VERY PROLIFIC

- Surprisingly, many of the best funded humanoid vendors appear to have filed relatively few patents, many less than 100
- There may be several reasons for this, such as:
 - Patents are filed using a proxy business with a different name
 - No mention of humanoid, perhaps using multi-limbed robot or similar
 - Not covered by Google Patent database
 - There may be few unique aspects of a humanoid and the focus of some companies may be on software

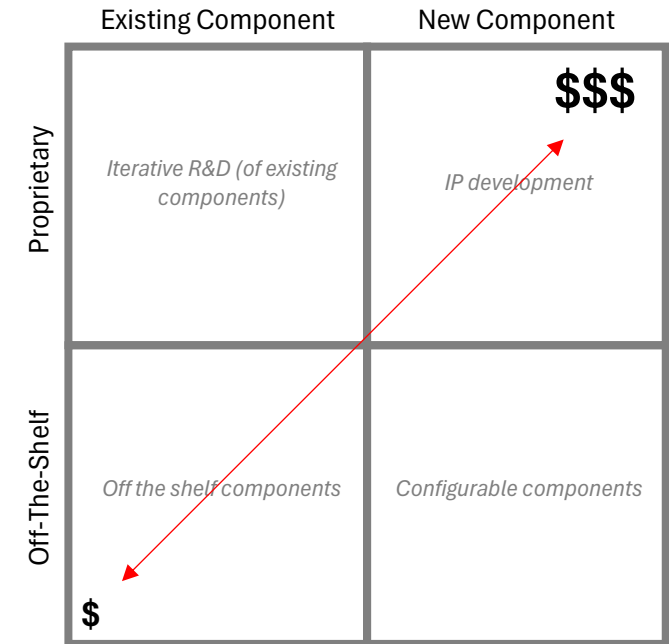
CHINESE VENDORS (& UNIVERSITIES) ACTIVE

- Chinese vendors appear far more active in filing patents compared to North American and European vendors
- Notably, more prolific patent filers includes, among others, Chinese universities, each with sometimes many 100's of filings

IS THERE AN INTELLECTUAL PROPERTY ISSUE?

- At this stage, technology appears to develop fast and patents may not be a suitable strategy considering the potential benefit and applicability
- There may also be some questions around the definition of humanoid and how this differs from other robots

COST OF INTELLECTUAL PROPERTY MAY OUTWEIGH ADVANTAGES (FOR NOW)

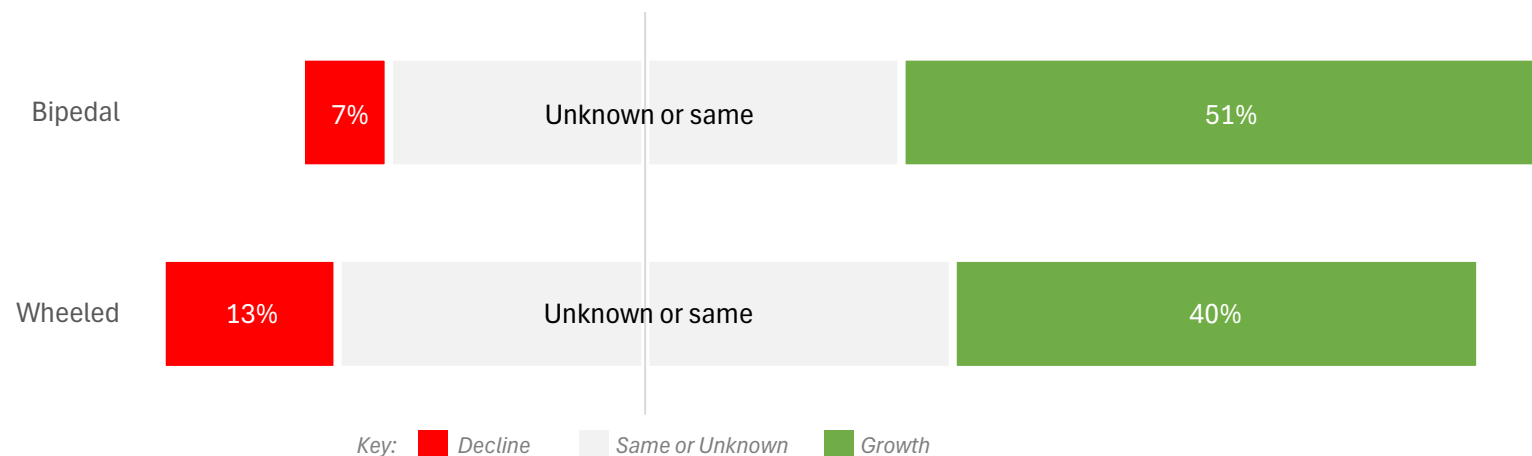


Source: STIQ Ltd Research & Analysis



THE PROLIFERATION OF HUMANOID VENDORS WILL LIKELY ADD PRESSURES ON COMPANIES IN 2026 WITH HARDER FUNDRAISING, ETC.

FTE GROWTH/DECLINE BY HUMANOID LOCOMOTION 2026 vs 2025



Source: STIQ Ltd Research & Analysis

VENDORS SUFFERING IN SATURATED MARKET

- A high level of vendor saturation in the humanoid market is pressurizing companies to differentiate to raise further funds and to gain brand recognition
- While there has been a huge influx of venture capital into the humanoid space, STIQ analysis suggests there is a relatively high number of companies suffering from a lack of traction
- Lack of traction is most likely due to a lack of fundraising rather than revenue at this stage of market evolution

NO GROWTH COMPANIES (OR UNKNOWN)

- A relatively large group experienced no growth/decline, however, the majority of these companies are likely relatively small or early stage

LARGE SHARE OF GROWING FTEs

- While there is a relatively high degree of unknowns in the sector, many companies are clearly growing their FTEs
- The majority (51%) of bipedal locomotion humanoids are growing compared to only 40% of wheeled locomotion vendors
- This is highly likely related to the higher fundraising attracted by vendors of bipedal vs wheeled humanoids

LEADERS MAY BE EMERGING

- The current humanoid market remains nascent and too small to currently have clear leaders emerging
- However, with the high degree of vendor saturation, it is likely leaders will feature those companies that are better at fundraising and branding (to attract talent and media coverage) rather than pure technological prowess
- These leading companies are also likely to acquire (acquire) a few smaller competitors to gain access to talent and potentially also customers and revenue streams



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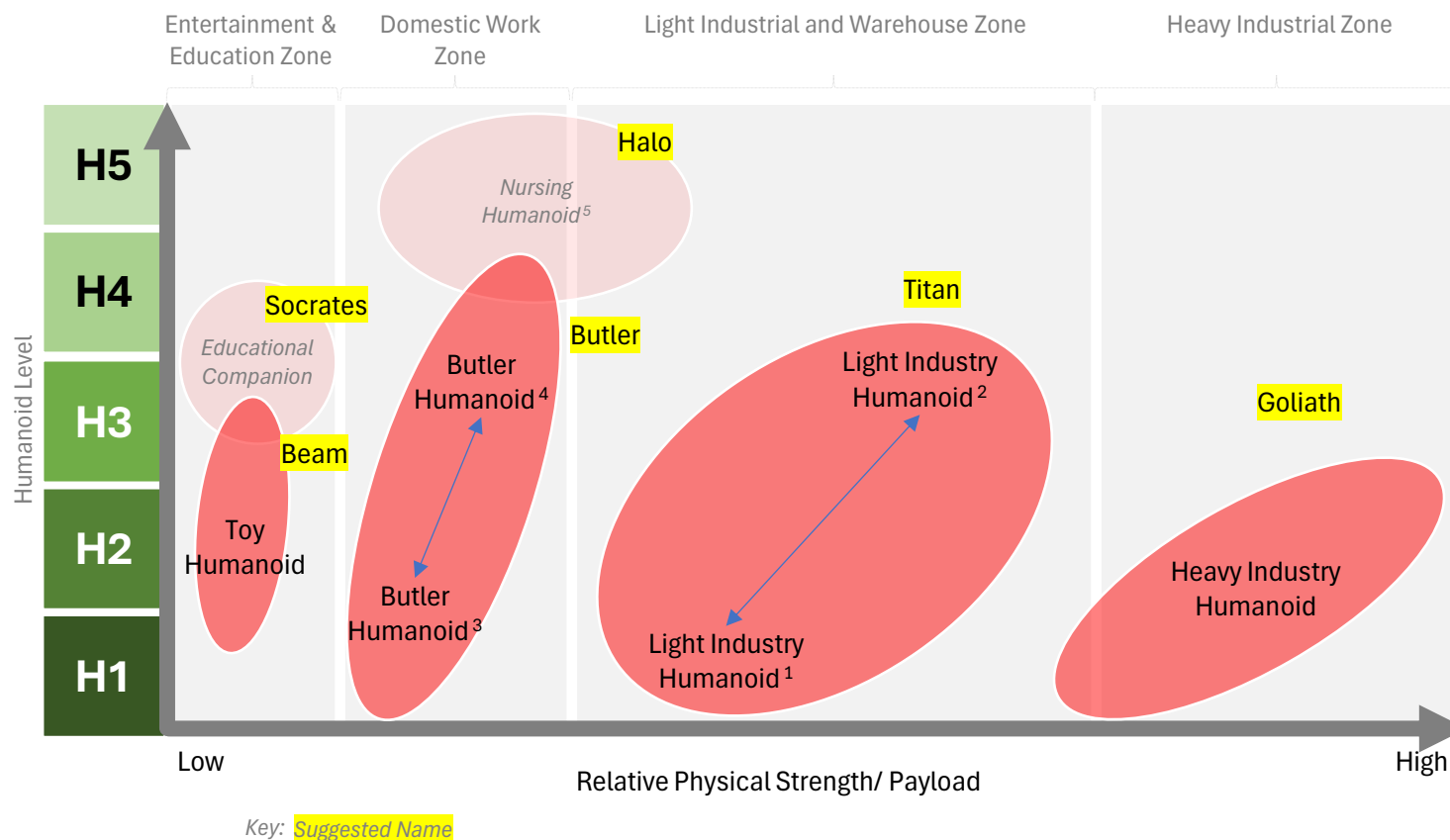
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EARLY SIGNALS THE MARKET IS SEGMENTING INTO TASK, PAYLOAD & ENVIRONMENT RELATED SPECIALIST COMMERCIAL AND CONSUMER HUMANOIDS

EARLY SIGNALS THERE ARE FOUR PRIMARY HUMANOID SEGMENTS APPEARING IN THE MARKET



Source: STIQ Ltd Research & Analysis

* Light Industry Humanoid is likely to vary from limited number of tasks¹ to more complex tasks²

* Butler Humanoid likely to range from simple tasks³ like picking up toys to folding garments to more social/ friend-related⁴ tasks

* Nursing humanoid is expected to be available only with higher level humanoids

EARLY SIGNALS OF HUMANOIDS SEGMENTING

- STIQ have picked up on early market signals hinting at a medium-term future with four primary types or segments of humanoids: Toy Humanoid, Butler Humanoid, Light Industrial Humanoid and Heavy Industrial Humanoid
- With the current humanoid state of the art remaining in H1 & H2, some of these segments are yet to be defined
- Furthermore, as humanoid technology evolves in the longer-term, there will be further segmentation of more advanced systems

FOUR HUMANOID SEGMENTS EMERGING

- Two overall distinct segments currently appear in the market with Consumer Humanoids and Commercial Humanoids
- Consumer Humanoids include Toy & Entertainment (Beam, Socrates) Humanoids and Butler Humanoids (Butler, Halo)
- Commercial Humanoids include Light Industrial Humanoids (Titan) and Heavy Industrial Humanoids (Goliath)
- Readers should note payload capability is only one of the many input variables for determining the segment
- For example, there is little requirement for a Light Industrial Humanoid to perform parkour exercises, while this may be a feature in Toy & Entertainment Humanoids



KEY FEATURES OF THE FOUR DIFFERENT HUMANOID TYPES EMERGING: TOYS, BUTLERS, TITAN AND GOLIATH HUMANOIDS

FOUR PRIMARY HUMANOID SEGMENTS APPEARING IN THE MARKET

	Toy Humanoid	Butler Humanoid	Titan Humanoid	Goliath Humanoid
Primary application	Toy for children to interact with	Executing home chores, potential 'friend'	Warehouse, light industrial use	Heavy duty industrial usage
Primary deployment location	Home (indoor mainly)	Home (in + outdoor)	Warehouse, Light industrial facilities	Factory, construction site, shipbuilding, etc.
Locomotion *	Bipedal	Bipedal	Wheeled/Bipedal	Wheeled/Bipedal
Payload capability *	<3Kgs	<20Kgs	<50Kgs	>100Kgs
Teleoperated *	No	Potential	Potential	Potential
Safety	Critical with additional child safety measures	Critical	Critical when in collaborative mode, minimal user training	Controlled environments, trained users only
Comment	Primary task as toy and/or companion for children. Light touch AI capabilities. May be tasked with getting children to do more of something such as physical exercise, homework, etc.	Wide variety of tasks including home chores, act as emotional support tool for adults. Potentially includes going outside homes. More advanced AI capabilities	Most advanced in terms of mechatronics and voice commands. Will have to be able to flex between different payloads, tasks, etc. Less training required for interacting humans with more natural language	Highest payload capability and sturdiest mechanical design. More specialized than other humanoids, more rigid commands required with training for interacting humans
Conversational capabilities	Play, teaching/ educational and low level EQ capabilities	Conversationally advanced. Wide range of topics. Top EQ.	High level of physical flexibility, space awareness, widest range of abilities, ease of understanding processes	Simplistic IQ level with focus on understanding commands. Potentially with specialist attachments by industry
Deployment	Plug & play	Plug & play	Buyer onboarding, minimal user training	Onboarding, high degree of user training

Source: STIQ Ltd Research & Analysis. * Most likely



Image Source: ChatGPT

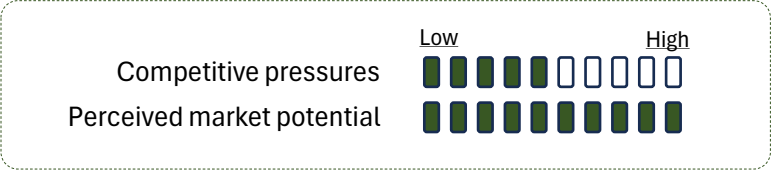
FOUR EMERGING HUMANOID SEGMENTS

- The four segments emerging in the humanoids sector can be compared to a family of humanoids
- Most likely, vendors will zoom in to and/or focus on one, or perhaps two, of these humanoids
- Each segment will require different abilities, AI interfaces, integration with other systems, etc.
- Note these are primary humanoid segments, there will likely be additional types of humanoids developing alongside other types of robots



TOY HUMANOIDS MOST LIKELY THE HIGHEST MARKET POTENTIAL WITH PLENTY OF WHITE SPACE. COMPETITION FROM TOYS, VIDEO GAMES, ETC.

TOY HUMANOID PROSPECTS AND COMPETITION



Source: STIQ Ltd Research & Analysis
Image Source: Google Gemini, STIQ Ltd prompt

TOY HUMANOID FUNCTIONALITY SPECTRUM

- Toy Humanoids may range from entry-level robots for young adults/ toddlers to begin their humanoid journey to more advanced teaching companions for slightly older children
- This segment also includes humanoids for entertainment which may vary from a robot presenting or performing stand up comedy routines, to more gymnastic performance and fighting humanoid robots, etc. in more controlled B2B environments, inside cages, etc.

EXISTING MARKET COMPETITION

- Toy and Entertainment humanoids will compete for share of wallet with existing and upcoming toys, video games, and other entertainment accessories
- There is an element of branding and hype in this segment where some toys can be must haves one season but out of season the next
- Perceived competitive pressures is low, partly due to the current hype surrounding humanoids
- Note there have been humanoid-like toys on the market for a long time and to stand out, vendors need to produce a more unique product with behavior potentially mimicking the many humanoid parkour videos in social media

REVENUE MODEL – HW+ SW UPGRADES

- Revenue models for Toy Humanoids may vary from Capex/ up front purchase for a basic model to more advanced rental models with multiple upgrade options and variations
- The toy RaaS model may require a paradigm shift which could push marketing budgets for vendors

- Consumer humanoids have the highest market potential for personalization of accessories, clothing, designs, etc.
- Software upgrades allowing these humanoids to behave differently or to change personality, etc. may also be part of and/or included in subscription models

HUMAN-IN-THE-LOOP & SAFETY ASPECTS

- B2B entertainment humanoids are deployed in controlled environments for safety purposes while consumer facing robots have far higher safety requirements and lower payload capabilities
- Toy humanoids specifically designed to operate with young children will have to fall within toy standards with some limitations on size of components, etc. in addition to robot/humanoid safety standards

MOST LIKELY LOCOMOTION SET-UP

- Toy and entertainment humanoids will most likely use bipedal locomotion as this is a key selling point

A CHILD/LIFE COMPANION RATHER THAN TOY?

- Toy Humanoids may be viewed as a life companions with transferrable ‘personality’ that can be integrated with more advanced robot upgrades or ‘grown up’ humanoids
- They may also be integrated with Butler Humanoids and share features such as languages, reading stories, memories, time management, etc. which can be checked by super users (adults)

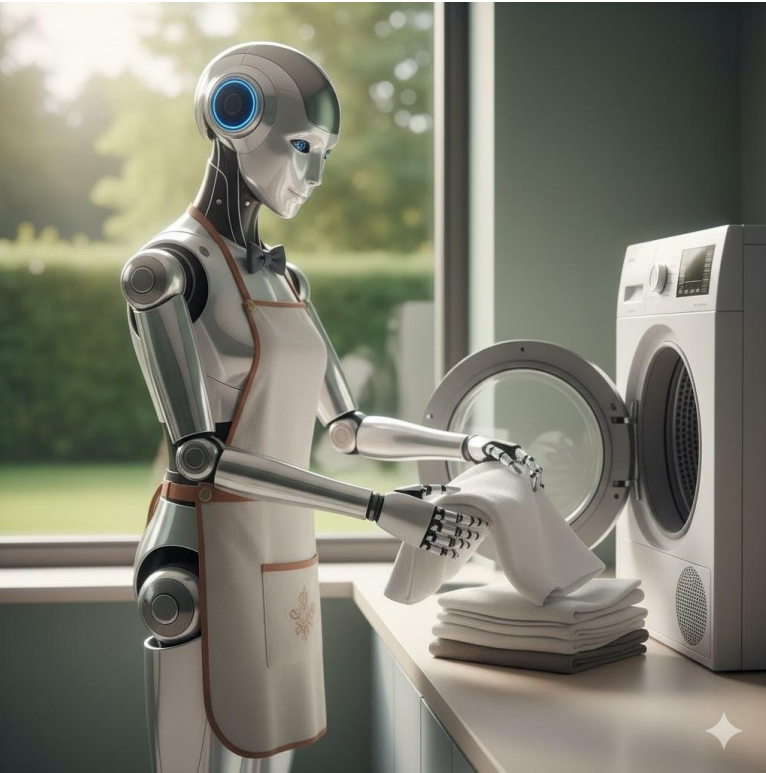


BUTLER HUMANOIDS TO ADD CONVENIENCE FOR CUSTOMERS. THIS ROBOT TO FORM BASE FOR INTIMATE HUMANOID PARTNERS, NURSING ROBOTS, ETC.



MADE POSSIBLE. MADE BETTER.

THE BUTLER HUMANOID



Source: STIQ Ltd Research & Analysis
Image Source: Google Gemini, STIQ Ltd prompt

FUNCTIONALITY SPECTRUM

- Butler Humanoids operate across a very broad range of tasks with a focus on managing homes and making more free time for owners/users
- The Butler will most likely be the most advanced of all humanoids due to a high variability of home environments and customer expectations
- Butler tasks range from managing a home, cleaning and cooking to caring for pets and children including a potentially high degree of social interaction with adults; this may require an advanced interface combined with social skills
- Social skills may include some level of emotional interaction intelligence and understanding
- The Butler humanoid forms the base for more elaborate and complex humanoids with specific applications in therapeutic, nursing and sex-interaction settings etc. as technology evolves

EXISTING MARKET COMPETITION

- While Butlers have the lowest competitive threshold, the market is unlikely to inflect in the short to medium-term
- Butler humanoids are likely to come with a hefty price tag and concerns around privacy + strict safety requirements
- There is existing competition including robot vacuum cleaners, lawn mowers and other automated equipment for homes
- The key to developing the market is the extra time or added convenience these robots can provide customers

REVENUE MODEL – HW+ SW UPGRADES

- The primary revenue model for Butlers will be as a service solution which may include a certain degree of built-in telops, etc.
- Hardware options may include different covers, faces, higher payload capabilities, more outdoor type applicability, etc.

HUMAN-IN-THE-LOOP & SAFETY ASPECTS

- As this robot will be operating in home environments, potentially among younger children, pets and people with no knowledge or experience of robots, safety is paramount and also at the highest possible level
- However, it is important safety is not perceived as an impediment to efficient functioning, which may be a difficult task for engineers to consolidate
- Safety aspects are likely to inhibit fast market traction

BIPEDAL LOCOMOTION MORE SUITABLE

- Homes are rarely easily traversable for robots and may include stairs, protruding details, etc. and the easiest way for a humanoid to move around in any type of home is likely with bipedal locomotion

BUTLERS, THE DOMESTIC NERVOUS SYSTEM

- The Butler is the centre of the domestic environment and will most likely require integration with other domestic systems, such as robot vacuum cleaner, pet automation systems, toys, white goods, etc.
- Butlers have the highest potential of becoming a friend or life companion to adults quickly



THE BLUE COLLAR HUMANOID FACES INTENSIVE INCUMBENT COMPETITION. SAFETY LIKELY TO REMAIN KEY INHIBITOR FOR MORE EFFECTIVE DEPLOYMENTS

TITAN LIGHT INDUSTRY HUMANOID

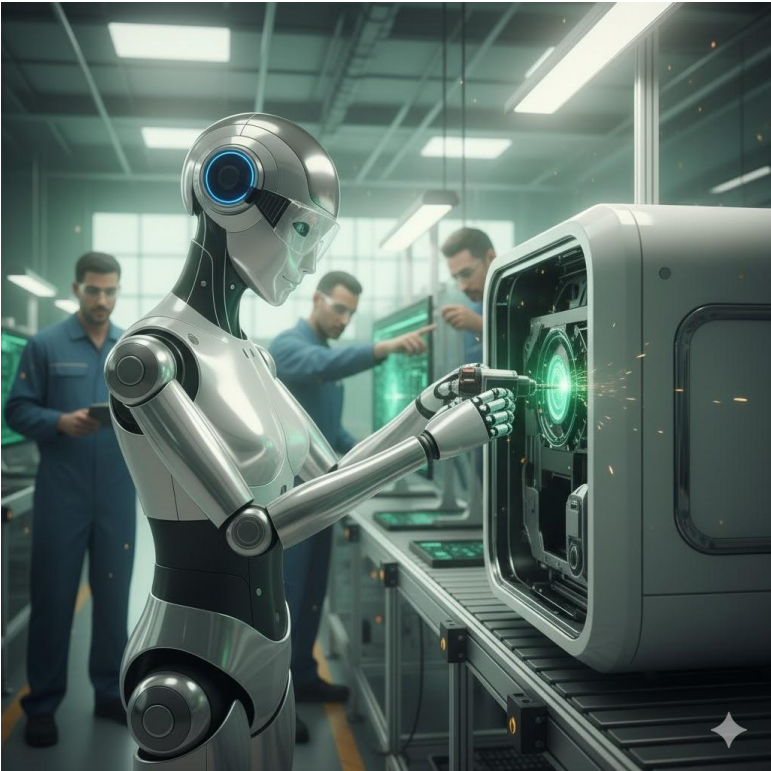
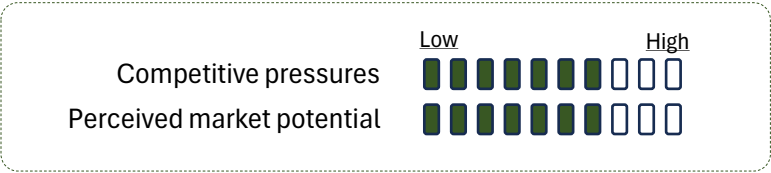


Image Source: Google Gemini

FUNCTIONALITY SPECTRUM

- The Titan (Light Industry) humanoid is among the more advanced of all segments due to its required versatility and flexibility of applications in a very wide variety of commercial environments
- Applications may vary between fine-mechanical tasks to unloading containers and beyond
- Light Industry humanoids are likely to have a payload capability 2-3X of the average human and may also be available with different end effectors or arm attachments, sensors, etc.
- The robot will also likely evolve into a more therapeutic humanoid e.g. patient/hospital care robots with human caring essential tasks, overlapping with Butler humanoids
- There is also potential for wider military applications once energy sources are developed further

EXISTING COMPETITION

- Target industries for Light Industry humanoid are mostly already well served by multiple different equipment and tool suppliers and integrators, offering a high degree of existing competition for these robots
- However, most non-automotive industries remain labor intensive with plenty of scope for automation equipment such as humanoids
- Carving out unique applications may be a key to success for these humanoids which may mean further application specialization, for example in electronics, warehousing, etc. use cases

REVENUE MODELS

- VC-backed startups typically push for RaaS deals, but manufacturers are often seeking capital efficiencies in addition to shopfloor efficiencies as they have steady demand
- Customers with more volatile demand cycles may be incentivized to apply RaaS business models, such as 3PLs or any retail related industry

HUMAN-IN-THE-LOOP AND SAFETY ASPECTS

- The promise of humanoids is they can work in several locations on different applications, so adding safety fences, etc. for these robots is unlikely to be feasible
- A very high degree of collaborative safety standards will likely be required before the market grows

MOST LIKELY LOCOMOTION SET-UP

- Most locations will likely use flat concrete flooring which is easy for mobile humanoids to traverse, potentially with some improvements in tires/wheels or suspension
- Bipedal humanoids may be superior in locations with less flat floors and where there are staircases, etc.

HIGHLY COMPETITIVE ENVIRONMENT

- These humanoids face the stiffest competition from incumbent robots, tools and equipment in a very mature and developed market
- It is highly likely these humanoids will face continued competitive pressures from legacy vendors once a good market opportunity and/or fit has been established



THE GOLIATH WILL BE USED IN HEAVY INDUSTRIAL, CONSTRUCTION, ETC. WORK FOR LIFTING AND HOLDING, ETC. MOST LIKELY REMOTE CONTROLLED

GOLIATH HEAVY INDUSTRY HUMANOID

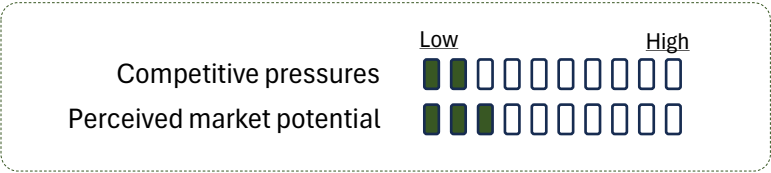


Image Source: Google Gemini

FUNCTIONALITY SPECTRUM

- The Industrial Humanoid is a heavy-duty yet highly flexible robot to be used primarily in heavy industrial applications such as bridge construction, ship building and beyond
- Most likely this robot will be used in or outside with
- This robot comes with the highest payload capabilities and is most likely to be fully remote controlled initially with strict safety procedures and training for operators

GOLIATH HUMANOIDS COMPETITION

- Goliath humanoids face lower competitive pressures primarily due to incumbent technologies often being highly inflexible (which itself could be due to adhering to current safety standards)
- The primary competition is likely to be mobile cranes and similar equipment for heavy lifting where flexibility may come with a hefty premium

REVENUE MODEL

- This humanoid will likely be available to buy as Capex or for shorter term rental arrangements

HUMAN-IN-THE-LOOP

- Collaboration is most likely in restricted environments where processes and work is most conducive for Goliath Humanoids

MOST LIKELY LOCOMOTION SET-UP

- This humanoid is used in- and/or outside environments with a wide variety of tasks, typically involving heavy lifting and/or holding, and the locomotion is most likely adapted to the environment
- The locomotion is likely wheeled or bipedal

SAFETY ASPECTS (VELOCITY, PAYLOAD)

- Safety is paramount and this humanoid is likely to require trained operators



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HUMANOID MARKET DRIVERS DIFFER SOMEWHAT BETWEEN CONSUMER AND COMMERCIAL HUMANOIDS. SAFETY IS A COMMON DRIVER

HUMANOID MARKET DRIVERS (NOT EXHAUSTIVE, SIMPLIFIED)

Sector	Market Driver	Description	Impact
Commercial Humanoid	Technology Curiosity	There is significant curiosity among end customers on what humanoids may bring to operations with current demand for trials and POCs	▲
	Lack of Labor	Lack of labour remains a key market driver for automation in many end customer sectors, especially in warehouses	▲
	Data Security	Data security is a concern for many end customers, especially with more advanced robots as they may use visual sensors (cameras)	◀▶
	Safety	- There are no current directly applicable safety standards for humanoid robots and this may have to develop before the market can inflect - With potentially very broad applications (and high complexity of safety), safety may remain a market inhibitor in the short to medium-term	▼
Consumer Humanoid	Resellers & System Integrators	- Global or international expansion requires a broad network of partners - As a completely new product, humanoids may struggle to identify suitable partners with good customer/consumer networks - This will have to be accompanied by an established maintenance and servicing ecosystem – likely to be managed directly by vendors initially	◀▶
	Convenience	While not evidenced yet, humanoids that offer additional convenience to consumers will likely be in high demand	▲
	Privacy Concerns	Most humanoids will require a level of remote control in the short to medium term which will may create serious privacy concerns in domestic settings	▼

HUMANOID MARKET DRIVERS

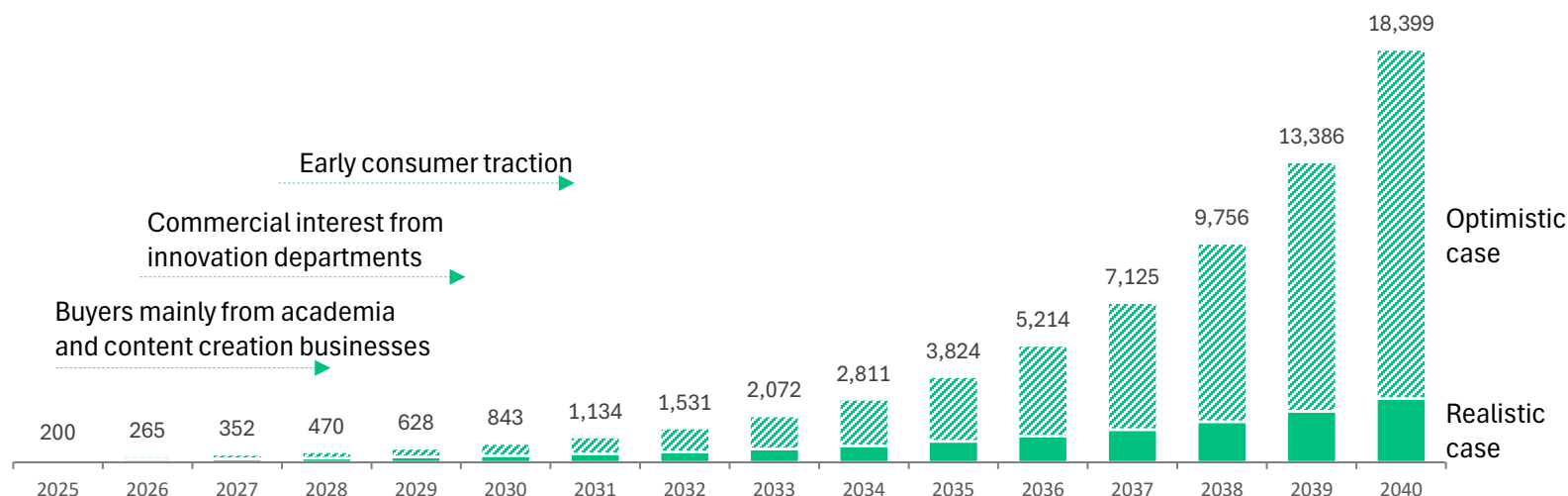
- Humanoid market drivers differ between the type of application, for example humanoids for consumer use and humanoids in industrial or warehouse settings
- The primary overall current market driver is curiosity, especially by engineering departments interested in how humanoids can be applied to their operations with potential future efficiency gains and/or savings
- For consumers, a primary driver will be convenience and how much free time a humanoid may add – which may vary significantly between family, couple and single users
- Lack of labor is an agnostic trend driving general automation initiatives and was far more critical during peak Covid
- Safety is currently key inhibitor as the inherent promise of humanoids is they will be able to collaborate with humans, but this appears way off with a lack of safety standards for both bipedal and wheeled humanoids
- Humanoids in domestic settings will be exposed to a greater degree of unstructured and collaborative situations which are likely to require far higher safety considerations, this will remain an important inhibitor
- Privacy is likely to remain an inhibitor for consumer applications, especially as teleoperation is a likely feature particularly for humanoid butlers in the short to medium-term
- The prevalence of cameras for humanoids with a younger target audience may also remain an inhibitor

Source: STIQ Ltd Research & Analysis



HUMANOID MARKET GROWTH EXPECTED TO REMAIN MUTED BASED ON TECHNICAL COMPLEXITIES, SAFETY CONCERNS, DEVELOPMENT OF PERMANENT CASE STUDIES

FORECAST COMMERCIAL AND CONSUMER HUMANOID MARKET SIZE (\$m)



Source: STIQ Ltd Research & Analysis

SHORT TO MEDIUM TERM MUTED GROWTH

- Early market adoption will likely be among wheeled humanoid vendors as these are less complex tools to manage, but are also likely to command a lower price point compared to bipedal humanoids
- As there is no effective commercial install base of humanoids, it will take significant time to scale up markets
- The short to medium term focus will likely remain on a smaller number of key customers where humanoids can be further developed with new capabilities across applications and environments

INNOVATION & PR ANGLE VS ROI

- There are plenty of ongoing industrial POCs and trial deployments of humanoids
- Most of these deployments are driven by innovation teams and/or marketing/PR departments and tend to be time-limited (vs production deployments)
- Humanoids can potentially fit into human roles without any major changes or integrations with a minimum or near 1:1 efficiency (humanoid vs human)
- However, the current level of humanoid technology competes with other robots and ROI limitations

- Once the humanoid PR angle is exhausted, it may become harder for these innovation departments to drive uptake of humanoids if capabilities remain limited as there are many different competing solutions to choose from

MARKET DEMAND BUT FEW SELLERS

- STIQ conversations with multiple potential buyers have indicated there are very few humanoids on offer or for sale, even from many of the more prominent players
- While this may be due to too high demand, the more likely explanation is that many humanoids are not ready to be deployed in non-experimental settings

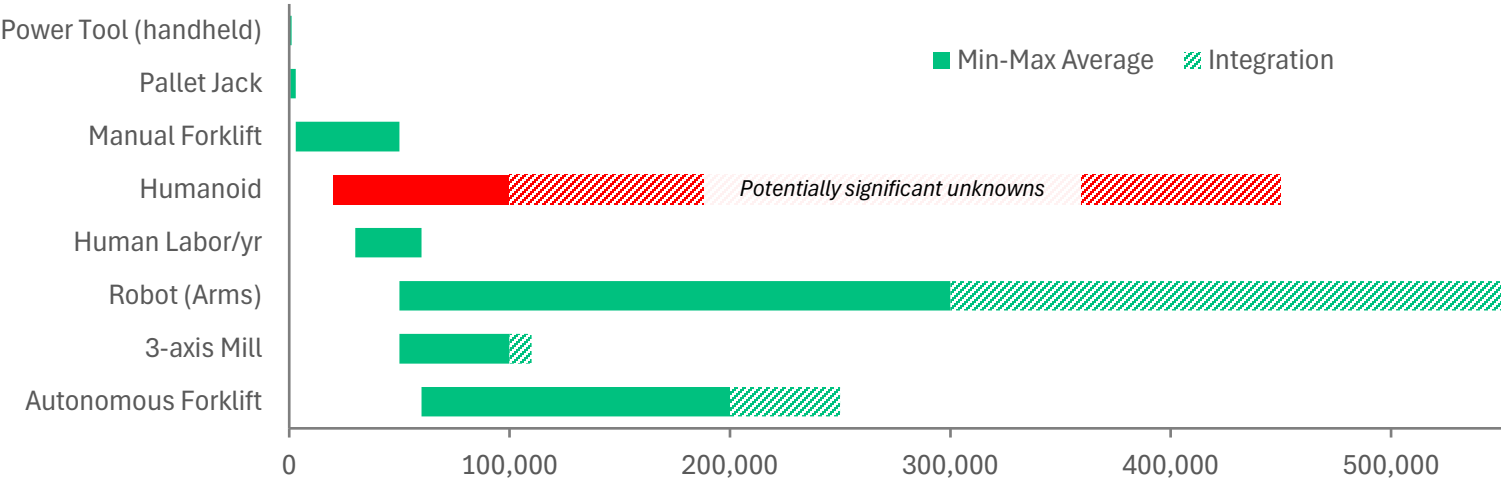
COMPLEXITY LIMITING LONG TERM POTENTIAL?

- Technical complexity and safety are likely to inhibit short term market potential
- Early-stage buyers include users with significant resources to learn how to program, deploy and use humanoid robots in a variety of cases
- These customers include primarily academic institutions and innovation departments
- In addition, there will be an early customer base of content creators looking to exploit the PR and hype angle of humanoids
- Creating a range of established permanent deployments where humanoids work >8hrs per day as a showcase for new potential customers, where they can physically visit and evaluate it for themselves, is likely many years away



COMMERCIAL HUMANOIDS WILL COMPETE WITH OTHER CONTINUOUS IMPROVEMENT PROJECTS AS THEY GRADUATE FROM INNOVATION DEPARTMENTS

AVERAGE BUSINESS COSTS COMPARED TO HUMANOID



Source: STIQ Ltd Research & Analysis

COMMERCIAL HUMANOIDS & IMPROVEMENTS

- Humanoids compete for budget with a multiplicity of options with various degrees of operational and financial improvements for end-customer CFOs
- While share of wallet is an important KPI in the consumer facing humanoids sector, it is rarely relevant for commercial customers where ROI and improvements trump as purchase criteria

- Commercial customers are less sensitive to the price of humanoids, which is largely irrelevant, but far more focused on ROI and operational improvements

INNOVATION > CONTINUOUS IMPROVEMENT

- Budgets for humanoids currently appears to originate from innovation teams rather than more permanent continuous improvement monies
- Innovation budgets often lack commitment to permanent deployments and tend to be time limited

- Moving humanoids towards continuous improvement budgets may be a challenge, especially considering the nascent stage of the technology and safety standards
- Another issue will be ROI since innovation budgets are rarely based on strict ROIs
- Once ROI is within reach for customers, humanoid projects may also compete internally with other projects for a share of budget

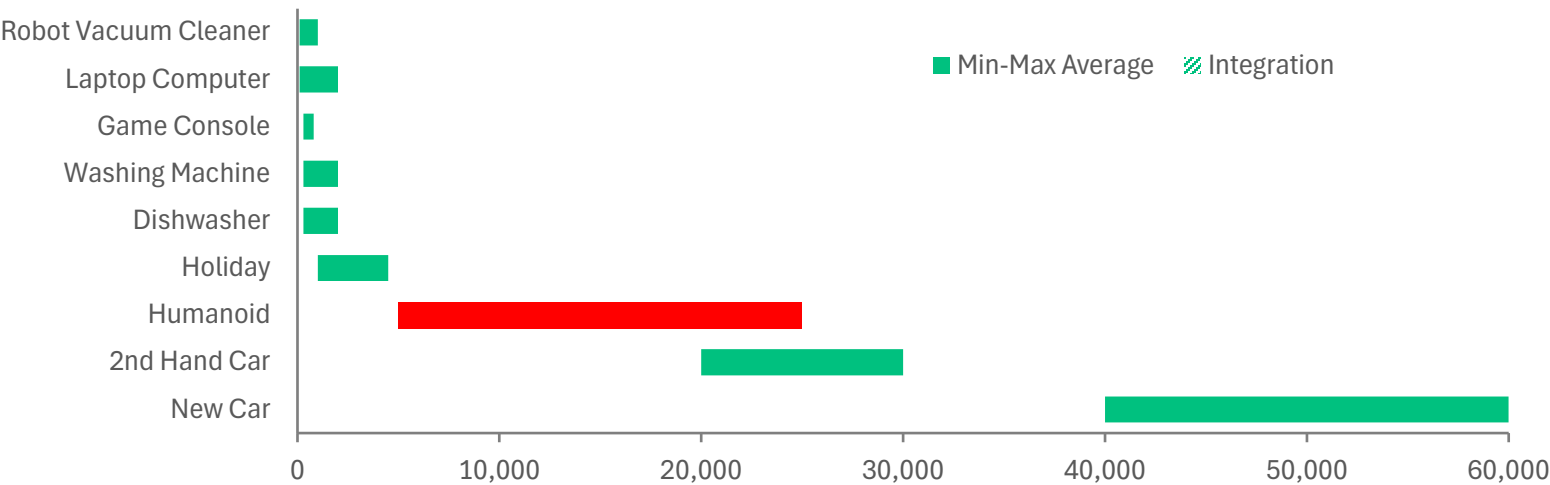
TELOPS AND LABOR SAVINGS

- Most humanoids deployed today are nearly fully remote controlled or tele operated (telops) and will likely continue like this in the short to medium term
- In these cases, any labor savings are merely reductions in recurring costs rather than a removal of costs
- An analogue to this can be switching a supplier (of any service/product) which is often driven by savings but also frequently comes with some level of pain
- For humanoid vendors, the level of pain associated with moving from highly flexible human labor to relatively uncertain (for now) semi-automated labor may have to show a major cost incentive for end-customers
- Simply replacing a higher recurring cost for a lower one with less flexibility may be too vague a commercial aim for even the most adventurous CFO



CONSUMER HUMANOIDS LIKELY TO REMAIN A LUXURY ITEM IN THE MEDIUM TO LONG TERM WITH LIMITED MASS MARKET APPEAL UNLESS PRICES DROP SIGNIFICANTLY

AVERAGE CONSUMER EXPENDITURES AND COSTS FOR GOODS COMPARED TO HUMANOID



Source: STIQ Ltd Research & Analysis. Estimate cost for humanoid \$5,000-25,000

ROI FOR CONSUMERS DIFFERENT CALCS

- Consumer humanoids will likely be evaluated on a more subjective cost/benefit analysis compared to commercial humanoids
- However, the share of consumer's wallets will be important in a humanoid purchase and the potential for these products to become a mass market item
- At an estimated \$5-25,000 consumer price, humanoids will be within reach mainly for upper middle-class buyers

- This theoretical price point places humanoids in between an average holiday and a 2nd hand car
- Depending on the functionality and/or capability range on offer, humanoids may be considered a luxury purchase in the short to medium term
- Note that there will be different expectations on a toy humanoid versus a butler humanoid

PRICE 2NDARY FOR DOMESTIC HUMANOIDS?

- The cost for a humanoid is likely to be an important issue for most domestic potential buyers on par with privacy and safety concerns
- Most (if not all) humanoids currently lack a wide range of autonomous capabilities for domestic applications
- For domestic humanoids, it is highly likely there will be a significant degree of remotely managed control in the short to medium term to drive up the volume of training data
- An immediate consideration for humanoid vendors will be how to manage privacy and safety with remote controlled robots
- Such concerns are likely to place significant barriers to developing consumer robots, especially in families with younger children

INTEGRATION – PLUG & PLAY ONLY

- For humanoids, especially butlers, to be truly useful they will have to be integrated with other home/domestic systems
- This kind of integration have to be automated and potentially part of an ecosystem, such as the 'Apple' device ecosystem with iPhone, laptops, and other devices quickly compatible with integrated functionality
- For example, humanoids should be easily integrated within an ecosystem with vacuum cleaners, light & temperature controls, virtual assistants such as Alexa, etc.
- Such simplicity would likely add value for consumer humanoids



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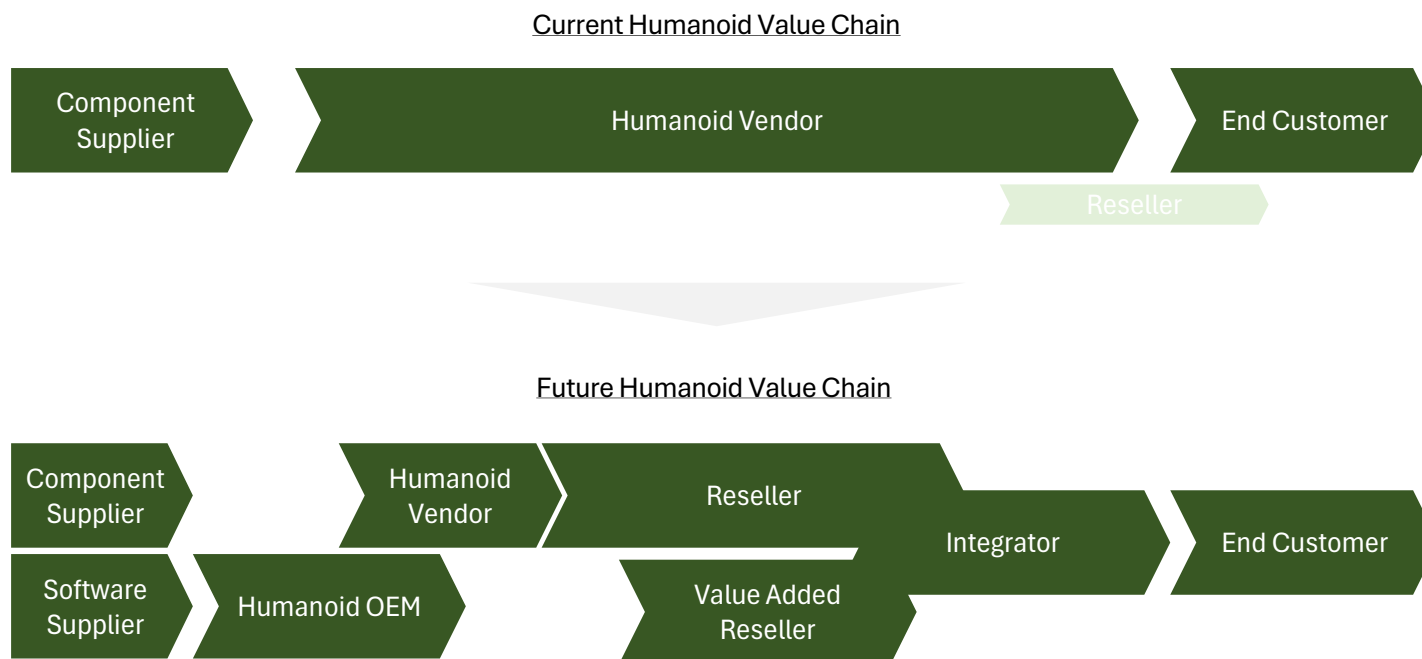
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THE HUMANOID VALUE CHAIN IS LIKELY TO EVOLVE FAST. AVOIDING UNSUSTAINABLE RELATIONSHIPS MAY BE KEY TO FUTURE MARKET LEADERSHIP

THE HUMANOID VALUE CHAIN WILL EVOLVE FROM ITS CURRENT SIMPLISTIC PRIMARILY DIRECT VENDOR AND END CUSTOMER RELATIONSHIPS



Source: STIQ Ltd Research & Analysis

THE CURRENT HUMANOID VALUE CHAIN

- As the humanoid market remains nascent, the value chain is yet to evolve
- A few humanoid vendors have already appointed resellers, but this largely remains an exception in the sector and appears driven more by interest rather than actual sales

EARLY HUMANOID VALUE CHAIN EVOLUTION

- There are early signs the value chain is changing and evolving into a more complex landscape
- Some humanoid vendors are developing into motor vendors and compete with incumbents for a space as leading suppliers
- A few incumbents have developed humanoid body parts, such as torsos with arms, or separate hands, legs, etc. in effect removing market entry inhibitors
- In addition there are multiple new software vendors targeting the humanoid sector with a variety of 'AI powered' packages

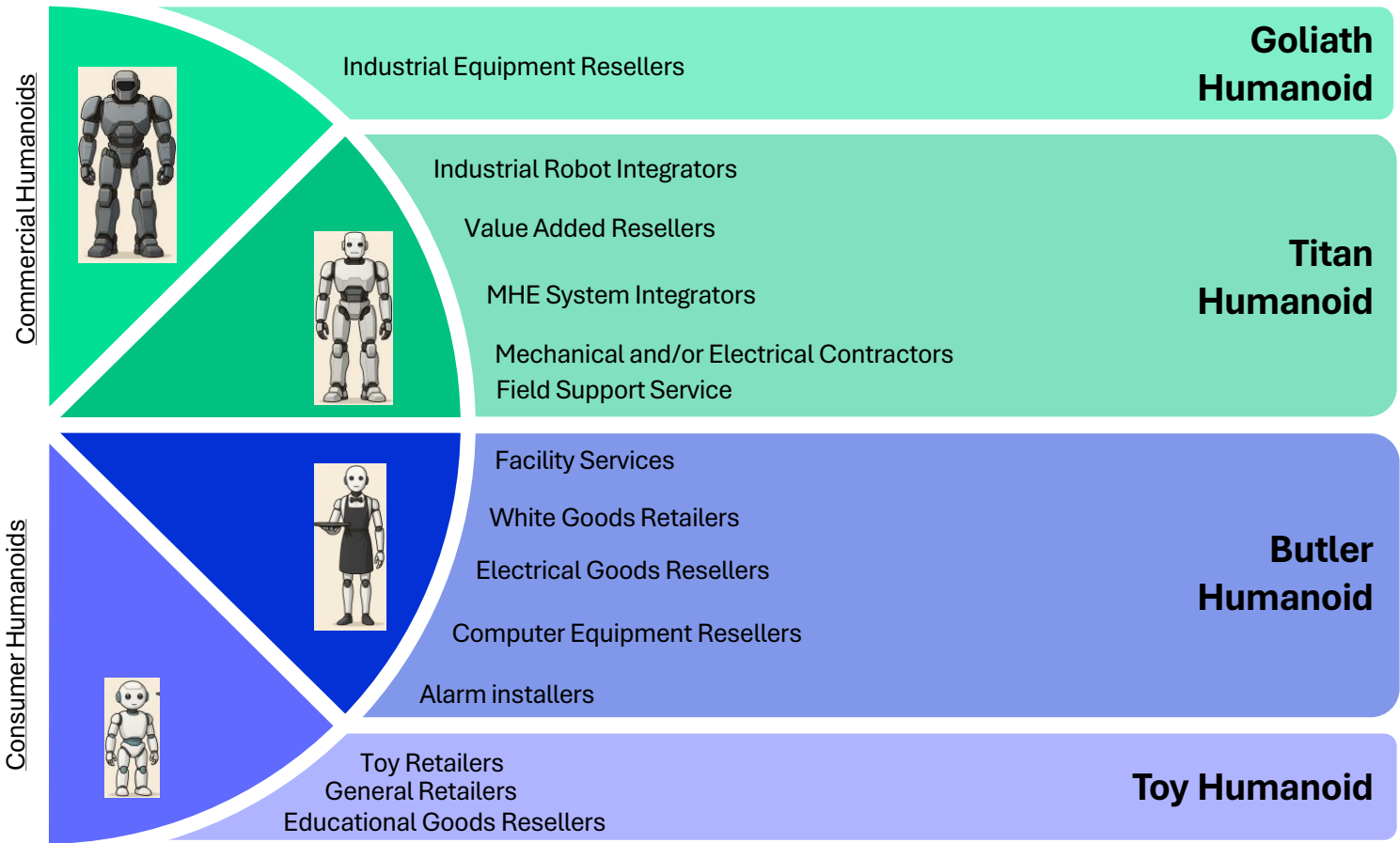
THE FUTURE HUMANOID VALUE CHAIN

- The most likely future is a far more complex value chain with multiple different stakeholders depending on customers, industries and applications targeted
- This will also depend on the level of integration or deployment assistance, maintenance and service, etc. required for a humanoid or fleet of humanoids



COMMERCIAL AND CONSUMER HUMANOIDS WILL MOST LIKELY USE CHANNEL PARTNERS FOR GO TO MARKET

HYPOTHETICAL CHANNEL PARTNERS FOR COMMERCIAL AND CONSUMER HUMANOIDS



DIRECT-TO-CUSTOMER ROUTE TO REMAIN

- Many robotics startups often find the direct route provides the fastest and most accurate feedback loop for data to contribute to further product development and to stabilize solutions
- With highly complex products like humanoids, this will remain a key channel, but to drive sales on a global scale and compete within the sector, a likely outcome is vendors will establish key channel partners

LIKELY FUTURE CHANNEL PARTNERS

- Heavy Industrial humanoids will likely be sold through resellers as this is thought to remain a teleoperated and/or remote controlled option due to safety implications
- Light Industry humanoids will likely require some level of integration into existing workflows and hence be resold by partners with experience of integration, most likely by industry sector targeted
- Consumer humanoids like Butler and Toy Humanoids are more likely to be sold as plug & play either directly or via retailers
- Some of these, in particular Butlers, may require some integration with domestic IT systems and will be resold by Electrical goods resellers with some installation capabilities

Source: STIQ Ltd Research & Analysis



IF THE SECTOR DEVELOPS AS FORECAST, HOW DO CUSTOMERS EVALUATE DIFFERENT HUMANOIDS AND VENDORS ACROSS A WIDER RANGE OF APPLICATIONS?

HUMANOIDS MAY BE BETTER AT CERTAIN TASKS THAN OTHER HUMANOIDS (EXAMPLE)



Source: Google Gemini, STIQ Ltd prompt

MANAGING VENDORS AND HUMANOIDS?

- Who's responsibility will it be to manage humanoid procurement? Human resources, Engineering, Operations or some other department, especially as these evolve?

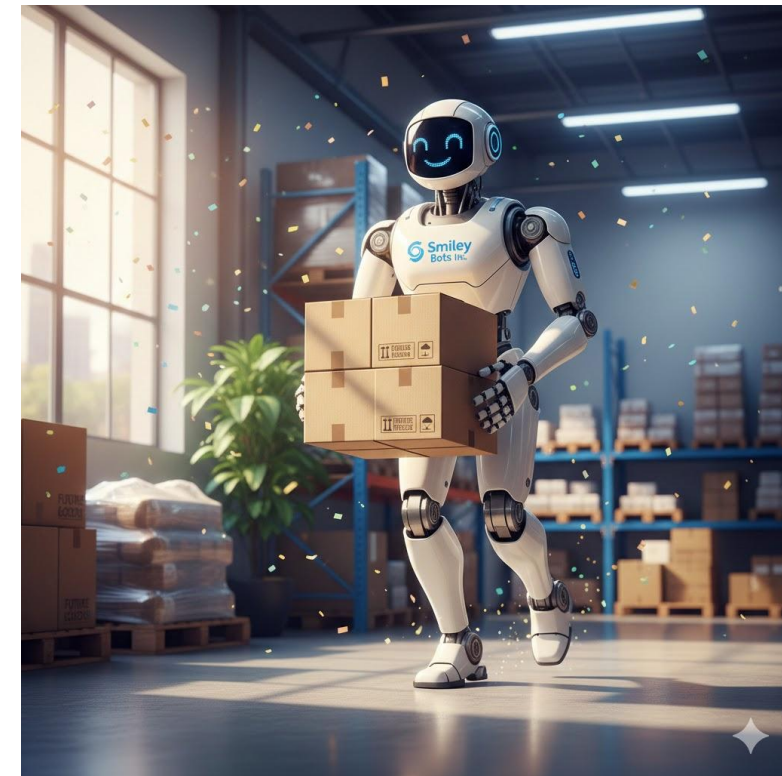
THE VENDOR TESTING CONUNDRUM

- Finding the most suitable vendor is paramount for most commercial end customers
- Simple products and tools can be easy to compare like for like by looking at quality, throughput, price, etc.
- With incumbent robot technologies, it can be relatively easy to compare one robot set up with another as throughput, price maintenance, life span, etc. can be determined for a single application
- More complex robotics & automation solutions, for example in warehouse automation, tend to require far more consultant advisory services and elaborate calculations to reach a proper conclusion

COMPARING HUMANOID A vs HUMANOID B

- Doing these calculations when comparing different humanoid vendors may be a hugely complex task that requires elaborate testing set ups and additional consulting for end customers
- With humanoids (in theory) capable of managing and executing multiple different tasks in a variety of settings, these calculations will inevitably be highly complex and nigh impossible
- There may, for example, be humanoids that are better at carrying boxes, and other humanoids that are better at fine-mechanical tasks
- This potential conundrum may inhibit market growth as end customers may elect to go for alternative technologies with clearer ROIs

HUMANOIDS MAY BE BETTER AT CERTAIN TASKS THAN OTHER HUMANOIDS (EXAMPLE)



Source: Google Gemini, STIQ Ltd prompt

MULTIPLE VENDOR RELATIONS?

- Is there a future where customers have to use humanoids from multiple vendors with Agnostic Humanoid Management Software tools?



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LEGAL EXPERTS SUGGEST LIABILITY WILL BE WITH HUMANOID END CUSTOMERS

AUTONOMOUS CARS & HUMANOIDS

- Could humanoids fall under the same regulations as Autonomous Cars?

“From my perspective, not at present. UK law currently regulates autonomous vehicles under the Automated and Electric Vehicles Act 2018, which places liability primarily on insurers (and indirectly on manufacturers) when a vehicle is driving itself. Humanoids, however, are not covered by any specific legislation. If deployed commercially, they would likely fall under: Product Liability (Consumer Protection Act 1987) – strict liability for defective products causing damage. Negligence principles – liability for misuse or unsafe instructions by the user. Given humanoids’ ability to operate in unpredictable environments (stairs, crowds, etc.), a strict liability regime similar to autonomous cars would require new legislation. The UK may eventually adopt an approach aligned with the EU’s AI Act proposals, but for now, the framework remains fragmented.” [Hill Dickinson]

THE TREE BRANCH SCENARIOS

- If a humanoid sits on a branch and, following the user’s instruction, cuts it and falls on a bystander:
- “If a humanoid sits on a branch and, following the user’s instruction, cuts it and falls on a bystander: User liability: Likely primary liability under negligence, as the instruction was foreseeably dangerous. Manufacturer liability: Only if the humanoid was defective (e.g., lacked basic safety logic to prevent self-harm or harm to others). Humanoid liability:

Entity/ Person	Probable liability
User	✓✓✓
Humanoid	✗
Reseller/ Integrator	✓
Manufacturer	✓

Insurance

Source: STIQ Ltd Research & Analysis

UK law does not recognize robots as legal persons, so liability cannot attach to the robot itself. Insurance will be key. If humanoids become mainstream, mandatory insurance (similar to autonomous vehicles) may be introduced.” [Hill Dickinson]

WIDER LEGAL COMMUNITY THOUGHTS

- There is an ongoing debate re humanoids and liability aspects in the wider legal community

SAWING OFF THE BRANCH YOU ARE SITTING ON



Image source: Google Gemini

“The debate is growing but remains largely theoretical. Key themes include: Allocation of liability between manufacturers, users, and potentially insurers. Ethical and safety standards for general-purpose robots. Regulatory gaps for humanoids compared to other robotics sectors.” [Hill Dickinson]



HUMANOID PHYSICAL REAL-WORLD UNDERSTANDING MAY BE CRITICAL FOR BROADER SCOPE APPLICATIONS AND MARKET IMPACT

PHYSICAL REAL WORLD UNDERSTANDING IS CRITICAL FOR UNLIMITED HUMANOID APPLICATIONS



Image source: Google Gemini

PHYSICAL AI AND HUMANOIDS

- As humanoids and AI capabilities evolve, more computing power will be required to understand environments and the interplay between physical things and humanoids

- One hypothetical example is STIQs hole in the wall example
- This includes a concrete wall with a hole in which there is an iron bar which holds a heavy weight on the opposite side (B) – out of view from the other side (A)

- To physically wrestle the bar out from side A, the person or machine would need to firstly know that the bar is not a permanent part of the wall, know the physical properties of the bar and be aware of the conditions on side B to ensure no one is in harms way pending the work
- Understanding the many myriads of such interplay between things and people could potentially be a pre-requisite for higher humanoid levels, and before allowing these robots to work more independently
- Without a higher level of spatial and/or physical awareness, the promise of humanoids may remain at a relatively basic level with simplistic and narrow operational parameters

COULD EMBODIED COGNITION BE REQUIRED?

- While the current state of LLMs are at an advanced level, they frequently lack any understanding of the physical world
- The concept of ‘Embodied Cognition’ may offer a glimpse to how humanoids could potentially solve the issue of real-world impact and understanding ([source](#))
- A few AI researchers and startups are now chasing this area of AGI

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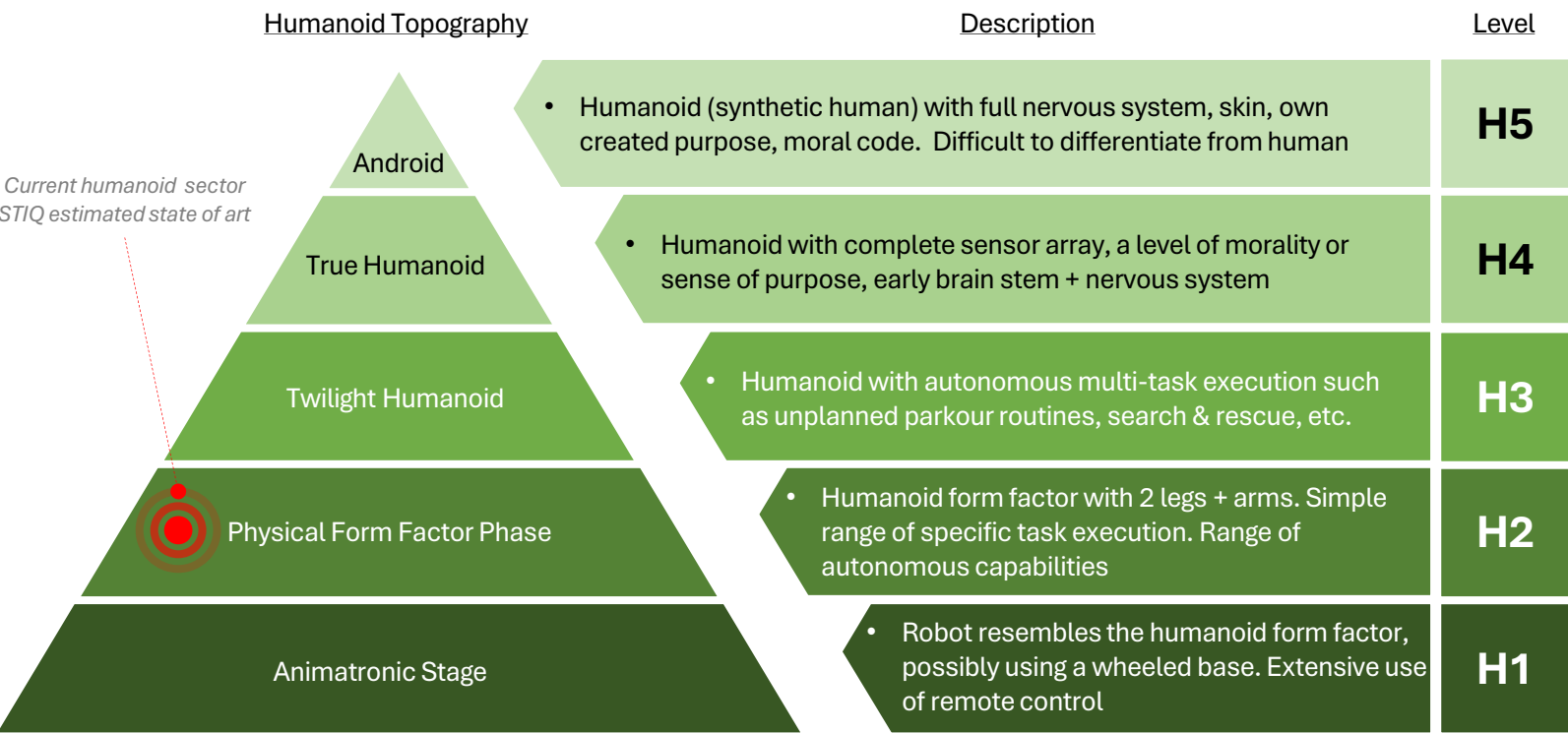
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THE HUMANOID DEFINITION IS VAGUE: STIQ SUGGEST VIEWING THESE ROBOTS ON A SCALE FROM ANIMATRONIC TO ANDROID

JABIL
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STIQs FIVE LEVELS OF HUMANOIDS BY AUTONOMY, FUNCTIONAL AND MECHATRONIC ABILITIES: FROM ROBOT TO ANDROID



Source: STIQ Ltd Research & Analysis

STIQs FIVE PRIMARY HUMANOID LEVELS

- H1 (Animatronic Stage) is the very simple level where someone might connect 4 cobots and a monitor with face, looks like a humanoid
- H2 (Physical Form Factor Phase) likely features proprietary body parts and motors with a limited range of functionality and applications
- H3 (Twilight Humanoid) is where humanoids begin to appreciate their impact on surroundings with a more advanced level of ‘embodied SLAM’ and understanding of complex physical relationships between parts of the world
- H4 (True Humanoid) humanoids are more agile and applicable to most tasks in industrial settings. Attachments or parts may vary to give the humanoid different specialist knowledge and/or capabilities
- H5 (Android) include humanoids that are nearly indistinguishable from humans

H3/H3+ TO REQUIRE EMBODIED KNOWLEDGE?

- To reach level H3, new ways of understanding the world are likely to have to evolve from combining LLMs and SLAM algorithms including a sense of self and potential impact on the environment
- This also includes an appreciation of the physical properties and interactions between different parts such as a towel hanging from a nail in a wall, i.e. removing the nail will also remove the towel, i.e. ‘magpie thinking’



A PREVAILING VIEW IS THAT HUMANOIDS ARE ‘SILVER BULLETS’. BUT SHOULD THESE BE VIEWED AS PART OF A LARGER TOOLKIT INSTEAD?

ARE HUMANOIDS JUST ANOTHER SET OF TOOLS IN THE TOOLKIT OR ‘SILVER BULLETS’?



Image source: Google Gemini. STIQ Ltd prompt

HUMANOIDS, A SILVER BULLET OR JUST A TOOL

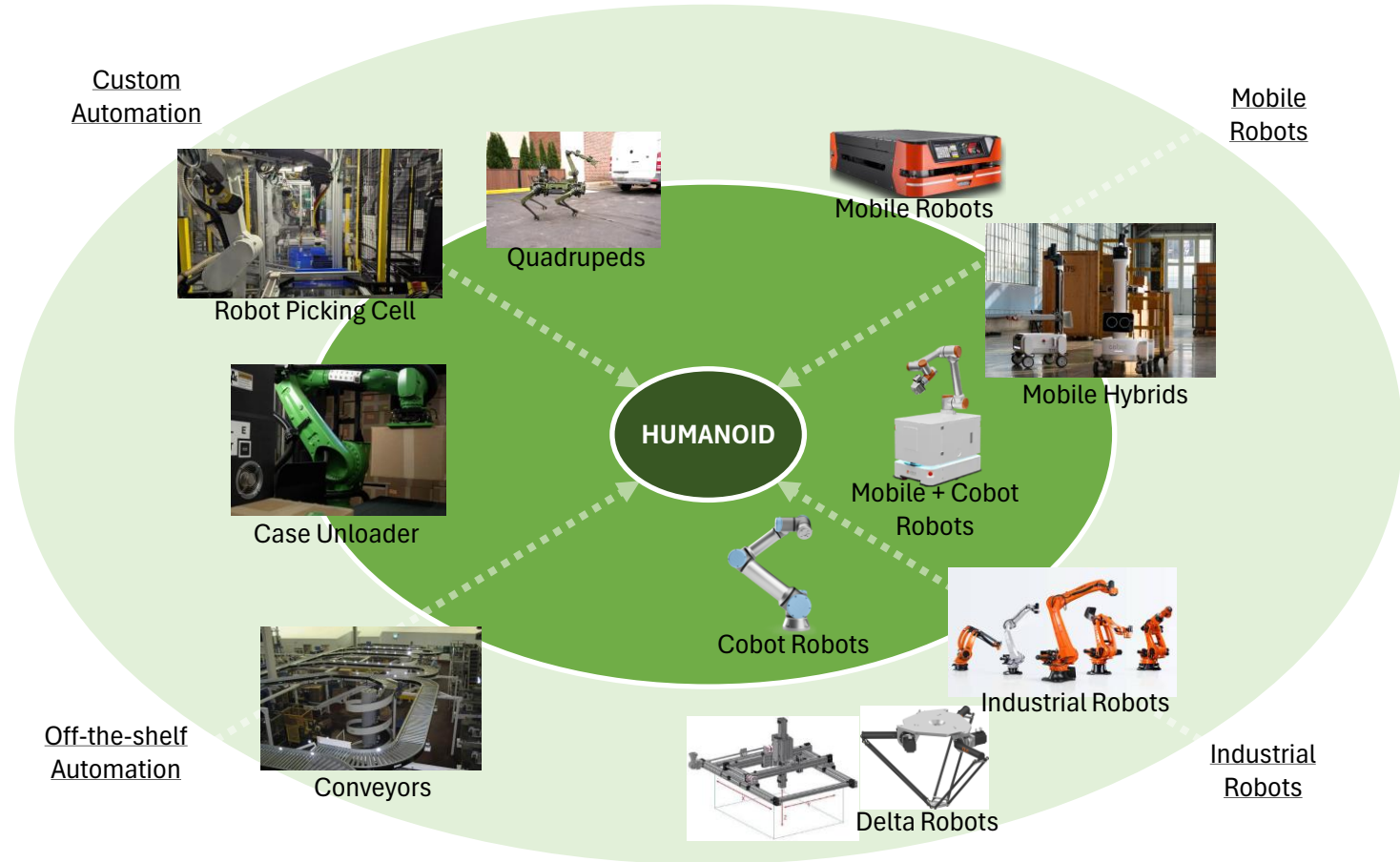
- STIQs view is a humanoid is to be viewed as just another tool in the overall toolkit for factory and/or warehouse engineers to deploy alongside many other options
- However, the popular way of viewing the humanoid form factor seems to be largely conflated with the entire toolbox contents, i.e. as an ‘automation silver bullet’ capable of doing everything a human can do
- This may be correct for a higher level humanoid (see STIQs 5 levels of humanoids), but not for the current crop of multi-limbed robots

HUMANOID DEFINITION REQUIRED (?)

- Interpretating the humanoid as a ‘silver bullet’ is potentially a very flawed comparison and also highlights the lack of definition for the humanoid robot form factor
- The current state of the art in the humanoids sector is relatively basic with many of these robots only able to perform very simple tasks such as moving tote boxes, lifting items, etc.
- STIQ suggests the current crop of humanoid robots will have to evolve multiple times both in terms of hard and software to get nearer to a potential silver bullet definition
- STIQ defines five different levels of humanoids with varying degree of capabilities, intelligence, flexibility, etc.

HUMANOIDS DO NOT COMPETE IN A VACUUM AND WILL FACE CHALLENGES ESTABLISHING A NEW MARKET. INCUMBENTS WILL ATTEMPT TO EXPLOIT ANY NEW OPPORTUNITIES

HUMANOIDS FACE INTENSE COMPETITION IN THE WIDER AUTOMATION MARKET (HIGHLY SIMPLIFIED, NOT EXHAUSTIVE)



PLENTY OF INCUMBENT COMPETITION

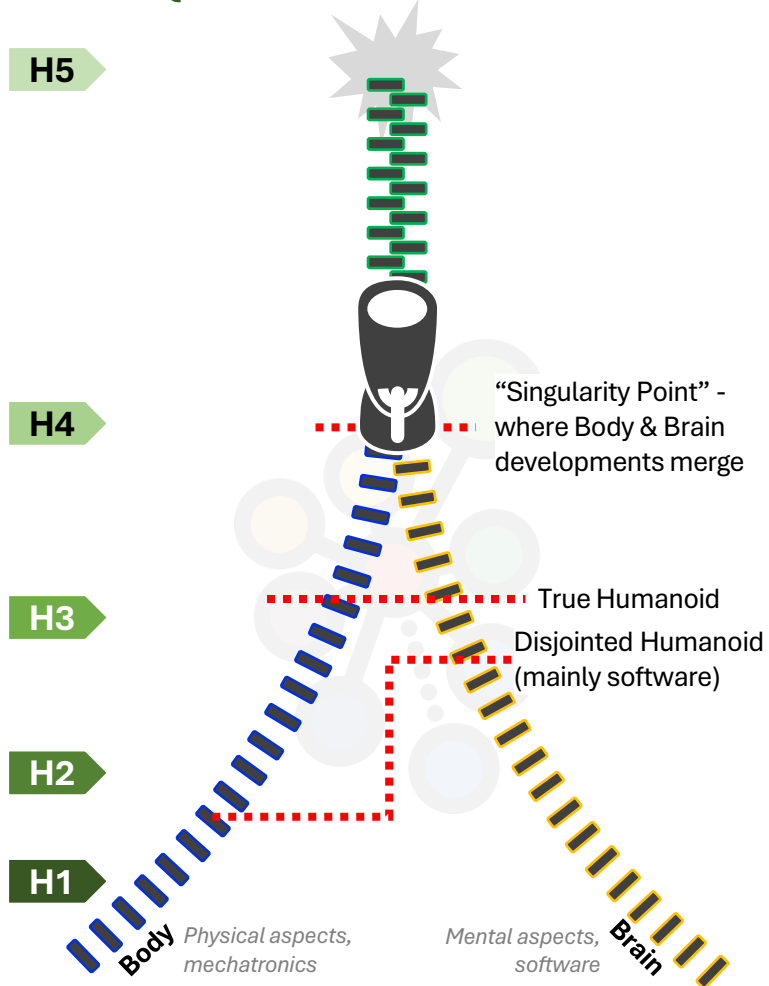
- Humanoids are frequently covered in media as if a panacea or solution to everything (a silver bullet) because they can mimic human behavior, adaptability and flexibility across plenty of use cases
- This often disregards existing competition which includes incumbents as well as new companies with an array of different products
- The illustration highlights only a few such competing solutions

COMPETITION OFTEN APPLICATION SPECIFIC

- Most incumbent technologies tend to focus on a single application and the advantage of humanoids is their inherent/apparent flexibility and adaptability to many different applications
- The current state of the humanoid sector is that humanoids offer limited flexibility across a small range of applications
- To improve the competitiveness of humanoids, vendors need to expand flexibility and applications
- The alternative may be for end customers to use multiple different, but proven, technologies

PARALLEL MECHATRONICS AND AI DEVELOPMENTS MAY NOT BE DESIRABLE OR REQUIRED. DISJOINTED DEVELOPMENT MAY OFFER MORE OPPORTUNITIES

PARALLEL BODY & BRAIN DEVELOPMENT REQUIRED FOR A TRUE HUMANOID



TRUE HUMANOID DEVELOPMENT

- To develop ‘True Humanoids’ (Humanoid level H3 and above) STIQ suggests mechatronics, AI and software should develop and evolve in parallel
- However, this may not be desirable or necessary by all vendors, especially as such parallel developments can be very resource intensive
- There are signals suggesting many vendors will focus on either primarily hardware or software developments and a likely development is a bifurcation of vendors into hard- or software focus
- Part of this is driven by faster hardware improvement cycles where platforms will be out of date relatively quickly

DISJOINTED HUMANOIDS REQUIRED?

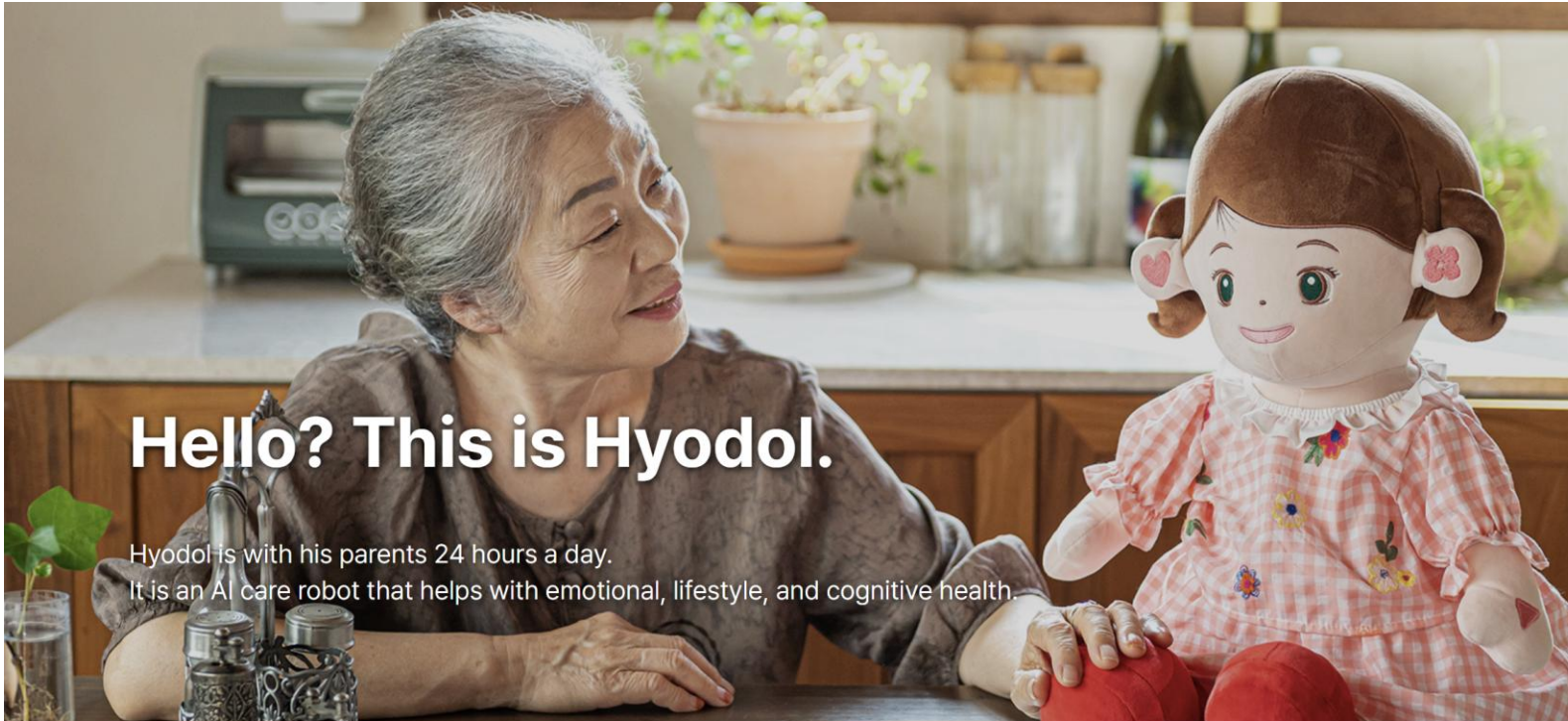
- Developing disjointed humanoids may be the goal of many vendors, i.e. where a form factor remains relatively advanced but with software that is bleeding edge
- For some vendors it may not even be desirable to develop any significant hardware and focus predominantly on software and language interaction – for example in elder social care or in children’s toys
- Other vendors may limit the scope of functionality of their humanoids focusing on, for example, heavier payload duties where simplistic but safe commands may override more complex functionalities

Source: [STIQ 2025 Humanoids report](#). Body = chassis. Brain includes brain stem, nervous system, etc. which may overlap with hardware/body developments the further towards level H5 a humanoid is moving



EMBODIED OR PHYSICAL AI IS LARGER THAN HUMANOIDS AND ALTERNATIVES MAY OFFER A FASTER ROUTE TO MARKET

EMBODIED AI MAY NOT ONLY RELATE TO THE FULL HUMANOID FORM FACTOR AND INFERIOR MECHATRONIC FORM FACTORS MAY OFFER A FASTER ROUTE TO MARKET



Hello? This is Hyodol.

Hyodol is with his parents 24 hours a day.
It is an AI care robot that helps with emotional, lifestyle, and cognitive health.

Source: STIQ Ltd Research & Analysis

Image source: [Hyodol](#)

THE ELDERLY COMPANION (HYODOL)

- While the South Korean company Hyodol is not the first to have developed an elderly care companion with natural language AI interface, they are an example of a potential faster route to market

- STIQs view is the entertainment or social care angle for humans offers a significant potential market with demand at the right price point and functionality
- For example, a Hyodol 'doll' currently starts at c.\$600 (range KRW 900k-1.6m), a price point with significant mass market appeal with relevant functionality and ease of use

ALTERNATIVE & FASTER ROUTES TO MARKET?

- The market for the humanoid form factor remains largely hypothetical but \$bn's VC funds continue to pour into companies developing highly complex mechatronic and software machinery
- However, other 'Embodied AI' form factors may offer a faster route to market, such as 'human companions' where the form factor is largely secondary and require far less (inferior?) mechatronic capabilities
- Such inferior mechatronic form factors (compared to humanoids) may offer additional convenience or stress release for people as they may remove the need to visit ageing parents, taking care of a child's book reading time, etc.
- However, while there may not be any key physical safety issues, there may be ethical or mental safety issues surrounding such products

- For a quick overview of 'Hyo' and Confucian inspired Asian philosophy of respecting the elderly see [here](#)



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HUMANOIDS DIRECTORY: 1-B

1X NO 2014  - Humanoid - Previously Halodi Robotics	7X Robotics US 2024  Humanoid	Aeolusbot TW 2000  Humanoid	AeiROBOT KR 2018  Humanoid	Agibot CN 2021  Humanoid	Agility Robotics US 2015  Humanoid
AI2 Robotics CN 2023  Humanoid	AIDOL RU 2023  Social robot	Aivot US 2017  Humanoid	AKINRobotics TR 2009  Humanoid	Andromeda Robotics AU 2022  Entertainment bots	Angel Robotics KR 2017  Exoskeleton
Anna One DK 2020  Butler	Apptronik US 2015  Humanoid	Atrobot CN 2015  Humanoid	ARX Robotics CN 2023  Humanoid	Ascento CH 2022  Humanoid	Astribot CN 2022  Humanoid
ATi Motors IN 2018  Humanoid	Beijing Zhongke Huiling... CN 2023  Humanoid	Beyond Imagination US 2020  Humanoid	Booster Robotics CN 2023  Humanoid	Borg Robotics US 2024  Humanoid	Boston Dynamics US 2000  - Humanoid - Acquired by Hyundai in 2021



HUMANOIDS DIRECTORY: B-F

Bridge DP CN 2023  Humanoid	Cartwheel Robotics US 2021  Humanoid	CETC CN 2013  Humanoid	Clone Robotics PL 2021  Limbs	Corenetic CN 2023  Humanoid	CX Robotics CN 1997  Humanoid
Dataa CN 2015  Humanoid	Devanthro DE 2018  Humanoid	Dexforce CN 2021  Humanoid	Dexmate US 2024  Humanoid	DexRobot CN 2021  Humanoid	Digit CN 2024  Humanoid
Diligent Robotics US 2017  Butler	Disney Imagineering US 1952  Entertainment device	Dobot Robotics CN 2015  Humanoid	Dyna Robotics CN 2024  Humanoid	Elephant Robotics CN 2016  Humanoid	Engine AI CN 2023  Humanoid
Estun CN 1993  Humanoid	Everyday Robots US 2004  - Butler - Part of Google Moonshot Factory - Closed in 2023	FD Robot CN 1980  Humanoid	Figure AI US 2017  Humanoid	Foundation US 2024  Humanoid	Fourier Intelligence CN 2015  Humanoid



HUMANOIDS DIRECTORY: G-K

G3N US 2024  Humanoid	GAC Group CN 2006  Humanoid	Galaxea CN 2023  Humanoid	Galbot CN 2017  Humanoid	Giant US 2018  Humanoid	Grabotics US 2022  Humanoid
Grasp Robotics US 2022  Artificial Muscle	Guchi Automation CN 2016  Humanoid	Haier CN 1984  Humanoid	Hanson Robotics CN 2013  Entertainment device	HARIBIT Technology CN 2015  Humanoid	Hello Robotics CN 2013  Entertainment device
Hestinova CN 2023  Humanoid	Holiday Robotics KR 2024  Humanoid	Houston Mechatronics US 2014  Hybrid	Humanoid UK 2024  Humanoid	Humotech US 2015  Exoskeleton	Hyodol KR 2009  Social
iBEN Robot CN 2016  Humanoid	i-Botics NL 2016  Exoskeleton	igus DE 1964  Humanoid	iRobotX CA 2017  Humanoid	Joyin CN 2024  Humanoid	Kawada Robot JP 2013  Hybrid



HUMANOIDS DIRECTORY: K-N

Kawasaki
JP | 1969



- Humanoid

Keenon Robotics
CN | 2010



- Humanoid

Kepler Robotics
CN | 2023



- Humanoid

Kind Humanoid
US | 2023



- Humanoid

Kinisi
US | 2023



- Humanoid

K-Scale Labs
KR | 2023



- Humanoid

Leju Robot
CN | 2016



- Humanoid

Lenovo
CN | 1984



- Humanoid

Li-Gong
CN | 1999



- Humanoid

LimX Dynamics
CN | 2022



- Humanoid

Lovot
JP | 2017



- Entertainment device

Lumos Robotics
CN | 2024



- Humanoid

Lux AI
LU | 2016



- Hybrid

Magiclub
CN | 2024



- Humanoid

Manifest
FR | 2024



- Humanoid

Maven Robotics
US | 2024



- Humanoid

Mentee Robotics
US | 2021



- Humanoid

Midea
CN | 1968



- Humanoid

Mirsee
CA | 2017



- Humanoid

Mojin Robotics
DE | 2021



- Hybrid

Moley Robotics
UK | 2014



- Hybrid

Neura Robotics
DE | 2019



- Humanoid

Neuromeka
KR | 2013



- Humanoid

Noetix Robotics
CN | 2023



- Humanoid



HUMANOIDS DIRECTORY: O-R

Orthopus
FR | 2019 

- Exoskeleton

Oversonic
IT | 2020 

- Humanoid

PAL Robotics
ES | 2004 

- Humanoid

PaXini Robotics
CN | 2021 

- Humanoid

Persona AI
US | 2024 

- Humanoid

Physical Robots
NO | 2023 

- Humanoid

PNDRobotics
CN | 2025 

- Humanoid

Pollen Robotics
FR | 2016 

- Hybrid

Prosper AI
UK | 2020 

- Stealth

PsiBot
CN | 2024 

- Humanoid

PUDU Robotics
CN | 2016 

- Humanoid

Qnbot
CN | 2025 

- Humanoid

Quinyun Robot
CN | 2021 

- Humanoid

Rainbow Robotics
KR | 2011 

- Humanoid
- IPO in 2021

Rapid Robotics
US | 2019 

- Humanoid

RayBot
CN | 2024 

- Humanoid

Realman
CN | 2010 

- Humanoid

Reflex Robotics
US | 2022 

- Humanoid

REVOBOTS
US | 2023 

- Humanoid

RIBA/ Robear
JP | 2007 

- Hybrid

Roboforce
US | 2023 

- Humanoid

Roboligent
US | 2016 

- Humanoid

Robot Era
CN | 2013 

- Humanoid

Robotis
KR | 1999 

- Humanoid



HUMANOIDS DIRECTORY: R-U

Robros KR 2020  Humanoid	RT Corporation JP 2005  Humanoid	Sanctuary Cognitive... CA 2018  Hybrid	Sarcomere Dynamics CA 2021  Hybrid	Sarcos Robotics US 1983  Exoskeleton	Seelink CN 2024  Humanoid
Senad CN 2012  Humanoid	Shanghai Electric CN 1902  Humanoid	Somatic US 2018  Butler	Sony JP 1946  Entertainment device	Spirit AI Robotics CN 2024  Humanoid	Standard Bots US 2016  Humanoid
Standard Robots CN 2016  Humanoid	Suzhou Alpha Robotics CN 2008  Humanoid	Tangible US 2024  Humanoid	Tekntrash UK 2019  Humanoid	Tesla US 2003  Humanoid	Ti5 Robot CN 2020  Humanoid
Tokyo Robotics JP 2014  Hybrid	Torooc KR 2012  Entertainment device	Toyota JP 1937  Humanoid	Tsubame Industries JP 2021  Exoskeleton	UBTech CN 2012  Humanoid	UCR US 2024  Humanoid



HUMANOIDS DIRECTORY: U-Z

Unitree
CN | 1995



- Humanoid

UnixAI
CN | 2025



- Humanoid

Unlimited Robotics
IL | 2020



- Humanoid

Vinmotion
VN | 2025



- Humanoid

Vizum
CN | 2016



- Humanoid

Vulcan Augmetics
VN | 2017



- Exoskeleton

Weave Robotics
US | 2024



- Humanoid

Westwood Robotics
US | 2020



- Humanoid

X Square Robot
CN | 2023



- Humanoid

Xborg
CN | 2024



- Humanoid

Xiaomi
CN | 2010



- Humanoid

Xpeng
CN | 2014



- Humanoid

Yobotics
CN | 2014



- Humanoid

Yunmy Intelligent
CN | 2021



- Humanoid

Zerith Robotics
CN | 2025



- Humanoid

Zhaowei
CN | 2001



- Humanoid

Zhejiang Hechuan Humanoid...



- Humanoid

Zhicheng AI
CN | 2024



- Humanoid

Zhiyuan Robotics
CN | 2022



- Humanoid

Source: STIQ Ltd Research & Analysis. Not an exhaustive list. Companies may be active in other sectors. Contact STIQ Ltd to be included in future versions



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TRADE SHOWS & EVENTS ATTENDED

• AI Summit	(London, UK)	Website
• Automate Show	(Detroit, US)	Website
• CeMAT Asia	(Shanghai, CN)	Website
• Hannover Messe	(Hannover, DE)	Website
• Humanoids Conference	(Seoul, KR)	Website
• Humanoids Summit	(London, UK)	Website
• LogiMAT	(Stuttgart, DE)	Website
• LogiMAT South East Asia	(Bangkok, TH)	Website
• Logis Tech Tokyo	(Tokyo, JP)	Website
• Manifest	(Las Vegas, US)	Website
• Modex	(Atlanta, US)	Website
• MTC Robotics and Automation	(Coventry, UK)	Website
• ProMAT	(Chicago, US)	Website
• RoboDEX	(Tokyo JP)	Website
• Robotworld	(Seoul, KR)	Website
• SiTL	(Paris, FR)	Website
• STIQRobotics Networking Event	(London, UK)	Website
• TAIROS	(Taipei, TW)	Website
• Vivatech	(Paris, FR)	Website

GLOSSARY

AMR	Autonomous Mobile Robot
AGV	Automatic Guided Vehicle
AS	Asia
ASRS	Automatic Storage & Retrieval System
CAGR	Compound Annual Growth Rate
EU	Europe
EV	Enterprise Valuation
HaaS	Humanoid as a Service
M&A	Mergers & Acquisitions
MHE	Material Handling Equipment
NA	North America
OEM	Own Equipment Manufacturer
RaaS	Robotics As A Service
ROI	Return On Investment
ROS	Robotics Operating System (open source)
SI	System Integrator
US	United States of America
VAR	Value Added Reseller

ABOUT STIQ LTD

- STIQ Ltd – founded in 2018 – is a team of ex-M&A analysts and engineers producing freemium, high-quality and unbiased market research reports focusing on global robotics, warehouse automation and supply chain technology sectors
- Freemium Market Research is a unique business model with global reach boosted by a high viral multiple among senior decision makers and influencers
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