2026 STATE OF THE ROBOTICS INDUSTRY REPORT

THE ROBOTREPORT

CONTENTS

TOP STORIES OF 2025

2025 exposed both the promise and volatility of robotics, marked by record investments, aggressive expansion, and sobering restructurings across the industry.

Brianna Wessling, associate editor, *The Robot Report*

Before we officially turn the page on 2025, let's take a look back at some of the year's biggest developments. It was a mixed year for robotics: While some companies saw falling sales or shut their doors altogether, others raised record-breaking funding rounds and continued to expand.

Here, in no particular order, are the top robotics stories of 2025.

Agility Robotics' Digit humanoid moving totes in a warehouse. Source: Agility Robotics

Humanoids are everywhere

Of course, we couldn't talk about 2025 without talking about humanoids. Many new developers entered the humanoid race in 2025, while some of the incumbents made significant strides.

Agility Robotics recently landed another deployment for its Digit humanoid. Digit will be working at a Mercado Libre facility in San Antonio, Texas. Digit has also been used by customers like GXO Logistics, where the robot has moved more than 100,000 totes, and Schaeffler.

Figure AI closed its Series C funding round, bringing it to over $1 billion in committed capital. The company's post-money valuation has climbed to $39 billion. Figure said it has deployed its robots with a paying customer since December 2024.

There's a long list of newcomers to the humanoid industry. This year, Humanoid, Agile Robots, Leju, Unitree, LimX Dynamics, Hexagon, and many more unveiled new robots.

A Waymo robotaxi in San Francisco. Source: Waymo

Waymo expands at a rapid pace

At the end of 2024, Waymo operated commercial robotaxi services in Los Angeles, San Francisco, Phoenix, and Austin. It had announced plans to launch services in Miami and Tokyo.

It was hard to keep up with the Alphabet subsidiary's growth in 2025. At the end of the year, Waymo was operating commercial services in Atlanta, Austin, Los Angeles, Phoenix, and San Francisco. It has announced plans to expand or launch services in Nashville, Las Vegas, San Diego, Detroit, Washington D.C., Miami, Dallas, Seattle, Houston, Orlando, San Antonio, Baltimore, Philadelphia, Pittsburgh, St. Louis, and Denver in the coming years. The company has launched test vehicles in Tokyo, and it has plans to deploy in London next year.

Waymo is also rolling out highway driving in San Francisco, Phoenix, and LA. Select riders in San Francisco have had access to freeways since November. In Phoenix, the company began giving select riders freeway access in December.

This growth has also come with some setbacks. Waymo issued two safety recalls in 2025. In May, it recalled 1,212 robotaxis to address risks of collisions with chains, gates, and other roadway barriers.

In December, it filed a voluntary recall in response to its robotaxis illegally passing stopped school buses in a number of incidents across different states.

Physical AI takes center stage

Technologies like generative AI and large language models have been top of mind for a few years now, but in 2025 physical AI took control of the conversation. There are many companies creating physical AI models, including Google DeepMind.

In March, the company introduced Gemini Robotics, its Gemini 2.0-based model designed for robotics. Gemini Robotics is an advanced vision-language-action (VLA) model that was built on Gemini 2.0. It added physical actions as a new output modality for the purpose of directly controlling robots.

Later in the year, it released Gemini Robotics 1.5. DeepMind said this is its most capable VLA model yet. It can turn visual information and instructions into motor commands for a robot to perform a task. It also thinks before taking action and shows its process, enabling robots to assess and complete complex tasks more transparently. The model also learns across embodiments, accelerating skill learning.

Amazon introduced its Blue Jay robot in 2025 that can pick, stow, and consolidate 75% of Amazon items inside a warehouse. Source: Amazon

Amazon deploys 1 millionth robot

Amazon acquired automated guided vehicle (AGV) maker Kiva Systems in 2012 for $775 million. Fast forward to 2025, Amazon deployed its one millionth robot. The company claimed it operates the world's largest fleet of industrial mobile robots.

Today, Amazon's fleet of robots goes far beyond AGVs. The company operates a diverse fleet of robots that includes various robotic arms and its own self-developed autonomous mobile robot, Proteus.

The one millionth robot was deployed at a fulfillment center in Japan, one of the over 300 facilities that make up Amazon's global network.

iRobot files Chapter 11 bankruptcy

It's been a rocky couple of years for iRobot. Amazon called off its bid to acquire iRobot in 2024, pulling away a very needed lifeline for the company. iRobot closed 2024 by laying off another 105 employees.

In 2025, iRobot saw a major decline in earnings. In August, the company reported it had "no sources" of additional capital and that it was exploring its options in the hopes of finding a partner or buyer for the well-known consumer brand.

In December, iRobot entered into a restructuring support agreement with its creditor Santrum Hong Kong Co. and primary contract manufacturer Shenzhen Picea Robotics Co. The Chinese companies plan to acquire the robotic vacuum cleaner maker through a court-supervised Chapter 11 bankruptcy process.

RealSense spins out from Intel

In 2025, we saw the end of a tumultuous era for RealSense. The company's troubles started in 2021, when parent company Intel announced plans to wind down the group. Intel, however, quickly reversed course, resulting in mixed signals for the robotics community.

RealSense spun out from Intel in 2025 with $50 million in funding from Intel Capital and MediaTek Innovation Fund.

RealSense's depth-sensing technology powers thousands of robots, including AMRs, robot arms, and an increasing number of humanoids. The company claimed it's already working with 60% of AMR and humanoid developers, including companies such as Geek+ and Agility Robotics. RealSense said it has 3,000-plus customers.

A Universal Robots cobot arm being used in a palletizing application. Source: Universal Robot

Teradyne's robotics group sees slipping sales

Teradyne's robotics group, which includes Universal Robots (UR) and Mobile Industrial Robots (MiR), started 2025 on a low note. In January, the company's robotics group laid off 10% of its global workforce. With the layoffs, the company consolidated UR and MiR's sales, marketing and support teams after focusing on new products for the last year.

In November, Teradyne laid off another 14% of its staff worldwide as revenue growth did not match expectations. The company said it made these layoffs to ensure long-term sustainability and operational efficiency.

Teradyne's robotics group has some positive news to end 2025, announcing it'll be opening its U.S. headquarters near Detroit in late 2026.

A new age of home robots

The rise of humanoids has also come with a renewed interest in home robots. For years, the industry has struggled to put robots, other than robot vacuum cleaners, into people's homes. Some humanoid companies, however, say these kinds of robots are versatile enough, robust enough, and will eventually be smart enough to work in our homes.

1X Technologies has been leading this charge. The company opened up orders for NEO, its humanoid household robot, in late 2025. 1X expects to ship its first robots to consumer homes in the U.S. in 2026.

Alongside 1X are other developers like Sunday Robotics and Weave Robotics. Unlike 1X, these companies developed a dual-armed mobile manipulation robot. While this robot won't have the flexibility that comes with two legs, it will have the stability that comes with a wheeled base.

1X's NEO humanoid. Source: 1X Technologies

We said goodbye to Rethink Robotics, again

Rethink Robotics, which rose as a force- and power-limited arm pioneer, shut down for a second time in September 2025.

The company filed for bankruptcy back in 2018. Afterwards, it was acquired by the German-based HAHN Group, relocated to Germany, and later became part of the United Robotics Group (URG). By September 2024, URG relaunched Rethink and brought the company back to the U.S. This time, however, URG launched Rethink using white-labeled robots from a German startup, which came with their own problems.

This led to slow sales, which prompted URG to pull back its funds, ending in Rethink declaring bankruptcy once again. The fate of Hebron, Ky.-based Rethink Robotics' IP and latest models has not yet been announced.

Advancing towards autonomous robotic surgeries

Surgical robots have become more popular in many hospitals. However, these robots are not performing surgeries entirely autonomously without any human insight. Instead, they're being controlled by skilled surgeons, providing increased visualization, stability, and precision.

In 2025, however, researchers made strides towards enabling fully autonomous surgeries. In July, researchers at Johns Hopkins University announced that a robot trained on videos of surgeries performed a lengthy phase of a gallbladder removal without human help. The robot operated for the first time on a lifelike patient.

This latest advancement builds on work the Johns Hopkins team did in 2024, when it taught the same robot to perform three foundational surgical tasks: manipulating a needle, lifting body tissue, and suturing. Moving forward, Johns Hopkins plans to train and test the system on more types of surgeries and expand its capabilities to perform a complete autonomous surgery.

Symbotic acquires Walmart's robotics unit

In January 2025, Symbotic kicked off the year by announcing plans to acquire Walmart Inc.'s Advanced Systems and Robotics business. The supply chain robotics company said the transaction expands its relationship with Walmart with the goal of "developing an integrated supply chain."

Symbotic paid $200 million for the group. Along with the acquisition, Walmart invested $520 million into Symbotic. Moving forward, Symbotic will develop, build, and deploy systems for Walmart's online pickup and delivery options at its stores. With Walmart's funding, Symbotic plans to develop technologies to enhance current fulfillment systems and design new ones to meet customer needs.

The two companies' relationship goes back to 2017. Currently, Walmart has deployed Symbotic's platform in all of its 42 regional distribution centers in the U.S.

ABB Group has sold its robotics division, which makes the IRB 1200 arm, to SoftBank. Source: ABB

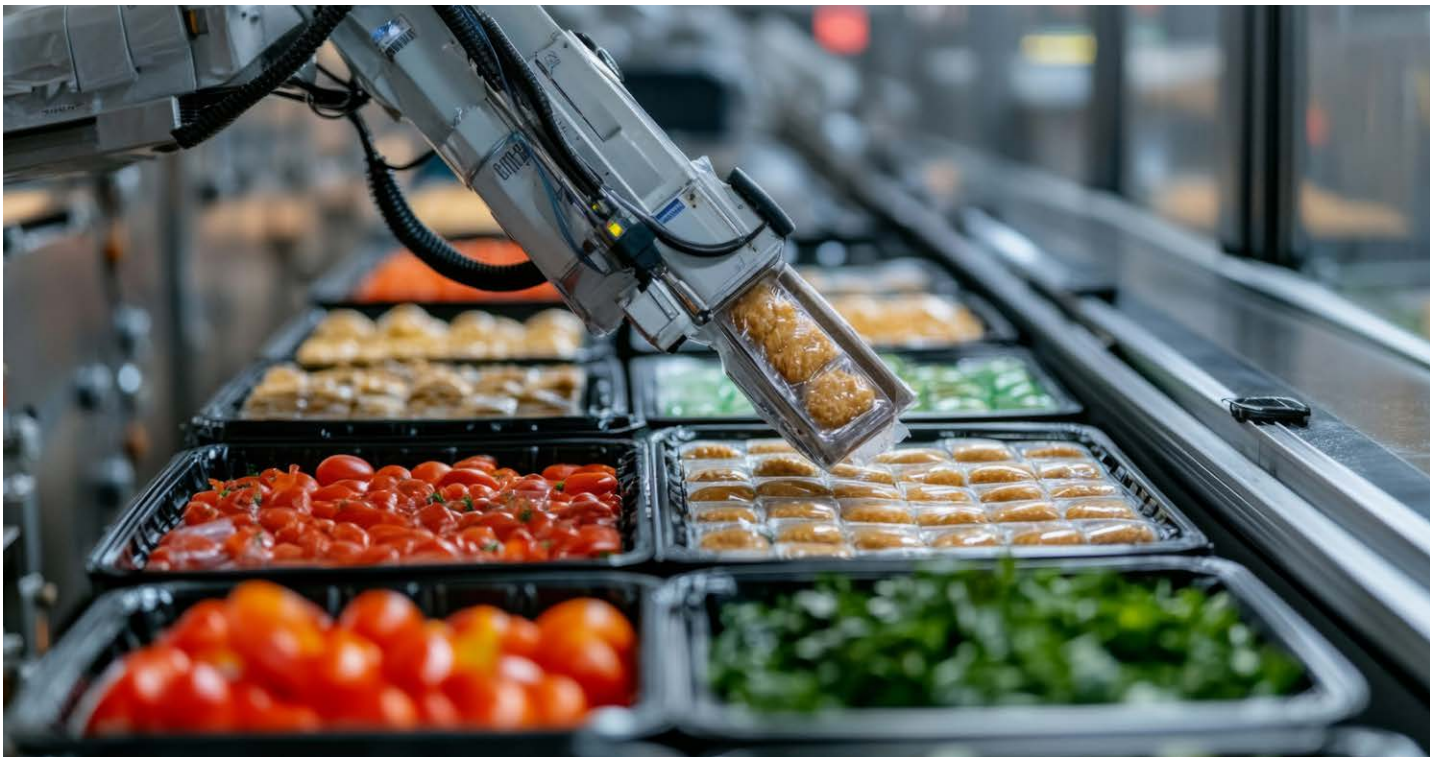
SoftBank buys ABB

Finally, 2025 brought major changes to one of the world's largest robotics developers. Late in the year, ABB Group divested its ABB Robotics & Discrete Automation division to SoftBank Group Corp. for $5.375 billion. The deal is expected to close in early 2026.

The division includes ABB's industrial automation, force- and power-limited robot arms, and autonomous mobile robots (AMRs) that it acquired with ASTI Mobile Robotics for $191 million in 2021.

The acquisition marked SoftBank's return to investing in robotics. The company has had a hand in robotics, in some way, for over a decade, since it acquired Aldebaran Robotics for $100 million in 2012. However, many of its investments have been short-lived, like its four-year ownership of legged robot developer Boston Dynamics.

ABB Robotics is, by far, the largest robotics company SoftBank has acquired, but it still has its challenges. ABB noted in an earnings call in April, when it first announced plans to spin off the unit, that orders and revenues had fallen sharply from 2023 to early 2025.



Robot adoption for food processing has increased, according to A3. Source: IMAGINIAC AI, via Adobe Stock

ROBOTICS EXPERTS OFFER MORE PREDICTIONS FOR 2026

***The Robot Report* staff**

Manufacturers and supply chains had stocked up on robots during the COVID-19, followed by slowdowns in automotive manufacturing and e-commerce in 2024. However, the robotics industry improved in the face of economic and geopolitical headwinds this past year, and 2026 could be even better.

In the third quarter of 2025, robot orders in North America increased, after a drop last year and steady sales in the first half of 2025, according to the Association for Advancing Automation (A3).

"More leaders are exploring automation as a long-term strategy to strengthen their operations," stated Alex Shikany, executive vice president at A3. "That enthusiasm is now starting to show up in the order data, particularly across general industry sectors. As industrial production improves into 2026 and supply chains stabilize, we expect automation to remain a strategic priority for manufacturers looking to compete, build resilience, and address persistent workforce pressures."

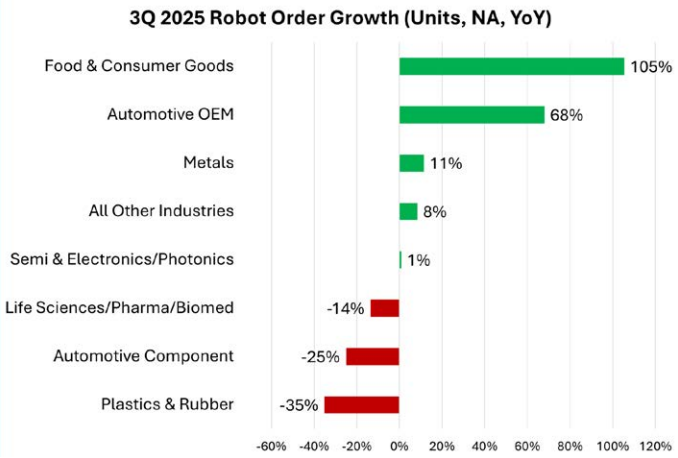
The International Federation of Robotics (IFR) was similarly bullish about recovering demand in 2026.

"The economic environment has remained complex, shaped by geopolitical uncertainties, shifting supply strategies, and ongoing transformations in key industries," wrote Takayuki Ito, president of the IFR. "Yet robotics continues to stand out as a stabilizing force and an essential driver of competitiveness. Across many regions, we see companies returning to investment plans that had been postponed in previous years. Demand for automation -- both industrial and service-oriented -- continues to recover as businesses strengthen resilience and prepare for long-term growth."

The combination of robotics and artificial intelligence could help automation expand into more markets.

"Physical AI, including robotics supported by AI edge processing, will accelerate in 2026," predicted ABI Research. "Partnerships between robotics startups and major system integrators (SIs) are creating market-ready solutions for greenfield verticals like life science, hospitality, retail, and healthcare. New approaches in training data generation and cloud-based model development will reduce time to market."

The New York-based market intelligence firm added that robotics and AI vendors can expect more deals, and SIs will find more specialized systems, in the coming year. *The Robot Report* asked more robotics industry experts for their predictions for 2026.



Robots for food and consumer goods outsold automotive in the third quarter of 2025. Source: A3

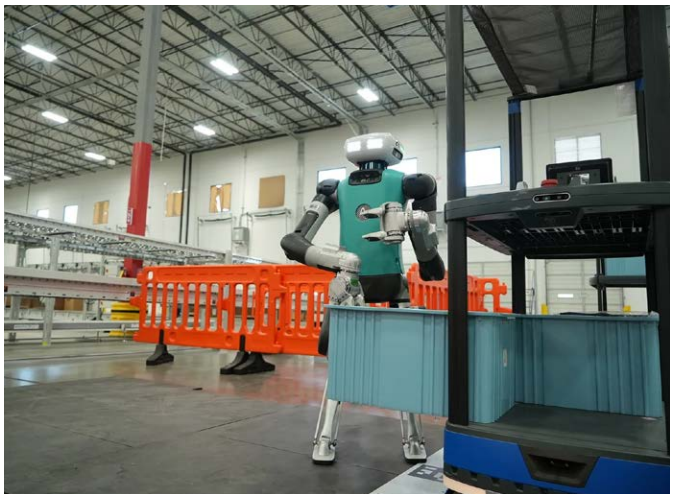
Vision leader sees a work shift coming

Chris Matthieu, vice president of developer ecosystem at RealSense, which spun out from Intel this past year, said he believes we're on the verge of a major workforce shift:

"I don't think automation removes humans from the equation; it changes what humans do. Just like during the Industrial Revolution, people will evolve from manual labor to becoming robot operators, programmers, and fleet managers."

"With humanoid robots and autonomous systems scaling in 2026, this transition will define the next decade of work and innovation."

"In five years, I think we'll see machine-to-machine commerce. Robots will shop for us, dispatch autonomous vehicles, and pay other machines directly using digital currency. A humanoid could buy groceries, pay at checkout, and coordinate with a robo-taxi — all without human input."



Agility Robotics' Digit humanoid working at a Spanx facility in Georgia. Source: RealSense

"There's a good chance we'll see robots fighting robots on the battlefield — battle bots on steroids. I have friends already doing humanoid boxing matches, like in *Real Steel*. They're using Unitree or Agility robots — four- or five-feet-tall humanoids with boxing gloves — and it's becoming a real competition scene."

Industry veteran says mobile manipulation a theme

Melonee Wise was co-founder of mobile robot developer Fetch Robotics, which was acquired by Zebra Technologies in 2021 and shut down in 2025. She was chief product officer at humanoid developer at Agility Robotics from 2023 to 2025, and she recently joined KUKA as chief product officer.

KUKA has developed mobile manipulators for service, logistics, and machining applications. Source: KUKA

Wise made the following predictions for 2026:

"For the next couple of years, I think mobile manipulation is going to be a big theme. I'm sure you've seen all of the mobile manipulators that have been coming out. There's Kinisi, Reflex, Sunday, Tangible."

"It feels like we're back in 2014, when there was a new AMR company every other day. Now there's a new mobile manipulation company every other day. So, I think that's something to really look out for in the next couple of years."

"The other thing that we're going to see is a lot more focus on getting AI onto the factory floor. That's going to be a big, big area that everyone is excited about, and delivering on the promise of it being industrial-grade. That's one of the big, exciting things that KUKA can bring to bear, that maybe other startups and other players may not be able to."

"The other big trend is the 'Web 2.0' moment of robotics, making everything easy to use, making it easy to stand up a robot system very rapidly. That's a big, important factor for a lot of our customers. Everyone wants to see that happen, and I think that's not just KUKA, but that's many startups. If you look around, you see a lot of startups and other big players becoming more and more focused on this."

More room for robot adoption

Ben Allen, head of product at A-SAFE, which makes industrial safety products, focused on markets where robotics will continue to spread:

"E-commerce fulfillment: By 2026, warehouse robots will use AI-driven vision and decision systems to react to what's happening around them, rerouting in real time, predicting congestion, and coordinating with humans on the floor. This leap from pre-programmed movement to situational awareness will make robotics more fluid but also more unpredictable."

"Safety design will have to evolve from fixed layouts to adaptive systems that understand live movement patterns and respond instantly to change. A-SAFE's experience in intelligent infrastructure gives us a front-row seat to that transition."

"CPG manufacturing: The next wave of robotics in consumer packaged goods will be defined by agility. As brands shorten product cycles and increase customization, factories will depend on reconfigurable robotics that can switch between tasks without long downtimes."

"But that flexibility brings constant layout changes and new human-machine interactions. We expect safety systems to become modular too, plug-and-play networks of barriers, sensors, and software that adapt as fast as the production line itself. It's how manufacturers will keep pace without compromising protection."

"Automotive manufacturing: In automotive, the move toward electric and hybrid platforms is forcing a redesign of assembly lines around mixed-model production. Robots will need to manage everything from battery modules to composite materials, often in shared workspaces with technicians.

"We anticipate a shift toward 'aware automation,' where robotics, vision systems, and safety infrastructure communicate in real time to manage proximity and risk. The factories that master this will produce faster and safer, not one at the expense of the other."

Automated and semi-automated equipment such as fork trucks need built-in safety as adoption spreads. Source: A-SAFE

"Data centers: By 2026, data centers will become some of the most automated environments in industry. Robots will handle routine maintenance, cabling, and equipment movement, guided by AI navigation that maps airflow, heat, and vibration in real time. These spaces are dense and sensitive, meaning the next safety frontier will be precision, creating automated systems that can navigate with millimeter accuracy without disrupting uptime."

"Companies leading this charge will combine robotics, sensors, and predictive safety models to protect people, assets, and continuity all at once."

Humanoids are coming to market

Artem Sokolov is founder of Humanoid, which is developing modular humanoid robots using its vision-language model (VLM) and vision-language-action (VLA)-based KinetIQ framework. He discussed some of Humanoid's goals for the coming year:

How rapidly is the humanoid market maturing? What are customers looking for?

"The market is maturing faster than many of us realize. It's actually one of the biggest industry misconceptions: People underestimate how close the technology really is. Real-world applications will arrive far sooner than most expect."

"We see this directly when talking to customers. Interest from industry has grown significantly over the past year. Before, most companies were mostly cautious and hesitant about humanoids, now they are more open, curious, and ready to test them. For example, for the next year, our PoC [proof-of-concept] pipeline is already fully booked."

"In industrial environments, customers are very pragmatic. They are looking for performance and efficiency, but also for clear economic value: low total cost of ownership, and an understandable path to scale. Easy integration is as important: Robots must fit into existing infrastructure without redesigning the entire environment."

The HMND 01 Alpha Bipedal robot reportedly achieved stable walking in just 48 hours. Source: Humanoid

What challenges have yet to be solved?

"Right now, the three core challenges are safety, predictability, and ethics. Safety is non-negotiable. Robots must be designed, tested, and deployed with strict safety standards so they can operate reliably in human environments.

"Predictable behavior is equally important; people need to understand how robots will act. Here, the humanoid robotics industry is also responsible for education. We need to help industries and workers understand how to work with humanoids safely and effectively."

"Beyond technology, there is a broader societal challenge: acceptance. Humanoid robotics will only succeed if people trust it. We believe trust must be earned step by step, first in factories and industrial settings, and then in everyday life."

"There is also a persistent fear that robots will take jobs. We see it differently. Humans are at the core of everything we do. Our goal is to amplify human potential, not replace it."

RobCo provides modular systems as a service for tasks such as finishing. Source: RobCo

RaaS can still help companies

Roman Hölzl, co-founder and CEO of RobCo, a provider of modular systems for automated manufacturing, cited a recent survey reporting that many decision makers are open to financing options such as robotics-as-a-service (RaaS) models to adopt more robots.

"High CapEx is still the No. 1 brake on adoption. Nearly half of respondents cited high upfront investment as the main reason they haven't implemented more automation, even though many already rate their current automation spend as 'high.'"

"Payback expectations are high. Most decision-makers are looking for a one- to two-year payback. The average target is around 16 months, with manufacturing even tighter. If a robot project doesn't pencil out on that horizon, it usually dies."

"Financing preferences are shifting toward OpEx. When asked how they want to fund robots, about 50% pointed to leasing/operating leases, a large share are actively looking at state or federal grants, and more than 4 in 10 said they would consider a robots-as-a-service model that bundles hardware, software, and support into a recurring fee."

"The most automation-mature companies are the most open to RaaS. The 'leaders' segment -- those already deep into automation -- is significantly more willing to adopt RaaS and revenue-share models than the laggards. This suggests that once factories understand the real lifecycle costs, they'd rather buy outcomes than equipment."

CEO expects robots to finally enter the home

Aaron Edsinger, co-founder and CEO of mobile manipulator developer Hello Robot, said household robots could finally break out in the coming year:

"In 2026, excitement around home robots will collide with reality. The gap between what people imagine robots can do and what they can reliably deliver in a domestic setting will become impossible to ignore."

"What will also become clear is that specialized robots designed to do a handful of high-value things safely and reliably are far better suited for the home than humanoids that can't do much reliably and safely."

The Stretch mobile manipulator won the 2025 RBR50 "Robots for Good" award for helping users such as Henry Evans, who has quadriplegia. Source: Hello Robot

5 PREDICTIONS FROM AN INVESTOR FOR 2026

Given the positive market momentum, many more robotics companies will choose to go public in 2026, and we predict the IPO pace will at least double.

Sanjay Aggarwal, venture partner, *F-Prime Capital*

Robotics is having its moment. The long-promised leap of robots out of the four walls of the factory and into our daily lives finally seems upon us. Waymo is taking over the streets of San Francisco, with more cities not far behind. The latest release of Tesla's FSD (*Supervised*) finally feels like FSD (*Un-supervised*).

Amazon announced its one-millionth robot deployment. Humanoid robot videos fill our social media feeds with wondrous demonstrations of a tantalizing future where robots do our mundane daily work (and apparently also entertain us with dancing, boxing, and Robot Olympics).

At F-Prime, we've been tracking the robotics investing landscape for years, and each year we publish our State of Robotics report to share what we are seeing in the market. Robotics investing has seen its ups and downs, but this year feels different. Like much of the venture capital market, investments are at an all-time high, with robotics being a direct beneficiary of the excitement around AI. Public markets are also taking notice with 10 new robotics IPOs in the last 2 years, and public robotics companies outperforming the market.

Despite the excitement, many early-stage robotics companies are still seeing their share of challenges. Early-stage investment has been on a steady decline the last few years. Anecdotally, we hear of many robotics companies that have been around for several years, and have raised tens of millions of dollars, either shutting down or seeing existing investors wiped out through a recap. Ultimately, building a robotics company is hard, and not everyone will survive.

Nevertheless, we continue to be extremely bullish about what the future has in store for the sector. The companies that succeed are building highly differentiated businesses, accruing significant value to both investors and customers.

As we look ahead to 2026, we have 5 predictions of what to expect.

1 Robots everywhere

There will be an acceleration of robot deployments across the country. For those of us who don't live in San Francisco, L.A., or Phoenix, robotaxis still feel distant. But the revolution is upon us.

In 2026, we will see robotaxis rapidly gain market share in most major U.S. cities. At the same time, delivery robots and delivery drones will start to become commonplace for day-to-day deliveries. It is already starting in a few cities, and though still 12-18 months behind the scale of robotaxis, growth will accelerate. There are also lots of smaller use cases such as commercial floor cleaning, restaurant delivery, hotel room service and security that will see robots becoming more and more commonplace.

2 IPO wave

There are a significant number of scaled robotics companies that have been waiting for the right opportunity for a public listing. We saw five robotics IPOs globally in each of the last two years, with most of the companies outperforming the broader market.

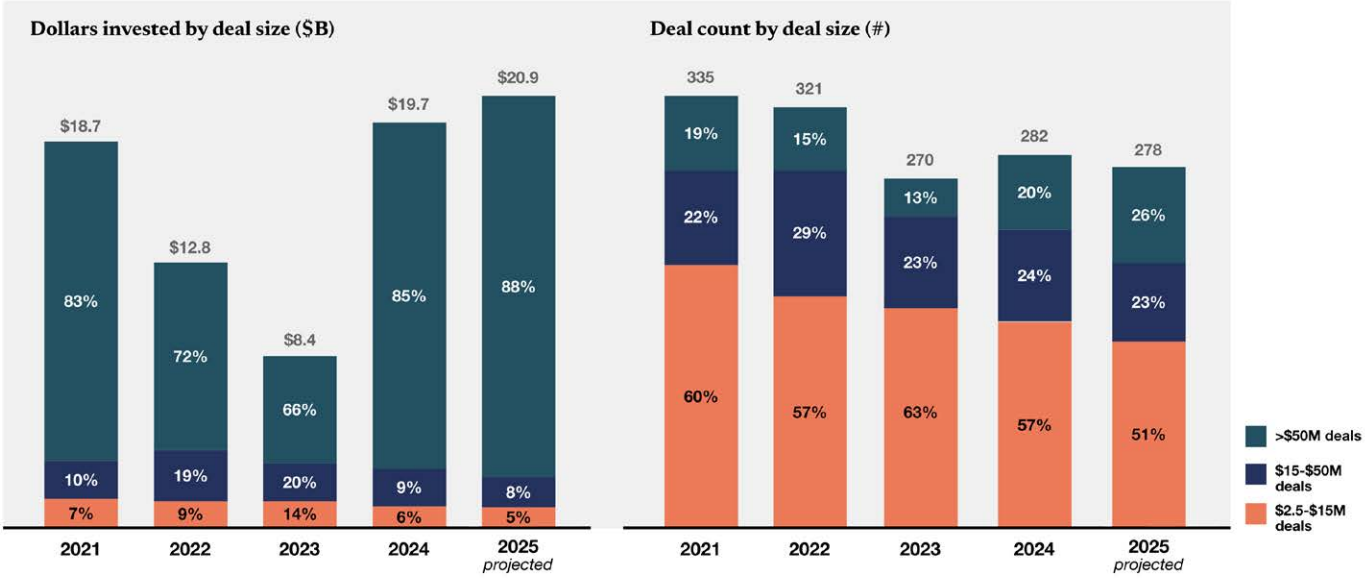
Given the positive market momentum, many more robotics companies will choose to go public in 2026, and we predict the IPO pace will at least double.

3 All-in with the Mag 7

Robotics investments amongst the Mag 7 will intensify. Tesla and Amazon have historically led the pack and continue to invest heavily. Nvidia has backed up its public announcement around physical AI being the next frontier with significant investments in creating developer tooling for building robots (Cosmos, Isaac Sim) and through direct investments into many of the hottest robotics companies.

Google, which has built one of the most successful robotics companies in Waymo, seems to be ramping its efforts further with the recent hiring of Boston Dynamics' CTO. Microsoft, Meta, and Apple have been laggards compared to others, though we expect to hear more public announcements from each in the coming year.

Mega deals continue to drive investment activity; smaller, often early-stage deal volume continues to fall



F/PRIME Source: PitchBook, F-Prime team analysis; 2025 data through August, run rated through EoY

4 General purpose consolidation

One of the most notable aspects of investment in 2025 has been the significant fundraising across the humanoid and robotic foundation model space, with a dozen companies in the U.S. and Europe now having raised more than $100 million each.

Given the high technical uncertainty for these companies, with limited near-term commercial validation, we expect that further investment will consolidate amongst the 3-4 perceived winners. Others will get acquired by these players, or by the tech majors as they play catch-up. Some will struggle to raise further capital and will ultimately be shut down or acqui-hired.

5 Haves and have nots

While the best companies will continue to see significant investor interest, fundraising for many robotics companies will become increasingly difficult, particularly beyond the earliest stages. For robotics companies to raise money today, they need exceptional teams, differentiated technology, and compelling market validation. It usually isn't good enough to have two of the three. There will be an increased number of announced shutdowns and acqui-hires, usually driven by companies that were unable to demonstrate enough commercial momentum to justify their next round of funding.

The next 12 months are shaping up to be another transformational year for robotics. We can't wait to see what surprises await.

About the Author

Sanjay Aggarwal is a venture partner focused on frontier technology and enterprise software investment opportunities. Prior to joining F-Prime, Sanjay was CEO of Unicel Technologies, an India-focused mobile messaging company. Sanjay scaled Unicel to become a leader in the Indian market and successfully exited the business to Karix Mobile.

Earlier in his career, Sanjay worked at Devonshire Investors (the private equity group of Fidelity Investments), McKinsey and Company in their U.S. and India offices, and at Berkeley Process Control (acquired by Moog Inc), where he built machine automation systems. Sanjay holds a B.S. in Mechanical Engineering from MIT, an M.S. in Mechanical Engineering from UC Berkeley, and an M.B.A. from the MIT Sloan School of Management.

Deloitte's Smart Factory simulates real use cases in Kansas. Source: Deloitte

AI AND RESHORING TO BOOST ROBOTICS ADOPTION IN 2026, PREDICTS DELOITTE

Eugene Demaitre, editorial director, *The Robot Report*

In its "2026 Technology, Media & Telecommunications Predictions," Deloitte Touche Tohmatsu Ltd. predicted that "intelligent autonomy" is going to boost robot adoption, accelerate with reshoring, and enable more autonomous operations. The combination of artificial intelligence, robotics, and drones will result in "self-directed systems capable of reasoning, adapting, and operating in dynamic environments," said the services firm.

"There are a lot of conversations right now about agentic and physical AI," said Gillian Crossan, global technology, media, and telecommunications industry leader at Deloitte. "This study is a logical progression of those AI discussions."

"Our predictions are driven by interest in bolstering domestic manufacturing in Europe and the U.S.," she told *The Robot Report*. "For many years, we've had a focus on services and other approaches from a labor perspective, but there's an increasing interest in domestic manufacturing."

Deloitte's target audience for its predictions includes executives, middle managers, journalists, and students.

The time is ripe for automation and reshoring

Advocates for reshoring manufacturing to the U.S. and Europe have long touted the role of robotics, so why is Deloitte predicting greater adoption now?

"There are a few components. The [COVID-19] pandemic made everyone realize that resilience in the semiconductor industry and supply chains was not necessarily there," Crossan replied. "Even fairly simple semiconductors have an impact on daily life. On the front edge, packaging these processors is very capital-intensive, and that's where governments are now offering more incentives."

In addition, the latest AI models have made companies more interested in building their own data centers, spurring demand for CPUs and GPUs, she said.

"Particulates are the enemy [in chip fabs], so the fewer people, the better," explained Crossan. "We're getting closer and closer to 'lights-out' manufacturing, which is a holy grail in that industry."

She also cited global population pressures as a driver for robotics development and adoption. Aging populations in Japan and elsewhere, plus shifting preferences among younger workers, are causing manufacturers of all sizes to consider automation.

Agentic AI spins up

With agentic AI, a company could "spin up" an agent to help with, say, a financial task, said Crossan. Deloitte is working with clients to determine how they can use agents to improve productivity, reduce costs, and run their operations more effectively.

"In the robotics space, we're starting to see vision-language-action [VLA] models get to a place where they can make humanoid robots smarter and more autonomous," she said. "At CES and Mobile World Congress, we've seen more robots relying on vision and language to learn. That's where the magic really starts to happen."

Advances in generative AI "could propel annual industrial robot sales to over a million units and $20 billion in revenues by 2030," said Doug Van Dyke, vice chair and U.S. telecommunications, media, and entertainment sector leader at Deloitte.

TSMC Arizona is a chip fab near Phoenix. Source: Taiwan Semiconductor Manufacturing Co.

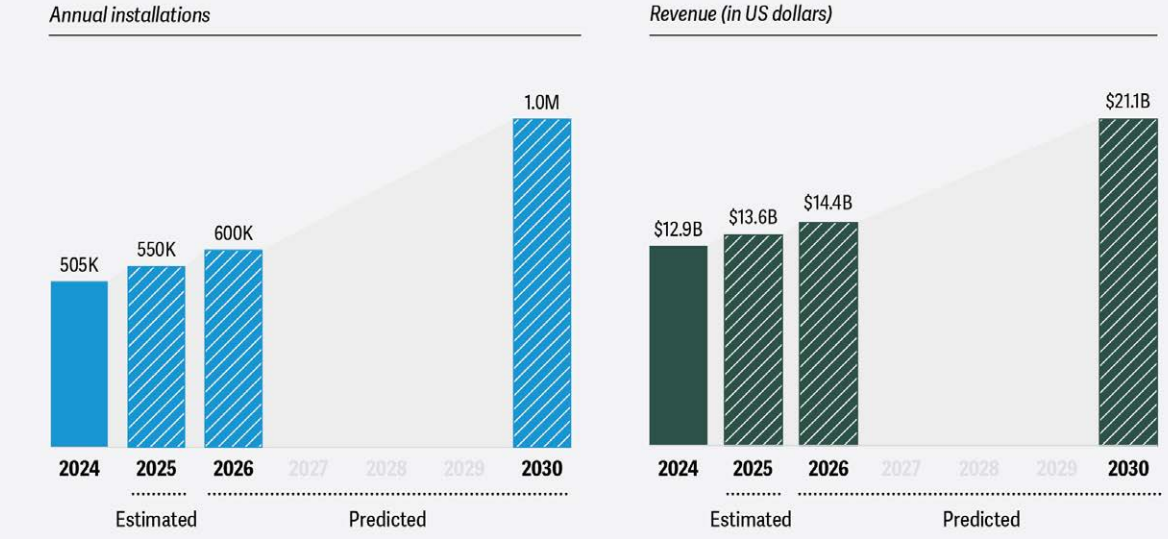
Robotics is coming to more sectors

"A lot of people wouldn't expect Deloitte to have a smart factory, but in Wichita, [Kan.], we have lots of robots together in a manufacturing environment to simulate real use cases," Crossan said. "We look at injection molding and maintenance."

Deloitte is also looking at robots and drones for situations that are dangerous for humans, such as in the power and utilities industries.

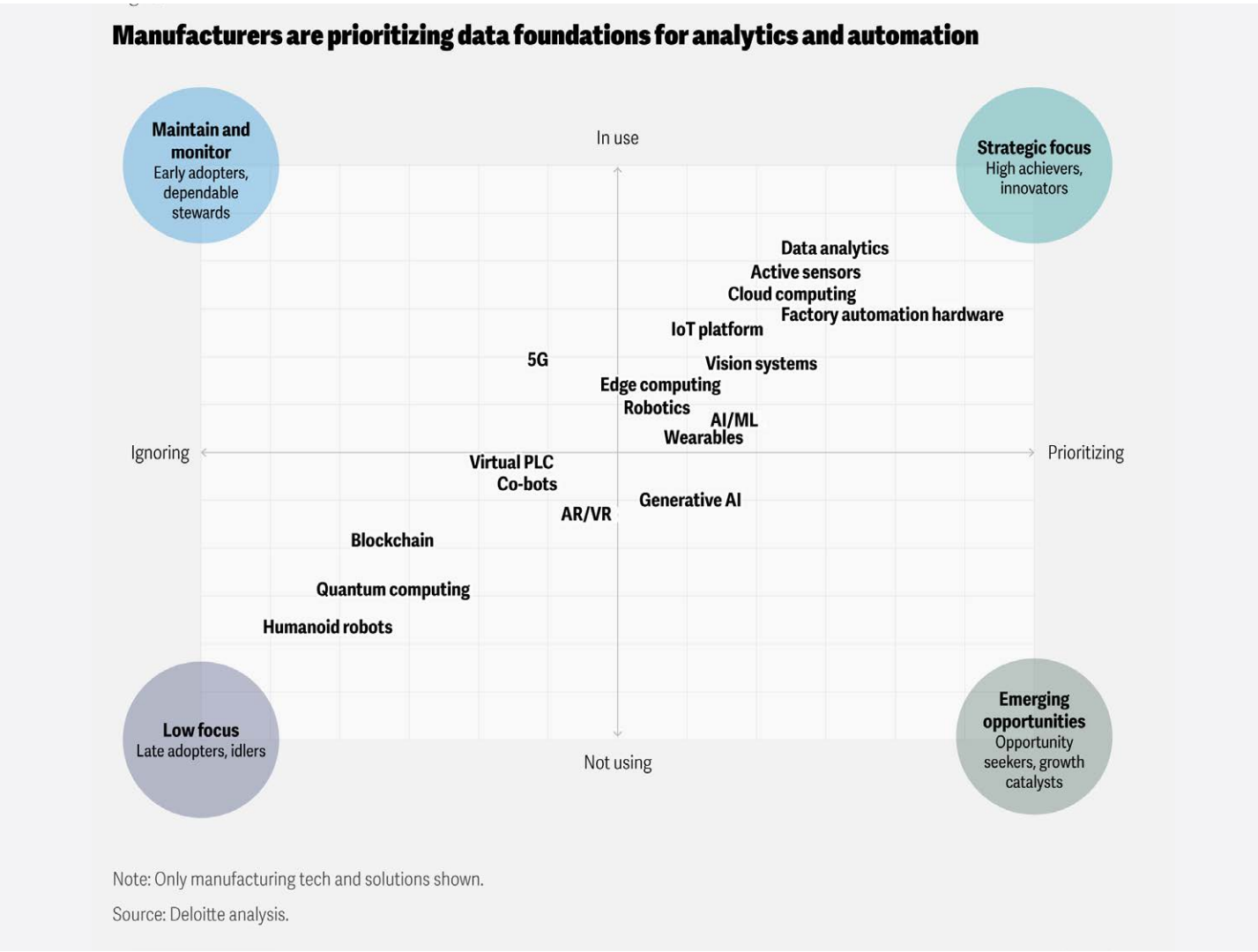
"Being able to fly and look across massive areas to check equipment and lines, plus identifying spots where you can do predictive maintenance, are good use cases," said Crossan. "In warehousing, many injuries happen when workers twist to pick up items, and in hospitals, picking up samples or disinfecting rooms can be hazardous."

Annual shipments of industrial robots, many AI-powered, could reach one million units by 2030, generating over US$20 billion in annual revenue



Source: Deloitte analysis based on publicly available information from sources including the International Federation of Robotics, Interact Analysis, and IPF Online.

Shipments of AI-powered industrial robots could reach $14.4 billion in 2026. Source: Deloitte



Robotics and AI are still emerging areas of strategic focus for manufacturers. Source: Deloitte

"Robots and AI are also good for tasks requiring extreme precision, such as robotic surgery, where surgeons in one city perform operations in another city," she said.

Where Deloitte expects robotics investment to grow in 2026

While Deloitte predicted that the global industrial robot base could reach 5.5 million by 2026, it acknowledged that "annual new robot sales have stalled at just over 500,000 units since 2021."

To meet the demographics-driven demand, the technology ecosystem must address bottlenecks related to data quality, integration, and security, asserted the company.

"There's not as much focus right now on regulation, but safety and cybersecurity are important design elements, and not something we can do as an afterthought," noted Crossan. "I do see a continuing need for spending on compliance in the robotics world."

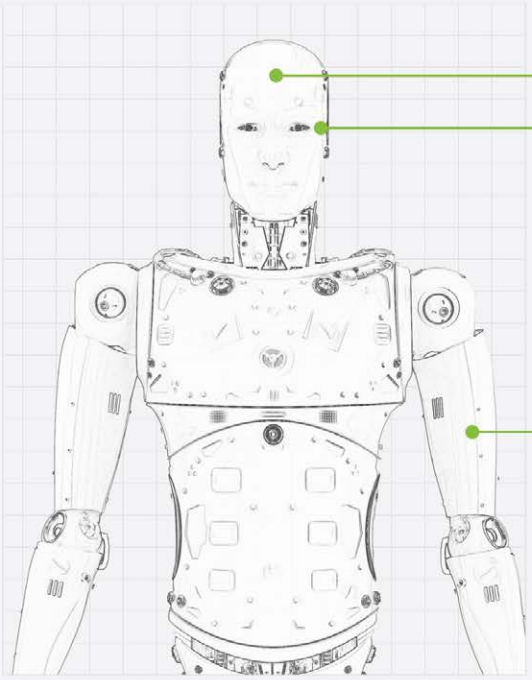
In addition, geopolitics has renewed interest in autonomous military and logistics systems.

"Europe has been very open about how much it is investing in defense. This will affect R&D and deployment of robots in 2026," Crossan noted. "We're also seeing many more extreme weather events, which is another important domain where I see investment to be made."

Will humanoid robots start to replace people in the near future?

"It's not a straight line. Some companies will look to humanoids to replace people," said Crossan. "But for the foreseeable future, we expect integration between humans and robots, the same as with humans and AI agents working together."

The chips and hardware that can make humanoid robots and embodied AI possible



Combining life-like appearance and equipped with conversational AI capabilities, humanoid robots could even make eye contact. Besides VLA models and related software, there are dedicated hardware components that may be essential for these embodied AI systems.

On-board processing units (GPUs, custom CPUs, purpose-built robotic processing unit)
- Enable learning
- Process real-world information and objects
- Develop spatial understanding
- Execute tasks autonomously

Sensors (Gyroscopes, accelerometers, AI-based computer vision, and cameras)
- Assist with environmental perception and navigation
- Enable object perception
- Interpret verbal or non-verbal instructions
- Help robots make informed decisions and actions

Actuators
- Enable movement
- Allow use of robotic arms
- Enable precise and skillful object handling
- Help robots achieve higher degrees of freedom

Note: Vision language action (VLA); graphics processing unit (GPU); central processing unit (CPU).
Source: Deloitte analysis.

Agentic and embodied AI require a combination of technologies currently difficult to produce within the U.S. Source: Deloitte

A3 LEADS DISCUSSION ON RESHORING AND A NATIONAL ROBOTICS STRATEGY

Eugene Demaitre, editorial director, *The Robot Report*

A national robotics strategy is necessary for U.S. economic competitiveness and national security, asserted Jeff Burnstein, president of the Association for Advancing Automation, or A3. He spent much of the past year traveling to speak with industry leaders, legislators, and other parties about the potential of robotics and artificial intelligence to aid with reshoring.

"Everybody wants to reshore manufacturing, but not everybody agrees on ways to do that," Burnstein told *The Robot Report.* "We need a national robotics strategy."

While countries like China and Japan have centralized industrial planning, the U.S. has historically preferred to leave innovation and market expansion to the private sector. The federal government supports research and development plus certain verticals such as automotive, but the current administration has focused on more directly promoting U.S. interests.

"We've discussed incentives for companies to manufacture here, like what China has done," said Burnstein of his visits to Capitol Hill. "Not everybody agrees on subsidies. The 'Big Beautiful Bill' accelerated depreciation."

"There's more the government could be doing to adopt robotics and automation itself," he added. "The Department of War has lots of logistics applications and manufacturing needs for things like shipbuilding that could be more automated."

Military and aerospace programs can also lead to dual-use technologies with civilian and industry benefits, noted Burnstein.

"Without robots running the actual means of production, reshored plants simply cannot deliver the cost structures, quality, or productivity necessary for sustained financial competitiveness," said Tyler Bouchard, co-founder and CEO of Flexxbotics, which provides digitalization solutions for robot-driven manufacturing.

FANUC has built a facility in Auburn Hills, Mich. Credit: FANUC America Corp.

While all of the major industrial robot manufacturers are based overseas, they have opened or plan to open factories in the U.S., including ABB, FANUC, KUKA, Yaskawa, and Universal Robots.

Tariffs could impede reshoring

In September 2025, the U.S. Department of Commerce said it had opened an investigation into the import of robotics, industrial machinery, personal protective equipment, and medical devices under Section 232 of the Trade Expansion Act.

This created uncertainty around the prospect of tariffs. Kearny's "2025 Reshoring Index" reported that while an increasing number of executives expressed interest in reshoring, actual reshoring activity had declined.

It is not yet clear whether tariffs would stack on existing surcharges on steel and aluminum and those on various countries that supply robots.

"We'd like to see companies incentivized to open up new factories the U.S. rather than be punished for not being here yet," Burnstein said. "There are better ways to get domestic supply chains, and tariffs could make it harder to get robots for U.S. factories."

"Five years ago, we started expanding manufacturing in the U.S.A. heavily — we invested in buildings, equipment. Many new local jobs are tied to these investments," said Felix Brockmeyer, CEO of motion plastics provider igus Inc. in Rumford R.I. "We now have the critical materials needed that we cannot get in the U.S.A., but tariffs make them expensive, and ultimately, the customer bears the cost."

Within the government, there is also a range of opinions on robotics tariffs.

"One Senate office would be fine with heavy tariffs if they accelerate movement to a domestic robot base," recalled Burnstein. "Others were neutral or wanted more information."

According to the International Federation of Robotics (IFR), China used 43% of the global operational stock of industrial robots in 2024, compared with about 10% for the U.S.

The IFR, A3, and others submitted responses urging for policies to promote robotics adoption.

"We wanted to be as transparent as possible on where we were, and we didn't redact anything from our statement," Burnstein recalled. "We left open the possibility of looking at certain categories of advanced mobile robots or humanoids, which are not yet in widespread use.

"We don't know what the investigation will conclude," he acknowledged. "The administration has 270 days from the close of the comment period in October to announce a decision, and it could happen more quickly."

The deadline for an official response is July 14, 2026.

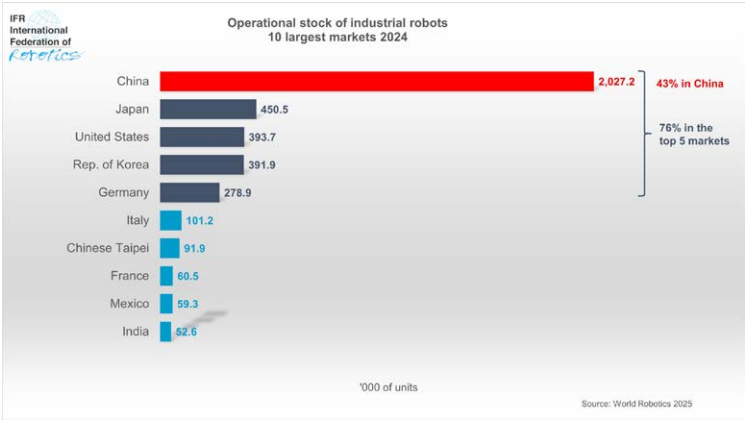
Congressional Robotics Caucus reconvenes

After about five years of inactivity, the Congressional Robotics Caucus relaunched in June 2025. The advisory committee is chaired by four members of the U.S. House of Representatives:

- Rep. Bob Latta (R-OH)
- Rep. Jim McGovern (D-MA)
- Rep. Jay Obernolte (R-CA)
- Rep. Haley Stevens (D-MI)

Other members from the 119th Congress include:

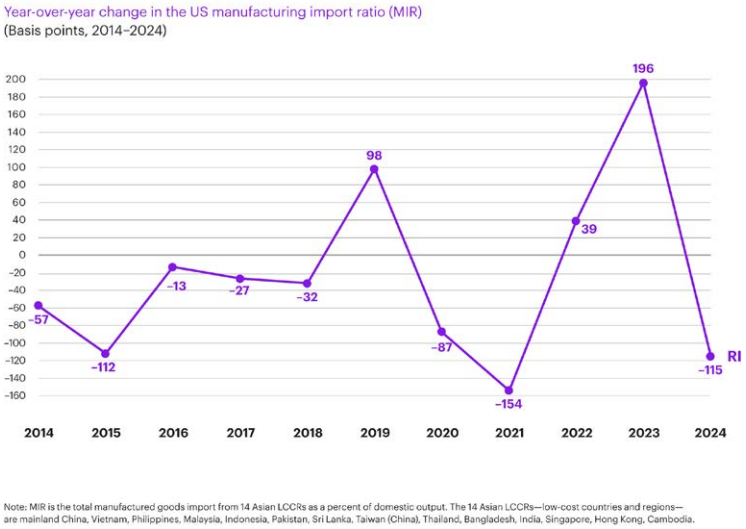
- Rep. Sanford Bishop (D-GA)
- Rep. Russell Fry (R-SC)
- Rep. Laura Gillen (D-NY)
- Rep. Summer Lee (D-PA)
- Rep. Andrea Salinas (D-OR)
- Rep. Jan Schakowsky (D-IL)
- Rep. Bennie Thompson (D-MS)
- Rep. Glenn Thompson (R-PA)



China now uses more industrial robots than the other leading nations put together. Credit: International Federation of Robotics

In early December 2025, A3 and law firm DLA Piper held a meeting with the caucus in Washington, D.C., to promote a national robotics strategy. Panelists discussed the importance of unified policies for automation and workforce development to reshore manufacturing.

"We learned tough lessons in COVID," said Rep. Latta at the time. "The supply chain was a disaster, and we realized the need to reshore. We're in a global competition with communist China, and there are no medals for second place."



The U.S. manufacturing import rate has declined. Credit: Kearny

Several industry experts agreed on the need for better education and training.

"Despite years of reshoring rhetoric, trade policy alone hasn't delivered a meaningful revival," wrote Shaun Edwards, co founder and chief technology officer of Plus One Robotics, a San Antonio, Texas-based startup deploying robots in logistics and e-commerce.

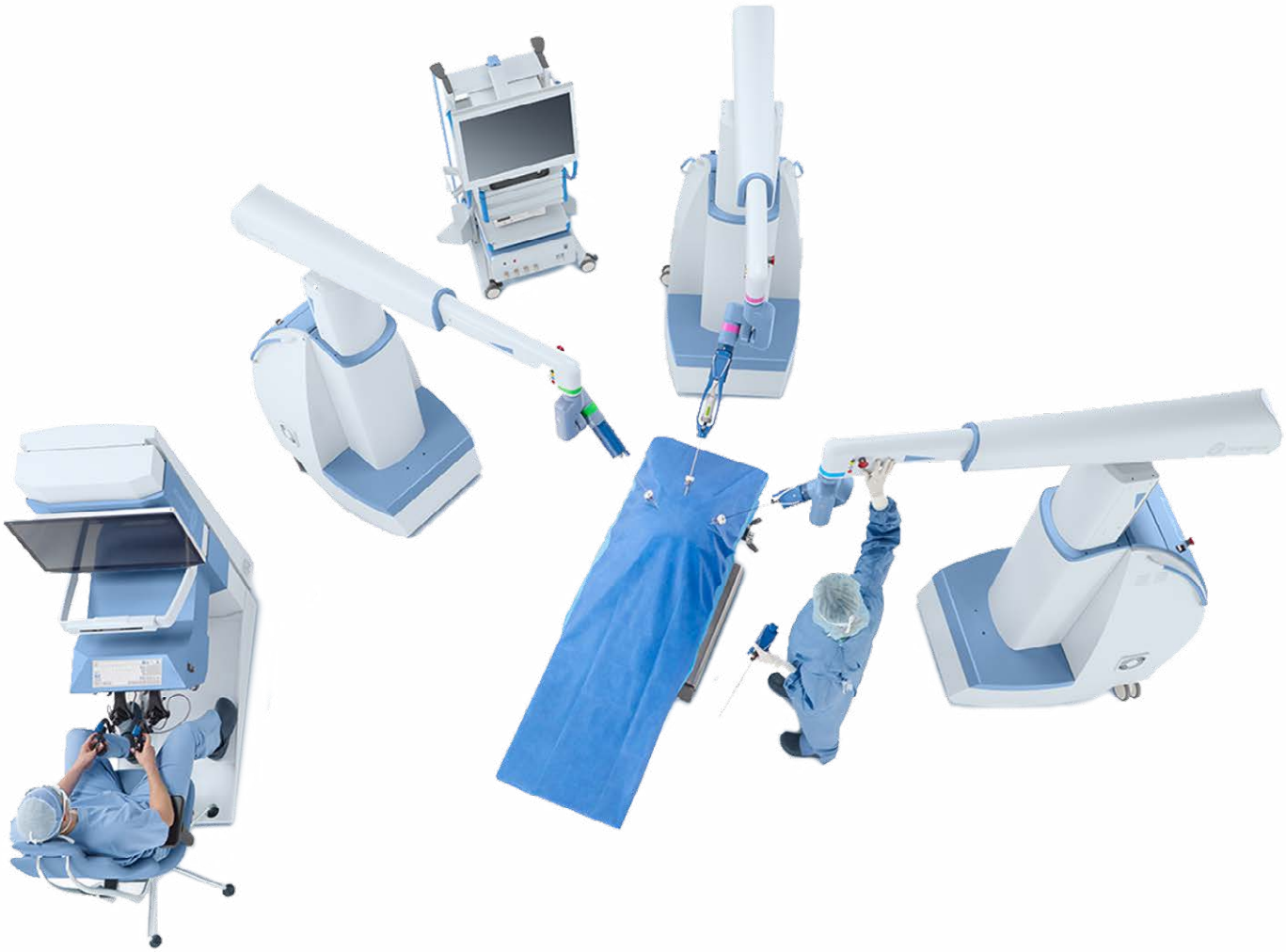
"Factory output has remained uneven, supply chains are still vulnerable, and many small and midsize producers lack the workforce and technology to scale," he added. "Meanwhile, global competitors have invested aggressively in automation, infrastructure, and technical education—building not just capacity, but also resilience."

Parallel reshoring efforts to the Congressional Robotics Caucus include the 2024 "Roadmap for U.S. Robotics" and the Special Competitive Studies Project's (SCSP) recommendation for a Technology Competitiveness Council. Both called for more federal coordination of robotics rather than simply more funding.

"It's about having a level playing field – robots are already everywhere in facilities in lower-cost labor countries like China and India," said Dave Evans, CEO of Fictiv, an Oakland, Calif.-based global manufacturing platform.

"I visited a plant in China with 450 CNC machines and maybe a dozen or two employees," he told *The Robot Report*. "It is making high-precision parts in a lights-out operation. It's incredible that they've invested in more engineers than operators. It's critical that we don't see automation as a competitive advantage but as table stakes."

Jeff Burnstein, president of A3, introduces a panel at a reshoring meeting with the Congressional Robotics Caucus. Credit: Eugene Demaitre



The Senhance System has approvals in 12 countries. Source: Asensus Surgical

SURGICAL ROBOTICS ADVANCES ARE CRYSTALLIZING, SAYS ASENSUS

Eugene Demaitre and Brianna Wessling, *The Robot Report*

Surgical robots continue to get more dexterous and deliver more and better information to physicians. However, they are the products of numerous deliberate decisions in response to clinical needs, regulatory requirements, and market competition. Asensus Surgical Inc. said it sees robotic surgery as a way to bring surgeons closer to patients.

Founded in 2006 as Transenterix, Asensus Surgical Inc. said it has developed "augmented intelligence" for laparoscopy. The Durham, N.C.-based company said its systems have participated in more than 15,000 procedures involving mover 300 surgeons.

Last year, Asensus completed its first gallbladder removal on a teenage patient with its technology.

Dr. Ed Chekan, vice president of medical affairs and education at Asensus Surgical, spoke with *The Robot Report* about the promise of surgical robotics in 2026.

Past year saw progress in robot-assisted surgery

What were some trends in surgical robots in 2025? Were there noteworthy developments in the technology, indications, or adoption?

Chekan: My background is in general surgery, and I did my training in minimally invasive surgery. Over the past 10 years or so, robots have become part of our daily practice.

Over the past year or so, different platforms have become a standardized presence in hospitals. It's just like laparoscopy, where minimally invasive procedures initially started as a good idea clinically and became prevalent. Where should we use these technologies?

There's also this idea that we can have informed surgery or performance-guided surgery, where we take the robot and the human surgeon and put them in an environment to get the best results for the patients. We're seeing the birth of that over the past couple of years, and it will become more formalized.

On the one hand, smaller and more portable surgical robots enable physicians to get closer to the bedside, while on the other, telesurgery allows experts to conduct procedures from many miles away. Where does Asensus fall in that continuum?

Chekan: Looking back at the history of surgery, we've been distancing surgeons from tactile sensation against the patient's tissue ever since Halsted put rubber gloves on them [at Johns Hopkins in the late 1800s].

Then laparoscopic surgery came along with long sticks and cameras, but we could still get some tactile feedback, like a from hard gallstone. We created this ergonomic gap where we were in contorted positions, and the robots have normalized that again, so we're in more natural positions.

Robots can be designed to bridge perception gaps in surgery. Source: Asensus Surgical

It wasn't the same leap as from open incisions to small laparoscopic incisions, and it hasn't improved outcomes, but it has certainly made it easier for surgeons to do certain kinds of cases.

We're now making up the perception gap with vision, and we're starting to see how we can close this sensation gap with haptics and interpretive analytics.

Asensus says AI and robots are tools, not surgeon replacements

How are software and AI changing surgical robotics?

Chekan: From a clinical perspective, it's giving us decision support. It's common sense that if you have the right information at the right time, you're going to make better decisions that improve patient care.

The proof will be in the pudding if digital assets can meaningfully improve safety or outcomes. With open surgery to minimal invasive procedures, we went from a gallbladder patient staying in the hospital for five days to going home the same day.

What's the role of humans in the loop for surgical automation?

Chekan: We don't think there is a replacement for surgeons in the near or intermediate term. There will be a human at the center of surgical care for the foreseeable future.

It's a very personal connection that needs to be made, and the responsibility and trust are between the surgeon and the patient.

The technology can help the surgeon communicate better with the patient, and there are tools that can facilitate the actions and intent that the surgeon has for the procedure.

What are some of the ongoing challenges? How do economic and governmental conditions affect the healthcare industry?

Chekan: Whether it's from a clinical standpoint or a product standpoint, it's about being resourceful and honest. If we could have more reusable instruments and a greener footprint moving forward, I think that would be good for everybody.

Surgical instruments continue to advance along with robotics. Source: Asensus Surgical

On the regulatory side, there are different markets and different kinds of licensing that we have to be mindful of. We're very interested in following all of them.

Hospitals could take more time in risk or quality assessments. We're spending a lot of time preparing not just the surgeon in the use of our instruments, but also making sure the hospital staff is comfortable with the new equipment.

If we could be more objective in how effective educational programs are, we as an industry could make that information available for hospitals to take the credit and have metrics to demonstrate what's working well.

2026 opportunities include visualization, integration

Looking ahead to 2026, what are you most excited about? What use cases do you expect to advance?

Chekan: The environment that surgeons are working in is improving with these enablers, whether they're new robots, cameras, or instruments. Bringing them together into an integrated environment has been promised since at least my fellowship around 2000.

Improvements in surgical visualization and control will continue, predicted Asensus. Source: Asensus Surgical

We had ideas, but no electronic medical records, and tools were independent sources of information. It has been a collective effort of clinicians and the industry for the past 30 years to simplify things for operators.

Asensus is part of the ecosystem, and we want to share our talents to get patients what they need. There was a lot of technology that got in the way, but there's an infrastructure, and we know how to get it to communicate now. I think we'll see the integrated OR as more of a crystallization that will happen all at once.

What technologies are most likely to improve in the coming year?

Chekan: From a digital solutions standpoint, AI has improved the visual or operative experience. We're excited about advances in camera technology with Asensus' [2024] merger with Karl Storz.

Its best-in-class camera and scope systems have a long history of supporting laparoscopic approaches. That camera technology is connected to our efforts in AI and augmented intelligence.

We're just breaking the surface of possibilities for data analytics and better visualization to close the sensory gap.

What are some opportunities for surgical robotics startups?

Chekan: I've been on both sides at big clinical companies and small startups.

I've learned along the way that the market or the patient is not going to reward novelty – that's not what they need. True innovation starts and ends with clinical needs. The solution isn't as hard as identifying the problem.

Clinicians have an arm's-length list of problems, and they're not necessarily all technically solvable. For instance, we need different size graspers.

If a novel solution is grounded in a true clinical need, it will be rewarded.

Omniverse enables U.S. manufacturers to build digital twins to help train AI and robotics. Source: NVIDIA

AI PROGRESS TO CONTINUE SHAPING ROBOTS IN 2026

The Robot Report **staff**

While artificial intelligence has been a part of robotics for many years now, the latest advances in foundation models promise to make robot training faster and easier.

"Physical AI and closed-loop automation are significantly enhancing cobot capabilities," noted George Chowdhury, an analyst at ABI Research, in the firm's global market outlook report. "According to our analyst study, robotics software will generate $24.5 billion in revenue by 2030."

Physical AI involves the combination of bits and atoms, as digital commands move things in the real world through robots. Agentic AI involves agents that can reason and act independently, and embodied AI is commonly understood to mean AI informing humanoid robot behaviors.

"Progress in robotics' foundation models — driven by advances in deep learning, richer training data from teleoperation and simulation, and cheaper hardware — is closing the gap between research and deployment," observed Insight Partners in its "State of the Robotics Ecosystem" report.

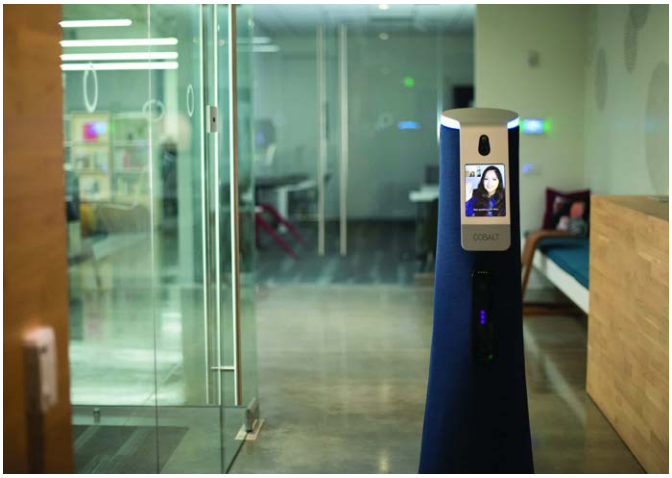
Many robots today use machine learning and reinforcement learning for tasks such as navigation and manipulation in addition to deterministic programming. Foundation models, including vision-language models (VLMs) and vision-language-action models (VLAs), combine computer vision with natural language processing. Such multimodal generative AI models enable robots to not only perceive their environments but also comprehend and interact with them.

Mike LeBlanc, co-founder Cobalt Robotics and Foundation, is building next-generation, rugged humanoids for industry, first responders, and the U.S. Department of War. He recently spoke with *The Robot Report* Podcast about how the latest iterations of AI could benefit robotics developers and users.

"What I'm most excited about coming up in the new year is really watching this technology develop the same way that you watch child development," he said. "You know, we see new advancements in our robots every day. They, they walk a little smoother. They walk a little faster. They get a little smarter. And, and I think it has the same rewarding effect of watching kids learn how to read or watching one of my kids, you know, learn how to play baseball."

"That's what we're to watch over the next year," said LeBlanc. "It's a touching story that goes on, even in defense robotics."

More innovators and entrepreneurs weighed in on the possibilities of AI plus robotics in 2026.



Mobile security robots can interact with people to control access, as well as with doors and elevators. Source: Cobalt Robotics

Robot deployments to reach new highs, thanks to physical AI

Evan Beard, co-founder and CEO of integrator Standard Bots, which acquired READY Robotics' IP in November, made four predictions about humanoids, U.S. robotics policy, and more:

"Record number of U.S. robot deployments: The U.S. will hit 45,000 new industrial robot installations for the first time as AI-powered robots prove they can handle sustained production workloads across manufacturing, logistics, agriculture, biotech, and more."

"This will be driven by reshoring efforts and first-time automation buyers, especially small to medium-sized manufacturers, as industrial robots become more accessible and affordable."

"By year's end, those new deployments will empirically confirm what American manufacturers already tell us: When companies adopt advanced robotics, they become more cost-competitive, improve productivity, and retain or grow their workforce in more technical and higher-wage roles."

"2026 will be the year industrial robots shift from "bleeding edge" to standard operating equipment across multiple critical industries."

"The White House implements a federal industrial policy for U.S. robotics: Washington will take concrete steps to safeguard and strengthen American robotics."

"The White House is already exploring an executive order to introduce a national framework that prioritizes procurement from U.S. or allied-nation robotics companies for federal automation projects. Agencies such as the Department of Energy and the Department of War will be required to source robots from domestic suppliers in part because Physical AI relies on high-fidelity video feeds of sensitive operations. That data cannot flow through adversarial systems."

"At the same time, Chinese robotics companies will face tariffs, bans, or other measures to counteract the heavy, PRC-backed subsidies that enable them to sell at or below cost. Policymakers saw what happened to the U.S. solar industry in the 2010s and will not repeat that mistake with robotics, a foundational technology for both manufacturing and national security."

"A federal framework will also override fragmented state-level rules that slow deployment. The goal will be clear: Build a coherent national strategy for this critical technology."

"Landmark U.S. research will show that robot-adopters create more, higher-paying manufacturing jobs while non-adopters fall behind in productivity: In 2026, new U.S. studies will provide the most definitive evidence to date on the relationship between robotics and employment."

"Firms that adopt robotics will improve product quality and reduce costs, allowing them to outcompete domestic peers and remain viable against foreign competitors with lower labor costs. These firms will grow revenue, margin, and throughput, leading them to hire more people to meet rising demand.

"The roles will be more technical and strategic, focused on robot operations, maintenance, and quality control, and therefore generate higher wages than traditional manual labor jobs."

"This shift will spark record enrollment in robotics programs across community colleges, trade schools, and universities, and galvanize a modernization effort across Manufacturing Extension Partners to provide more hands-on training and best practices for mechatronics and advanced manufacturing."

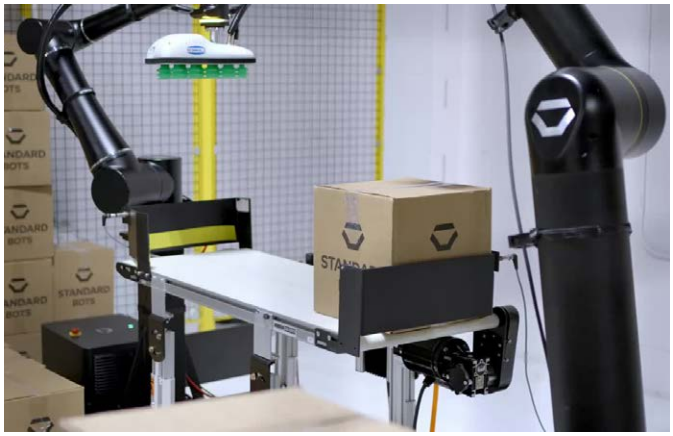
"Humanoids will make consumer inroads, while purpose-built robots dominate industry: Humanoid robots will finally reach homes in 2026. They will assist with caregiving, housekeeping, and simple companionship tasks. But bipedal systems will continue to face safety, stability, and performance issues, while general-purpose AI models will still require frequent teleoperation, raising reliability and privacy concerns."

"Humanoid makers will lean into consumer and service-industry applications such as healthcare, hospitality, and office management."

"Meanwhile, purpose-built robots will see orders-of-magnitude greater growth in industrial and commercial applications due to their configurable form factor and narrower, trainable task assignments, which yield higher uptime and lower cost."

AI to bring more robots to construction

Henri Lee is the co-founder and CEO of Xpanner, a leader in construction automation. He previously spent two decades in executive positions leading innovation at Bobcat and Hyundai Infracore, driving unmanned construction projects and corporate venture initiatives in the heavy equipment world.



Physical AI allows robots to take on more challenging tasks, such as mixed palletizing. Source: Standard Bots

"Physical AI is transforming construction by integrating perception, intelligence, and actuation, enabling a system-level approach to automate job-site tasks, thus addressing labor shortages and meeting AI-driven infrastructure demands."

"For physical AI to reach its full potential, the construction industry needs to start collecting previously ignored data, such as machine motion trajectories, task sequencing, weather interactions, and real-time safety measures, to train effective AI models."

"By 2026, the construction industry will witness the foundational deployment of physical AI, transitioning from pilot projects to real-world usage, with the emergence of unmanned job-site zones and reliable operation in unpredictable environments, marking a shift towards functional implementation."

"The leaders of the physical AI era will be those who invest in generating comprehensive action-level data, develop integrated software-defined machines, and leverage data feedback loops to continuously improve AI-driven machine autonomy, creating a cycle that leads to superior job-site automation."

Xpanner uses AI to precisely guide solar piling automation. Source: Xpanner

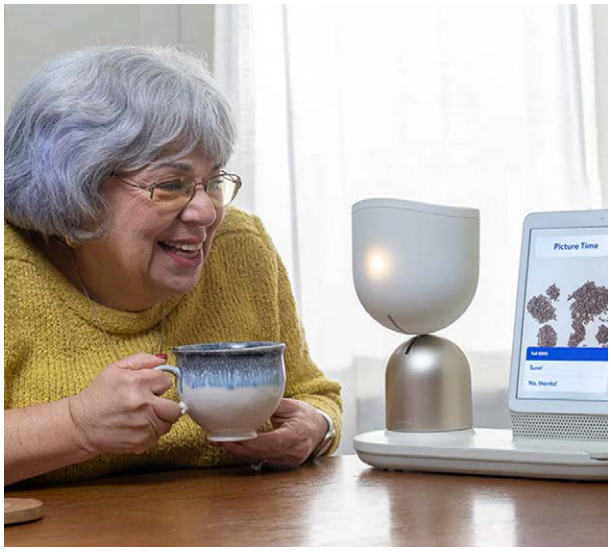
Robotic companion maker warns about AI developer intent

Dor Skuler is co-founder and CEO of Intuition Robotics, which has developed companion robots for elder care. He warned of some of the dangers around AI:

"In 2026, relationships with AI and robotics will become mainstream. We'll see two potentially very different paths emerge depending on the innovators guiding the development."

"On one side, responsible and ethical innovators will use AI companions to address real human challenges like loneliness, isolation, and access to care, while amplifying our ability to connect and thrive with others in the real world."

"On the other hand, some may exploit this technology for greed and market share, deepening the human's dependency on AI, providing the illusion of a modified improved reality, rather than empowerment and assistance in the real world. The line between enhancing human experience and exploiting it will grow thin, and the choice each creator makes will shape our relationships with each other and our sense of self as we add relationships with AIs to the human experience."



ElliQ is designed to reduce isolation and increase social and physical activity in older adults. Source: Intuition Robotics

Supply chains need fast, reliable, and traceable item picking. Credit: Vanderlande

VANDERLADE IDENTIFIES WAREHOUSE AUTOMATION TRENDS

***Automated Warehouse* staff**

In November 2025, Toyota Industries Corp. reorganized its warehouse automation businesses. Netherlands-based Vanderlande handles large-scale automation systems for airports, parcel handling, and warehouse automation.

German subsidiary Viastore Intralogistics focuses on small- to medium-scale warehouse automation, while Indianapolis-based Bastian Solutions integrates small- and midsize logistics systems in the U.S.

Jake Heldenberg is director of sales engineering and warehouse solutions for North America at Vanderlande. He helps organizations — including retailers in the general merchandise, food, and apparel industries — address their materials handling challenges with the right automation at the right time.

In 2025, Heldenberg spoke at industry events and an *Automated Warehouse* webinar.

Andy Lockhart is director of strategic engagement for warehouse solutions in North America at Vanderlande. He draws on experience with automated materials handling for specific applications, including e-commerce, business-to-business, or direct-to-consumer markets.

Lockhart assesses operational process needs, helps find the right technologies, and shows the return on investment (ROI) for those systems. Vanderlande offers unit-load, case, and piece-picking systems for multiple environments.

Heldenberg and Lockhart identified three trends and offered five predictions for warehouse automation in 2026.

Jake Heldenberg. Source: Vanderlande

Trend 1: Labor shortages are driving strategic automation investments

Operations continued to struggle to attract and retain employees, particularly for the most physically demanding roles, even in the face of continued investments in compensation and workplace benefits. This reality, combined with high cost of capital, began to shape the types of automation that companies are investing in.

Instead of broad, sweeping initiatives, businesses are strategically targeting specific tasks where automation can deliver clear ROI and operational efficiency.

Key areas like truck loading and unloading, picking operations, and palletizing have emerged as prime candidates for automation. This targeted approach reflects the reality of constrained capital expenditure, pushing businesses to prioritize investments in areas with the highest impact.

For example, 54% of supply chain and logistics leaders told Descartes Systems Group that they are focusing on automating repetitive tasks and non-value-added services to address labor shortages. This highlights a clear shift toward maximizing efficiency and reducing reliance on manual labor.

In response to these challenges, technology innovation has accelerated. Solutions such as mobile automation, advanced case-handling systems, and trailer unloading technologies are gaining traction, particularly in labor-intensive industries like grocery and logistics.

"These advancements underscore a clear trend: Businesses are using targeted automation to navigate labor constraints and drive operational success," said Heldenberg.

Andy Lockhart. Source: Vanderlande

Trend 2: Retailers supercharge fulfillment to meet consumer demand

As online sales once again outpaced in-store growth, as reported by the U.S. Department of Commerce, shoppers now place a premium on convenience, speed, and reliability. Guaranteed delivery dates have emerged as a defining factor in consumer behavior, with two-thirds of holiday shoppers willing to forgo price discounts in exchange for delivery certainty, according to Radial Inc. This has pushed retailers to optimize fulfillment operations, focusing on later order cut-off times, next-day delivery, and accuracy.

Leading retailers are addressing this by strategically positioning inventory closer to consumers and tailoring SKU assortments to regional demand, ensuring faster, cost-effective delivery. Many are also adopting suites of advanced automation, including intelligent shuttle systems, robotic item picking, and goods-to-person technologies that enhance speed, accuracy, and flexibility.

"In an uncertain economic climate, these investments are no longer optional—they are critical for earning customer loyalty and staying competitive," Heldenberg said.

Trend 3: Grocers embrace automation in replenishment, lag in in-store operations

"Grocers are increasingly focusing on automation to address the labor-intensive demands of store replenishment," observed Lockhart. "Case-level automation, particularly for managing large SKU ranges, is seeing notable growth as grocers seek to improve efficiency and reduce costs."

Technologies like automated stock shelving and store-specific palletizing are helping streamline replenishment processes, making it a key area of investment.

"In contrast, in-store automation has yet to gain significant traction in the U.S. Demand for online grocery fulfillment has stabilized since COVID-19, and with most in-store picking still handled by associates or third-party services, there has been little push to retrofit stores originally designed for consumer traffic," Lockhart said. "This has led grocers to focus instead on replenishment automation, where the operational benefits are clearer and more impactful."

STOREPICK is designed to to optimize grocery throughput. Source: Vanderlande

Trend 4: AI's promise grows—but so do the hype and challenges

"AI hype was at an all-time high in 2025," acknowledged Heldenberg. "There was no shortage of discussion about transformative potential, from smarter robotic picking and accelerated supply chain analytics to more efficient warehouse management."

However, this enthusiasm often outpaced real-world results, as significant challenges—including data bias, hallucinations in language models, security concerns, and the heavy energy demands of advanced AI systems—became clear.

While machine learning is already being applied in automation hardware, like Vanderlande's STOREPICK and Nomagic's piece-picking robots, broader applications, such as demand forecasting and supply chain management, are still in their early stages. True integration of large language models (LLMs) into automation efforts has yet to be realized, underscoring how young the technology truly is.

While AI's potential is undeniable, its journey toward meaningful impact in warehouse automation is just beginning. For now, the focus must remain on defining AI's role, building robust data foundations, and taking measured steps to explore its capabilities."

Prediction 1: Flexibility will define the future of automation

"The most pressing challenge for businesses in 2026 won't just be adopting automation—it will be selecting the right technologies that offer true flexibility to meet evolving consumer demands," said Heldenberg.

Nomagic has partnered with Vanderlande to apply machine learning to logistics. Source: Vanderlande

While many products claim to be scalable and flexible, the real question is whether the technology can adapt to shifting priorities as scalability alone is no longer enough. The key to long-term success lies in procuring automation solutions that can evolve alongside a business, supporting changing order profiles and diverse operational processes.

Automated and semi-automated depalletizing is a popular application for robotics. Source: Vanderlande

Prediction 2: Innovation will redefine both commodity and advanced technologies

"In 2026, the materials handling industry will embrace significant advancements that transform both commodity technologies and cutting-edge solutions," said Lockhart.

Conveyors and sorters will evolve into smarter, more efficient systems that drive higher throughput, greater accuracy, and reduced product damage. For example, a line sorter that can sort all package types as well control individual shoes with a simple controller.

Simultaneously, advancements in robotics and software will tackle some of the most challenging warehouse tasks, such as automating the loading and unloading of trailers.

These innovations will address persistent pain points like employee turnover, injuries, and bottlenecks, while also unlocking new levels of efficiency and resilience."

Prediction 3: Employee perception of automation will continue to evolve

As automation increasingly takes over the most physically strenuous, repetitive, and dangerous tasks, employees will begin to see it as a key indicator of a better, safer workplace. Working in a highly automated facility is less physically demanding and creates opportunities for upskilling into higher-paying roles like maintaining or managing robotic systems.

"Forward-thinking companies will start to promote their use of automation not just as a business efficiency tool, but as a competitive advantage in attracting and retaining the best talent," Lockhart predicted. "Automation will become a differentiator for employees choosing where to work."

Prediction 4: Fulfillment will emerge as the new battleground for retail success

Although the demands associated with brick-and-mortar stores, particularly replenishment, will remain, the continued acceleration of e-commerce and the rise of multi-channel shopping behaviors will make fulfillment the new ground zero in the fight for customers. Consumers' expectations for fast, accurate, and reliable deliveries will only intensify, pushing brands to expand their SKU offerings and optimize fulfillment operations to meet these demands.

The complexities of e-commerce fulfillment—managing vast SKU profiles, enabling later cut-off times, and ensuring order accuracy—will far surpass those encountered in-store.

In 2026, fulfillment operations, and the warehouses and distribution centers they rely on, will not only be a key driver of operational efficiency, but also a critical differentiator in earning customer loyalty and driving both bottom-line and top-line success," said Heldenberg.

Vanderlande recently rolled out its ADAPTO automated storage and retrieval system (ASRS) at Foot Locker. Source: Vanderlande

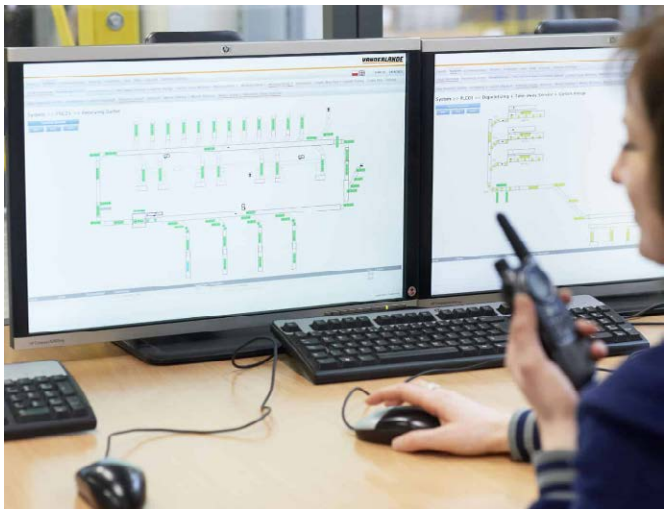
Prediction 5: Lights-out warehouses will move within reach

"For years, the idea of a fully autonomous 'lights-out' warehouse has been a futuristic goal," Heldenberg noted. "In 2026, technology has advanced to a point where a major brand could feasibly test a legitimate lights-out facility in a live production environment. Under the right circumstances—with a specific order profile and the right combination of automated systems—it is now possible."

Industries like manufacturing are best positioned to lead the way, thanks to their hyper-consistent products that allow for standardized automation in sorting, palletizing, and marshalling pallets to loading areas. Grocery, by contrast, faces greater challenges due to the variability of its products.

Even in a lights-out facility, human roles will remain essential for maintenance, monitoring, and support as true autonomy doesn't mean the absence of people—it means redefining their roles to oversee and sustain the systems.

"The first company to successfully implement a dark warehouse will not only achieve unparalleled efficiency but also trigger a paradigm shift across the entire industry, forcing everyone to reconsider what's possible in fulfillment," said Heldenberg.



Software, data, and AI are key ingredients for 'lights-out' facilities. Source: Vanderlande

HUMANOIDS IN 2026: LESS DANCING, MORE DOING

After years of viral demos and hype, will 2026 be the year humanoids are judged by usefulness, not flashy moves?

Steve Crowe, executive editor, *The Robot Report*

After several years of viral videos, soaring valuations, and bold claims about general-purpose capabilities, humanoids need to turn the page in 2026. The excitement isn't gone, but expectations are changing.

Progress will be measured less by how athletic a robot looks at a trade show or research lab and more by whether it can safely deliver incremental value to customers. Some companies will place a small number of robots with development partners. Others will expand pilots, refine hardware, or quietly walk away from overly ambitious claims.

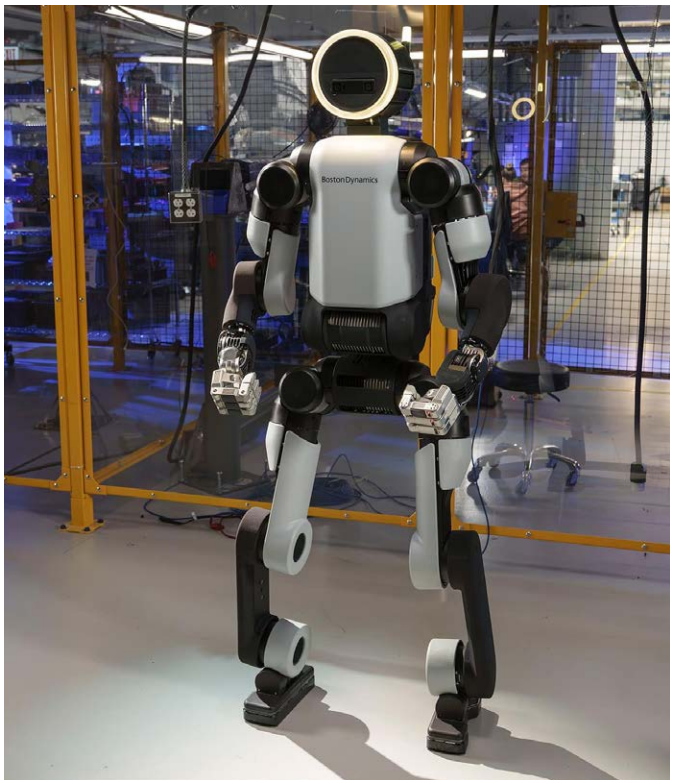
"2026 is not the year where everything is solved, but it is the year to really demonstrate commercial viability and show the fruits of a lot of this investment leading into 2027 and beyond," said Jeff Cardenas, co-founder and CEO of Apptronik.

Baby steps in 2026

No humanoids will be autonomously doing useful work inside people's homes in 2026. The most productive humanoid deployments will happen in industry with partners who understand where the technology truly stands. These customers aren't expecting humanoids to outperform specialized robots or humans overnight. Instead, they're betting on versatility, labor continuity, and long-term capability growth.

Take Hyundai-owned Boston Dynamics, for example. It was the only humanoid company at CES 2026 to show a potential path from humanoid demo to industrial work. CES marked the first time the company ever publicly demoed one of its humanoids.

The parts-sequencing demo had Atlas autonomously picking up and moving car parts in a makeshift factory environment. It was nothing flashy. *The Robot Report* watched the demo for about 15 minutes. A nearby human teleoperator stepped in a few times to help Atlas when it mispicked a part. Boston Dynamics recently completed a pilot of this same task at Hyundai's Metaplant America in Georgia.



Boston Dynamics introduced this production version of its Atlas humanoid at CES 2026. It is aiming to deploy them at Hyundai Motor Group factories starting in 2028. | Photo Credit: Boston Dynamics

"If anything, 2026 will be the year the rest of us finally say: okay, we're done with this. No more robots doing martial arts or dancing," said Aaron Prather, director of robotics & autonomous systems program at ASTM International. "Show us them actually doing something useful."

Also at CES, Boston Dynamics unveiled a new, production version of Atlas. The latest Atlas reflects hard-earned lessons about scalability: fewer components, improved serviceability, and a design optimized for industrial use rather than demonstrations.

Boston Dynamics said all Atlas units for 2026 are already committed, shipping to Hyundai and Google DeepMind, the company's new artificial intelligence partner.

Hyundai said it will be able to manufacture up to 30,000 Atlas humanoids annually by 2028. It said Atlas will be performing high-precision sequencing at scale in 2028, with complex assembly tasks slated for 2030.

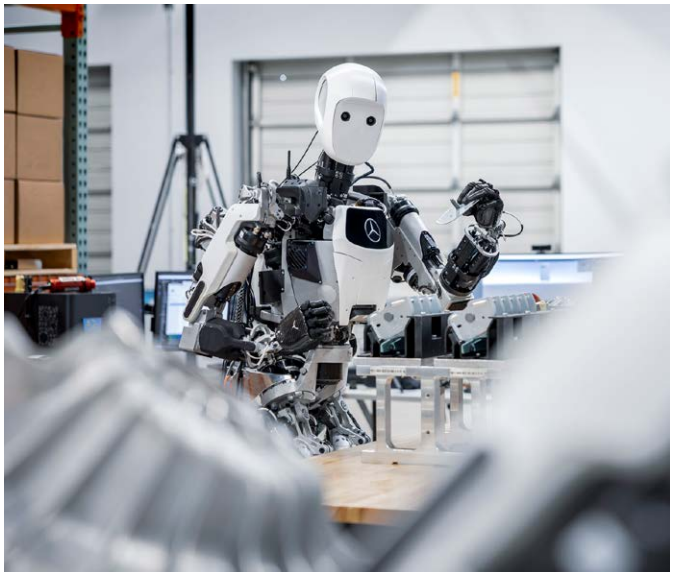
Other leading U.S. humanoid companies focused on industrial work include Agility Robotics and Apptronik. Agility Robotics entered 2026 with evidence that its humanoid strategy is translating into real-world progress. The company's Digit robot recently surpassed 100,000 tote movements in a live logistics operation. It also landed a new customer, Mercado Libre, adding to its portfolio of customers that already included Amazon, GXO Logistics, and Schaeffler, which is also an investor in the company.

Agility announced its bipedal robot, Digit, passed a field inspection by a Nationally Recognized Test Lab. The evaluation took place at a live e-commerce customer fulfillment site, certifying that the deployment meets safety standards required by the Occupational Safety and Health Administration (OSHA).

Apptronik enters 2026 with a growing development partner program that works closely with companies like Mercedes-Benz and GXO Logistics to pilot its Apollo humanoid in operational environments. Rather than selling turnkey products, Apptronik collaborates with these partners, bringing them onsite, walking through current capabilities and limitations, and jointly advancing use cases that demonstrate commercial viability.

The company plans to build on this momentum and announce additional development partners early in 2026.

"Customers are looking at humanoids differently than traditional robots. It doesn't have to pencil out on day one," said Cardenas. "If a robot can meet a baseline level of performance and show a clear roadmap to task-switching and improved capability over time, the ROI can evolve. Humanoids may not win head-to-head today, but as they pick up new tasks, that equation changes quickly."



Apptronik's Apollo humanoid getting to working during a pilot at Mercedes-Benz. Credit: Apptronik

The U.S. and other regions working on humanoids face intense competition from China. But China's top economic planners recently warned about a potential bubble in humanoids, noting that more than 150 Chinese companies are now active in the sector despite a lack of proven commercial use cases. For most of these firms, China's humanoids are R&D platforms for robotics engineers without a clear path to deployment or ROI.

AI and safety standards must advance

Labor availability remains the biggest driver of robotics. Across manufacturing, logistics, and automotive, executives all point to the same issue: they don't have enough people to do the work reliably. Humanoids are being explored not because they're faster, but because they might eventually be flexible enough to fill gaps where other automation fails.

A lot needs to happen to close the gap between what humanoids are promising and what they can currently do, but AI and safety are two of the more critical pieces of the puzzle.

Today's systems can perform impressive individual skills, but stitching those skills together and adapting to new tasks without extensive reprogramming remains a core challenge. Progress in foundation models, multimodal perception, and learning from demonstration is beginning to close that gap, enabling robots to understand instructions, switch tasks, and recover from errors in real time.

"The big question looming out there is: how will AI impact robotics as a sector? And then specifically, how does it impact humanoid robotics? What are these robots able to do that other form factors cannot? I think 2026 will be the year where the rubber meets the road, and we show the progress of where all this funding has led," said Cardenas.

Agility Robotics, Apptronik, Boston Dynamics, and other humanoid makers have partnered with Google DeepMind. They are hoping DeepMind's Gemini foundation models will give their robots the intelligence to adapt to a variety of tasks and environments.

Carolina Parada, head of robotics at Google DeepMind, said the industry is just scratching the surface of what's possible with AI.

"Tasks that require certain sensors the robot doesn't have are still limited," she said. "But the robot can learn almost anything you can consistently demonstrate through teleoperation."

Safety will ultimately determine whether humanoids can scale. Multi-purpose robots must operate around people, equipment, and unpredictable environments, making reliability, fault tolerance, and graceful failure non-negotiable.

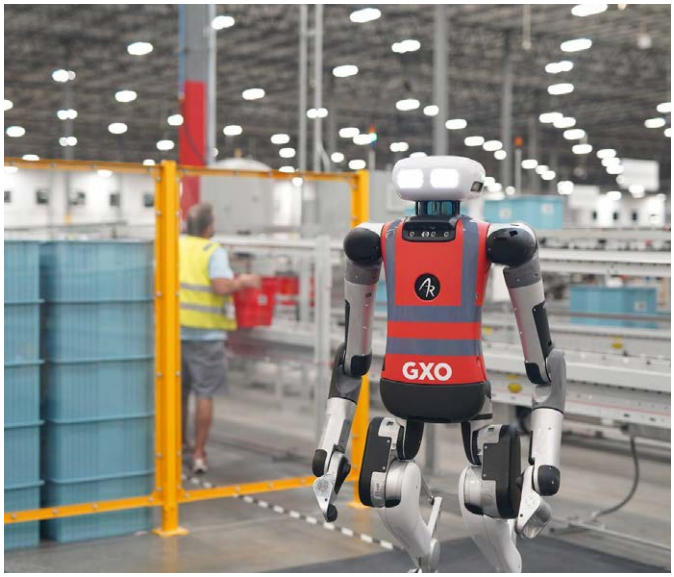
There are no official standards for humanoids. Developers are using existing industrial robot standards for guidance. But as the industry converges on shared benchmarks, validation methods, and regulatory frameworks, safety will become less of a bottleneck and more of an enabler that unlocks broader humanoid deployment. We're not there yet.

U.S. regulatory agencies are starting to clarify roles, responsibilities, and oversight around humanoids. The National Institute of Standards and Technology (NIST) is significantly ramping up its work around humanoid benchmarking. NIST will announce later this year that it is bringing back a DARPA-like humanoid challenge.

Prather said the goal of the challenge is benchmarking to figure out where each humanoid actually stands.

"NIST is working on tests for basic skills like stability, walking, lifting, and picking up objects, which could form the basis of what's essentially a *Consumer Reports* for humanoids," said Prather. "Most of the activity we'll see in 2026 will be on the standards and regulatory side."

"Safety is the key to scale," said Cardenas. "We can do pilots and get a small number of systems out, but we need to solve safety as an industry in order to see real adoption. This is something you'll see the entire industry focusing on in 2026. The whole industry is excited to see what the initial guidance is from these safety subcommittees."



Digit is in commercial trials at GXO Logistics. Credit: Agility Robotics