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Monthly focus

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Executive summary

Robotics comes of age

A recent Global Insight Special Report explores the innovations transforming robotics and the industry's state of play. We examine the intriguing and much-hyped world of humanoid robots, considering how the workplace and the home might change with these machines.

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MONTHLY

Focus



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Read the complete Special Report

"Robotics comes of age"

Part of
RBC Wealth Management's
"Innovations" series.

Executive summary

Robotics comes of age

Is the era of R2-D2 and C-3PO, the two Star Wars robots, upon us? This article explores the innovations transforming robotics and focuses on the intriguing world of humanoid robots. It foresees how the workplace and the home might change with these machines, before exploring investment opportunities.

Key points

- **Powerful hardware and software advances, moving in lockstep, are transforming robotics.**
- **Industrial and service robots remain the backbone of today's robotics industry.**
- **Humanoids' athletic prowess is impressive, but they remain confined to structured industrial pilots—for now.**
- **Actionable investment opportunities lie across the whole robotics value chain.**

Innovations gather pace

Extraordinary scientific advances are transforming the robotics industry.

Daniela Rus, director of The Massachusetts Institute of Technology's (MIT) Computer Science and Artificial Intelligence Laboratory, told McKinsey in a June 2026 interview, that both the body (hardware), and the brain (software) of robots have progressed significantly. Meaningful advancement, however, requires them to move forward in tandem, as they have in recent years.

The body

Robotic bodies have evolved from metal and heavy plastic to a wide range of materials that are now paired with markedly smaller, lighter motors. This matters because dexterity requires fitting motors into tight places—a hand has many small joints.

The brain

AI has transformed how robots perceive and respond to their environment. Legacy robots required step-by-step programming and very precise conditions. Today's robots learn to recognise objects by studying a vast number of examples until they can identify an object regardless of its position, lighting, or orientation, and adjust their movements accordingly.

A newer generation of AI systems, known as vision-language-action (VLA) models, enables robots to turn plain language instructions—'pick up the glass on the right'—directly into movement. VLA models can merge all three steps of seeing, understanding language, and generating motor commands into one trained system that reads the scene, interprets the instruction, and generates the movement in a single step. That lets robots

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attempt tasks they were never specifically trained for, drawing on general knowledge of the world.

The body and the brain

Rus believes that the clearest gains arise when body and brain improve together. For example, Amazon's robotic arm system Vulcan, unveiled in May 2025, pairs force-feedback sensors and a gripper fitted with a camera and suction cup (body) with perception and action software (the brain) that lets it adapt to items it has never specifically encountered before. Vulcan reliably handles roughly 75% of the more than one million catalogue items of widely different shapes, sizes, and textures.

Humanoids: From backflips to usefulness

Industrial and service robots remain the backbone of today's robotics industry, but the emergence of humanoid robots has captivated audiences worldwide. Recent technological breakthroughs are perhaps most visible in humanoid robots.

Videos of humanoids dancing on stage have stunned viewers. But these are staged events, the robots having been trained on thousands of simulated hours in virtual reality. Such training does not build an understanding of how the world works. Getting a robot to do a task reliably, with all the complications, such as the forces and torques that arise when interacting with the physical world, as Rus puts it, is far harder, in her view.

In his 'RBC Imagine™: The Rise of the Robotic Intelligence' report, RBC Capital Markets, LLC Global Automobiles and Auto Parts Analyst Tom Narayan argues that industrial and commercial applications will likely take precedence over household robots thanks to the former's narrower capability requirements and faster return on investments for businesses. Robots as domestic assistants are likely more than 20 years away, given the complexity of home tasks.

Many pilot programmes are underway today to integrate humanoids into an industrial setting, but progress has been limited, McKinsey notes. Humanoid robots remain confined to repetitive, moderately complex tasks in structured settings such as mapped factory aisles or routine inspection routes. The dynamic, close-contact work many roboticists envision for humanoids remains elusive for now.

Still, given the promise of robotics, the Chinese government is backing the industry. China's humanoid industry also benefits from the robust domestic manufacturing base, and an ability to scale hardware production rapidly. Inexpensive components, such as motors and batteries, are readily available, while university-industry collaboration enable Chinese firms to iterate and deploy at scale faster than anyone else. As a result, China now leads the humanoid race.

RBC's Narayan found that while Chinese firms generally excel in hardware, U.S. and European companies lead in software innovation—arguably where it matters most for how far this technology can progress.

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Forecasts for how large this industry could become vary enormously. McKinsey expects general-purpose robotics (including humanoids) to reach hundreds of billions of dollars by 2040, though further technological breakthroughs are needed for this to happen, including on safety, staying power, and ensuring price points are compelling.

Tools or teammates?

Rus expects a future with a wide range of machines: some humanoids, others built and optimized for specific tasks.

For Mikell Taylor, director of robotics strategy at General Motors, the future of robotics is about thoughtful system design that would enable humans to do their best work alongside increasingly capable, collaborative machines.

Further out, robots may become able to learn a new activity within hours by merely watching a human perform it, and to work safely alongside people without the segregation that separates them today. That shift, however, is likely beyond a practical investment horizon.

For now, actionable investment opportunities are across the robotics value chain, though investors should be aware of how competitive parts of it already are. On the hardware side, these include part suppliers, select robot makers, and design companies. On the software side,

Humanoids on the factory floor: Early industrial pilots

Narrow tasks, heavy safety constraints, still far from autonomy

End user / Robotics company	Use case	Robot / description	Capabilities
BMW / Figure AI	Pilot for a humanoid to move components between stations in mapped, controlled settings, emphasizing mobility over fine manipulation.	**The Figure 02** • Height: 1.68 m (5′5″) • Weight 70 kg (154 lbs)	• Run time: 5 hours • Fourth-generation hands with 16 degrees of freedom (1)
Amazon / Agility Robotics	Pilot for a humanoid to handle repetitive tote movement in warehouses. Despite being able to navigate dynamic environments, it currently operates in semi-segregated zones due to gaps in safety systems and the lack of humanoid-specific regulation.	**The Digit** • Height: 1.75 m (5′9″) • Weight: 65 kg (143 lbs)	• Run time: 4 hours • Can lift 16 kg (35 lbs) • Charges itself via a charging station, docking on its own • Legs have 5 degrees of freedom, arms have 3 • The next-gen Digit announced for end of 2026 aims to have a 50 lb (23 kg) payload and fence-free ‘cooperative safety’
Airbus / UBTech robotics	Pilot for a humanoid to do strenuous tasks on aircraft assembly lines so humans can focus on quality control and specialised operations. Currently in testing phase.	**The Walker S2** • Height: 1.76 m (5′9″) • Weight: 73 kg+ (160 lbs) (2)	• Hands have 11 degrees of freedom & tactile sensors • Can hold 7.5 kg (16.5 lbs) in each hand and 1 kg (2.2 lbs) with each finger • Walks at about 2 meters per second • First humanoid robot that can hot-swap its battery while in operation, enabling continuous operation in factories

(1) Degrees of freedom are the number of independent ways a joint can move.

(2) Weight of the Walker S2 ranges from 73 kg to 95 kg.

Source - Bloomberg, Forbes, IEEE Spectrum ‘Robots Guide’, company reports

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opportunities include developers building the operating systems, apps, and communication frameworks that enable robots to talk to each other.

Importantly, shares in humanoid robotics companies could be subject to the same pattern seen in other early technology cycles, where genuine technological promise is accompanied by valuations that run ahead of commercial reality.

Emerging technological advancements are driving innovations all around us, transforming how we live, work, and interact with one another, today and in the future. RBC Wealth Management's "Innovations" series examines these agents of change and how they can bring up compelling investment opportunities.

To learn more about the powerful advances transforming robotics, read the complete Special Report: "Robotics comes of age."

Research resources

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