# Humanoid robots and dark factories accelerate the cognitive industrial revolution



The industrial landscape is on the cusp of a transformative era, often referred to as the cognitive industrial revolution. This paradigm shift is primarily driven by the integration of advanced technologies such as artificial intelligence (AI), robotics, and the Internet of Things (IoT) into manufacturing processes. The goal is not merely to automate operations but to optimise and integrate intelligence across all stages of production. Such advancements are reshaping not only the manufacturing sector but also the workforce dynamics and economic frameworks surrounding these industries.

At the forefront of this revolution is the evolution of robotics, which have significantly departed from their early, simplistic roles. Modern robots are now equipped with AI, enabling them to execute tasks with remarkable agility and autonomy. This shift is exemplified by the increasing use of humanoid robots in various settings, including factories and warehouses. For instance, companies like BMW are making strides by incorporating humanoid robots that can walk and perform assembly tasks, aimed at alleviating rising labour costs and addressing workforce shortages. Such initiatives underscore a broader trend: robots are no longer one-trick ponies but versatile tools capable of assisting humans in complex environments.

In a notable development, "dark factories" are emerging, where manufacturing processes operate without any human intervention. These fully automated facilities leverage physical AI and smart machinery, resulting in substantial cost savings by eliminating salaries and physical infrastructure costs typically associated with human workers. This radical shift highlights the potential of cognitive manufacturing to operate continuously and without the human factors that often complicate traditional manufacturing environments. However, the implications of such technology raise ethical concerns regarding job displacement and the need for a ready workforce equipped to handle these changes.

Notably, the global competition in robotics and AI is intensifying. In China, the government is heavily investing in advanced manufacturing technologies in response to its ageing population and labour shortages. This has led to the rapid expansion of automation technologies, with companies such as Zongwei producing sophisticated machinery to meet these challenges. However, this wave of automation has simultaneously displaced many lower-skilled workers, who often migrate to less stable, lower-paying service jobs. There are ongoing efforts to address the skills gap through training initiatives aimed at preparing the workforce for a future dominated by technology.

In the United States, similar sentiments resonate as robotics firms advocate for a national strategy to bolster their industry. With a concerted push from companies like Tesla and Boston Dynamics, American firms stress the urgency of maintaining a competitive edge against China, which has made significant headway in robotics through substantial investments and a focus on innovative applications. Lawmakers are beginning to recognise that without a unified approach to develop and promote robotics, the U.S. risks falling behind in this vital industrial sector.

The trend towards automation is not simply a matter of technology but is also marked by the societal shifts it precipitates. Companies are beginning to deploy humanoid robots like "Digit" from Agility Robotics to fill the void left by a scarcity of available labour, particularly in manufacturing and logistics—a sector increasingly struggling to meet demand amid demographic changes. As these humanoid robots become more commonplace in workplaces, they may very well change the nature of human-robot relationships, prompting considerations around workplace safety, ethical use of surveillance, and the essence of human labour itself.

Planning for this future entails thoughtful engagement with the potential ramifications of cognitive manufacturing. As robots become more integrated into everyday life, leaders and policymakers must consider how to support a workforce that can co-exist with such technology. The advancements in robotics promise efficiency and productivity; however, they also demand a proactive approach to mitigate the socioeconomic ramifications of widespread automation.

Ultimately, the cognitive industrial revolution is a multifaceted phenomenon that will reshape industries while presenting both opportunities and challenges. As leaders prepare for this imminent transformation, they must balance innovation with a commitment to ethical practices that ensure technology serves humanity rather than displacing it entirely.

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* Paragraph 1 – [[1]](https://www.forbes.com/sites/jonathanreichental/2025/06/08/ai-driven-robots-are-rewriting-the-factory-rulebook/), [[4]](https://www.reuters.com/breakingviews/china-has-shaky-upper-hand-battle-robots-2025-03-26/)
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* Paragraph 3 – [[2]](https://www.ft.com/content/dc7e1117-11d1-4da4-8af0-931fe967f548), [[3]](https://apnews.com/article/702796f1584fe1920e5fd86f15a99b4f)
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* Paragraph 5 – [[3]](https://apnews.com/article/702796f1584fe1920e5fd86f15a99b4f), [[6]](https://time.com/7094773/agility-robotics-digit/)
* Paragraph 6 – [[1]](https://www.forbes.com/sites/jonathanreichental/2025/06/08/ai-driven-robots-are-rewriting-the-factory-rulebook/), [[2]](https://www.ft.com/content/dc7e1117-11d1-4da4-8af0-931fe967f548)
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## Bibliography

1. <https://www.forbes.com/sites/jonathanreichental/2025/06/08/ai-driven-robots-are-rewriting-the-factory-rulebook/> - Please view link - unable to able to access data
2. <https://www.ft.com/content/dc7e1117-11d1-4da4-8af0-931fe967f548> - China is increasingly embracing automation and smart manufacturing to address labour shortages caused by its ageing population. Companies like Zongwei are developing advanced machinery to reduce manufacturing times and labour costs, with support from Beijing through tax breaks and subsidies. However, the adoption of this technology is also displacing many workers, particularly migrant workers who are least educated and typically fill factory jobs. As a result, many of these workers are shifting to lower-paying service sector jobs. Efforts are underway to bridge the skills gap, with training programmes being launched by provinces and companies, though many local educational institutions lack modern equipment. Companies like Tusk Robots and ABB Robotics China are actively training workers to operate new machinery, ensuring that the workforce can adapt to the changing technological landscape. Despite the challenges, automation is seen by Chinese policymakers as a necessary step to keep the country competitive in global manufacturing.
3. <https://apnews.com/article/702796f1584fe1920e5fd86f15a99b4f> - American robotics companies, including Tesla, Boston Dynamics, and Agility Robotics, met with lawmakers in Washington D.C. to advocate for a national robotics strategy and a federal office dedicated to promoting the industry. The impetus for this push is the increasing competition from China, which prioritises intelligent robots and integrates them with AI and other emerging technologies. The Association for Advancing Automation emphasised the need for such a strategy to prevent the U.S. from falling behind in both the robotics and AI races. Proposals include tax incentives, federally-funded training, and academic and commercial research funding. U.S. companies highlighted their AI leadership but stressed that without a coordinated national strategy, maintaining this edge would be challenging. Meanwhile, China's rapid advances and significant investments in robotics are positioning it as a formidable competitor.
4. <https://www.reuters.com/breakingviews/china-has-shaky-upper-hand-battle-robots-2025-03-26/> - China is recognising the importance of robots in its rapidly ageing economy, which faces a significant labour shortage. A meeting of corporate leaders including Unitree Robotics' CEO Wang Xingxing highlights the sector's growing prominence. Despite leading in industrial robot installations, most Chinese robots are low-tech compared to the advanced humanoids being developed. The U.S. and China are both racing to develop these sophisticated robots, with companies like Tesla and Nvidia anticipating widespread use in the near future. However, China's robotics sector remains reliant on foreign components and faces potential limitations from U.S. sanctions against Chinese technology. While China has made strides, its position in the robotics race is still precarious due to its dependency on critical technologies from abroad.
5. <https://www.axios.com/2024/01/23/humanoid-robots-bmw-automotive-manufacturing-figure> - BMW has announced the integration of humanoid robots into its production line. Standing at 5'6" and weighing 130 pounds, these robots can walk on two legs and use five-fingered hands for assembly tasks. The initiative, led by a partnership between Figure and BMW, aims to deploy these robots in automotive manufacturing following a milestone-based strategy. The inclusion of humanoid robots marks a significant advancement, with potential implications for the labour market, aiming to address rising labour costs. While the robots are designed to perform tasks similar to humans, the technology remains complex and poses challenges, with further advancements anticipated before they can fully substitute human workers.
6. <https://time.com/7094773/agility-robotics-digit/> - Due to a shortage of workers available for physical tasks in manufacturing and logistics, Agility Robotics has introduced Digit, a humanoid robot trained by AI to perform such tasks. CEO Peggy Johnson highlights that there are over a million vacant jobs in the U.S. that Digit could potentially fill. Digit is currently deployed in various facilities, including those of GXO and Amazon, becoming one of the first humanoid robots to be commercially utilised for paid work. GXO, for example, pays $30 an hour to use each Digit. While initially operating in isolated areas for safety, there are plans for Digit to work alongside human counterparts by the end of 2025.
7. <https://www.reuters.com/technology/artificial-intelligence/ai-focused-manufacturing-startup-raises-106-million-nvidia-others-2024-06-25/> - Bright Machines, a San Francisco-based software and robotics startup, raised $106 million in a Series C funding round, which included Nvidia, Microsoft, Eclipse Ventures, Jabil, and BlackRock as investors. Additionally, the company secured $20 million in debt from J.P. Morgan. Bright Machines specialises in using artificial intelligence and machine learning to automate various manufacturing tasks. The majority of the new funds will support the company's engineering efforts focused on improving robotics, computer vision, and other automation technologies. According to CEO Lior Susan, this investment aims to enhance their platform, enabling engineers to design products that can be manufactured by robotic systems remotely. The startup's tools can streamline the manufacturing process for AI server hardware, significantly reducing build times. The growing market for AI servers has driven substantial demand for Bright Machines' solutions, which are also applicable to building other electronic devices like mobile phones.