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EDITORIAL

The future of AI: Toward an era of embodied intelligence and scientific automation

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SUMMARY

This editorial explores the transformative potential of generative AI, particularly embodied intelligence, highlighting its rapid evolution from language models like ChatGPT to sophisticated robots capable of physical interaction. It underscores the simultaneous automation of intellectual and physical tasks, significantly reshaping fields such as healthcare through administrative efficiency, improved diagnostics, personalised treatments, and even fully automated surgeries. Furthermore, the article discusses how embodied AI could accelerate scientific discovery, revolutionising research efficiency and productivity. It also emphasises ethical considerations, advocating for responsible integration of AI technologies to ensure beneficial outcomes, enhanced healthcare accessibility, and breakthroughs in scientific advancement.

Key Words: Embodied AI; AI; healthcare innovation; scientific discovery; scientific automation

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INTRODUCTION

The topic of artificial intelligence (AI) has garnered immense interest, particularly with the emergence of publicly accessible generative-AI systems such as ChatGPT. Remarkably, ChatGPT–3.5, a transformative model that has reshaped public perceptions of AI, was released on 30 November 2022.[1] The pace of subsequent progress has been astonishing: innovations once viewed as disruptive become mundane within months, underscoring both the technology's exponential growth and the human mind's adaptability to novelty.

What lies ahead for AI-driven scientific discovery? The unexpected "ChatGPT moment" suggests further milestones are imminent. GPT–3.5—an evolution of GPT–3, originally trained for probabilistic next-word prediction—achieved its breakthrough when reengineered for conversational dialogue, enabling coherent, extended responses to free-form prompts.[2] This trajectory illustrates a broader principle: revolutionary advances often emerge from the imaginative adaptation of existing technologies rather than from entirely novel inventions.

The next frontier is **embodied AI**—intelligent entities endowed with sensors and actuators that allow them to operate autonomously in the physical world. Although robotics has existed for decades, meaningful progress was historically incremental. Companies such as Standard Bots document how Boston Dynamics' *Spot* has evolved from an attention-grabbing demonstration platform into a reliable tool for industrial inspection, construction, and public-safety tasks—evidence of genuine technology maturity.[3] Improvements in AI "brains", cheaper sensors, and large-scale computation are accelerating developments in humanoid robotics, autonomous vehicles, and adaptive manufacturing.

Conventional wisdom once held that automation would disrupt blue-collar occupations long before encroaching on white-collar work. Generative AI has already upended this assumption by exhibiting formidable performance in intellectual domains, including software engineering, long-form writing, musical composition, and film pre-production.[4] In healthcare, foundation models are accelerating drug discovery, improving diagnostic accuracy in medical imaging, and supporting personalised treatment plans.[5] These trends signal that physical *and* cognitive labour may be transformed simultaneously, driven by AI's compounding progress.

As embodied AI matures, an ever-wider spectrum of tasks could be delegated to autonomous agents that work continuously and at superhuman scale. In effect, humanity is poised to create a universally accessible, non-human labour force. Ethical debates—ranging from machine rights to moratoria on highly autonomous systems—have already surfaced in policy circles. While a detailed treatment of such debates lies beyond this article's scope, any deployment roadmap must embed safety, transparency, and accountability from inception.

Medicine as a catalyst for embodied AI

Medical practice stands on the brink of rapid evolution. AI-enabled assistants with advanced speech recognition and computer vision will first streamline administrative bottlenecks: patient check-ins, insurance processing, scheduling, and clinical documentation.[6] Beyond clerical support, AI will harness multimodal analytics—spanning imaging, genomics, wearables, and electronic health record data—to uncover latent patterns in patient trajectories, enabling autonomous differential diagnoses and tailored therapy recommendations.[7,8] Early studies in pathology, dermatology, and radiology show that algorithmic second opinions already rival those of board-certified specialists.

Over time, the healthcare workforce may shift from manual execution toward supervisory and empathic roles. Embodied AI promises to blur traditional boundaries between medical subspecialties by integrating knowledge across radiology, pathology, pharmacology, and surgery, thereby enhancing diagnostic precision and therapeutic efficiency.[8] Humans will remain indispensable in situations demanding nuanced ethical judgement, contextual empathy, or dexterous intervention; yet, the centre of gravity will increasingly migrate toward human–AI collaboration.

Routine visits to general practitioners could diminish as embodied-AI platforms deliver privacy-preserving consultations directly into the home via mobile robots or ambient smart-home devices.[9] Even complex surgical procedures are inching toward full automation: AI-guided robotic suites already achieve sub-millimetre precision in orthopaedics and ophthalmology, and recent prototypes hint that fully autonomous surgery—with human clinicians providing high-level oversight—may soon be feasible.[10] Such transformations are expected to shorten hospital stays, reduce iatrogenic error, and lower overall costs, making high-quality medicine globally accessible.[11]

Embodied AI and the future of research

The scalability of embodied AI implies that scientific output may soon correlate more strongly with available capital and energy than with human headcount. Humanoid robots, projected to cost less than USD

$20,000—roughly the price of a mid-range automobile—could staff entire laboratories, from principal investigators to animal technicians.[12] Autonomous scientific discovery is no longer speculative: in 2009, the "Robot Scientist" Adam independently hypothesised and validated gene functions in yeast;[13] in 2022, DeepMind's AlphaTensor discovered matrix-multiplication algorithms faster than any previously known.[14] These achievements exemplify AI's accelerating feedback cycle.

Historically, inquiry has been constrained by human frailties—finite lifespan, fatigue, and slow inter-generational knowledge transfer. Embodied AI can transcend these barriers, running countless experiments in parallel and sharing results instantaneously. Moreover, AI-driven laboratories could become self-improving: agentic systems are already designing better hardware, protocols, and learning algorithms.[15] Such capabilities could unlock breakthroughs in fundamental physics, climate modelling, and biotechnology at a pace difficult to imagine today.

We may therefore be approaching a new golden age of science and material abundance. Yet every technological inflection carries risk: amplified inequality, labour displacement, dual-use weaponisation, and environmental externalities must all be acknowledged and mitigated. It is humanity's responsibility to steer AI's evolution responsibly, embedding values of inclusivity, sustainability, and democratic oversight into its development. Success will not be measured solely by computational milestones but by the degree to which these systems advance human flourishing.

REFERENCES

1. OpenAI. ChatGPT [Internet]. 2022 [cited 2025 Jun 11]. Available from: https://openai.com/chatgpt
2. Mouser Electronics. GPT-3.5 vs GPT-4: What's the difference? Bench Talk [Internet]. 2023 May 11 [cited 2025 Jun 11]. Available from: https://www.mouser.com/blog/gpt-35-vs-gpt-4-difference
3. Standard Bots. The Spot robot by Boston Dynamics: features & use cases [Internet]. 2025 May 6 [cited 2025 Jun 11]. Available from: https://standardbots.com/blog/spot-robot
4. NSF. Potential impacts of generative AI across the medical-device industry [Internet]. 2025 Jan 14 [cited 2025 Jun 11]. Available from: https://www.nsf.org/life-science-news/potential-impacts-generative-ai-across-medical-device-industry
5. John Snow Labs. Generative AI in healthcare: use cases, benefits, challenges of GenAI and trends 2025 [Internet]. 2025 May 22 [cited 2025 Jun 11]. Available from: https://www.johnsnowlabs.com/generative-ai-healthcare/
6. TechMagic. AI virtual assistants in healthcare: you need it in 2025 [Internet]. 2025 Jun 10 [cited 2025 Jun 12]. Available from: https://www.techmagic.co/blog/ai-virtual-assistant-in-healthcare
7. OpenMedScience. Artificial intelligence in healthcare: revolutionising diagnosis and treatment [Internet]. 2024 Jan 6 [cited 2025 Jun 12]. Available from: https://openmedscience.com/artificial-intelligence-in-healthcare-revolutionising-diagnosis-and-treatment/
8. Al-Antari MA, et al. Artificial intelligence for medical diagnostics—existing and future AI technology! Diagnostics (Basel). 2023;13(4):688. doi:10.3390/diagnostics13040688
9. Liu Y, Cao X, Chen T, et al. From screens to scenes: a survey of embodied AI in healthcare [Internet]. arXiv. 2025 Jan 13 [cited 2025 Jun 12]. Available from: https://arxiv.org/abs/2501.07468

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10. AI Competence Center. Fully automated surgery: how close are we really? [Internet]. 2025 Mar 26 [cited 2025 Jun 12]. Available from: https://aicompetence.org/fully-automated-surgery-how-close-are-we-really/
11. World Economic Forum. Six ways AI is transforming healthcare [Internet]. 2025 Mar 14 [cited 2025 Jun 12]. Available from: https://www.weforum.org/stories/2025/03/ai-transforming-global-health/
12. Humanoid Robotics Technology. Tesla unveils ambitious Optimus humanoid roadmap [Internet]. 2025 [cited 2025 Jun 11]. Available from: https://humanoidroboticstechnology.com/industry-news/tesla-unveils-ambitious-optimus-humanoid-roadmap/
13. King RD, Rowland J, Oliver SG, et al. The automation of science. Science. 2009;324(5923):85-89. doi:10.1126/science.1165620
14. Fawzi A, Balog M, Touvron A, et al. Discovering faster matrix-multiplication algorithms with reinforcement learning. Nature. 2022;610(7930):47-53. doi:10.1038/s41586-022-05172-4
15. Gridach M, Nanavati J, Zine El Abidine K, et al. Agentic AI for scientific discovery: a survey of progress, challenges, and future directions [Internet]. arXiv. 2025 Mar 12 [cited 2025 Jun 11]. Available from: https://arxiv.org/abs/2503.08979

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