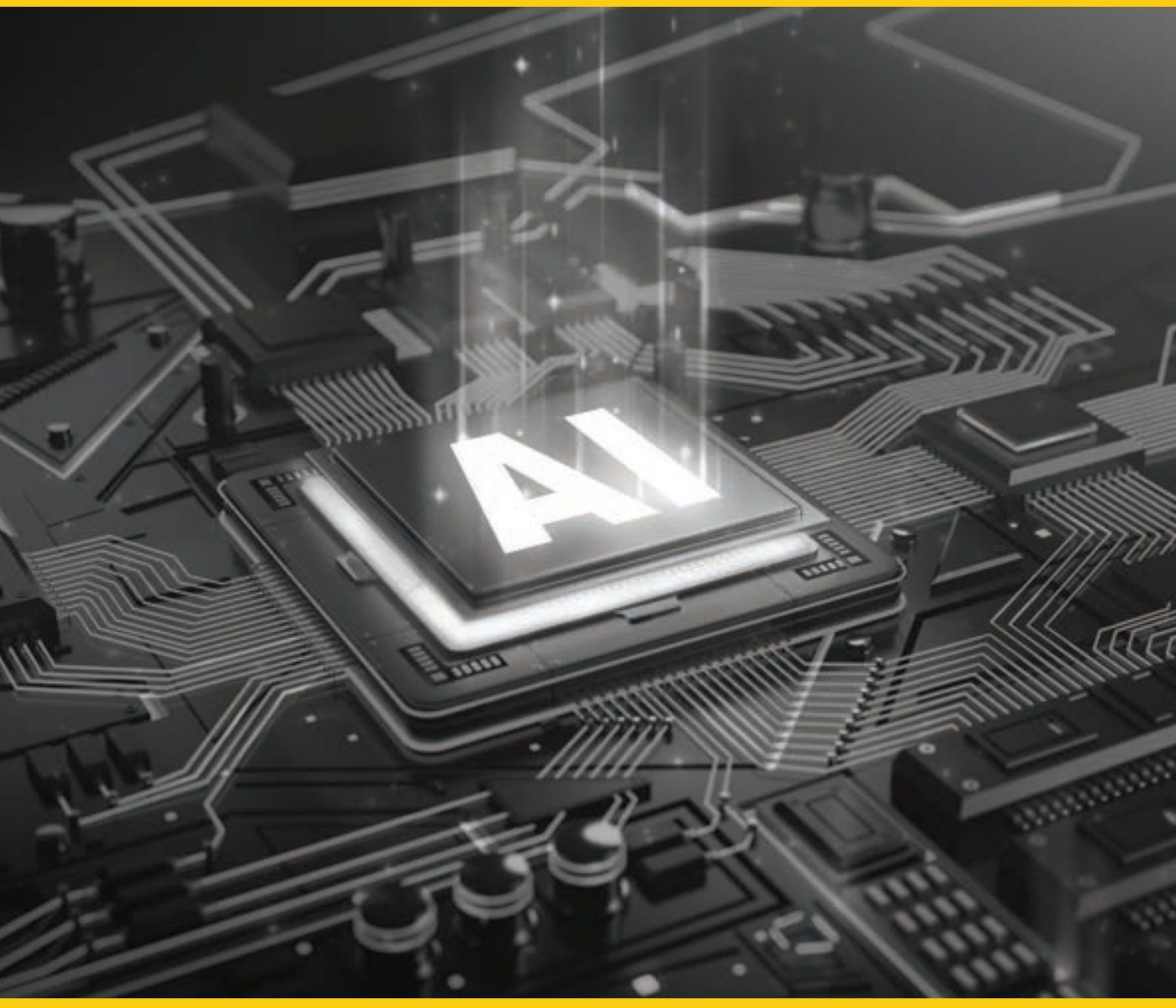
AI and semiconductors fueling each other's evolution



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Introduction

Our lives started becoming increasingly digital over the last few decades. However, the last 12 months have seen an explosion of large language models (LLM) based generative AI that has brought to the forefront frenzied discourses on intelligence; both human and artificial. D Stenhouse, a British evolutionary biologist, regarded intelligence as a blend of genetic inheritance, environment, learning, and culture, defining it as "adaptively variable behavior". This definition is congruent with the traditional understanding of intelligence as the "capacity for learning, reasoning, understanding," emphasizing the elements of "learning" and "under-standing" the "environment," which subsequently lead to "adaptive" behavior.

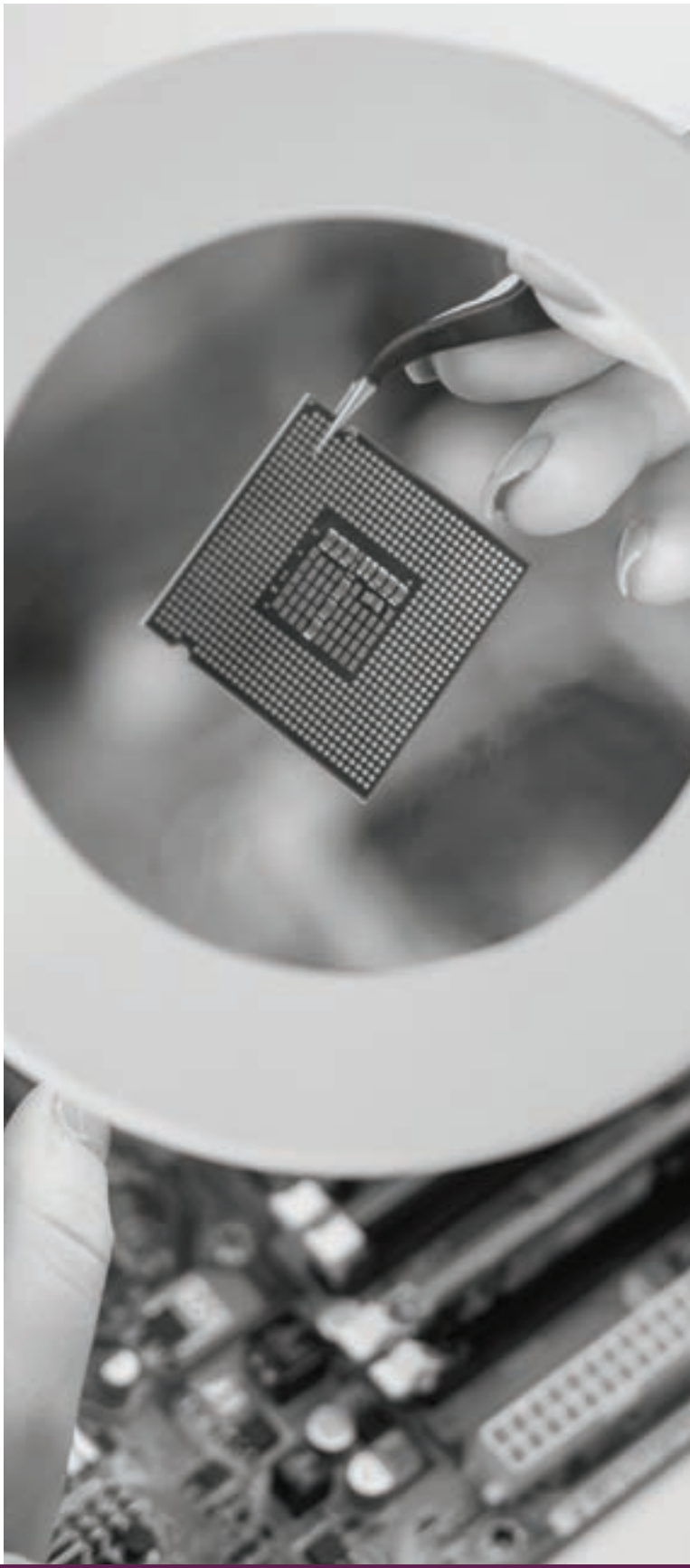
The intricate connection between artificial intelligence (AI) and the semiconductor sector becomes evident as we dive into the realm of processing massive data and executing a wide range of computations at breakneck speeds.

For example, Reinforced Learning (RL), when used for chip design, reduces the entire chip design process into a graph optimization game. This technology, which once overshadowed human champions in Go, a game more complex than chess, should now tackle configurations and scenarios of the order of 10 raised to the power of a staggering 90000 for the designing of a simple chip.

Semiconductor advancements fueled by AI appetite and vice-versa

The semiconductor journey isn't a lone one; it's tightly intertwined with monumental AI advancements, creating a reciprocal relationship where each drives the other's progress. Innovations in semiconductor technologies like advanced lithography, 3D chip stacking, and heteroge-neous integration are pivotal in satisfying AI's thirst for processing power.

A recent report by Semico Research sheds light on AI's growing influence in the Electronic Design Automation (EDA) market. By the year 2025, AI functionality is projected to penetrate 47.8% of the EDA market, marking a CAGR of 33.8%[1]. The symbiosis extends to cost efficiency as well, with potential design cost savings for chip design ranging from 20% to 30%. Deloitte supports this projection, estimating that AI design tools could save the semiconductor industry between $10 billion to $20 billion annually by 2025[2].



AI's touch on chip efficiency

The impact of AI on enhancing chip efficiency is already tangible. MIT's AI tool orchestrated circuit designs that were 2.3 times more energy-efficient[3] than those crafted by humans. Similarly, MediaTek utilized AI tools to reduce processor component size by 5% and decrease power consumption by 6%[4]. Cadence, on the other hand, employed AI to boost a 5 nm mobile chip's performance by 14%[5] and cut its power consumption by 3%, displaying a snippet of the potential AI holds in reshaping the semiconductor landscape.

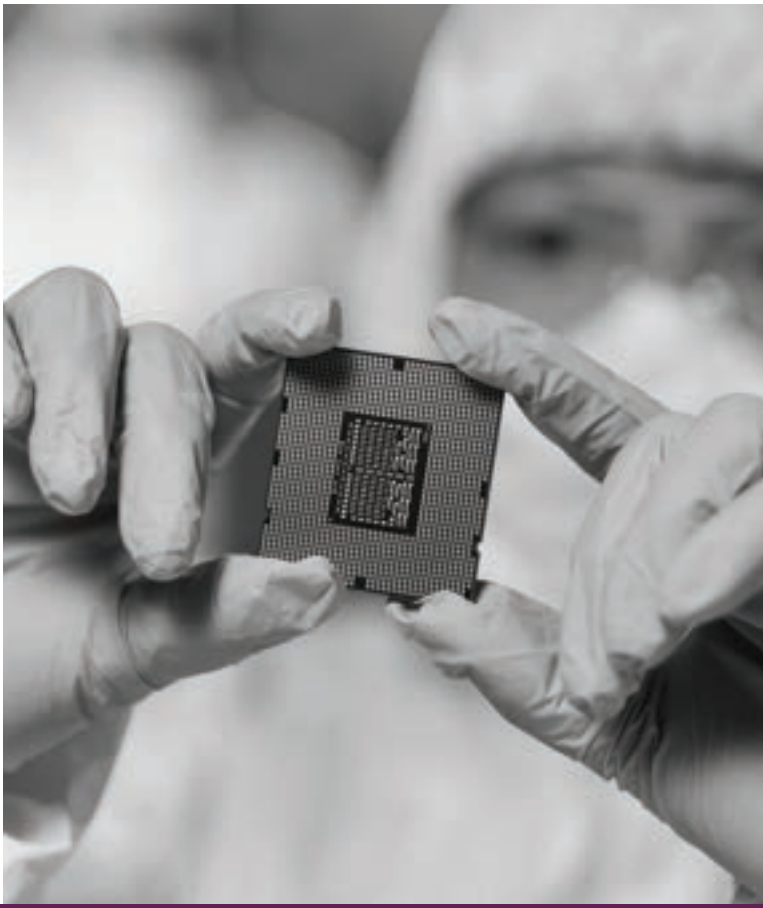
The semiconductor workforce evolution

The semiconductor industry, a cornerstone of modern technological advancements, is undergoing a transfor-mational phase accentuated by the integration of artificial intelligence in chip design and manufacturing processes. As we edge closer to this tech-driven renaissance, the semiconductor workforce finds itself at a crucial junction, necessitating a blend of AI-driven tools and a fresh wave of skill sets among chip design engineers. The journey ahead demands a mix of problem-solving abilities, creativity, critical thinking, and effective communication skills.

Demand outstripping semiconductor talent supply

The global semiconductor industry is anticipated to require over one million additional skilled workers by 2030 to meet the ballooning demand. The acute demand for a semiconductor-trained workforce is propelling both governments and private companies to scramble in order to bridge the talent gap. For instance, amidst a severe talent shortage, Taiwan and South Korea have rolled out initiatives to attract and retain semiconductor professionals[6]. In the U.S., both the government and manufacturers are pooling resources to close the employment gap in the semiconductor industry[7]. Intel, a key player, has voiced concerns over the workforce shortage, underlining the urgent need for addressing this challenge[8].

AI is not just a tool but a companion in this journey towards creating a future-proof workforce. With the help of AI, business leaders are investing in upskilling and reskilling opportunities to not only bridge the skills gap but also enhance employee retention and satisfaction[9]. AI-powered tools are significantly accelerating the pace at which employees are trained, thereby expediting the process of filling the skill voids in the industry.



Quest Global driving the integration of AI and semiconductors

At Quest Global, we recognize the semiconductor industry's skill evolution as a journey of collective growth and adaptation. Our endeavors are directed towards ensuring that the semiconductor industry is well-equipped to navigate the complexities of today's digital transformation needs, thus contributing to the holistic development of the industry's human capital.

The infusion of Artificial Intelligence (AI) in the semiconductor sector has emerged as a catalyst in mitigating prevalent challenges. Firstly, AI-driven tools curtail design costs for complex System-on-Chips (SoCs) by optimizing design processes, thereby ensuring cost efficiency. Secondly, AI enhances the accuracy of designs, thereby increasing the likelihood of first-time-right designs which, in turn, saves both time and resources. Lastly, the integration of AI accelerates design cycle times, enabling timely market entries despite narrowing market windows and waning product life cycles. Through predictive analytics and machine learning algorithms, AI ensures a proactive approach to design modifications, thus aligning product releases with market dynamics efficiently.

The fusion of AI and semiconductors is not just a technological evolution; it symbolizes the boundless realms of innovation, where intelligence, whether artificial or natural, continually redefines the possibilities. This reciprocal journey underscores the intertwined destinies of AI and semiconductors, each propelling the other towards a horizon filled with limitless potential.

References

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3. MIT’s AI tool orchestrated circuit designs
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9. Upskilling and reskilling opportunities in semiconductor industry aided by AI

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