

# SPECIAL REPORT no. 276

## The Future of Global A.I.

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# Abstract

**A**s the global economy moves towards ubiquitous digitisation, the demand for and generation of data is experiencing exponential growth, as are computational requirements and user adoption of AI products and services. This growth is forcing big-tech incumbents to expand capital expenditure. Undergirding this dynamic is the confluence of increasing frontier model training costs and plummeting inference costs. Revenue streams of AI companies are further being strained due to the rise of open-

source systems offering competitive performance. To explore this techno-economic matrix, this report analyses the findings of BOND's 'Trends in Artificial Intelligence' report released in May 2025. The analysis is followed by recommendations for accelerating adoption through inclusive practices, supporting infrastructure development and strategic capacity-building in the Middle East and India.

# Introduction: The Present and Future of Digital Intelligence

**A**rtificial Intelligence (AI)—a technology that was once conjured in the accelerationist dreams of science-fiction writers to challenge conventional notions of human identity through a technological ‘other’—has now found its way into national and global discourses on the future of geopolitical and geo-economic formations. Nations have begun racing to leave their footprint on the digital foundations of the future. BOND’s ‘Trends in Artificial Intelligence’ report of May 2025 attempts to quantify the undulations of the ongoing technological shift.<sup>1</sup> The report charts the evolution of AI in

recent decades and attributes unprecedented developments in the field to breakthroughs in large language models (LLMs). This is exemplified by the launch of OpenAI’s ChatGPT in November 2022, which was facilitated by an existing and accessible global internet infrastructure and the proliferation of digital datasets over the last three decades. The unfolding AI revolution is further acting as a “compounder” of growth in digital user engagement, developer ecosystem growth, and capital investment.<sup>2</sup> These factors primed the global economy for innovation, investment and the adoption of AI in the financial, social, geopolitical, and technical spheres in a much shorter time scale than previous technological cycles.

A crucial observation made in the report is that global connectivity has been a key determinant of the pace of AI scaling. While previous digital platforms had to build their foundational infrastructure from the ground up, AI developers and deployers have been able to leverage approximately 5.5 billion digitally connected people. It also underscores the importance of enabling infrastructure as, “[the] document is filled with user, usage and revenue charts that go up-and-to-the-right...often supported by spending charts that also go up-and-to-the-right.”<sup>3</sup>

While the trends highlighted may seem unidirectional, the trajectory of growth metrics also reveals an intricate and fast-evolving economic context. AI-focused entities, including both legacy companies and startups, are facing a higher degree of cash burn relative to their revenue. Rising pre-training costs, falling inference costs, and performance convergence across frontier models are favouring application programming interface (API) developers and deployers over foundation model developers. The global competitive arena is also intensifying with challenges to Big Tech by agile AI-native startups, the achievements of China in AI foundation models and AI-powered robotics despite years of United States (US) sanctions, and noteworthy innovations in open-source models.

The accelerating development and adoption of AI products, services and platforms present both challenges and opportunities for regions like the Middle East and North Africa (MENA) and India that have ambitions of integrating AI into their economies. Data presented in the report suggests that the mobile user bases in India and MENA are primed for AI products and services on mobile platforms. For the Middle East, AI is a crucial enabler of economic diversification beyond its hydrocarbon industries, whereas for India, AI can be transformative for its world-leading digital public infrastructure, public service delivery, and digital payments platforms.

Although the BOND report provides extensive data sets to support an optimistic investment message for the AI sector, it pays insufficient attention to longitudinal risk factors such as disproportionately high valuations of AI companies and the impact of AI on the labour market. For instance, the report highlights the discrepancy between the high valuations of AI startups and their low revenues, but it does not expand on the correlations between the ongoing AI boom and the dot-com bubble of the 1990s, revealing an optimistic bias.<sup>4</sup> The report notes that AI adoption is leading to a global “cognitive automation”, which is particularly threatening to white-collar jobs.<sup>5</sup>

Whether workers can adapt to and work symbiotically with AI will decide the future of work and displacement risk, according to the report. It projects that while AI will lead to job displacement, it will also create new categories of jobs in AI development, management, and ethics. However, due to the paucity of data on the long-term effects of cross-sectoral white-collar job-function automation, optimistic predictions along these lines (including the BOND report) often rely on truisms, such as callbacks to innovation cycles of the past and presuming that the rate of job creation will match job losses.

Given the comprehensive nature of the BOND report, the following pages will provide an overview of key assessments for policymakers and extrapolate the implications for emerging markets in the AI space, like the Middle East and India.

Section 1 will follow the thematic areas covered in the report in the following order: the pace and scale of AI adoption; AI model economics vis-a-vis developers and deployers; the emerging competitive landscape and geopolitical competition; Physical AI and the future of work; and the road to artificial general intelligence (AGI). The second section will explore how global trends in AI development present a unique set of challenges and opportunities for the capital-rich markets of the Middle East and the strong user base of the Indian market.

# Key Assessments

## **Pace and Scale of AI Adoption and Development: AI Everywhere All at Once**

The BOND report notes that the current wave of AI development and adoption is unprecedented when compared to previous technological waves. It uses OpenAI's ChatGPT as a benchmark to showcase the explosive growth of user adoption as the platform achieved 1 million users within five days, 800 million weekly active users within 17 months, and registered 90 percent of its users from non-US geographies by its third year.<sup>6</sup>

The expansion of the developer ecosystem is a key factor enabling the growth of AI adoption. The report highlights NVIDIA's ecosystem reaching six million developers over seven years. More strikingly, Google Gemini's ecosystem saw a 500-percent increase to seven million developers in one year.<sup>7</sup> The growth of the AI developer community is also seen in the 175-percent rise in AI-related repositories on GitHub and an increase in developers integrating AI in their workflows from 44 percent to 66 percent between 2023 and 2024.<sup>8</sup>

It underlines the historic surge in capital expenditure (capex) as a core factor enabling the flourishing of the AI landscape. Collectively, the “Big Six” (Apple, Amazon, Alphabet, Meta, Microsoft, NVIDIA) US tech companies invested US\$212 billion in capex (a 63 percent per year increase) in 2024.<sup>9</sup> It also notes that a decade ago, capex, as a share of their revenue, stood at eight percent, and has now increased to 15 percent, indicating an industry-wide prioritisation of AI development.

On the end-user side, a distinguishing factor between AI products like ChatGPT and earlier technologies like the internet is that today’s products are presented with “easy-to-use” interfaces and are accessible on ubiquitous mobile devices, requiring less technical literacy compared to the early internet.<sup>10</sup> Therefore, by leveraging accessibility, current AI models can penetrate an already primed user base. A noteworthy example of this phenomenon is ChatGPT, which “hit the world stage all at once, growing in most regions simultaneously.”<sup>11</sup>

The BOND report indicates that a primed global user base, expanding developer ecosystem, and surging capex have created a recursive feedback loop wherein growing compute power

(resulting from increased capex) leads to more powerful frontier models. More powerful models then drive engagement with the global developer community, which leads to the proliferation of AI applications and services. New products and services, in turn, increase user demand and expectations that necessitate increasing investment in compute power/resources.

### **The Economic Nuances of AI Development: Expensive to Build, Cheap to Run**

Even though user adoption and AI development are trending “up-and-to-the-right”,<sup>12</sup> as the authors of the BOND report state, the economics of AI are evolving in a more nuanced manner. The report provides a comparison of the high and rising costs of training frontier AI models against the plummeting inference costs for end-users. Training new frontier models, as Anthropic’s CEO Dario Amodei has stated, will likely start costing billions of dollars from 2025.<sup>13</sup> Consequently, the barrier to market entry for new entrants will be steep, and regions like the Middle East and India, which have ambitious AI goals, will need to cultivate public-private partnerships (PPPs) to provide for the necessary up-front investment.

Compared to the training costs of frontier models, the running or inference costs are sharply declining due to increases in hardware efficiency gains. The report cites the increase in energy efficiency between NVIDIA's 2014 Kepler GPU (Graphics Processing Unit) and the 2024 Blackwell GPU, which uses 105,000 times less energy per token generated than the former.<sup>14</sup> Such efficiency gains have led to a 99.7-percent drop in inference costs for consumers between January 2023 and January 2025. Big Tech companies like Google and Amazon are strategically manoeuvring this dynamic landscape by investing in custom AI silicon like the former's Tensor Processing Units and the latter's Trainium chips. Custom hardware not only reduces operational inefficiencies but also adds to vertical integration, supply chain risk-mitigation, and optimises hardware for specific software environments, which makes such offerings more lucrative than general-purpose GPUs.<sup>15</sup>

Based on benchmarks like the LMSYS (Large Model Systems) Arena, the report has identified a rapid convergence in the performance of frontier models.<sup>16</sup> As the gap between the capabilities of mid-to-upper tier models of AI companies narrows for most common tasks, differentiating between models based on raw performance becomes challenging for monetisation strategies.<sup>17</sup> The report notes that a fall in inference costs in conjunction with convergence in performance is propelling developer usage by offering them more choice and ways to experiment with AI systems.<sup>18</sup> Moreover, the rise of open-weight models like China's DeepSeek and Meta's Llama is adding another layer of pressure to monetisation problems in the AI race. Authors of the report suggest that if performance convergence continues and developers decide that open-source models offer good-enough performance with the added benefit of cheaper running costs, the value proposition of proprietary foundation models may continue to decrease. This may allow the Middle East and India to adopt open-source models to limit dependence on proprietary offerings, given the already volatile relationship between the US and China.

The matrix of high development/training cost, low inference cost, advances in open-source models, along with a surge in AI development and adoption, has led to remarkable revenue growth for many AI companies. However, this has been accompanied by increasing operational costs and heavy losses in some cases. Case in point, the report notes that OpenAI's revenue grew to US\$3.7 billion in 2024, against its US\$5-billion compute expense.<sup>19</sup> Despite losses, leading AI companies are experiencing skyrocketing valuations, with OpenAI reporting a US\$5-billion loss but receiving US\$300 billion in valuation, and Anthropic receiving a US\$61.5-billion valuation despite a US\$5.6-billion burn in 2024.<sup>20</sup> The report suggests that markets are optimistic about the future of AI despite recurrent failures in monetisation.

The steep rise in token processing and the continuous increase in developer activity are mentioned to illustrate the economic principle of Jevons Paradox, meaning that the usage of AI increases by order of magnitude as inference

costs plummet. Amodei has similarly stated the importance of the “scaling curve”, where the deployment of resources by AI companies increases as inference gets cheaper.<sup>21</sup> This growth in usage, in turn, dramatically increases the need for computational resources, capex on GPUs and data centre capacity, and total energy consumption. This creates a scenario where efficiency gains drive resource consumption faster than they can manifest, creating a series of challenges for sustainable scaling.

A prime example of the scaling problem can be seen in the data centre market. In 2024, global IT (Information Technology) data centre capex reached US\$455 billion and continues to accelerate.<sup>22</sup> The skyrocketing increase in energy consumption is a consequence of this expansion. In 2024, data centres accounted for 1.5 percent of the world's electricity consumption, marking a 12-percent per-year increase since 2017 at more than four times the growth rate of total global electricity consumption.<sup>23</sup> The growing energy demand and pressures on local energy grids can become a bottleneck for future growth—a problem that market leaders like the US are already facing.<sup>24</sup>

## The Global Competitive Landscape: Closing Ranks, Building Moats

In an era of increasing geopolitical competition, countries are supporting efforts to achieve digital sovereignty. The BOND report notes a growing interest in Sovereign AI projects, as demonstrated by NVIDIA's partnerships in countries like France, Spain, Switzerland, Ecuador, Japan, Vietnam, and Singapore.<sup>25</sup> OpenAI has also entered into a partnership with the UAE (United Arab Emirates) under its OpenAI for Countries programme, which aids countries in building sovereign AI capabilities.<sup>26</sup> Whether such partnerships will yield actual sovereignty is another question since importing the US stack will only increase foreign dependence.

The intensification of global competition due to China's quick ascent in the AI race is the biggest factor catalysing digital sovereignty efforts. AI development and deployment in China have been markedly faster compared to the internet adoption curve from the 1990s. In R&D (Research & Development), the nation has a leading position in AI-related patents and publications.<sup>27</sup> China-

made frontier models, like DeepSeek, Alibaba's Qwen, Baidu's Ernie, are converging in terms of performance with leading proprietary models from the US, such as OpenAI's GPT 4.1 and Anthropic's Claude Sonnet.

The report also mentions the trend of scaling unsupervised reinforcement learning during model training. Chinese subject matter experts have produced a body of research regarding a model training paradigm called 'Absolute Zero',<sup>28</sup> which completely uses self-play for generating and learning from interactions with the model's environment. It is not aided by human-generated data at any given point in time. If successful, this paradigm will greatly reduce dependence on human-curated datasets that have been a bottleneck for model training. Furthermore, China has also been leading in robot installations in the industrial sector, demonstrating a commitment towards the large-scale integration of AI in its economy. The report also highlights more positive sentiment toward AI by the Chinese population when compared to the US, which may lead to faster adoption and a more permissive policy environment.<sup>29</sup>

The nexus of continuously advancing frontier models, performance convergence of open-source models, the rise of Chinese AI, and various countries pursuing sovereign AI capabilities is creating a fluctuating dynamic that can impede the US's leading position in the AI sector, potentially leading to a multipolar landscape with rival AI ecosystems.<sup>30</sup> While the US models currently lead in many general-purpose LLM benchmarks, China's integration of robotics in real industrial processes may give it an edge in manufacturing, automated logistics, and resource optimisation.

### **Physical AI and the Not-So-Human Future of Work**

The report notes how AI is treading into traditional economic sectors. Anduril, a company specialising in AI-powered autonomous systems, has doubled its revenue year-over-year between 2023-2024. In the mining industry, KoBold Metals is implementing AI-enabled exploration techniques to improve the efficiency of critical mineral deposit discovery. In agriculture, Carbon Robotics' LaserWeeder has treated over 230,000 acres of land and reduced herbicide use.<sup>31</sup> The rapid adoption of AI in capital-intensive sectors like defence, mining, and agriculture indicates

that the Return on investment (ROI) for AI in such sectors is reaching the threshold where the inertia towards technological adoption is being overcome.

The report also observes that the next generation of digital natives will likely first encounter the internet through multimodal AI-first interfaces through conversational interactions rather than web- and application-based services. A consequence of this generational shift, particularly for regions with large, unconnected or rural populations, can be a narrowing of the digital divide as the availability of natural language-based interfaces will lower the required technical literacy skills.

It posits that the dizzying speed of AI development will radically alter job markets, with data from the US showing a 448-percent increase in AI-related job postings between 2018 and 2025 that coincided with a 9-percent decrease in non-AI IT job postings during that time. The report also highlights tech companies adjusting their expectations and considering AI literacy as a baseline skill for their workers, and even applauding Jensen Huang's remark that workers are more likely to lose their jobs to "somebody who uses AI" rather than AI itself.<sup>32</sup>

The specific rise in demand for AI-related jobs, as well as a general expectation of AI literacy in the workforce, suggests that AI will likely become a general-purpose technology like the internet rather than a specific one like the products and services categories.

Although the report presents strong indicators of rapidly evolving labour market conditions in the tech sector, total factor productivity (TFP) is a crucial metric for understanding the broader economic impact of AI. Daron Acemoglu, 2024 Nobel laureate in the economic sciences, argues in a paper on the macroeconomics of AI that in the next decade, AI advances will lead to modest advances in TFP growth at about 0.064 percent yearly increases.<sup>33</sup> This conclusion is derived primarily by adjusting the number of AI-exposed jobs in the US labour market (about 20 percent) to jobs that can be profitably automated by AI (about 5 percent). Acemoglu further tempers expectations by incorporating the negative impact of AI-driven products and services on social welfare, a factor not emphasised in the BOND report. The report, with its focus on developed markets, also does not present data on how the labour market impact of AI may differ in Global South countries where the size of informal or unregulated economic sectors (as percentage of GDP) can be as high as 35 percent.<sup>34</sup> Furthermore,

if the technology leads to the creation of new jobs, specifically in domains such as Reinforcement Learning through Human Feedback (RLHF), the question of job quality is left unanswered. This issue is particularly relevant for developing regions where the prevalence of exploitative click-work, data and content moderation jobs is already seen as generating net negative social impact.<sup>35</sup>

## **The Road to AGI**

The BOND report posits conjectures about the possibility of AGI, though the arguments are primarily based on industry sentiment rather than data and scientific consensus. Speaking on the threats posed by AI, the report refers to the concept of ‘Mutually Assured Deterrence’ (MAD) arising from the increased competition and apprehension regarding the unpredictable consequences of AI development.<sup>36</sup> However, the concept seems to rest on shaky ground when compared to its counterpoint in the nuclear domain, as the weaponisation of AI can manifest in non-obvious ways such as disinformation campaigns, controlled disruptions, and sabotage. Although it may be difficult to chart the future of AI, a prescient and responsible step towards mitigating unintended consequences will be the development of international norms and cooperative research.

# Implications for the Middle East and India

## **Leveraging a Vast Base of Mobile-First Users That De-Risks Market Entry**

In the Global South, India has emerged as a leader in user adoption for mobile-based engagement with AI applications like ChatGPT, with over 70 million active monthly users by April 2025, representing 13.5 percent of its global user base.<sup>37</sup> South Asia broadly surpassed 100 million

active monthly users, and MENA has crossed 20-30 million, with Egypt leading in early adoption.<sup>38</sup> The popularity and market penetration of mobile devices and mobile-based digital services indicate market readiness for targeted AI services. The existence of a ready and willing user base reduces market entry risks and signals a cross-sector readiness for integrating AI. Market trends suggest that if enterprises in regions like India aim to capitalise on this user base, they will need to optimise their offerings for mobile interfaces, multimodality (mainly voice), environments with varied bandwidth and diverse local languages.

## Data Centre Capacity-Building through Energy Infrastructure

As mentioned in the earlier sections, high capex requirements are one of the bottlenecks for entrants, regardless of whether they are model developers or hyper-scalers. The report demonstrates the resulting AI infrastructure imbalance of this high cost of entry by noting that the Global South (excluding China) has less than 10 percent of global data centre capacity despite having 50 percent of global internet users.

Addressing this gap, the Indian government launched the IndiaAI mission in 2024 with a US\$1.24-billion budget, a significant portion of which was directed towards increasing data centre capacity by 500 MW by 2028.<sup>39</sup> Following the “up-and-to-the-right” trend, the Indian data centre market is expecting private investments to the tune of US\$20-25 billion by 2030, and is projected to exceed 4.5 GW capacity during the same period.<sup>40</sup> In January 2025, Reliance Industries announced plans to build a world-leading data centre in India with a 3GW capacity that will likely be powered by NVIDIA chips.<sup>41</sup> The country is also set to launch homegrown chips in the 20nm-90nm range, which, though not cutting edge, are ubiquitously deployed in telecom, automotive and industrial applications.<sup>42</sup>

While the Indian approach towards infrastructure involves generating investments while promoting long-term local capacity-building, the Middle East is leveraging its capital pool to strengthen its tech partnerships with the West to import the US tech stack. Major AI infrastructure and chip deals were struck during President Trump’s visit to the region in May 2025, including a US\$600-billion two-way investment package with the Kingdom of Saudi Arabia (KSA), and a US\$200-billion deal with the UAE. The Abu Dhabi-based G42 secured a guaranteed import of 500,000 cutting-edge Nvidia chips per year, as well as a partnership with US entities to build a 5GW AI data centre campus in the UAE, enabling the country to become a regional hub for AI training and inferencing.<sup>43</sup> However, a true sovereign AI strategy must go beyond imports to shoring up native production capacity.

Since infrastructure development will be crucial for AI development in India and the Middle East, preparing the energy grid to absorb the surge in demand will be a critical issue. To address this potential bottleneck, policymakers should explicitly include projected AI-sector energy demands in national energy strategies and increase investment in alternatives like nuclear energy.<sup>44</sup> Furthermore, to prevent data centres from adding pressure to local grids, regulators should co-locate power plants and AI data centres, if feasible.

## Customisable Open-Source Models for Sovereign AI

On the geopolitical front, the US-China rivalry, along with the rise of open-source models, presents challenges for India and the Middle East, which will necessitate the adoption of a broader non-aligned stance and selective partnerships with American and Chinese entities. In this respect, open-source platforms like Hugging Face and models like Meta's Llama and DeepSeek will allow the Middle East and India to reduce dependency on proprietary offerings and further customise models for local contexts and regional languages.

Investing in regional customisation will be a particularly good move for India, given its linguistic diversity and large rural population. As highlighted in the BOND report, the next generation of internet user may have their first interaction with the internet through multimodal AI platforms. Prioritising the development of multilingual AI models, such as Falcon Arabic in the UAE and the Bhashini platform in India, may help significantly lower the digital barrier to entry, increase digital inclusion, and accelerate user adoption for a large swathe of the digitally marginalised populations while unlocking an untapped user base for AI developers and deployers.

## AI in Education

Policies for integrating AI in national educational curricula and conducting large-scale awareness and educational campaigns will be imperative for the creation of new user bases. The premise of next-generation internet users and erstwhile unconnected groups having an AI-first experience necessitates a thorough integration of AI (including AI development and basic usage skills) throughout the educational pipeline. In India, OpenAI, in collaboration with the IT Ministry, has launched the OpenAI Academy India under the IndiaAI mission, marking the first expansion of the company's international educational platform. The country has also launched a broader mission of integrating AI and machine learning in schools, demonstrating a commitment towards future-readiness.<sup>45</sup> In the Middle East, raising AI literacy has seen obstacles due to the lack of local AI talent and regulatory strategies for integrating AI in education.<sup>46</sup> The UAE has been a leader<sup>47</sup> in encouraging AI proficiency literacy by taking decisive actions such as mandating AI learning in classrooms from 2026.<sup>48</sup>

From an end-user perspective, it is essential to also educate the workforce on the risks associated with AI usage, such as exposing personal information, AI hallucination errors, inherent bias of AI models, disinformation risks, and the limitations of their knowledge base. Through the example of public appraisal of AI in China, as

presented in the report, public sentiment towards AI will be a key factor for promoting user adoption growth and developing a supportive regulatory regime.<sup>49</sup> Therefore, continuous and consistent information campaigns about the opportunities and risks of AI use will be necessary to ensure responsible AI uptake.

# Conclusion

**T**he BOND report concludes that the current trajectory and pace of AI development and adoption is unprecedented, propelled by a feedback loop of expanding capex, a flourishing developer ecosystem, and a primed market eager to engage with user-friendly AI products. The economics of AI are following a more labyrinthine pathway due to the ballooning training costs of frontier models, coupled with a welcome decline in inference costs.

Seen in conjunction with converging performance metrics and innovations in the open-source space, this combination of factors offers incumbents and entrants in the frontier model space a steep hill to climb to achieve sustainable revenue generation. The ensuing rivalry between the US and China—the two poles of the emerging techno-polar world—is pushing countries to shore up their AI infrastructure. Furthermore, the integration of AI in physical industries, along with shifting labour market trends, highlights the importance of investing in upskilling and information initiatives to prepare sustainable conditions for future market growth. Riding the waves generated by this technological tsunami will require nations to assess their local demands and make targeted investments.

For instance, Middle Eastern countries like Saudi Arabia and the UAE have the advantage of possessing substantial capital reserves to import AI stacks and accommodate hyper-scalers in the short to medium term while strategically addressing bottlenecks such as an energy infrastructure capable of absorbing exponentially growing AI workloads in the long term.<sup>50</sup> India is home to one

of the biggest market-entry-friendly, primed user bases that can be harnessed through accessible products that are customised for local needs. A critical challenge for Global South players going forward will be how they are able to synergise their specific advantages and disadvantages to build coalitions and strengthen partnerships to stay connected in an increasingly distributed digital world. ORF

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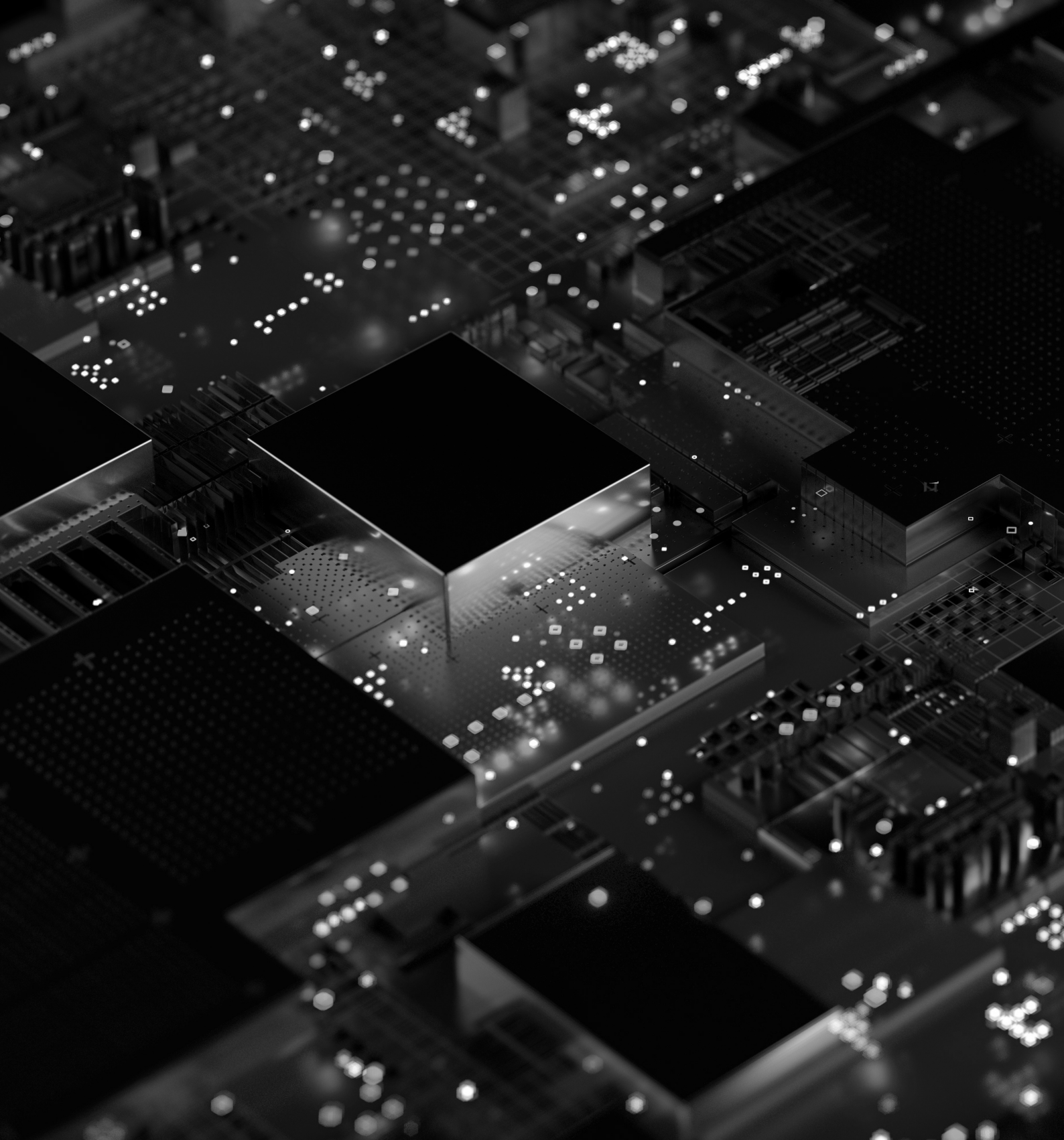
## About the Author

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