

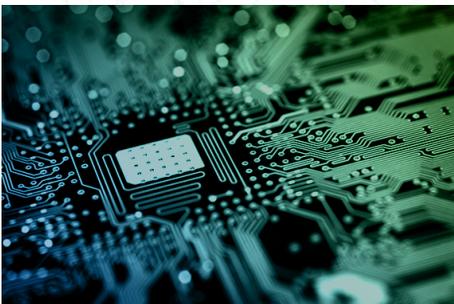
# ARTIFICIAL INTELLIGENCE: FUELING THE NEXT WAVE OF THE DIGITAL ERA

Artificial intelligence (AI) is proving to be one of the most disruptive forces in technology in decades. Much like the introduction of electricity in the early 20th century and the more recent advent of the internet and mobile technologies, AI offers broad technological capabilities that can be applied to all industries, profoundly transforming the world around us. AI-enabled technologies are already shifting how we communicate, how we work and play, and how we shop and care for our health. For businesses, AI has become an absolute imperative for creating and maintaining a competitive edge.



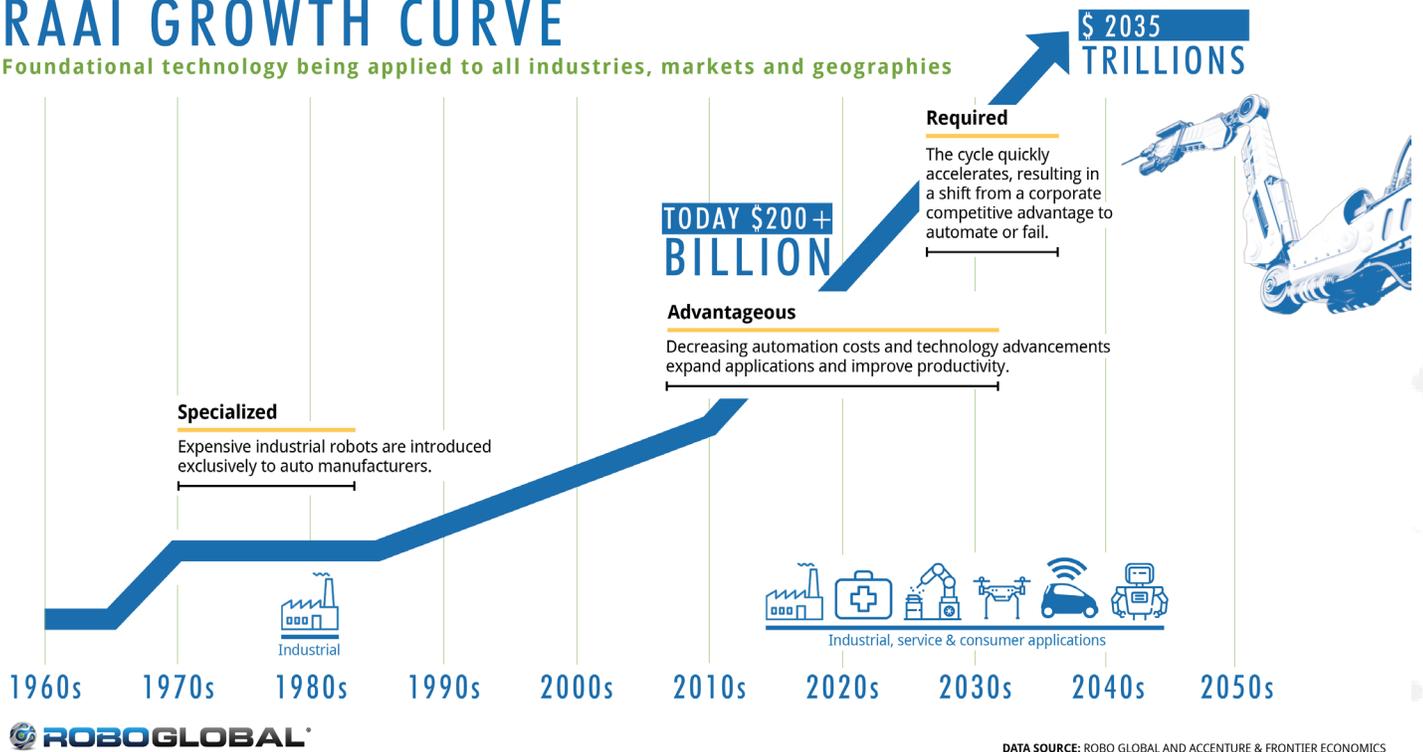
For investors, AI may be one of the greatest investment opportunities of our generation. The simulation of human intelligence processes by computer systems, AI uses **machine learning** and deep learning to enable systems to learn by themselves with little to no human intervention. And while machine intelligence has been around since the 1950s, it has recently hit an inflection point, moving from the experimental phase to an era of practical commercial application.

Historically, the stock market tends to under-appreciate the scale of opportunity enjoyed by leading providers of new technologies during this phase of development. This fact creates a remarkable opportunity for investors who understand the scope of the AI revolution, and who take action at a time when AI is disrupting industry as we know it and forcing us to rethink the world around us.



## RAAI GROWTH CURVE

Foundational technology being applied to all industries, markets and geographies



## THE RISE OF ARTIFICIAL INTELLIGENCE: WHY NOW?

- Massive growth of data
- Faster processing chip power
- Breakthrough in AI-related software
- Rapid growth of infrastructure frameworks
- Major transformation of the labor force

Smart devices and virtual assistants such as Siri and Alexa have made AI a part of our daily lives. Meanwhile, revolutionary breakthroughs like self-driving cars and cashier-less grocery stores are well within reach.

In healthcare, AI is making an enormous impact with cloud-based tools for genomics and precision medicine, human language technologies, assistive robotics, and machines that can read medical images with the highest accuracy. In agriculture, farmers are using deep learning techniques to dramatically improve crop

yields. Smart sensors and appliances in the home now enable consumers to connect intuitively with their living spaces and order everything from groceries to movies with a touch of a button or a simple voice command. As **artificial reality (AR)** and **virtual reality (VR)** technologies mature, they are prompting us to immerse ourselves in an increasingly virtual world, while video game publishers continue to harness the power of cloud and AI to create a personalized gaming experience from any mobile device with limited hardware.

As the reach of AI continues to grow and expand, the number of companies focused on new applications and innovations is accelerating at a stunning pace—and they are disrupting every industry they touch, including healthcare, telecommunications, semiconductors, government, retail, and finance, as well as the entire universe of technology.

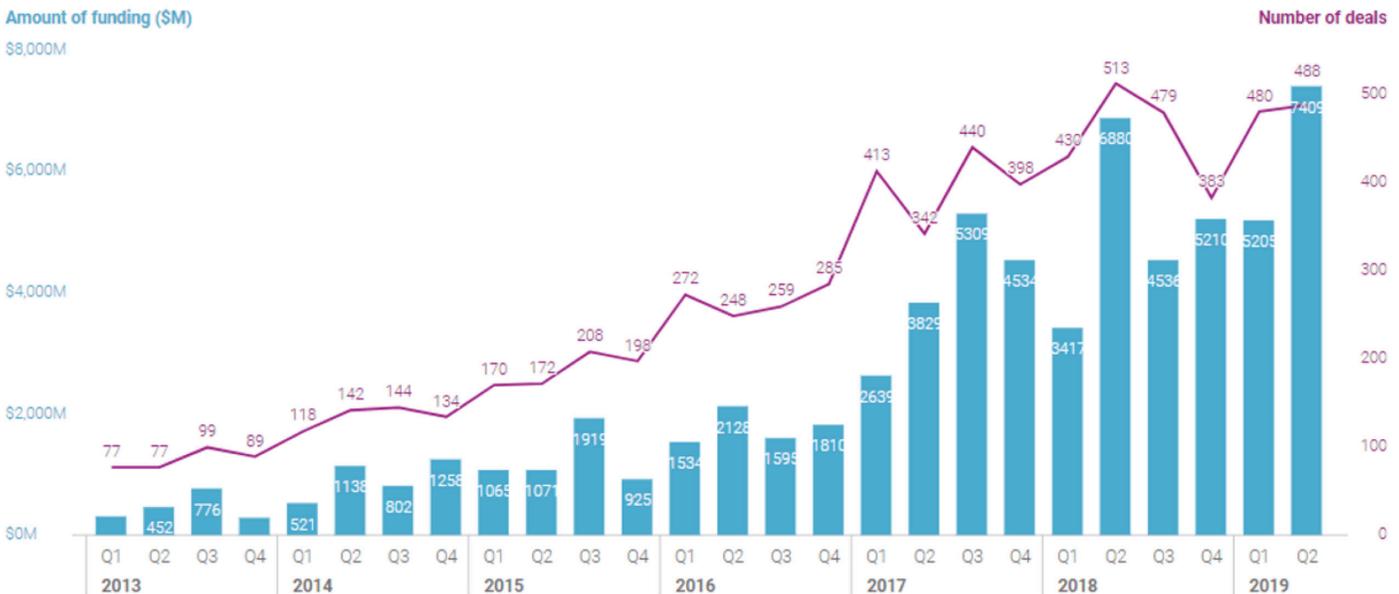
## CAPTURING THE AI ECOSYSTEM

To give investors a diversified and broad exposure to companies around the world that are leading the AI revolution, ROBO Global constructed the **ROBO Global Artificial Intelligence Index (THNQ)**, which includes companies that are actively developing and leveraging AI-based tools and AI-powered engines to capitalize on new market opportunities and accelerate their revenue growth. The potential for these companies cannot be understated. According to recent research from Bank of America Merrill Lynch<sup>1</sup>, the AI market could quadruple in size from \$36B in 2020 to \$127B by 2025 as usage expands in retail, cybersecurity, and other verticals. As the evolutionary next step from PCs and the internet, AI is experiencing enormous global momentum that is evident from the corporate and VC funding that has been pouring into AI startups in recent years:

- From 2015 to 2018, the number of active AI startups increased 113%, while all active startups increased just 28%.<sup>2</sup>
- 2Q2019 saw a record of \$7.4B invested in AI startups, with the majority going to autonomous vehicles and healthcare-related companies. Since 2013, \$66B has been invested in AI start-ups across nearly 7,000 deals, with several \$100M+ mega deals in the most recent quarters.<sup>3</sup>
- China's **2030 Plan** aims to build a \$150B AI industry in China alone.

## Q2'19 sees record funding to AI startups at \$7.4B

Q1'13 - Q2'19 (swipe right to see full data)



Source: CB Insights

<sup>1</sup> "Global Semiconductors Deep Learning and the processor chips fueling the AI revolution", Bank of America Merrill Lynch

<sup>2</sup> "AI Index 2018 Report, Stanford's Human-Centered AI Institute (HAI)

<sup>3</sup> CB Insights

From Apple and Tencent to Amazon and Microsoft, the world's most valuable companies are dedicating resources to breakthroughs in artificial intelligence. Corporate giants like John Deere have also emphasized the enormous growth potential of AI and the wide variety of ways they can take advantage of AI technologies to improve their business models. In fact, **every one of the top 10 S&P 500 companies is actively investing in AI and machine learning systems today.**

## AI's Inflection Point

Artificial Intelligence has reached an inflection point and is now in the early stages of adoption. In the past few years, progress in the AI field has rapidly accelerated, with companies racing to develop and use machine learning, neural networks, natural language processing, and a range of other sub-fields to drive innovation and monetize the power of AI. Already that race has seen intense jockeying for position, with early leaders,

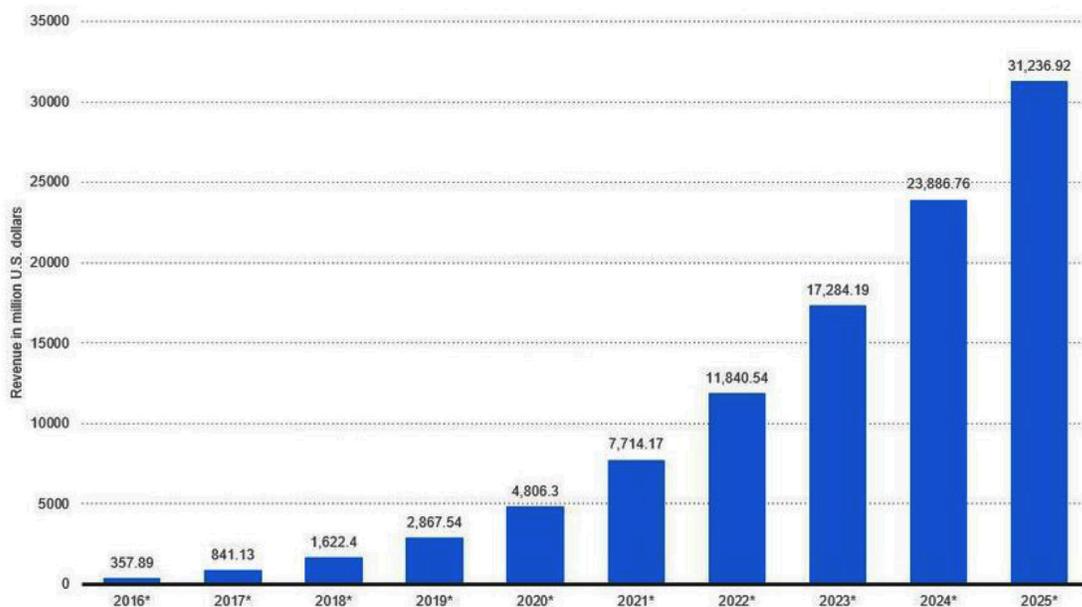
laggards, and startups in a tight race for the next AI breakthrough. Using the insights of the **ROBO Global Strategic Advisory Board** and the **ROBO Global Industry Classification** system for the THNQ index, we identified companies that are making big bets on AI and using AI as a driving force for the future of their business.

Some of the key applications being powered by AI today include:

- Cyber threat detection
- Personalized search recommendation
- Autonomous driving
- Credit card fraud detection
- Pathology and radiology
- Clinical research
- Genomics
- Warehouse fulfillment
- Smart home appliances
- Video and music streaming

Enterprise artificial intelligence market revenue worldwide 2016-2025

### Revenues from the artificial intelligence for enterprise applications market worldwide, from 2016 to 2025 (in million U.S. dollars)



## AI in Enterprises

Thanks to the power of AI, nearly every major company in every region of the world is going through a digital transformation today. According to IDC, AI is expected to be a \$1.2T opportunity this year alone<sup>4</sup>, and we have just begun to scratch the surface. Research by Capgemini indicates that though companies have more technology at their disposal than at any other point in history, only 39% of executives today feel they have the digital capabilities and talent they need in order to compete. Today, modern technology stacks powered by AI technologies are being created for the first time, and they are quickly replacing outdated legacy architectures. This adoption of AI is the final tipping point for the next round of digital transformation that started with the migration to cloud computing just a few years ago.

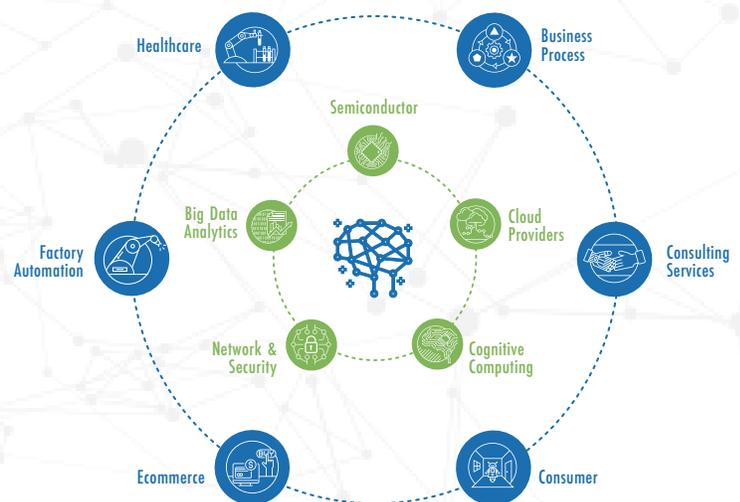
- Accenture believes AI has the potential to boost rates of profitability by an average of 38% and could lead to an economic boost of \$14T in additional gross value added (GVA) by 2035.<sup>5</sup>
- According to Statista, global revenues from AI for enterprise applications are projected to grow from \$1.6B in 2018 to \$31.2B in 2025, a 53% CAGR.
- IDC has estimated that spending on AI and machine learning will grow from \$12B in 2017 to \$57.6B by 2021.

Digital transformation doesn't result from merely digitizing manual tasks; it comes from automating entire processes and leaving humans to guide strategy rather than execution. This requires data processing, data analytics, and the predictive maintenance of intelligent machines that can autonomously process data and act on AI-driven insights at lightning speed. As humans learn to better collaborate with AI, and as machines learn to create new possibilities and outcomes, the collaboration between man and machine will amplify our technological capabilities for years to come.

## Disruptive Innovation

Companies at the forefront of the AI revolution have significantly outperformed global equities. A backtest of the **ROBO Global Artificial Intelligence Index (THNQ)** shows annualized total returns of more than 27%, and 21% growth in the three and five years ending in 2018. The overlap with world equity indices is around 8%, which is significantly lower than broader technology funds.

The THNQ index combines the results of our extensive research efforts with the discipline and quantitative aspects of index investing. The index leverages ROBO Global's deep technology expertise from our team of **strategic advisors** and AI thought leaders to identify best-in-class companies, both small and large, that are playing a role in shaping the future of AI and its capabilities across eleven classifications, including healthcare, business process, consulting services, consumer, ecommerce, factory automation, semiconductor, cloud providers, cognitive computing, network & security, and big data analytics.



<sup>4</sup> Worldwide Semiannual Digital Transformation Spending Guide, IDC, April 2019

<sup>5</sup> How AI Boots Industry Profits and Innovation, Accenture, 2017

## WHO WE ARE

At ROBO Global, we recognized the robotics, automation, and artificial intelligence (RAII) revolution was coming early on, becoming the first investment product to market in 2013 to capitalize on this technological era of epic proportions. In monitoring the publicly traded universe of enablers of artificial intelligence over the past 6 years, we saw the massive shift that was occurring—that as the AI ecosystem had been building, it was time to create a portfolio to capture this targeted investment opportunity.

### Differentiated Strategy

Companies in the THNQ index possess technology and market leadership with defensible moats—the highest revenue purity derived from selling products and services powering AI systems to providers of AI as-a-service—and have been investing time and resources into developing crucial machine learning functionalities and enabling businesses to capitalize on the era of smart machines. Our index construction also includes companies with a high level of resources allocated to investing in AI through M&A or in-house development. The THNQ index captures the true pioneers and market leaders disrupting the artificial intelligence landscape with a strong value proposition. Those with the highest 'THNQ scores' that also pass ROBO Global's **Environmental, Social, and Governance (ESG) Policy** requirements are selected as members of the ROBO Global THNQ Index. We review suitable companies' THNQ scores based on ongoing research, engagement with company management teams, and market developments, and we reconstitute and rebalance the index to modified equal weights on a quarterly basis.

Senior business leaders around the world are realizing the impact of AI, and they are implementing AI initiatives as rapidly as they can. The ROBO Global THNQ Index is designed to identify which companies are playing a key role in the expanding AI ecosystem and to capture their potential for future growth.