New Innovations and Global Trends Boost Case for Artificial Intelligence and Robotics

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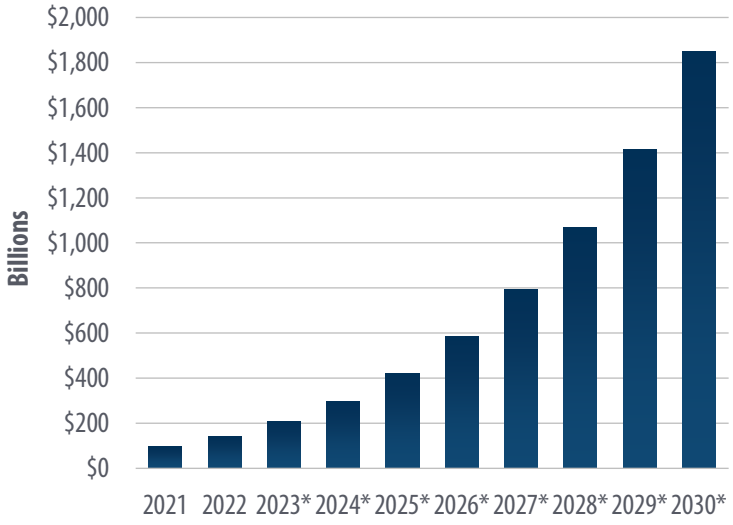
Recent developments in artificial intelligence (AI) have captured the attention of investors and the media alike, drawing comparisons to other major disruptive technologies, such as the Internet or the smart phone. Below, we discuss some of the underlying factors that have contributed to the growing excitement surrounding AI, highlighting a few specific use cases. We also explore some of the trends impacting robotics, AI's physical counterpart. In our view, the First Trust Nasdaq Artificial Intelligence and Robotics ETF (ROBT) and the First Trust Nasdaq-100-Technology Sector Index Fund (QTEC) are two compelling options for gaining exposure to these emerging trends.

Artificial Intelligence Goes Mainstream

Artificial intelligence is technology that enables computers to mimic human intelligence, performing tasks such as analyzing and interpreting vast amounts of data, solving problems, and producing new insights. One forecast suggests the global AI market could grow to nearly $600 billion by 2026 and $1.8 trillion by 2030 (see chart 1).[1] Although the field of AI has been around for decades, the public release of OpenAI's ChatGPT in late 2022, a remarkable AI-powered chatbot with human-like conversational abilities, brought renewed focus to the technology. According to reports, ChatGPT gained 100 million active users in just two months, becoming the fastest-growing app of all time. For reference, it took TikTok nine months and Instagram two and a half years to reach that milestone.[2]

Chatbots like ChatGPT are considered "generative-AI" because of their ability to generate unique content, drawing from large amounts of data. Various generative-AI applications can create text, images, audio, and video. After the blockbuster launch of ChatGPT, Microsoft announced a $10 billion investment in OpenAI and integration of the technology with its own search engine, Bing.[3] Similarly, Google parent Alphabet has introduced Bard, its own effort to integrate generative-AI to streamline and enhance internet search, even including conversation AI features.[4]

Chart 1: Forecasted Global Artificial Intelligence Market Size



*Projected. Source: Statista, as of January 2023.

There is no guarantee that past trends will continue or projections will be realized.

There are numerous use cases being developed for generative-AI, as several industries seek ways to enhance productivity and efficiency. Many of these involve tasks typically performed by white-collar workers. For example, generative-AI could be used by an attorney to quickly summarize information from thousands of pages of legal documents.[5] The technology could also be useful for auditing financial statements or tax returns.[6] Even the medical field could face disruption as generative-AI may one day help diagnose patients based on the most up-to-date research and information available, or more efficiently read x-rays or CT scans.[7]

Other subfields of artificial intelligence, such as deep learning, also offer intriguing propositions. Deep learning algorithms can process vast amounts of unstructured data with limited parameters set by human experts. As a result, deep learning can produce significant new insights and information. For example, for decades scientists struggled to understand the 3-dimensional structure of proteins, which can be a key input for understanding diseases and for developing new drugs. By training Google's DeepMind AI with experimentally derived data about proteins, a project known as AlphaFold recently claimed to have predicted the 3D structure of over 200 million proteins, nearly every protein known to science.[8] Such AI-powered discoveries may have a dramatic impact on future drug development.

In another recent study, a paralyzed man's ability to walk naturally was restored using brain and spine implants and an AI "thought decoder," which provided a critical link between the patient's mind and body.[9] While researchers acknowledge certain limitations, they believe this innovation may engender a new era in the treatment of certain forms of paralysis.[10]

[1]Next Move Strategy Consulting. "Artificial intelligence (AI) market size worldwide in 2021 with a forecast until 2030 (in million U.S. dollars)." January 15, 2023.

[2]*ZDNET. ChatGPT Just Became the Fastest-Growing 'App' of All Time.* February 3, 2023.

[3]*The Wall Street Journal. Microsoft Adds ChatGPT AI Technology to Bing Search Engine.* February 10, 2023

[4]*The Wall Street Journal. Google Says Search Enters New Era With Conversational AI Features.* May 10, 2023.

[5]Harvard Law School Center on the Legal Profession. "The Implications of ChatGPT for Legal Services and Society." The Practice - March/April 2023.

[6]Business.com. *How AI and Automation Technology Can Help Accountants.* February 21, 2023

[7]*The New England Journal of Medicine. Is Medicine Ready for AI?* April 6, 2023.

[8]*The New York Times. A.I. Predicts the Shape of Nearly Every Protein Known to Science.* July 28, 2022.

[9]*The New York Times. A Paralyzed Man Can Walk Naturally Again With Brain And Spine Implants.* May 24, 2023

[10]*Nature*, Henri Lorach, Andrew Galvez, Valeria Spagnolo, et. al., 2023. "Walking naturally after spinal cord injury using a brain-spine interface." May 24, 2023.

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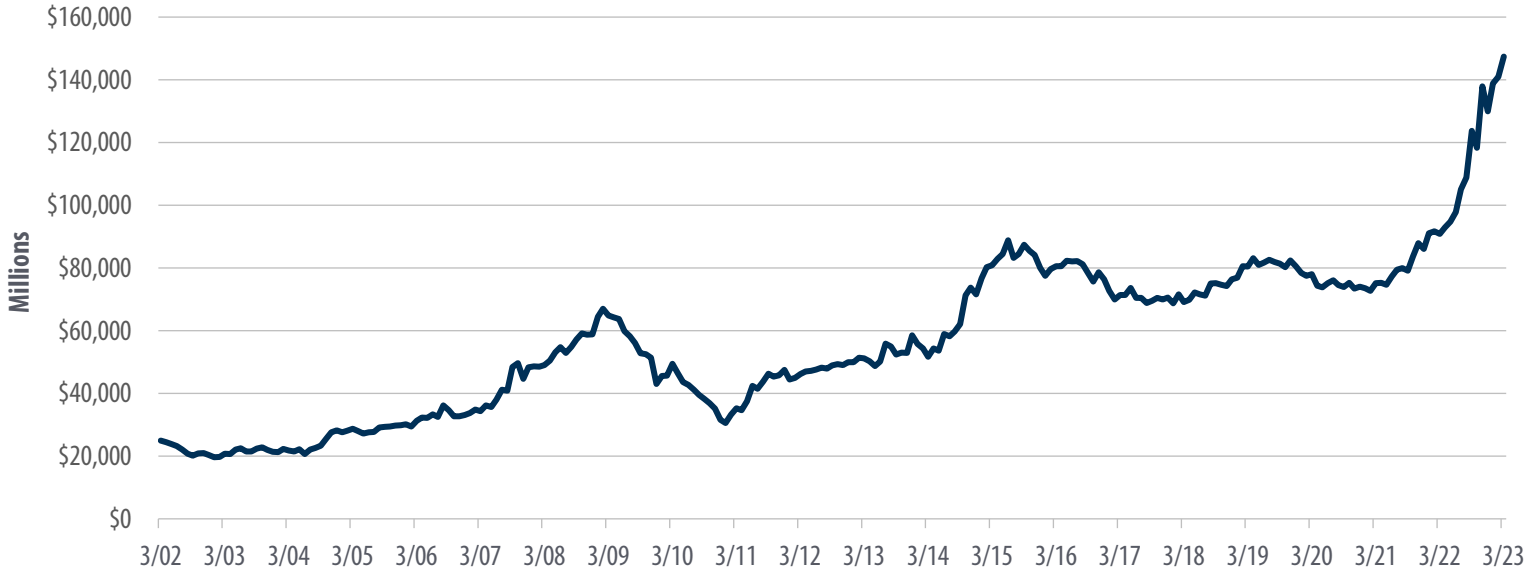
The Rise of Intelligent Machines

Robots, the physical counterparts of AI, have been a staple of pop culture and science fiction for years. The widespread adoption of personal robots envisioned in classic TV shows like *The Jetsons*, with Rosie the robot maid, hasn't yet materialized, but advancements in AI are creating new complementary sources of demand for robotics. For example, a self-driving car may utilize both artificial intelligence—to make real-time decisions about surrounding conditions—and robotics—to steer the vehicle through traffic. This interconnected relationship between AI and robotics is important for many applications, ranging from automated factories to robotic equipment in agriculture.

In our opinion, one factor that may boost demand for robotics and automation over the next few years is an ongoing construction boom for new factories. According to the Census Bureau, construction spending related to US manufacturing rose to a record $147.4 billion annual rate, as of 3/31/23. The Covid-19 pandemic revealed the vulnerabilities of many global supply chains, and increasing geopolitical instability adds further uncertainty about the future. By shifting manufacturing to the US, companies can not only address some of these concerns, but also capitalize on generous subsidies and incentives found in legislation passed over the past couple of years, including the Chips Act and the Inflation Reduction Act.

Chart 2: U.S. Construction Spending on Manufacturing (Seasonally-adjusted Annual Rate)



Source: S&P Dow Jones Indices. Data as of 3/31/02 - 3/31/23.

We expect new factories to incorporate some of the latest technologies, including robotics and automation, to maximize productivity and efficiency. Labor market challenges, such as worker shortages and rising labor costs, may further incentivize investment in these technologies. According to the National Association of Manufacturers, roughly 800,000 more workers are needed for jobs in manufacturing.[11] Nominal wages for manufacturing jobs rose 4.5% over the past year, less than the 5.0% increase in inflation over the same period, but persistent labor shortages and increasing manufacturing capacity may put upward pressure on wages, in our opinion.

The net result of these factors was a resurgence in orders for industrial robots in 2022. North American companies spent a record $2.4 billion on robotics last year, an 18% increase over 2021, with automakers accounting for a significant chunk of the new orders due to retooling for electric vehicle production.[12] We believe these trends may be durable, pushing new orders for advanced robotics even higher in the years ahead.

In our view, artificial intelligence and robotics have the potential to transform countless industries over the next several years. As these complementary technologies advance, new use cases are sure to follow. With any nascent technology, long-term winners and losers may be difficult to identify in advance. We believe the First Trust Nasdaq Artificial Intelligence and Robotics ETF (ROBT) provides a prudent way for investors to gain exposure to this theme, while diversifying among several stocks that may benefit from its growth in the years ahead. We also believe the First Trust Nasdaq-100-Technology Sector Index Fund (QTEC) may be a compelling option for those seeking greater focus on artificial intelligence specifically.

[11] *The Wall Street Journal. America Is Back in the Factory Business.* April 8, 2023.

[12] *Association for Advancing Automation. North America Sees Record Robot Sales in 2022.* February 24, 2023.

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You should consider a fund's investment objectives, risks, and charges and expenses carefully before investing. Contact First Trust Portfolios L.P. at 1-800-621-1675 or visit www.ftportfolios.com to obtain a prospectus or summary prospectus which contains this and other information about a fund. The prospectus or summary prospectus should be read carefully before investing.

RISK CONSIDERATIONS

You could lose money by investing in a fund. An investment in a fund is not a deposit of a bank and is not insured or guaranteed. There can be no assurance that a fund's objective(s) will be achieved. Investors buying or selling shares on the secondary market may incur customary brokerage commissions. Please refer to each fund's prospectus and SAI for additional details on a fund's risks. The order of the below risk factors does not indicate the significance of any particular risk factor.

Unlike mutual funds, shares of the fund may only be redeemed directly from a fund by authorized participants in very large creation/redemption units. If a fund's authorized participants are unable to proceed with creation/redemption orders and no other authorized participant is able to step forward to create or redeem, fund shares may trade at a premium or discount to a fund's net asset value and possibly face delisting and the bid/ask spread may widen.

Changes in currency exchange rates and the relative value of non-US currencies may affect the value of a fund's investments and the value of a fund's shares.

A fund is susceptible to operational risks through breaches in cyber security. Such events could cause a fund to incur regulatory penalties, reputational damage, additional compliance costs associated with corrective measures and/or financial loss.

Depositary receipts may be less liquid than the underlying shares in their primary trading market and distributions may be subject to a fee. Holders may have limited voting rights, and investment restrictions in certain countries may adversely impact their value.

Investments in emerging market securities are generally considered speculative and involve additional risks relating to political, economic and regulatory conditions.

Equity securities may decline significantly in price over short or extended periods of time, and such declines may occur in the equity market as a whole, or they may occur in only a particular country, company, industry or sector of the market.

An index fund will be concentrated in an industry or a group of industries to the extent that the index is so concentrated. A fund with significant exposure to a single asset class, or the securities of issuers within the same country, state, region, industry, or sector may have its value more affected by an adverse economic, business or political development than a broadly diversified fund.

A fund may be a constituent of one or more indices or models which could greatly affect a fund's trading activity, size and volatility.

There is no assurance that the index provider or its agents will compile or maintain the index accurately. Losses or costs associated with any index provider errors generally will be borne by a fund and its shareholders.

Industrials and producer durables companies are subject to certain risks, including the general state of the economy, intense competition, consolidation, domestic and international politics, excess capacity and consumer demand and spending trends. They may also be significantly affected by overall capital spending levels, economic cycles, technical obsolescence, delays in modernization, labor relations, and government regulations.

Information technology companies are subject to certain risks, including rapidly changing technologies, short product life cycles, fierce competition, aggressive pricing and reduced profit margins, loss of patent, copyright and trademark protections, cyclical market patterns, evolving industry standards and regulation and frequent new product introductions.

Large capitalization companies may grow at a slower rate than the overall market.

Market risk is the risk that a particular security, or shares of a fund in general may fall in value. Securities are subject to market fluctuations caused by such factors as general economic conditions, political events, regulatory or market developments, changes in interest rates and perceived trends in securities prices. Shares of a fund could decline in value or underperform other investments as a result. In addition, local, regional or global events such as war, acts of terrorism, spread of infectious disease or other public health issues, recessions, natural disasters or other events could have significant negative impact on a fund. In February 2022, Russia invaded Ukraine which has caused and could continue to cause significant market disruptions and volatility within the markets in Russia, Europe, and the United States. The hostilities and sanctions resulting from those hostilities could have a significant impact on certain fund investments as well as fund performance. The COVID-19 global pandemic and the ensuing policies enacted by governments and central banks have caused and may continue to cause significant volatility and uncertainty in global financial markets. While vaccines have been developed, there is no guarantee that vaccines will be effective against future variants of the disease. Recent and potential future bank failures could result in disruption to the broader banking industry or markets generally and reduce confidence in financial institutions and the economy as a whole, which may also heighten market volatility and reduce liquidity.

A fund faces numerous market trading risks, including the potential lack of an active market for fund shares due to a limited number of market makers. Decisions by market makers or authorized participants to reduce their role or step away in times of market stress could inhibit the effectiveness of the arbitrage process in maintaining the relationship between the underlying values of a fund's portfolio securities and a fund's market price.

An index fund's return may not match the return of the index for a number of reasons including operating expenses, costs of buying and selling securities to reflect changes in the index, and the fact that a fund's portfolio holdings may not exactly replicate the index.

Securities of non-U.S. issuers are subject to additional risks, including currency fluctuations, political risks, withholding, lack of liquidity, lack of adequate financial information, and exchange control restrictions impacting non-U.S. issuers.

A fund and a fund's advisor may seek to reduce various operational risks through controls and procedures, but it is not possible to completely protect against such risks. The fund also relies on third parties for a range of services, including custody, and any delay or failure related to those services may affect the fund's ability to meet its objective.

A fund that invests in securities included in or representative of an index will hold those securities regardless of investment merit and the fund generally will not take defensive positions in declining markets.

High portfolio turnover may result in higher levels of transaction costs and may generate greater tax liabilities for shareholders.

The market price of a fund's shares will generally fluctuate in accordance with changes in the fund's net asset value ("NAV") as well as the relative supply of and demand for shares on the exchange, and a fund's investment advisor cannot predict whether shares will trade below, at or above their NAV.

Robotics and artificial intelligence companies tend to be more volatile and they may have limited product lines, markets, financial resources or personnel and are subject to the risks of changes in business cycles, world economic growth, technological progress, costs of research and development, and government regulation. These companies are also heavily dependent on intellectual property rights, and challenges to or misappropriation of such rights could have a material adverse effect on such companies.

Securities of small- and mid-capitalization companies may experience greater price volatility and be less liquid than larger, more established companies.

Trading on an exchange may be halted due to market conditions or other reasons. There can be no assurance that a fund's requirements to maintain the exchange listing will continue to be met or be unchanged.

First Trust Advisors L.P. is the adviser to the fund. First Trust Advisors L.P. is an affiliate of First Trust Portfolios L.P., the fund's distributor.

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DEFINITIONS

The **S&P 500 Information Technology Index** includes all of the stocks in the information technology sector of the S&P 500 Index. The **S&P 500 Index** is an unmanaged index of 500 companies used to measure large-cap U.S. stock market performance.