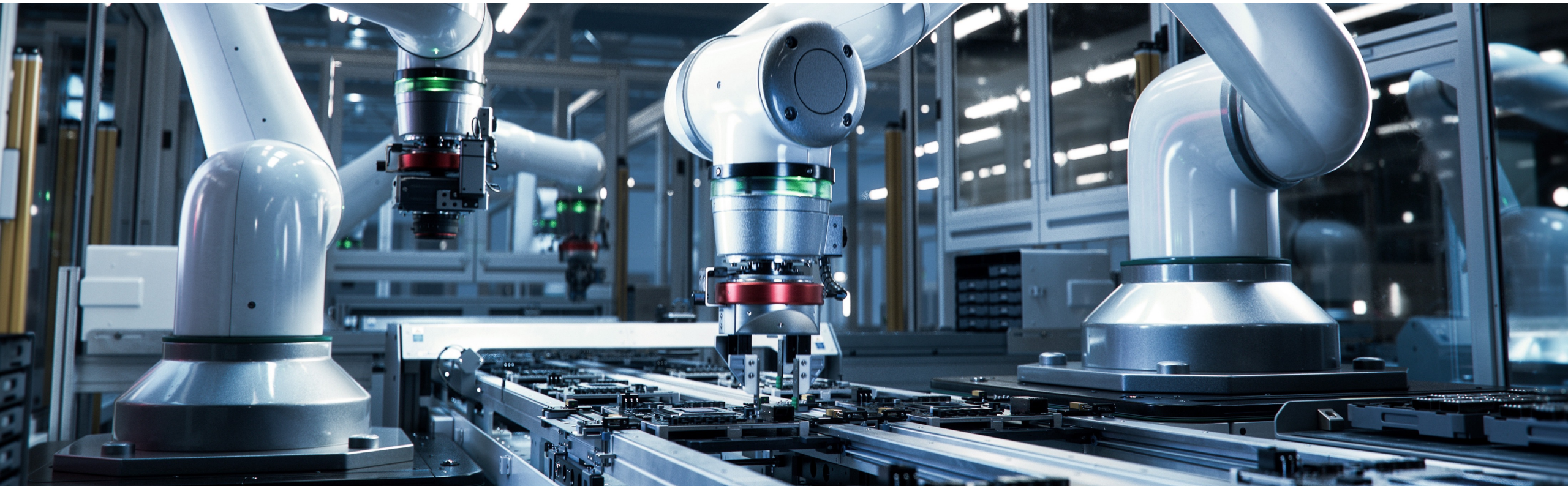


J.P.Morgan

INNOVATION ECONOMY

Sector Spotlight: Applied Technology



Executive summary

“Applied technology, or applied tech, is an important keystone of the innovation economy. The focus of the applied tech sector is to bridge groundbreaking scientific advances and engineering marvels through technology applications. The sector plays an important role in driving innovation, economic growth and societal progress through the intersection of hardware and software, bringing to life ideas that previously existed only in the realm of science fiction. Silicon Valley itself is a testament to the power of applied tech with its name rooted in silicon—the very material that sparked a revolution in semiconductors, computing and defense. From those early days of silicon wafers to today’s cutting-edge innovations, applied tech has been at the heart of Silicon Valley’s legacy, fueling progress and shaping the future. This report delves into the macroeconomic factors influencing applied tech by exploring the industry innovation quadrant, providing comprehensive industry overviews and offering an insightful sector outlook. It’s exciting to watch this dynamic ecosystem as founders develop the critical technologies that will continue to push the boundaries of what is possible in applied tech.”

- Justin Krauss

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Applied technology definition and taxonomy

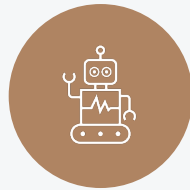
Applied technology's core focus is to bridge scientific advances and engineering innovation through state-of-the-art technology applications. The sector plays an important role in driving innovation, economic growth and societal progress through the intersection of hardware and software.

Industries within applied technology¹



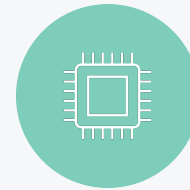
Defense technology

Includes autonomous military systems, advanced materials and manufacturing, sensing, connectivity, security, human-machine interfaces, defense-specific technologies, and advanced computing and software.



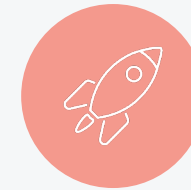
Robotics, automation & AI

Includes humanoid robotics, AI in the physical world, autonomous robotic systems, and application-specific robots (e.g., food service, medical and construction robots).



Semiconductors & microelectronics

Includes general purpose semiconductors, application-specific conductors, semiconductor production, other semiconductors (e.g., optoelectronics), and quantum sciences (e.g., quantum computing, nanotechnology and quantum sensing).



Space technology

Includes space situational awareness technology (e.g., space debris tracking and mitigation, orbital traffic management), satellites, manufacturing, in-space services (e.g., mining, in-orbit refueling), launch services, software and space tourism.

Notes: (1) For the purposes of this report, we are concentrating on these four specific industries. Other industries within applied tech are not included here, making this a non-exhaustive list.

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- 01 Macroeconomic Variables
- 02 Applied Tech Innovation Quadrant
- 03 Industry Breakdowns
- 04 Sector Outlook

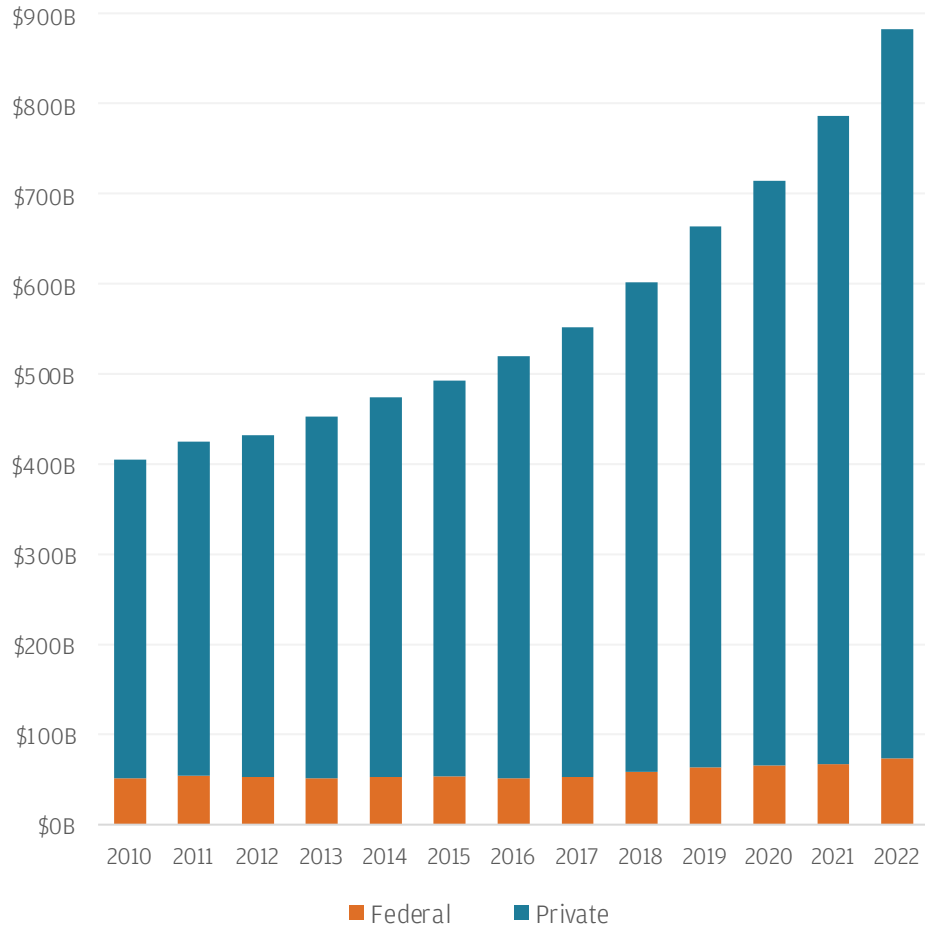
01

Macroeconomic
Variables

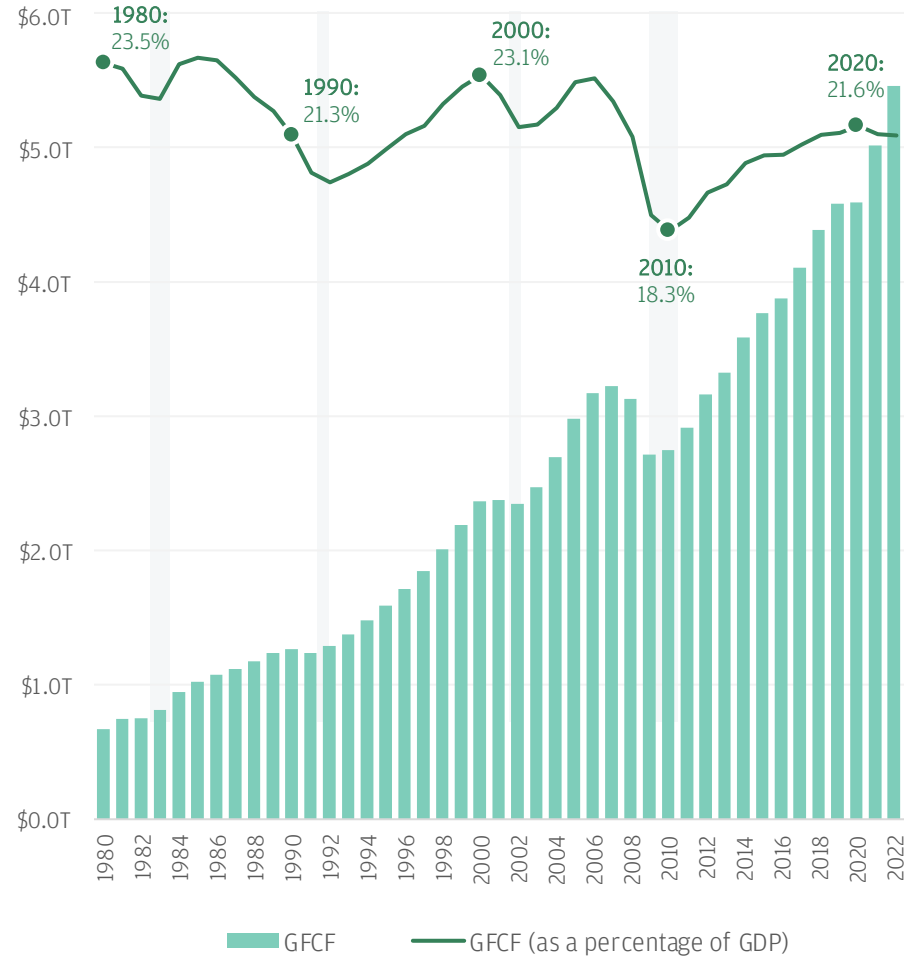


Investing for today and tomorrow

U.S. R&D EXPENDITURES



U.S. GROSS FIXED CAPITAL FORMATION¹



The industries within applied tech are typically based on new or reimagined innovations. As such, higher levels of private and federal investment in R&D may benefit the sector. Federal spending has increased modestly at a constant percentage of GDP. In contrast, the contribution to R&D from the private sector has risen significantly.

Many areas of applied tech have a strong dependency on fixed assets, such as infrastructure, machinery and equipment, to produce its products and solutions. Higher levels of GFCF today typically result in greater productive capacity in the future.

Notes: (1) Gross fixed capital formation (GFCF), also called "investment," is defined as the acquisition of produced assets, including the production of such assets by producers for their own use, minus disposals.

02

| Applied Tech
Innovation Quadrant



Applied tech innovation quadrant

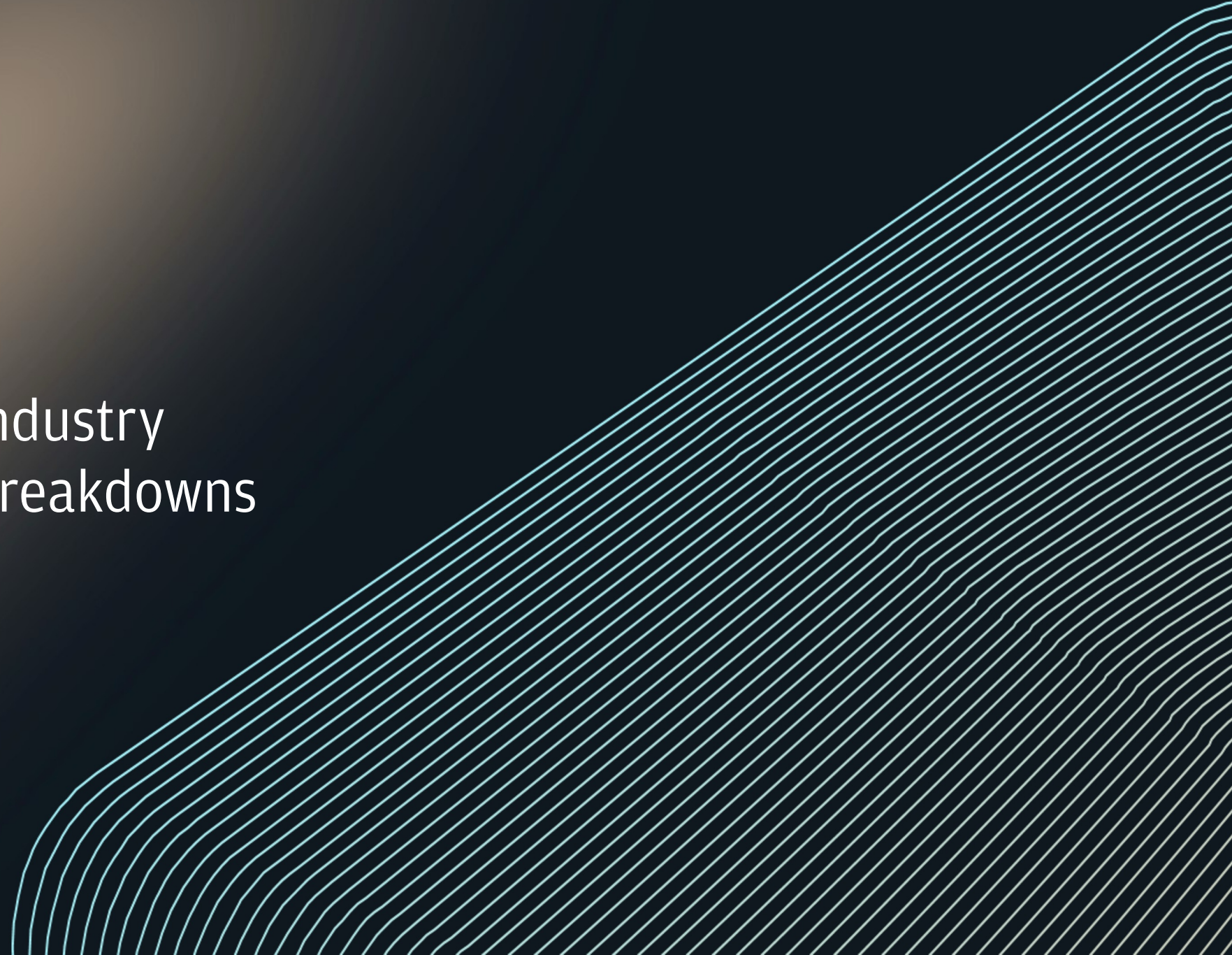


Technology innovations within applied tech vary in terms of maturity and market adoption, influenced by factors such as an aging global population, sustainability initiatives, and advancements in artificial intelligence (AI) and graphic processing units (GPUs), among others. These drivers are contributing to the development and deployment of new technologies, leading to diverse applications across various industries. For example, autonomous delivery robots are gaining traction due to advancements in AI and the growing need for efficient, contactless delivery solutions, highlighting the intersection of technological progress and market demand.

Notes: As of September 2024.

03

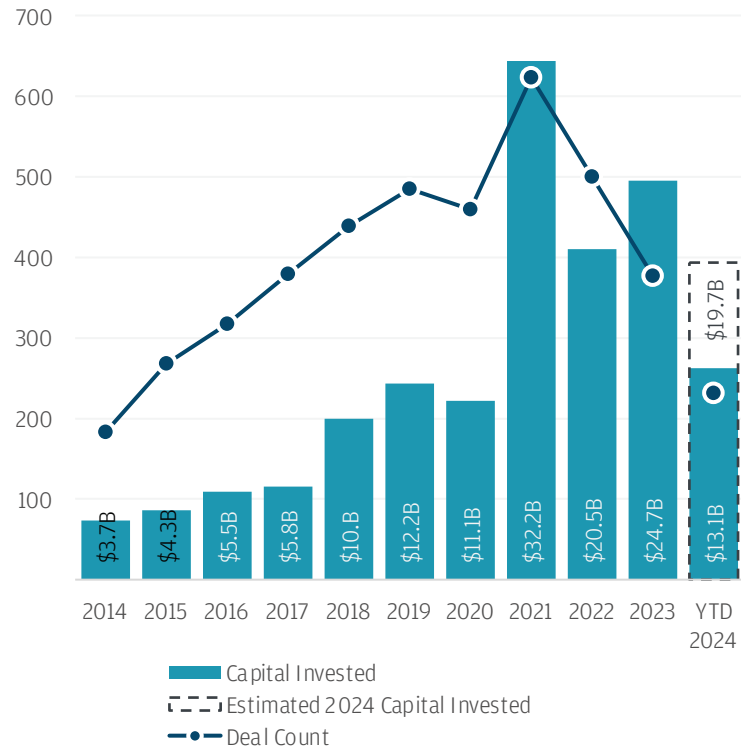
| Industry
Breakdowns



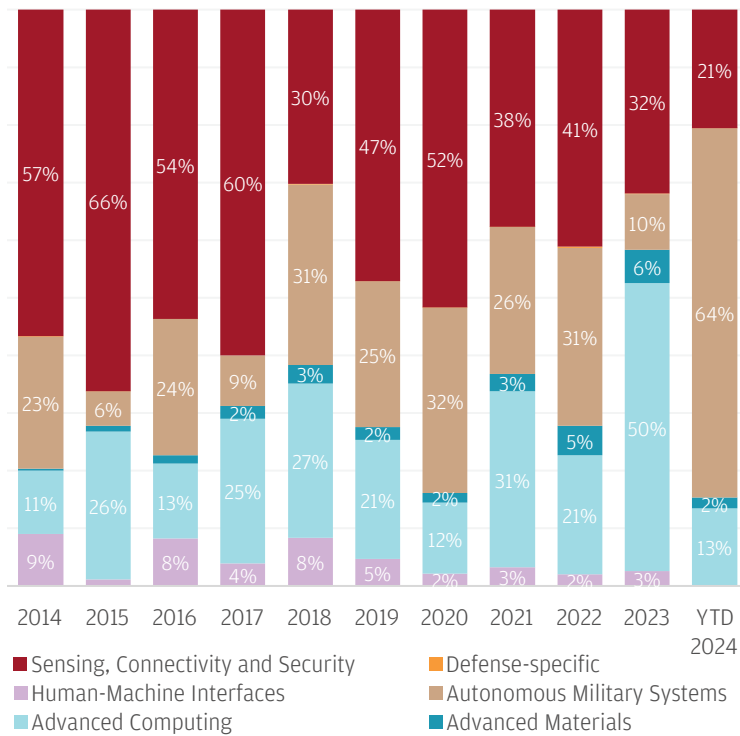


Industry snapshot: Defense technology

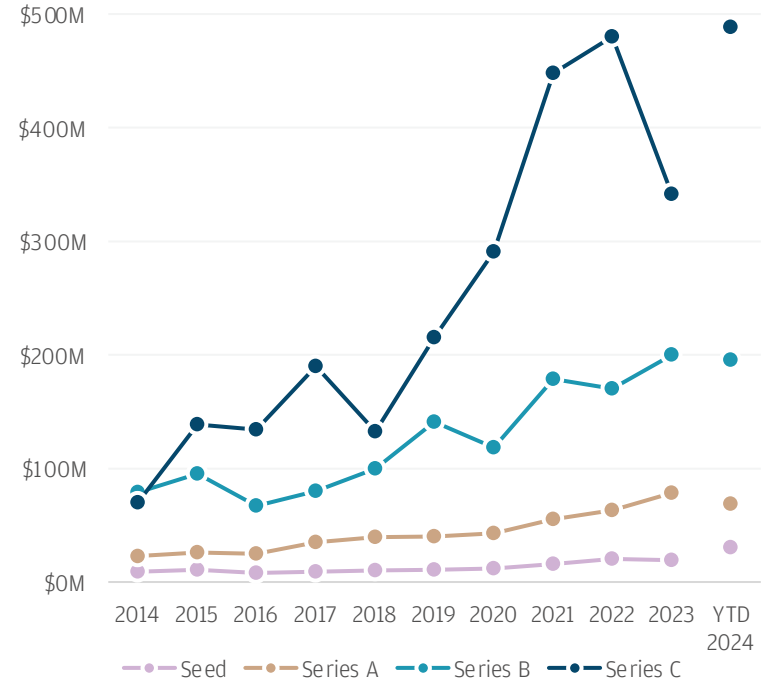
U.S. VENTURE DEAL ACTIVITY



INDUSTRY INVESTMENT SHARE

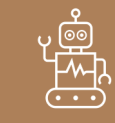


MEDIAN POST-MONEY VALUATION BY SERIES



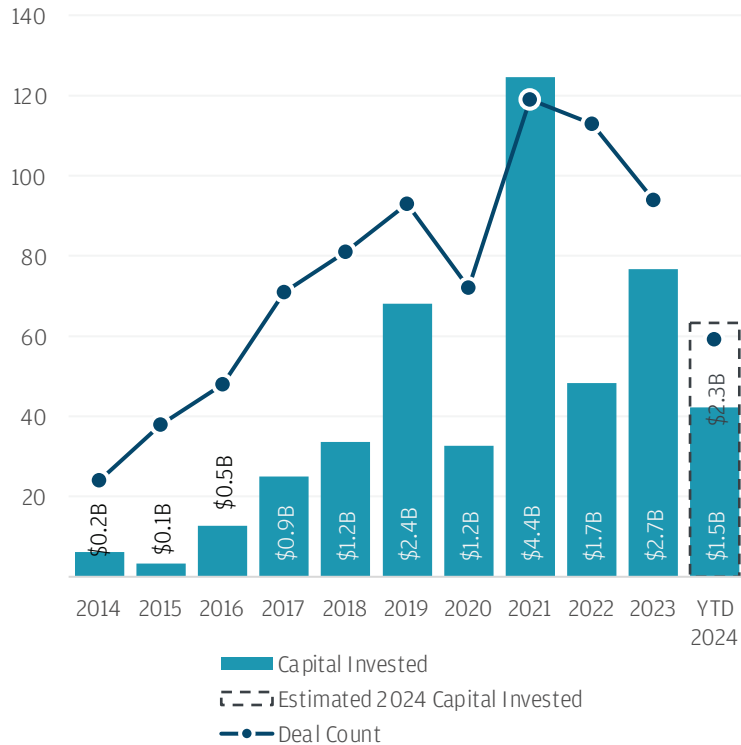
The collaboration between government agencies and startups is supporting the next wave of innovation. This is further bolstered by venture capital investments into the space which has grown from \$3.7 billion in 2014 to approximately \$20 billion by the end of 2024 if the year-to-date run rate is maintained through year-end. Investments in sensing, connectivity and security have constituted a considerable share of venture funding over the last decade. However, investments in autonomous military systems in 2024 has been proportionally higher as growing demand for unmanned systems, such as drones, has spurred investment in technologies that enable these platforms to operate independently and effectively in complex environments.

Notes: YTD 2024 as of September 1, 2024.

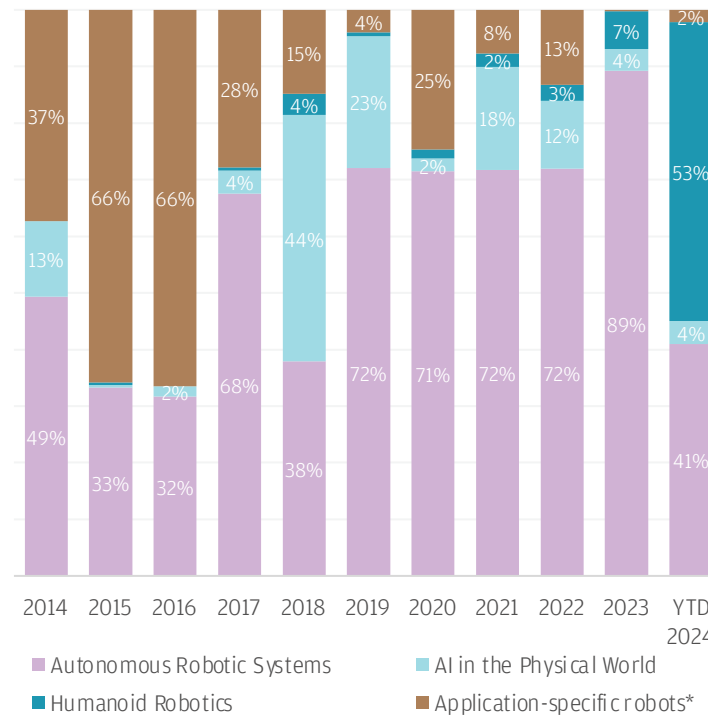


Industry snapshot: Robotics, automation & AI

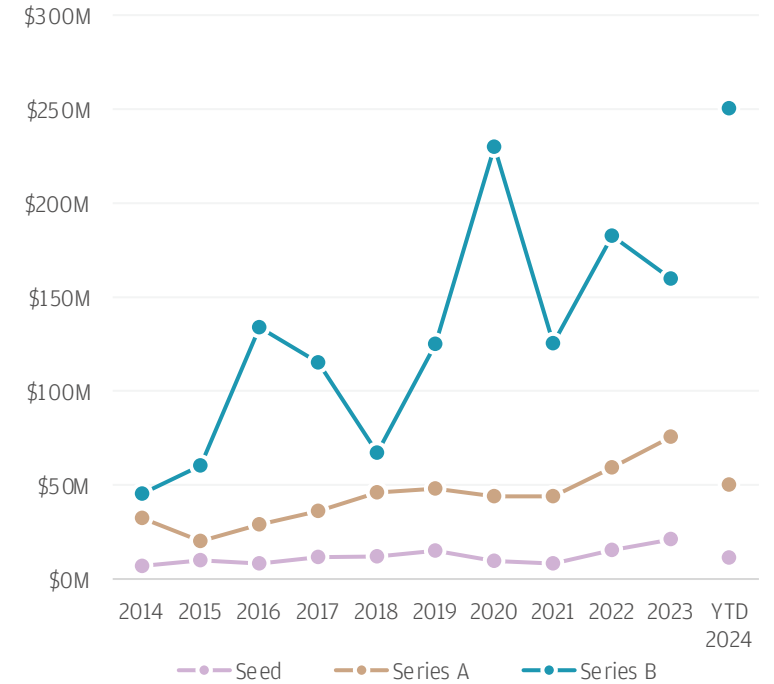
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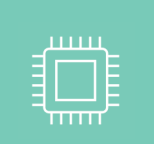


MEDIAN POST-MONEY VALUATION BY SERIES



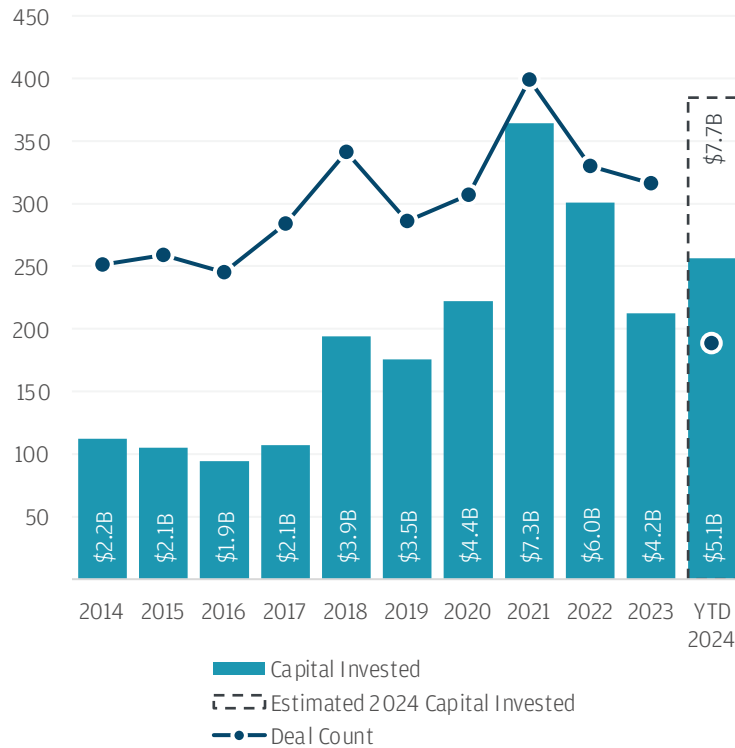
Breakthroughs in artificial intelligence (AI), connectivity and control are expanding robotic capabilities and potential applications. While down from its 2021 peak, venture capital investments in robotics remain elevated compared to a decade ago, growing from roughly \$200 million in 2014 to an estimated \$2 to \$3 billion by the end of 2024 if the year-to-date run rate is maintained through year-end. Recently, application-specific robots have comprised a smaller share of robotics funding due to the growing versatility and applicability of autonomous robotic systems. Additionally, while humanoid robotics have not historically captured a large share of robotics funding, a few high-profile startups have raised significant amounts of capital in 2024, leading to a higher proportional share of venture funding this year.

Notes: (1) Series C valuations excluded due to limited data. *Includes food service, medical and construction robots. YTD 2024 as of September 1, 2024.

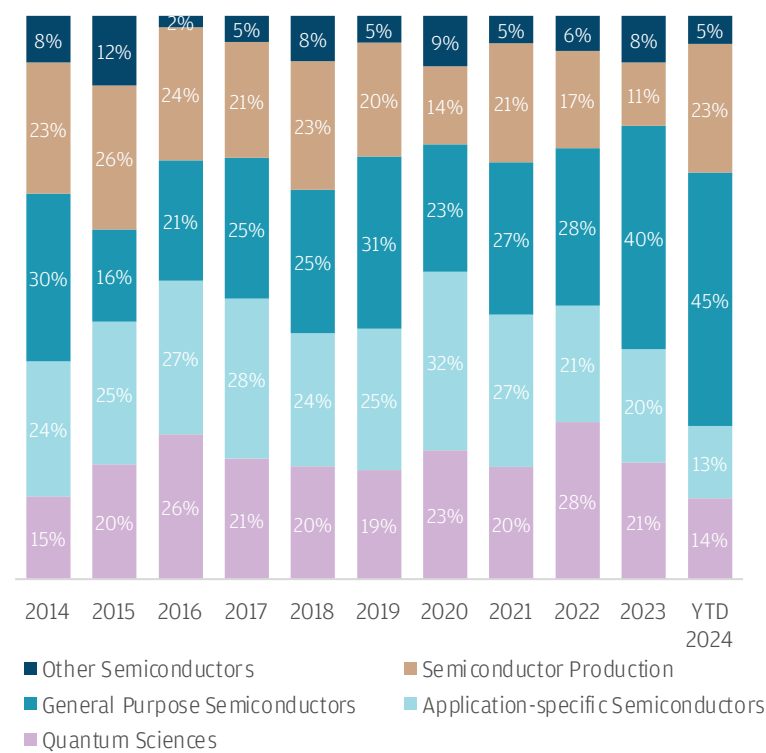


Industry snapshot: Semiconductors and microelectronics

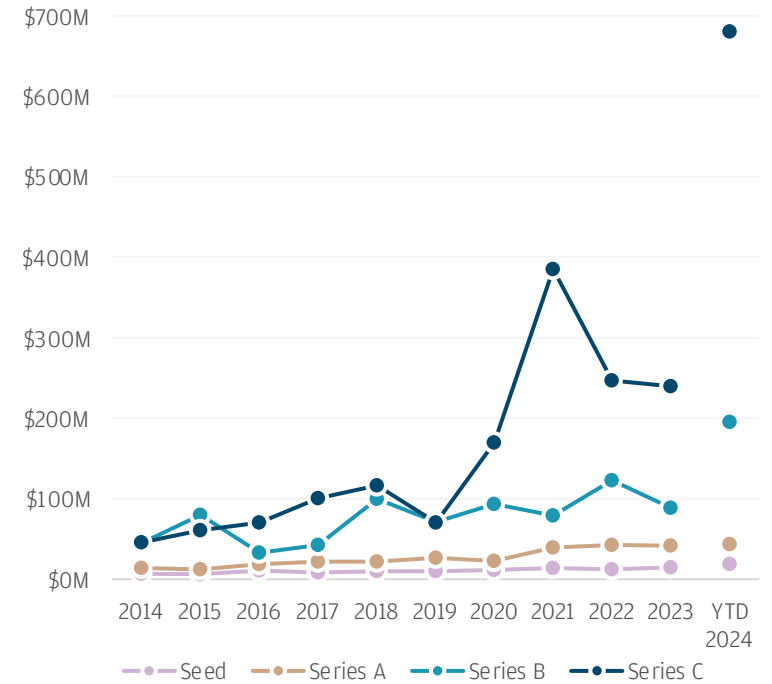
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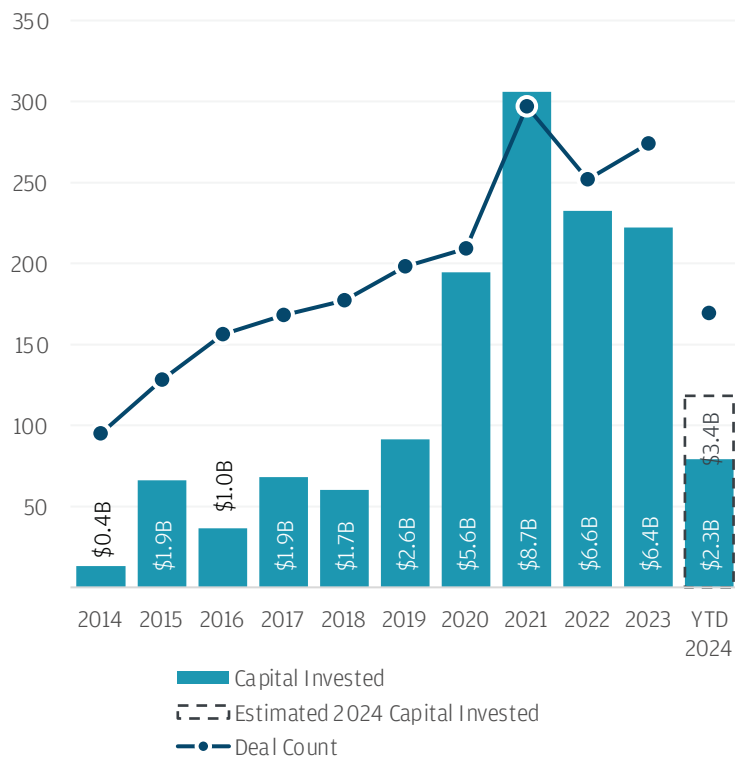
The growth of the semiconductor and microelectronics industry has been driven by the growing demand for graphics processing units (GPUs) and other innovations, which are important for many reliant applications such as running complex AI algorithms trained on large datasets. Venture investment in the industry has more than doubled over the past decade and could potentially triple by the end of this year, from \$2.2 billion in 2014 to an estimated \$7 to \$8 billion by the end of 2024 if the year-to-date run rate is maintained through year-end. Application-specific and general-purpose semiconductors in particular have consistently attracted venture funding, driven by the demand of Artificial Intelligence, 5G and other applicable technologies.

Notes: YTD 2024 as of September 1, 2024.

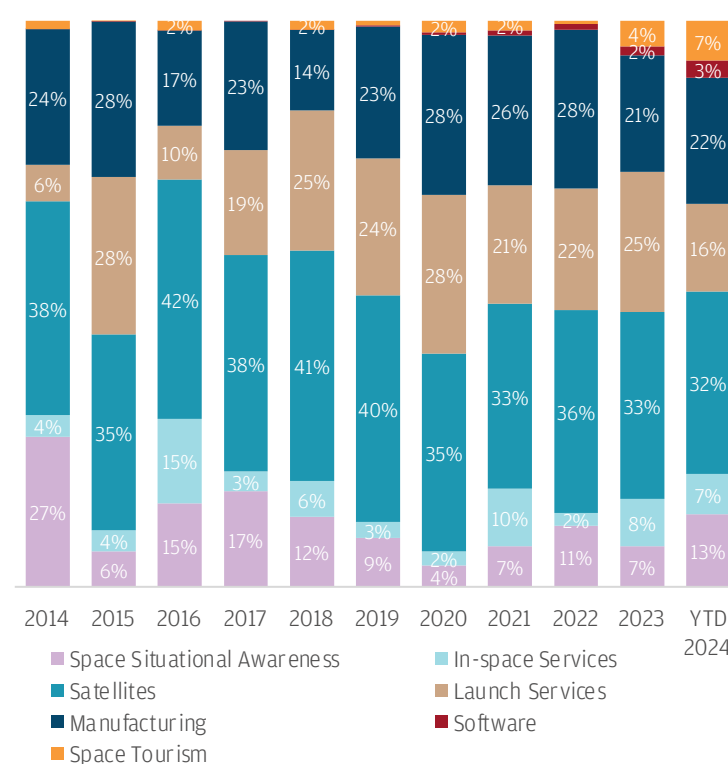


Industry snapshot: Space technology

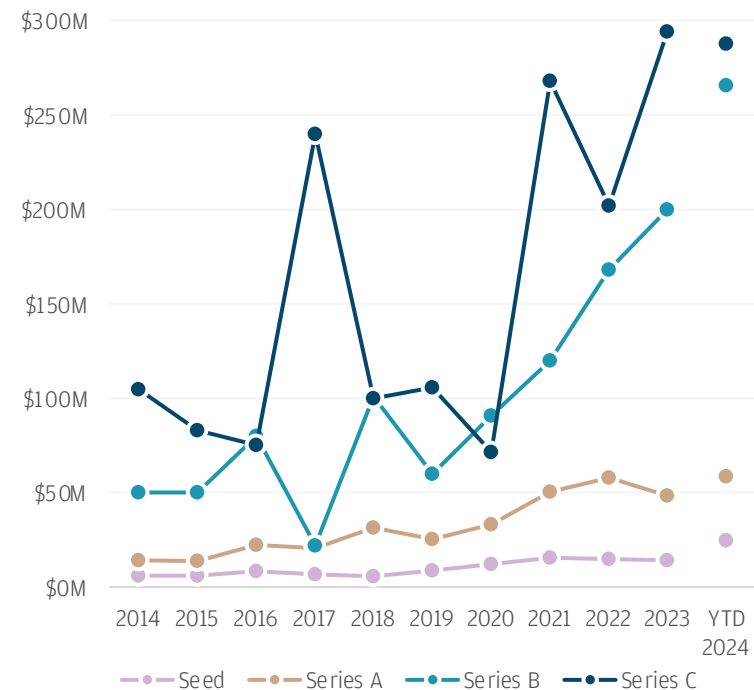
U.S. VENTURE DEAL ACTIVITY



INDUSTRY INVESTMENT SHARE



MEDIAN POST-MONEY VALUATION BY SERIES

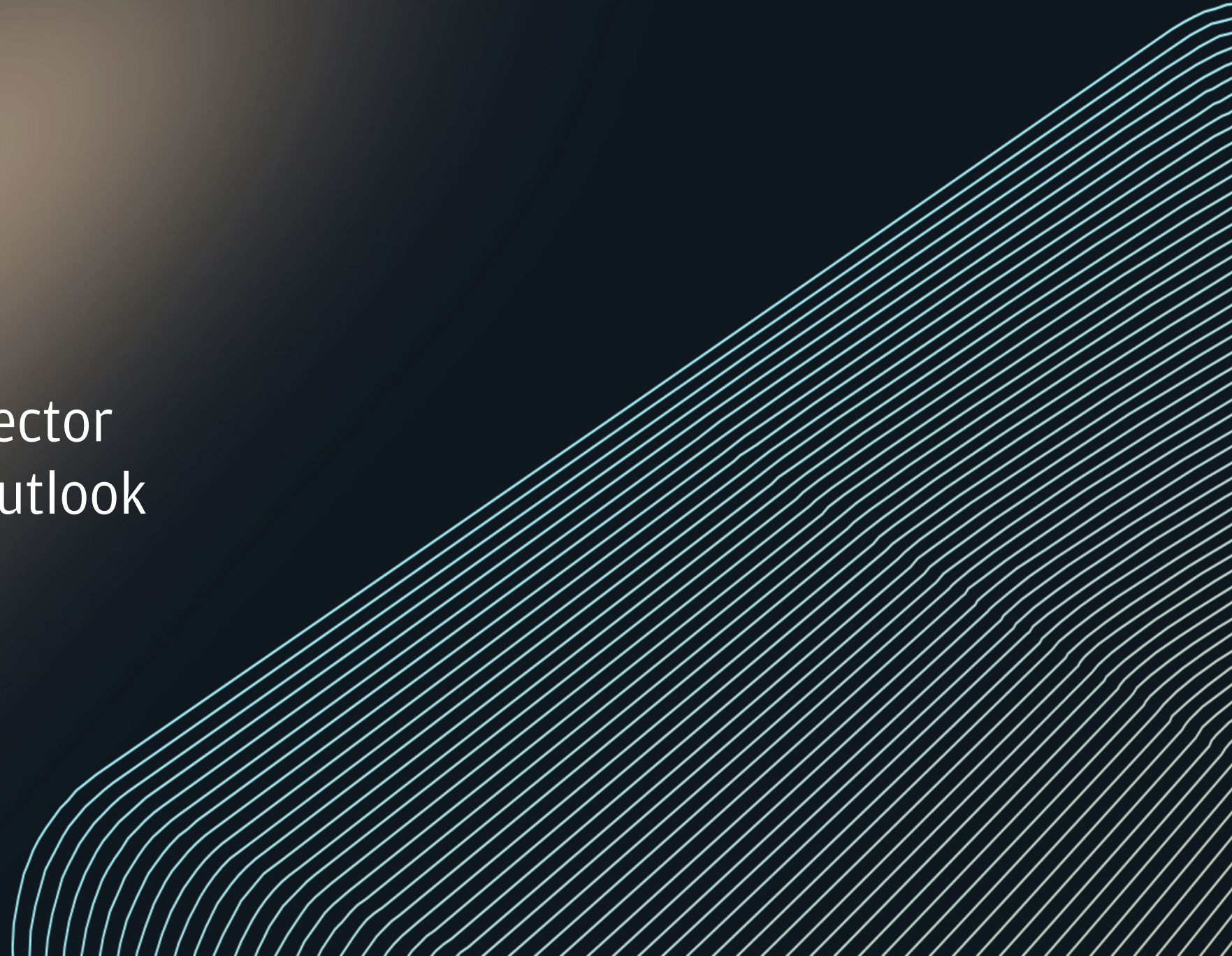


The space technology industry is increasingly defined by heightened competition and collaboration between traditional original equipment manufacturers (OEMs), Government agencies and emerging aerospace startups. Notable startups have combined innovative technologies and approaches to provide cost-effective solutions, which in turn has captured market share from established players. Venture investment into the space has increased from roughly \$400 million in 2014 to an estimated \$3 to \$4 billion by the end of 2024 if the year-to-date run rate is maintained through year-end. Technologies such as satellites and in-space manufacturing are attracting funding, driven by demand for global connectivity and the urge to commercialize low earth orbit.

Notes: YTD 2024 as of September 1, 2024.

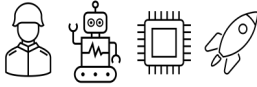
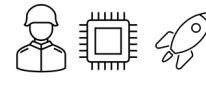
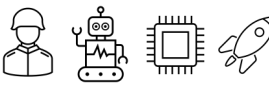
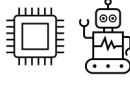
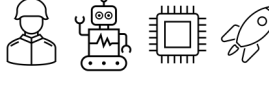
04

| Sector
Outlook



Applied technology outlook

NOTABLE FACTORS AND CONSIDERATIONS

Factors	Industries	Considerations
Government Funding and Policies		Government spending, especially through small business programs, can support innovation, encourage R&D and foster startup growth.
Geopolitical Uncertainty		In times of increasing geopolitical uncertainty, countries have historically increased spending on national security.
Automation and AI Integration		With its numerous applications, AI has the potential to accelerate tech development and increase demand across multiple industries.
Labor Costs		Rising labor costs encourage efficiency improvements, which may impact overall production costs.
Environmental Policy		Can influence or steer innovation in sustainable technologies, many based in the applied tech sector.

Through several programs, the U.S. government continues to work with and support startups to accelerate field adoption of many new technologies. Robotics, ranging from humanoids and bipeds to vertical robotics systems, look to become established in new environments, such as restaurants and offices, as they become more flexible, effective and affordable. Moreover, as digitization grows more pervasive, semiconductors are in more products that previously didn't contain chips and in greater quantities. Global communication and geolocation systems, integral components of space technology, are becoming increasingly important for data analysis solutions across an expanding number of industries.

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