EDGE

State of Innovation

Technologies that defined 2025 and will shape the future

What's inside?

An overview of 2025's breakthrough tech, expected disruptive themes in 2026, and transformative innovation trends beyond 2028

- **Section 1: Technologies that defined 2025:** Top breakthrough tech trends in 2025, with a focus on industry developments, company activity, and outlook
- **Section 2: Top tech trends likely to disrupt 2026:** Top innovative technologies poised for breakthroughs in 2026
- **Section 3: Transformative tech of the future:** Emerging innovation themes likely to shape industries in the next 3+ years

Technologies that defined 2025

- Agentic front- and back-end automation
- Real-world asset tokens and stablecoins
- CRISPR gene editing
- Brain-computer interfaces

Top tech trends likely to disrupt 2026

- Physical AI for robotics
- Autonomous coding agents
- Sustainable IT
- Next-gen cryptography techniques

Transformative tech of the future

- Humanoid robots
- Neuromorphic computing
- Fault-tolerant quantum architecture
- Photonic semiconductors
- Artificial general intelligence

Disclaimer:
This report is based on information gathered from the SPEEDA Edge platform and external research. All information gathering for the report was completed on October 31, 2025, and may not reflect subsequent developments.

Technologies that defined 2025

What is agentic AI?

- Agentic AI refers to a new generation of AI systems that can operate autonomously and adapt to situations, making decisions and taking actions with limited human oversight.
- These systems (autonomous AI agents) use foundation models paired with software that serves as "decision-making engines" to guide AI models through reasoning capabilities.
- The growing interest in the area is largely driven by their potential to streamline operations across marketing, sales, customer support, and administration, among other business functions. Agents can reduce the need for constant human oversight and improve overall productivity.

1: Agentic front- and back-end automation

Agentic AI reached widespread deployment in 2025, with autonomous agents being adopted to manage customer workflows, from sales to support, at scale. New advances in multimodal capabilities, multi-agent systems, and orchestration frameworks have enabled these agents to plan, self-heal, coordinate, and operate independently.

Front-end operations led agentic AI adoption: Customer service and sales and marketing witnessed the most traction, with 57% and 54% of companies, respectively, actively using or planning to deploy AI agents in these functions by end of the year.

Hyperscalers launched open-source frameworks for multi-agent interoperability: Microsoft's AutoGen v0.4 introduced event-driven orchestration for complex agent networks, while Google's A2A framework enabled secure cross-platform agent communication.

Workflow automation leaders have begun entering the space: ServiceNow and UiPath made major strategic pivots into agentic AI in 2025, repositioning their platforms as agentic autonomation solutions.

Notable product launches

OpenAI

Launched Operator, its first general-purpose AI agent that can control web browsers and perform tasks independently

Microsoft

Released AutoGen v0.4 with an asynchronous, event-driven design for scalable, observable multi-agent networks

UiPath

Launched an agentic automation platform, along with multi-agent orchestration across third-party systems

1: Agentic front- and back-end automation

Currently, most startups focus on general administration and operations task automation

General administration and operations

- CrowdStrike
- kore.ai
- Amplitude
- Armis
- Aisera
- uniphore
- servicenow
- Automation Anywhere
- Relevance AI
- OpenAI
- UiPath
- Anthropic
- thoughtful.ai
- allganize
- Dataminr
- perplexity
- Orca Security
- salesforce
- snyk
- Hugging Face
- Respell
- Writer

Sales and marketing

- Landbase
- Relevance AI
- jasper
- Triple Whale
- palona
- Ema
- Cognigy
- auxia
- Aisera
- 11x
- GoCharlie
- Brevian
- Symmetri
- everstage
- Thanx
- solda.ai
- qeen.ai
- Respell

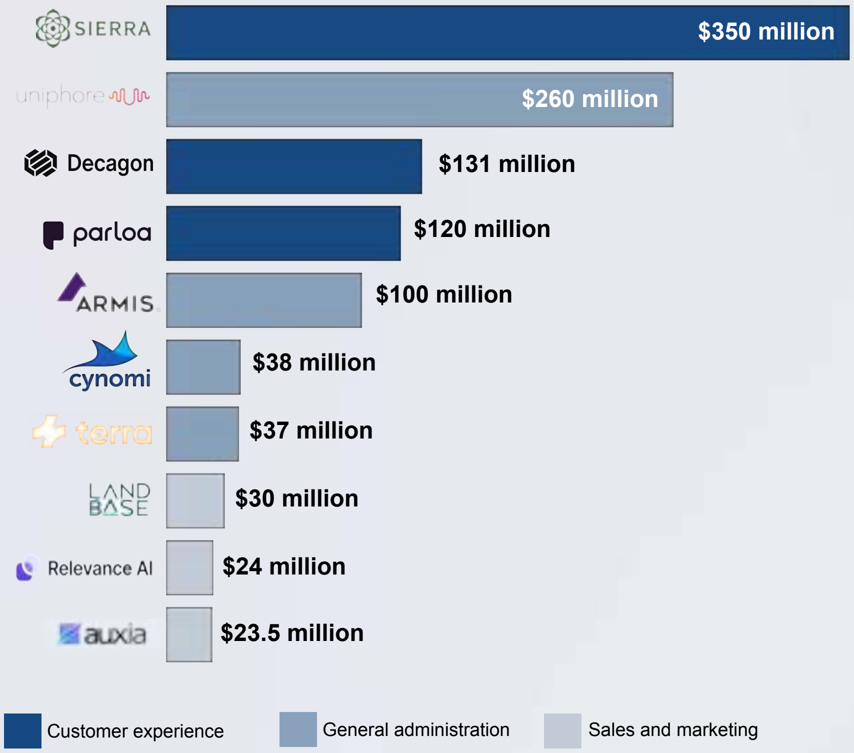
Customer experience

- Relevance AI
- Aisera
- talkdesk
- zoom
- Cognigy
- Ema
- parahelp
- ushur
- parloa
- netomi
- Brainfish
- symbl.ai
- Decagon
- allganize

Note: This map only represents select top players and is not an exhaustive list of companies operating in the space

Source: SPEEDA Edge research

Startups raised over $2.4 billion in 2025, primarily investing in innovation



Note: 1) $ refers to USD, 2) data represents funding raised up until October 31, 2025
Source: SPEEDA Edge research • Funding data powered by Crunchbase

In 2025, agentic AI applications related to front- and back-end operations collectively raised over $2.4 billion. Nearly all of this funding was allocated to further develop platforms, emphasizing a shared focus on leveraging advanced AI to drive innovation.

Notable funding raised in these areas included the following:

- **General administration and operation (31 rounds, $1.6 billion)**
  Uniphore, a business AI platform, raised $260 million to accelerate innovation, deepen ecosystem partnerships and expand global operations. Although, both OpenAI and Anthropic raised over $40 billion and $13 billion, respectively, these investments were primarily for general AI infrastructure and broader platform development, not directly for their agentic AI products.

- **Customer experience (15 rounds, $691 million)**
  Sierra raised the most funds ($350 million) for product platform development and expansion initiatives. Meanwhile, Decagon also secured $131 million in funding to expand go-to-market reach and scale the team.

- **Sales and marketing (13 rounds, $98 million)**
  Landbase, an agentic marketing automation company, raised $30 million to support the development of its proprietary domain-specific AI model (GTM-1 Omni).

Partnerships enabled agent interoperability via open-source standards and platform integrations

Partnerships

- Tech giants and systems integrators are embedding agentic capabilities into unified platforms to enable enterprises to deploy multi-agent systems across front-end business functions.
- The adoption of open-source frameworks signals a shift from vendor lock-in toward cross-platform agent collaboration, enabling agents built on different platforms to communicate securely and compose functionality.

Salesforce expanded partnerships with AI companies OpenAI and Anthropic to **embed their LLMs into the Agentforce 360 platform for AI agents** (October 2025).

KPMG partnered with ServiceNow to **launch Global Business Services with KPMG Velocity**, combining KPMG expertise with ServiceNow AI Platform tools, including AI Agent Studio and AI Control Tower (October 2025).

Accenture partnered with Google Cloud to **leverage the "Gemini Enterprise" agentic AI platform to expand its joint GenAI center of excellence** to include agentic capabilities for scaling multi-agent systems (October 2025).

Microsoft announced **support for Google's Agent2Agent (A2A) protocol** in its Azure AI Foundry and Copilot Studio platforms, and **joined the A2A working group on GitHub to contribute to the protocol's development** (May 2025).

M&A

- Salesforce was a standout player in 2025, executing an aggressive acquisition spree to **vertically integrate critical capabilities** such as data management (Informatica), process intelligence (Apromore), new AI agent technology (Convergence.ai), recruiting automation (Moonhub), and supply chain workflows (Regrello).

- NICE's acquisition of Cognigy and Hubspot's acquisition of Dashworks demonstrate how established enterprise platforms are absorbing best-of-breed agentic AI vendors to offer integrated end-to-end solutions.

1: Agentic front- and back-end automation

Incumbents are making large acquisitions to bolster their agentic AI offerings

Salesforce acquired Informatica

Date: May 2025

Transaction value: ~$8 billion

Objective: To enhance its data foundation for deploying agentic AI by integrating Informatica's data management capabilities into Agentforce **to create a unified, agent-ready enterprise intelligence**

Acquirer: salesforce — Acquiree: Informatica

Hubspot acquired Dashworks

Date: April 2025

Transaction value: Undisclosed

Objective: To integrate natural language search capabilities into its AI features, including Breeze Copilot, and agents **to enable deep, unified workplace search**

Acquirer: HubSpot — Acquiree: DASHWORKS

NICE acquired Cognigy

Date: July 2025

Transaction value: $955 million

Objective: To integrate Cognigy's agentic AI features into its platform for users to orchestrate customer experiences and **create seamless, intelligent engagement flows**

Acquirer: NICE — Acquiree: COGNIGY

Acquirer *Acquiree*

Outlook

- With early adopters reporting productivity gains and cost savings, many enterprises will likely shift from pilots to production-scale implementations. By end-2026, 40% of enterprise applications are expected to incorporate task-specific AI agents.
- As standardized protocols like MCP and A2A become more popular, the industry may also see transition from single-purpose agents to multi-agent ecosystems where specialized AI agents collaborate across platforms.
- However, early caution is also surfacing, with Gartner predicting that by 2027, over 40% of agentic AI projects "may be abandoned due to escalating costs and unclear business value or inadequate risk controls."

1: Agentic front- and back-end automation

Key companies to look out for in 2026

Company details	Description	What to expect in 2026
OpenAI **HQ:** US Year: 2015 **PS:** GTM **Total funding:** $78,000 mn	Develops and uses foundation models to create a wide range of AI tools and services, including AI agents for general administration and operations tasks	The launch of ChatGPT Atlas, an AI-native browser with embedded agentic AI, is expected to mark the **expansion of agentic AI deployments beyond enterprises into consumer-facing applications** at scale
salesforce **HQ:** US Year: 2016 **PS:** Incumbent	Offers Agentforce, a portfolio of pre-built customer support, sales and marketing agents, and infrastructure to build custom AI agents	The **launch of** Agentforce 360 in October, as well as its **acquisitions throughout the year**, indicates that the company plans to expand the scope of its agentic offering into an **integrated ecosystem of automation products**
SIERRA **HQ:** US Year: 2023 **PS:** GTM **Total funding:** $635 mn	Offers a conversational AI platform that enables companies to build branded AI agents for customer service and commerce	It is positioned to lead the agentic customer service space, backed by recent major funding aimed at domestic and **global expansion across Europe and Asia**

HQ: Headquarters PS: Product stage GTM: Go-to-market

Note:
The companies mentioned above are selected based on their activities during 2025 and the potential they hold to enhance their offerings in 2026

What are real-world asset tokens and stablecoins?

- Blockchain and cryptographic assets derive their value, ownership, and functionality from cryptographic technology and blockchain networks. These mainly consist of cryptocurrencies and tokenized assets.
- Stablecoins are cryptocurrencies that maintain a stable value by being pegged to traditional assets like fiat currencies.
- Tokenized real-world assets (RWAs) convert physical or financial assets into digital tokens that can be traded and settled on blockchain networks.
- As of October, the total market size of stablecoins stood at $300 billion, while RWAs surpassed $30 billion.

2: Real-world asset tokens and stablecoins

2025 marked the transition of tokenized traditional assets from experimentation to deployment with institutional players like Visa and Mastercard integrating stablecoins into traditional payment rails and BlackRock filing to offer tokenized shares of its $150 billion Treasury Trust fund.

Regulatory frameworks paved the way for mainstream adoption: In the US, the GENIUS Act established clear federal pathways for stablecoin issuance, while the EU's MiCA framework and Hong Kong's Full Stablecoins Ordinance formalized licensing regimes that reduced legal uncertainty.

Major financial infrastructure providers entered the space: Stripe acquired stablecoin infrastructure company Bridge, Visa and Mastercard expanded stablecoin-native payment offerings, and European banking giants formed a consortium to issue a MiCA-compliant euro-denominated stablecoin.

Significant deals indicated investor confidence: Circle's $1.05 billion IPO marked stablecoin issuers' arrival as mainstream financial institutions, while Securitize announced its proposed $1.25 billion SPAC merger for Nasdaq listing in early 2026.

Notable product launches

tether

Announced UST̶, a US-regulated, dollar-backed stablecoin that will comply with the GENIUS Act and use Tether's Hadron tokenization technology

plume

Launched its Genesis mainnet for RWA integration, enabling RWA tokens to function like crypto-native tokens across DeFi primitives

CLOUDFLARE

Launched NET Dollar, a US dollar-backed stablecoin designed for AI-driven internet transactions

The RWA token space features a wider variety of players compared with stablecoins

Stablecoins

Stablecoin issuers

CIRCLE, PAXOS, GEMINI, archblock, Membrane Finance, TRON, tether, MAKER

Stablecoin infrastructure

Bridge, Resolv, Frax, ORIGIN, Reserve, Hermetica, stably, celo, CERES COIN, IRON, SKOPA, w3i, SCHUMAN FINANCIAL

RWA tokenization

Real estate

VDDX, RED SWAN, alphabloQ, LCX

Funds and equity

SECURITIZE, SYGNUM, Centrifuge, VDDX

Debt and cash instruments

SECURITIZE, alphabloQ, untangled, VDDX

Metals

DIAMOND STANDARD, alphabloQ, TRADEWIND, KINESIS

Art and collectibles

LCX, SYGNUM, ARTORY NEW YORK · BERLIN, BlockBar

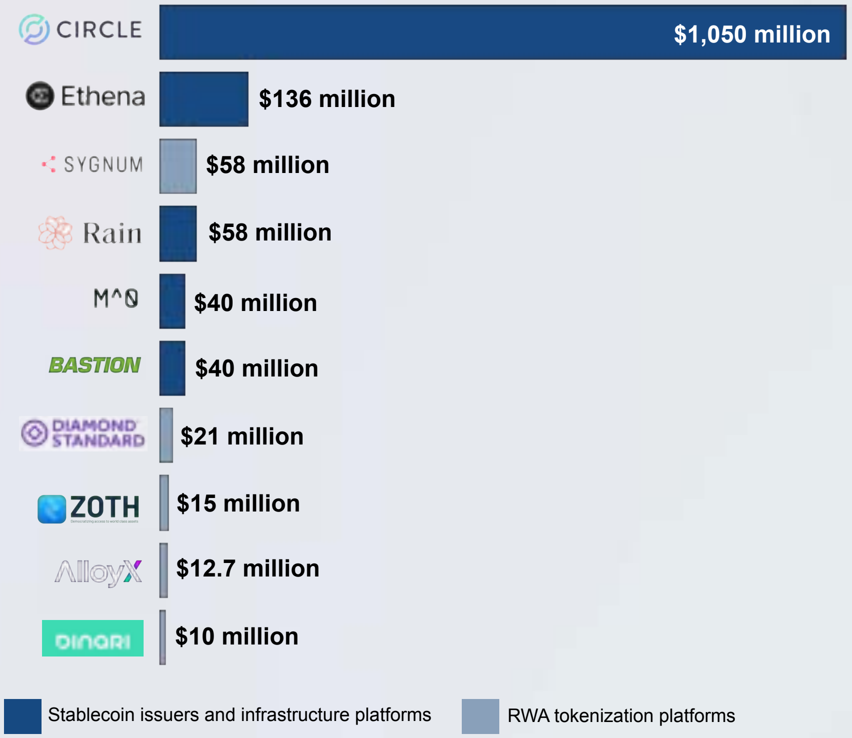
Infrastructure providers

SECURITIZE, POLY, Centrifuge, tZERO

Note: This map only represents select top players and is not an exhaustive list of companies operating in the space

Source: SPEEDA Edge research

Stablecoins dominate funding, as regulatory clarity boosts investor confidence



Note: 1) $ refers to USD, 2) data represents funding raised up until October 31, 2025
Source: SPEEDA Edge research • Funding data powered by Crunchbase

In 2025, digital asset companies in the stablecoin and RWA tokenization space collectively raised nearly $1.5 billion, with a majority coming from stablecoin platforms driven by positive regulatory developments. Nearly all of the funds were allocated to expanding market presence and supporting infrastructure.

Notable funding raised in these areas included the following:

- **Stablecoin issuers and infrastructure platforms (12 rounds, ~$1.3 billion)**
  Circle, the issuer of the USDC and EURC stablecoins, raised $1.05 billion, marking the first IPO by a stablecoin issuer. Additionally, Rain, a stablecoin infrastructure platform, raised $58 million to expand its platform, scale compliance and engineering teams, and support institutional partners in new markets.

- **RWA tokenization platforms (13 rounds, $185 million)**
  Sygnum Bank raised the most funding ($58 million) to drive multi-region market entry, expand its product portfolio, and enable strategic acquisitions. Other significant round came from Dinari ($12.7 million), AlloyX ($10 million), and Mavryk Network ($5.2 million).

Partnerships

- Major payment infrastructure providers, such as Visa and Mastercard, emerged as dominant players in the stablecoin ecosystem in 2025.
- These networks executed coordinated strategies to integrate digital currencies into traditional payment rails, enabling conversion between stablecoins and fiat currencies at the point of sale.
- Established financial institutions are also partnering with blockchain-native platforms to integrate tokenized assets into existing financial infrastructure while maintaining regulatory compliance and allowing access to blockchain benefits.

2: Real-world asset tokens and stablecoins

Financial institutions are partnering with blockchain players to integrate stablecoins and RWAs into existing infrastructure

Visa partnered with Bridge **to launch stablecoin-linked cards**, enabling FinTechs like Ramp, Squads, and Airtm to issue Visa cards that allow users to spend stablecoin balances across merchants worldwide (April 2025).

Fiserv partnered with PayPal **to launch the FIUSD stablecoin**, with PayPal providing the underlying technology and regulatory framework (June 2025).

Ondo Finance partnered with Mastercard **to make tokenized institutional financial assets available on Mastercard's Multi-Token Network** (February 2025).

Circle partnered with Deutsche Börse **to deploy Circle's EURC and USDC stablecoins within its financial market infrastructure** (October 2025).

M&A enabled larger startups to keep pace with traditional financial institutions entering the digital asset space

M&A

- Traditional payment and FinTech giants have begun acquiring specialized blockchain infrastructure providers to build end-to-end capabilities without blockchain friction. Notably, Stripe's acquisition marked the largest deal in the stablecoin space so far.
- Securitize's acquisition of MG Stover's fund administration business was a significant development in the year, reportedly making it the world's largest digital asset fund administrator with $38 billion in assets under administration across 715 funds (as of April 2025).

Stripe acquired Bridge

Date: February 2025

Transaction value: $1.1 billion

Objective: **To enter the stablecoin market** and enable businesses to accept stablecoin payments without managing the underlying blockchain infrastructure

stripe → Bridge

MoonPay acquired Iron

Date: March 2025

Transaction value: $100 million

Objective: **To expand its enterprise offerings for treasury management and cross-border payments** via Iron's API-first stablecoin infrastructure including on/off-ramps, swaps, banking rails, and virtual accounts

MoonPay → IRON

Securitize acquired MG Stover's fund administration business

Date: April 2025

Transaction value: Undisclosed

Objective: **To provide an integrated suite of services**, including fund administration, token issuance, brokerage, and an alternative trading system (ATS)

SECURITIZE → STOVER

Acquirer *Acquiree*

Outlook

- The stablecoin market in the US is projected to reach up to $1.9 trillion by 2030, driven by regulatory clarity from the GENIUS Act, institutional adoption by payment giants (Visa, Mastercard, Stripe, etc.), and expanding use cases in cross-border payments and ecommerce.
- With tokenized debt and private funds dominating the RWA market, 2026 could be a breakthrough year, as more traditional financial instruments go "fully on-chain."
- 2026 may also see an increase in new global currencies, making up a larger proportion of the stablecoin market, as governments and traditional banks continue to enter the market, challenging private USD-pegged stablecoin issuers.

Key companies to look out for in 2026

Company details	Description	What to expect in 2026
CIRCLE **HQ:** US Year: 2013 **PS:** Expansion **Total funding:** Public	Specializes in stablecoins and blockchain-based financial services. Its flagship product, USD Coin (USDC), is a fully-reserved digital currency backed 1:1 by cash and cash equivalents	Following its IPO, the company is preparing to launch its **payments-focused Arc blockchain**, with a testnet already involving **over 100 institutions**, including Visa, HSBC, BlackRock, and Anthropic
plume **HQ:** US Year: 2023 **PS:** GTM **Total funding:** $30 mn	Offers a modular Layer 2 blockchain designed specifically for RWA tokenization and optimization. The solution enables users to deploy assets directly on-chain in a regulated manner	Given Plume's significant partnership and product development activity this year, the platform is positioned to aggressively scale via the **launch of new cross-chain liquidity and derivatives features** for RWAs
SECURITIZE **HQ:** US Year: 2017 **PS:** Expansion **Total funding:** $147.2 mn	Offers a platform that enables enterprises to raise funds by issuing tokens on assets such as equity, funds, fixed income, and real estate	The company plans to go public via a SPAC merger at a **$1.25 billion valuation in 1H 2026**. It also expects to build on its **long-running partnership with BlackRock** on the BUIDL fund

HQ: Headquarters PS: Product stage GTM: Go-to-market

Note:
The companies mentioned above are selected based on their activities during 2025 and the potential they hold to enhance their offerings in 2026

What is CRISPR gene editing?

- Clustered regularly interspaced short palindromic repeats **(CRISPR)** is a breakthrough biotechnology that enables **precise, targeted modifications of DNA in living organisms**.
- It can be applied directly to cells within the body (in vivo) or to cells modified in the laboratory before being reintroduced into an organism (ex vivo), allowing for **highly controlled genetic interventions**.
- This technology is being explored for **treating genetic disorders**, **enhancing immune therapies**, and potentially **preventing inherited diseases**, offering broad applications in precision medicine.

3: CRISPR gene editing

CRISPR technologies continued to gain clinical validation and regulatory support, driving early commercial adoption. In 2025, multiple companies advanced to Phase I/II trials or progressed their pipelines, reflecting ongoing clinical maturity.

Clinical transition underway: Numerous therapies advanced into Phase I–III trials, with regulators granting designations and even approvals in rare disease areas, signalling a shift from experimental to application-driven development.

Heightened focus on precision and safety: Research efforts increasingly focused on off-target effects, delivery efficiency, and immunogenicity, driving innovation in guide RNA design, delivery vectors, and AI-enabled validation systems.

Applications broadened beyond rare genetic disorders: These include complex diseases such as oncology, cardiovascular, and neurological conditions, underscoring CRISPR's evolution toward mainstream precision medicine.

Notable product launches

Intellia Therapeutics

Initiated dosing in the Phase III study of NTLA-2002, a single-dose treatment for hereditary angioedema

University of Minnesota

Completed a first-in-human clinical trial of a CRISPR/Cas9 gene-editing therapy for advanced gastrointestinal cancers

SYNTHEGO

Launched GMP SpCas9, a gene editing tool that integrates with GMP sgRNAs for CRISPR-based therapeutic development

Most startups focus on oncology treatments and blood disorders

Oncology treatments

- editas MEDICINE
- Intellia THERAPEUTICS
- Sana Biotechnology
- scribe THERAPEUTICS
- POSEIDA THERAPEUTICS
- Mammoth Biosciences
- CARIBOU BIOSCIENCES
- LOCUS BIOSCIENCES ENGINEERING PRECISION MEDICINES
- SNIPRBIOME A CRISPR COMPANY
- ELIGO BIOSCIENCE
- CRISPR THERAPEUTICS
- recombinetics™
- SPOTLIGHT THERAPEUTICS
- BioPalette genome editing

Blood and liver disorders

- editas MEDICINE
- CRISPR THERAPEUTICS
- Beam THERAPEUTICS
- Sana Biotechnology
- arbor
- prime medicine
- POSEIDA THERAPEUTICS
- EMENDO BIOTHERAPEUTICS
- GRAPHITE BIO
- Mammoth Biosciences

Cardiovascular and genetic disorders

- verve THERAPEUTICS
- LEMPO THERAPEUTICS
- prime medicine
- SPOTLIGHT THERAPEUTICS
- ELIGO BIOSCIENCE
- AiRNA
- Alia THERAPEUTICS
- Intellia THERAPEUTICS

Ocular and neurological disorders

- editas MEDICINE
- prime medicine
- scribe THERAPEUTICS
- Mammoth Biosciences
- EMENDO BIOTHERAPEUTICS
- SPOTLIGHT THERAPEUTICS

Infectious diseases and immunology

- LOCUS BIOSCIENCES ENGINEERING PRECISION MEDICINES
- ELIGO BIOSCIENCE
- recombinetics™
- LEMPO THERAPEUTICS
- EXCISION

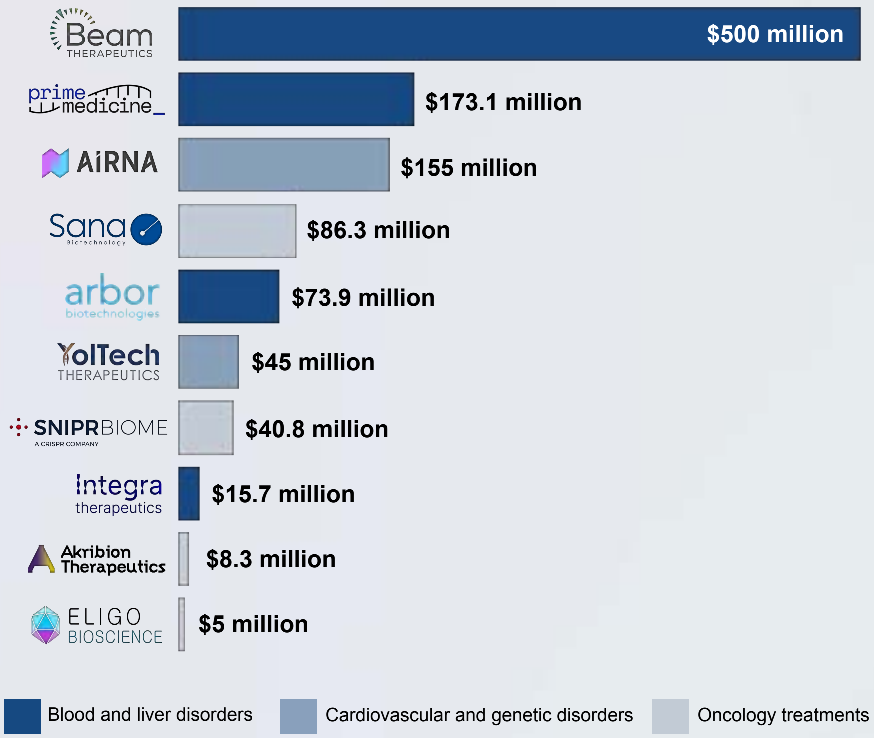
Note: This map only represents select top players and is not an exhaustive list of companies operating in the space

Source: SPEEDA Edge research

Notable progress has been achieved across clinical trials

Note: This list was last updated in February 2025
Source: CRISPR News Medicine

The bulk of investments focused on progressing blood and liver disorder pipelines



CRISPR gene editing companies collectively raised **$1.1 billion across 15 rounds** in 2025. Most of these focused on advancing gene and RNA-editing platforms toward late-stage clinical trials while also expanding therapeutic pipelines and accelerating commercialization of next-generation precision medicine technologies.

Notable funding raised in these areas included the following:

- **Blood and liver disorders (seven rounds $762.9 million)**
  Beam Therapeutics, Prime Medicine, and Arbor Biotechnologies raised funds to advance platform technology, R&D activities, and clinical trial initiatives, with Prime Medicine specifically focusing on one-time curative therapies.

- **Cardiovascular and genetic disorders (two rounds, 200 million)**
  AIRNA and YolTech Therapeutics raised $155 million, attracting venture funding for clinical programs and developing RNA-editing medicines for cardiometabolic diseases.

- **Oncology treatments (five rounds, $141.4 million)**
  SNIPR Biome, Akribion Therapeutics, and Eligo Bioscience secured funding to advance the development of novel therapeutics in areas like hematological cancer.

Note: 1) $ refers to USD, 2) data represents funding raised up until October 31, 2025
Source: SPEEDA Edge research • Funding data powered by Crunchbase

Partnerships and M&A

- The 2025 CRISPR gene editing partnership landscape was defined by cross-sector collaborations aimed at enhancing precision, scalability, and safety in gene-editing therapeutics to strengthen discovery and clinical transition.
- These alliances emphasized platform innovation, AI-driven guide RNA optimization, and the application of CRISPR to complex disease areas such as immunology and muscular dystrophy, reflecting a broader move toward more efficient, data-enabled, and patient-centric therapeutic development.

Cross-sector partnerships underscored AI integrations for therapeutics developments

Synthego partnered with AstraZeneca to license AstraZeneca's novel **CRISPR gene-editing enzyme, eSpOT-ON** (January 2025).

ElevateBio partnered with AWS in a multi-year collaboration to accelerate **CRISPR gene editing therapeutic discovery using GenAI** (March 2025).

Modalis Therapeutics partnered with SOLVE FSHD to develop an innovative CRISPR-based **treatment for facioscapulohumeral muscular dystrophy** (June 2025).

Eli Lilly announced a definitive agreement to acquire Verve Therapeutics for $1 billion to **advance cardiovascular gene editing treatments** (June 2025).

Outlook

- 2025 witnessed the development of a personalized CRISPR treatment in just six months, underscoring the future potential of one-time curative genetic therapies across areas like liver, lung, immunology, and oncology programs.
- Companies like Beam Therapeutics and AIRNA significantly advanced their pipelines, while others secured FDA designations, signalling accelerated clinical deployments and broader patient access in the near future.
- AI is streamlining design and editing accuracy across the board, with next-generation copilot tools and GenAI collaborations poised to improve data analysis, guide optimization, and candidate selection.

3: CRISPR gene editing

Key companies to look out for in 2026

Company details	Description	What to expect in 2026
Beam THERAPEUTICS **HQ:** US; YEAR: 2017 **PS:** MVP; **Total funding:** $1,200 mn	Specializes in gene editing to develop novel precision therapeutics for a variety of genetic diseases	It is expected to advance **BEAM-101** and **BEAM-302** toward pivotal trials, building on positive Phase I/II results and **multiple FDA designations** in 2025
Intellia THERAPEUTICS **HQ:** US; YEAR: 2014 **PS:** MVP; **Total funding:** $1,500 mn	Leverages Cas9 enzymes to develop novel in-vivo and ex-vivo treatments for multiple focus areas	The company plans to submit a **biologics license application** for **NTLA-2002** as the company gears up for the US market launch of its first in-vivo CRISPR therapy by 2027
prime medicine **HQ:** US; YEAR: 2019 **PS:** MVP; **Total funding:** $558.2 mn	Develops novel therapeutics for genetic diseases leveraging prime editing that targets liver and eye-related diseases and neuromuscular indications	Backed by strong funding, the company is set to **accelerate prime editing programs** and will likely make headway on developing **one-time curative treatments** across areas like liver, lung, immunology, and oncology programs

HQ: Headquarters PS: Product stage MVP: Minimum viable product

Note:
The companies mentioned above are selected based on their activities during 2025 and the potential they hold to enhance their offerings in 2026

What are brain-computer interfaces?

- A brain-computer interface (BCI) is a direct link between the human brain and a computer, translating neural signals into commands interpretable by external devices.
- Early innovations like cochlear implants and neuro-prosthetic limbs demonstrated their ability to restore sensory and motor functions, bridging the biological and digital worlds.
- Emerging systems aim to establish bi-directional communication, interpreting brain signals while transmitting sensory feedback and digital information back to the brain, unlocking possibilities for cognitive enhancement, adaptive learning, and immersive human-machine collaboration.

4: Brain-computer interfaces

As predicted in our 2024 report, the BCI landscape in 2025 entered a new phase of clinical maturity, marked by progress from experimental trials by Neuralink in 2024 to validated applications. Non-invasive wearables demonstrated growing clinical relevance and increased accuracy, while tech giants like NVIDIA and Apple deepened their involvement, underscoring mounting interest in commercial applications.

Decoding advancements led to improved use cases: 2025 saw major progress in neural signal decoding, enabling more accurate speech restoration, realistic sensory feedback, and broader real-world BCI applications.

BCI research broadened into mental health and cognition: Recent studies are exploring brain activity patterns and mental health monitoring, signaling a deepening application in cognitive and therapeutic uses.

Regulatory approvals paved the way for wider commercial adoption: Medtronic and Precision Neuroscience earned FDA clearances, allowing for the commercialization of brain stimulation tech.

Notable product launches

NeuroXess

Achieved breakthrough using an invasive flexible BCI system to decode movement intentions and language in real time

Faculty of Engineering
THE UNIVERSITY OF HONG KONG

Developed a memristor-based adaptive BCI decoder that co-evolves with brain signals

Paradromics

Conducted its first-in-human procedure with the Connexus BCI

Non-invasive EEG systems are prevalent due to ease of use

Non-invasive wearables

- ceribell
- muse – the brain sensing headband
- neosensory
- brain.space
- NeuroCatch – Cognitive Evaluation Platform
- mindmaze
- NeuroFieldz – Eye-Brain Diagnostics
- kernel
- neurable
- EMOTIV
- OpenBCI
- OPENWATER
- Bitbrain
- Wispr AI
- MindPortal – Making Humanity Telepathic
- NE neuroelectrics
- mbt
- CONSCIOUS LABS
- Neurolutions – Kandu
- NEUROCONCISE
- MINDROVE
- NEUROSITY
- CoMind
- BrainCo – your brain controls everything
- g.tec
- nl2

Neuroprosthetics and neural implants

- NEURALINK
- synchron
- BRAINGATE – Turning thought into action
- CorTec
- INBRAIN NEUROELECTRONICS
- NEUROPACE
- Precision
- INNER COSMOS
- Blackrock Neurotech

User interface software

- PETAL
- BrainQ
- Wispr AI
- Cognixion
- OpenBCI
- NEUROCONCISE
- CEREGATE
- AXOFT
- cerebian
- nuro

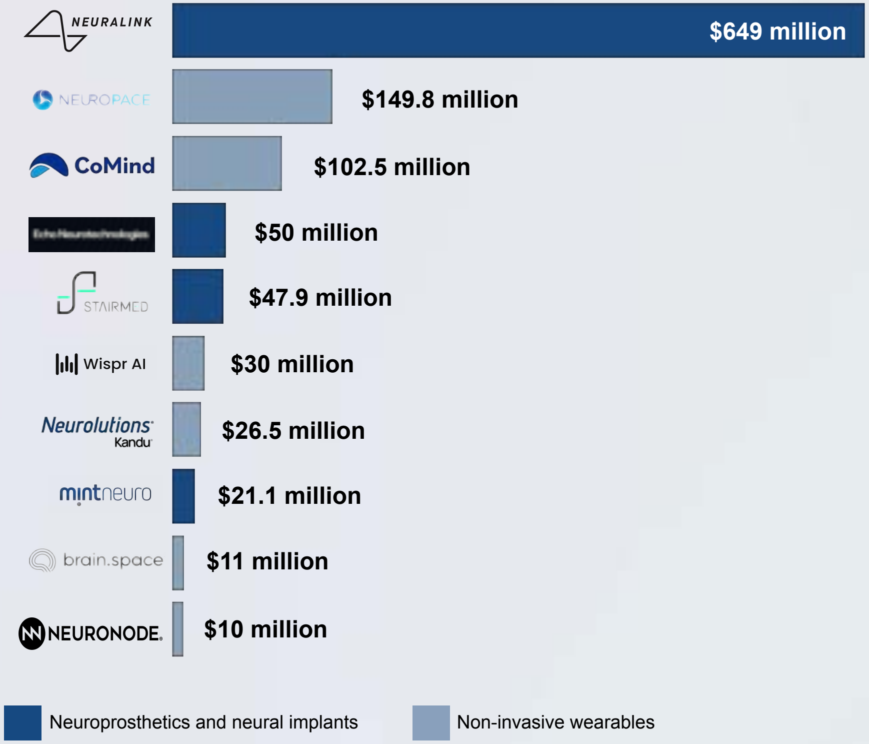
Neuroinformatics

- kernel
- CorTec
- intheon
- Paradromics
- brain.space
- EMOTIV
- nl2

Notes: 1) This map only represents select top players and is not an exhaustive list of companies operating in the space, 2) OpenAI has not been included due to uncertain involvement in BCI, with information limited to speculative reports, 3) non-invasive wearables mostly consist of over-the-head EEG monitoring systems

Source: SPEEDA Edge research

Neuroprosthetics and implants dominated the funding landscape



BCI startups collectively raised over $1 billion in 2025, with the majority of funding concentrated around neuroprosthetics and neural implants, signaling a shift toward more invasive options.

Notable funding raised in these areas included the following:

- **Neuroprosthetics and neural implants (nine rounds, $925 million)**
  Neuralink anchored this funding with $649 million raised to expand consumer access to its implant technology and accelerate new development initiatives. Meanwhile, NeuroPace also raised $150 million across two rounds.

- **Non-invasive wearables (eight rounds, $145 million)**
  CoMind raised the most amount of funds ($103 million) to enhance its non-invasive brain monitoring technology designed to improve care for critically ill patients. Meanwhile, Wispr Flow also secured $30 million in funding for expansion, as the company eyes profitability soon.

Note: 1) $ refers to USD, 2) data represents funding raised up until October 31, 2025
Source: SPEEDA Edge research • Funding data powered by Crunchbase

Partnerships and M&A

- Strategic collaborations between BCI firms and tech giants like NVIDIA and Apple focused on integrating advanced AI and device-control capabilities, enabling real-time neural processing and practical applications for people with limited mobility.

- Cross-sector efforts targeting therapeutic innovation emphasized the development of precision BCI therapeutics for neurological disorders, accelerating both R&D and commercialization in previously untapped areas.

Partnerships sought to explore BCI solutions, mainly in neurotherapeutics and assistive tech

Synchron partnered with NVIDIA to **leverage the Holoscan edge AI** platform to advance BCIs through improved **real-time neural processing** and **scalable brain-language models** (January 2025).

Paradromics partnered with the NEOM investment fund to develop BCI-based therapies targeting **restoration, enhancement, or replacement of lost neurological functions** (February 2025).

Synchron partnered with Apple to develop BCI tech that enables people with **limited mobility conditions** to control devices like iPhones using their thoughts (March 2025).

Kandu Health merged with Neurolutions to combine BCI technology with telehealth services to **enhance recovery outcomes for stroke patients post-hospitalization** (April 2025).

Outlook

- Precision Neuroscience secured FDA approval, while other major players have advanced their clinical pipelines, indicating near-term commercial readiness. Investments are expected to concentrate around these players with demonstrated viability.
- Notable strides in decoding brain signals and real-time neural processing, assisted by AI-driven platforms, is likely to enable seamless interactions, advanced movements, and the development of bidirectional BCI interfaces.
- National-level interest in BCIs are intensifying, with China, the US, Canada, and the UK advancing clinical trials, device development, and validation, paving the way for broader adoption.

Key companies to look out for in 2026

Company details	Description	What to expect in 2026
NEURALINK **HQ:** US Year: 2016 **PS:** MVP **Total funding:** $1,300 mn	Develops BCIs, which includes its flagship N1 Implant, a coin-sized device that is surgically implanted in the brain	The company expects to achieve the ambitious goal of **1,000 implantations by the end of 2026,** driven by large funding rounds
synchron **HQ:** US Year: 2016 **PS:** MVP **Total funding:** $130 mn	Develops implantable BCIs designed to enable patients with severe paralysis to control digital devices through their thoughts	It is likely to continue **exploring integrations with tech players**, including NVIDIA and Apple, to improve real-time neural processing for thought controlled devices
Paradromics **HQ:** US Year: 2015 **PS:** MVP **Total funding:** $108 mn	Develops Connexus, a fully-implantable high data-rate-BCI, to collect a massive number of individual neural signals from the brain	The company is expected to **move into long-term human studies** following its first implantations to advance speech and communication therapies

HQ: Headquarters PS: Product stage MVP: Minimum viable product

Note:
The companies mentioned above are selected based on their activities during 2025 and the potential they hold to enhance their offerings in 2026

Top tech trends likely to disrupt 2026

What is physical AI?

- Physical AI refers to AI systems that are embodied in machines, enabling them to perceive, reason, and act within the physical world.
- The latest breakthroughs in physical AI combine foundation models for perception and reasoning with robotic platforms, resulting in autonomous machines capable of complex real-world tasks.
- Growing interest in physical AI is fueled by its potential to transform industries such as agriculture, manufacturing, logistics, and hospitality, moving AI beyond virtual tasks to enable intelligent automation, safer manufacturing, and unprecedented physical-human collaboration.

1: Physical AI for robotics

In 2025, physical AI for robotics transitioned from research stages to commercially viable models. NVIDIA's Isaac platform became the standard for robotic programming, driving major partnerships including Foxconn's humanoid deployment at its Houston AI server plant, while open-source frameworks like Isaac GR00T enabled engineers to quickly train and test robots in a simulated virtual environment and transfer that knowledge to real-world physical systems.

Meanwhile, startups in the industry also made strides, such as Figure AI, which announced that it had made a "major breakthrough on fully end-to-end robot AI" built entirely in-house, prompting it to leave its collaboration agreement with OpenAI.

Notable startup activities in 2025

Product updates

Google DeepMind launched Gemini Robotics On-Device **for offline robot operation**, along with Gemini Robotics 1.5 and ER 1.5 models that **enable perception, planning, tool use, and execution of complex tasks**.

Funding

Figure AI raised over $1 billion **to develop humanoid robots capable of performing complex tasks** via physical AI, and Genesis AI raised $105 million **to build a general-purpose robotic foundational model**.

Partnerships

NVIDIA partnered with Galbot **to integrate NVIDIA Jetson AGX Thor into its G1 Premium robot**, and with ADI, which adopted Jetson Thor for **developing reasoning-enabled humanoid robots**.

M&A

Hugging Face acquired Pollen Robotics **to combine its 1.5 million AI models and datasets with Pollen's robotics hardware expertise** to advance physical AI.

Foundation model developers and enterprise tools shape the physical AI market

Foundation model developers

FIGURE
Meta
DYNA
NVIDIA
X SQUARE ROBOT
Microsoft
mimic
Hugging Face
Alphabet
RLWRLD
生数 ShengShu
diligent
Genesis
1X
aws
Physical Intelligence (π)
PROCEPTION
TELEXISTENCE

Reinforcement learning platforms

Xaba
PALLADYNE AI
JACOBI ROBOTICS
intrinsic
VENTION

Orchestration and control solutions

accenture
Pivot Robotics
NORDBO ROBOTICS
IndustrialNext
SprutCAM
VIAM
ENERGY ROBOTICS
T-robotics
inOrbit
ROBOTCLOUD

Robotic vision solutions

APERA
Photoneo Focused on 3D
cogniteam
36ZERO VISION
Gimic
viso.ai
CMES AI ROBOTICS
roboception

Note: This map only represents select top players and is not an exhaustive list of companies operating in the space
Source: SPEEDA Edge research

Physical AI enables robots to handle complex tasks without additional programming

Industry	Use case	Description	Benefits
Agriculture	Autonomous crop monitoring	AI-powered drones and sensors assess crop health and soil conditions in real time	• Increased yield • Reduced water and pesticide usage
Construction	AI-driven site safety	Robots and AI vision systems monitor construction sites for hazards and compliance	• Fewer accidents • Better regulatory compliance
Manufacturing	Humanoid assembly robots	Robots can handle more complex assembly and precision tasks, adapting to real-time conditions	• Higher productivity • Fewer errors • Flexible automation • Easier robotic programming
Logistics	Automated inventory auditing	Robots can conduct real-time warehouse monitoring as well as restocking using predictive planning	• Fewer stockouts • Improved inventory accuracy
Hospitality	Robotic cleaning solutions	Physical AI models could drive robots that autonomously clean and disinfect hotel and public spaces	• Improved sanitation • Reduced labor dependency
Mining	Remote exploration drones	AI-driven aerial and ground drones map and analyze mineral sites for efficiency	• Safer exploration • Reduced operational costs

Note: This is not an exhaustive list of potential use cases
Source: SPEEDA Edge research

Outlook

- NVIDIA's release of the world's largest open-source physical AI dataset signals a shift toward collaborative development frameworks that will accelerate deployment across robot manufacturers.
- Robotic foundation models like GR00T N1.6 and Gemini Robotics will be key for the development of next-generation humanoid robots with intelligent interactive capabilities, while expediting go-to-market timelines.
- With physical AI expected to enable commercial robots to reach cost parity with human labor, millions of workers globally in manufacturing, logistics, and service sectors may require to switch occupational categories.

Key companies to look out for in 2026

Company details	Description	What to expect in 2026
NVIDIA HQ: US; Year: 1993 PS: Incumbent	Offers the Isaac GR00T model for robotics, hardware for model training, and large open-source datasets, all focused on enabling robots to perceive, reason, and act in real-world environments	It is likely to expand on its existing industry partnerships to **launch new integrations with next-gen robots**. Its AI infrastructure advantage will likely enable it to **launch new frontier models faster than its competition**
Physical Intelligence (π) HQ: US; Year: 2024 PS: MVP; **Total funding:** $470 mn	Develops foundation models and learning algorithms to power robots and physically-actuated devices	The company's latest $400 million in funding is expected to **support hiring, accelerating the development timeline** of its robot foundation model. Moreover, the model is likely to see an **increase in adoption, as it was recently made open-source**
Genesis HQ: US; Year: 2024 PS: MVP; **Total funding:** $105 mn	Develops a general purpose robotic foundation model that uses a proprietary physics engine to generate synthetic data for training AI models for robotics	The company's recent $105 million funding round is likely to **support hiring activities, enabling the faster development** of its universal physical AI foundation model, which it **plans to launch at the end of 2025**

HQ: Headquarters PS: Product stage MVP: Minimum viable product

Note:
The companies mentioned above are selected based on their activities during 2025 and the potential they hold to enhance their offerings in 2026

What are autonomous coding agents?

- Recent breakthroughs have allowed for agentic coding tools and platforms to become capable of executing multi-step development tasks such as designing software architectures, writing and debugging entire features, continually running automated tests, and deploying updates, across the software lifecycle.

- Interest is surging, as agentic AI systems demonstrate dramatic productivity gains, reduce bugs, and enable continuous delivery, making it possible for small teams or even a single developer to build and sustain complex software projects with unprecedented autonomy.

2: Autonomous coding agents

Software development is transitioning from simple coding assistants that can auto-generate snippets of code to fully autonomous coding agents to handle multi-step engineering tasks from architecture design through testing and deployment with minimal human oversight.

Furthermore, open-source infrastructure matured through Claude Agent SDK, Google's Agent Development Kit, and Anthropic's orchestrator-based architectures establishing production standards for scalable, coordinated agent workflows across the software development lifecycle.

Notable startup activities in 2025

Product updates

OpenAI launched Codex, a coding agent that **helps engineers write code and fix bugs**. Meanwhile, GitHub introduced a coding agent for GitHub Copilot that **uses advanced RAG and MCP**.

Funding

Anysphere raised $900 million **to expand its platform and enterprise offerings.** Other notable rounds came from Cognition AI ($400 million), Replit ($250 million), and Code Rabbit ($60 million).

Partnerships

Goldman Sachs partnered with Cognition **to deploy Devin, an AI coding agent,** across its approximately 12,000-person developer workforce.

M&A

NVIDIA acquired Solver as part of its **AI software stack expansion strategy**. Meanwhile, Cognition acquired Windsurf to **integrate its capabilities into its Devin AI coding agent**.

Note: RAG stands for retrieval augmented generation; MCP stands for model context protocol

Agentic AI is being deployed across the software development lifecycle

Development platforms

- replit
- Cognition
- SAGITTAL·AI
- GitHub
- Alphabet
- autonoma
- aws
- warp
- Saldor
- Meta
- Verdent

Code quality and assurance

- CodeRabbit
- Tricentis
- qodo
- NEUBIRD
- ZEST
- testaify
- Ardent
- Tusk
- deepsource
- nunu.ai

Software engineering workflows and maintenance

- Anysphere
- FACTOR
- recurse
- Sourcegraph
- All Hands AI
- grit
- iGent AI
- Superagent
- Alibaba Group 阿里巴巴集团
- Layer
- Dosu
- Laredo Labs
- augment
- automorph

Note: This map only represents select top players and is not an exhaustive list of companies operating in the space

Source: SPEEDA Edge research

Agentic AI can support complex applications while requiring less development resources

Industry	Use case	Description	Benefits
Software development	Multi-agent product engineering and code maintenance	AI agent teams can autonomously plan, design, develop, refactor, test, document, and maintain entire software products and platforms	• Faster product delivery cycles • 24/7 code maintenance • Greater developer focus on innovation and strategy
Financial services	Regulatory compliant code generation	Agentic AI automatically writes, tests, and updates financial software modules to meet evolving regulatory requirements	• Faster compliance updates • Reduced legal risk • Fewer manual coding errors
Ecommerce	Transaction system development	Autonomous agents design, code, and deploy payment integrations across web, mobile, and POS systems with region-specific tax logic	• Faster market expansion • Consistent user experience • Reduced integration time
Healthcare	HIPAA-compliant application scaffolding	Agentic AI can generate secure healthcare software frameworks with built-in encryption, access controls, and audit logging that meet HIPAA standards	• Accelerated development • Guaranteed compliance • Reduced security vulnerabilities
Manufacturing	Digital twin simulation platforms	Agentic AI develops entire factory simulation software, generating physics engines, 3D models, and real-time synchronization code for production optimization	• Reduced production downtime • Faster process optimization • Lower capital investment risk

Note: This is not an exhaustive list of potential use cases

Source: SPEEDA Edge research

Outlook

- 2026 will mark the transition from AI coding "assistants" (code completion and syntax suggestions) to fully agentic systems that autonomously manage entire development workflows.
- As AI-generated code proliferates, with research showing nearly half of AI-generated code contains potentially harmful bugs, specialized security layers become essential enterprise requirements. Over half of enterprises are expected to use third-party services for AI agent guardrails by end-2026.
- The fundamental job of software developers may shift from writing individual lines of code to orchestrating AI agents, reviewing AI-generated outputs, and focusing on architecture and strategy.

2: Autonomous coding agents

Key companies to look out for in 2026

Company details	Description	What to expect in 2026
Anysphere **HQ:** US : 2022 **PS:** Expansion **Total funding:** $1,100 mn	Offers Cursor, an AI-powered, agentic code editor that helps programmers write, edit, and automate code through AI assistance	The company's recent fundraise is expected to support the expansion of its product offerings**.** The **launch of Composer**, its proprietary fast LLM for agentic coding, also reduces reliance on third-party models
replit **HQ:** US : 2016 **PS:** Expansion **Total funding:** $472 mn	Offers the "Replit Agent," which enables users to build and deploy fully-functional applications using natural language commands	Having **increased its annualized revenue by 60x in less than a year,** Replit is expected to continue its rapid growth by channeling its recent funding **toward the expansion of engineering, research, and marketing efforts**
Cognition **HQ:** US : 2023 **PS:** Expansion **Total funding:** $896 mn	Offers "Devin," an autonomous AI software engineer that can plan and write code as well as test, debug, and deploy software solutions with minimal human oversight	It is set to **leverage Windsurf's IDE to boost Devin's real-time collaboration**, debugging, and deployment, appealing to large enterprises. Insights from its Goldman Sachs partnership will **accelerate enterprise-focused improvements** in security, compliance, and integration

HQ: Headquarters PS: Product stage

Note:
The companies mentioned above are selected based on their activities during 2025 and the potential they hold to enhance their offerings in 2026

What is Sustainable IT?

- Sustainable IT focuses on **reducing the environmental impact** of computing by **designing, operating, and disposing** of technology in energy-efficient and resource-conscious ways.
- It encompasses **green data centers, efficient hardware design, liquid cooling solutions, and sustainable energy generation** practices that minimize waste and emissions across the IT lifecycle.
- As organizations pursue net-zero digital strategies, sustainable IT is becoming a core enabler of both environmental stewardship and operational efficiency.

3: Sustainable IT

Increased high-performance computing (HPC) and AI workloads are expected to increase power demands, with forecasts suggesting around 156 GW global power requirement by 2030. These developments bring about the need for sustainable, energy efficient solutions to mitigate negative environmental impacts, including renewable power sources, efficient hardware components, and liquid cooling solutions.

Hyperscalers like Google and Meta leads the way in advancing sustainable IT, embedding circular economy principles and investing in large-scale clean energy procurement. Their efforts, coupled with growing regulatory and climate-driven accountability, are pushing the broader technology ecosystem toward a future where sustainability is a fundamental criteria.

Notable startup activities in 2025

Product updates

Developments primarily targeted **AI and HPC workloads**, featuring liquid cooling innovations, energy solutions, and large-scale optimized data center, led by major players like Meta, Google, and Vertiv.

Funding

Startups raised over **$18 billion** across **29 rounds**. These were primarily directed toward sustainable data center expansion, energy infrastructure, chip design, and cooling innovations.

Partnerships

Activity spanned nuclear, geothermal, and fusion energy integration as well as AI-powered grid management, innovative cooling solutions, and modular data center development across global markets.

M&A

Trends highlighted growing emphasis on efficient infrastructure, spanning advanced cooling technologies, AI-enabled optimization, and energy asset acquisitions to support large-scale developments.

Climate goals are pushing startups to develop sustainable innovations

Green data centers

- serverfarm
- KAO DATA
- CLOVERLEAF
- EcoDataCenter
- SCALA DATA CENTERS
- DEEP GREEN
- Borealis DATA CENTER
- VIRTUS Data Centres
- CLOUD & HEAT
- SOLUNA
- ECL

Energy generation and storage

- Invenergy
- Intersect Power
- REDWOOD MATERIALS
- TALLGRASS
- Commonwealth Fusion Systems
- TerraPower
- ENERGY VAULT
- First Solar
- energy
- HITHIUM
- HELION
- Mainspring

Cooling solutions

- VERTIV
- ADACEN
- colovore
- submer
- liquid stack
- incooling
- nVent
- jetcool
- Aligned Adaptive Data Centers
- FLEXNODE
- NAUTILUS DATA TECHNOLOGIES

Green hardware

- SiFive
- ATLAS DATA STORAGE
- SOFTIRON
- BIOMEMORY Sustainable Storage Solutions
- QARNOT
- ATOMICS
- aws
- Lenovo
- SAMSUNG
- FALCOMM

Note: This map only represents select top players and is not an exhaustive list of companies operating in the space

Source: SPEEDA Edge research

Emerging innovations are delivering measurable sustainability and efficiency gains

Focus area	Notable products/solutions	Benefits claimed
Deployment of energy efficient components	• Intel Clearwater Forest processor • Intel Crescent Island GPU • IBM 2 nm chip • AWS Graviton processor	• Improved performance-per-watt • Reduced power consumption for AI and HPC workloads • Enables higher compute density
Liquid cooling solutions for data centers	• LiquidStack GigaModular coolant distribution unit • Asperitas plug-and-play immersion cooling system • Microsoft x Corintis microfluidic cooling technology • Fourier Cold Plate Container Solution	• Higher thermal efficiency than air cooling • Lower power usage effectiveness • Allows for higher rack densities • Reduces water consumption and refrigerant usage
AI-powered optimization	• Meta 1 GW AI-optimized data center • Nokia x Supermicro AI-optimized data centers • Google DeepMind AI-optimized cooling • Eaton x Xendee AI-powered microgrid optimization	• Allows for real-time operational adjustments • Enables predictive maintenance and automated load balancing • Reduction of energy consumption
Renewable energy adoption	• Google x Renner wind power for data centers • Google x CFS 200 MW fusion power plant • Meta x Nexus renewable energy for data centers • Amazon x Avangrid solar power for data centers	• Reduced reliance on fossil fuel sources • Improved energy resilience • Enables progress toward net-zero targets • Enables compliance with environmental regulations

Note: This is not an exhaustive list of key industry applications
Source: SPEEDA Edge research

Outlook

- As sustainability becomes integral to digital infrastructure design, suppliers across semiconductors, cooling, and materials are expected to compete on lifecycle efficiency and recyclability rather than performance alone.
- Increased collaboration between IT providers, utilities, and governments is likely to accelerate standards for measuring carbon intensity and power usage effectiveness, fostering greater transparency in sustainable IT reporting.
- The next phase of sustainable IT will see AI-driven optimization and circular hardware recovery evolve from pilot initiatives to default practices across hyperscale and enterprise operations.

Key companies to look out for in 2026

Company details	Description	What to expect in 2026
VERTIV HQ: 🇺🇸 Year: 2016 PS: Incumbent Total funding: Public	Designs, manufactures, and services critical digital infrastructure technologies for data centers, communication networks, and commercial environments	Expected to expand its **immersion and direct-to-chip cooling** portfolios, targeting AI-intensive data centers and integrating intelligent monitoring for real-time carbon efficiency tracking
Alphabet HQ: 🇺🇸 Year: 2015 PS: Incumbent	A frontrunner in sustainable IT, pioneering renewable energy procurement, circular hardware reuse, and AI-driven data center optimization to reduce global digital infrastructure emissions	Likely to deepen its **fusion** and **geothermal energy** partnerships while scaling carbon-intelligent computing to autonomously shift workloads based on real-time grid sustainability
Schneider Electric HQ: 🇫🇷 Year: 1836 PS: Incumbent	A company accelerating sustainable IT through AI-enabled microgrids, modular cooling systems, and digital twins that optimize energy use across hybrid and distributed infrastructure	Stronger collaborations with **hyperscalers** and **equipment manufacturers**, focusing on **integrated sustainability dashboards** and expanding its EcoStruxure platform to quantify lifecycle environmental performance

HQ: Headquarters PS: Product stage

Note:
The companies mentioned above are selected based on their activities during 2025 and the potential they hold to enhance their offerings in 2026

What is next-gen cryptography?

- Next-gen cryptography comprises of fully homomorphic encryption (FHE), post-quantum cryptography, and zero-knowledge proofs. These represents a fundamental shift in how sensitive data is protected, verified, and processed.
- FHE enables computations directly on encrypted data without decryption. Post-quantum cryptography counters future quantum computer threats using quantum-resistant algorithms. Zero-knowledge proofs help verify information without revealing any underlying data.
- The accelerating adoption of these techniques is driven by stringent data protection regulations demanding stronger privacy safeguards and the need to enable secure computation on sensitive datasets.

4: Next-gen cryptography techniques

Government directives such as the US Post-Quantum Financial Infrastructure framework and Canada's federal migration roadmap mandated federal migration to post-quantum encryption by 2030-2035. This has led to accelerated adoption of the technology across the defense, finance, and critical infrastructure sectors.

Meanwhile, zero-knowledge proofs saw 98.4% reduction in proof generation costs over two years, enabling economically viable everyday applications. Similarly, fully homomorphic encryption (FHE) matured through dedicated hardware acceleration and cloud platforms like Optalysys' LightLocker Node and Lattica's HEAL framework, enabling encrypted AI inference and analytics on regulated data.

Notable startup activities in 2025

Product updates

SEALSQ launched the **industry's first hardware-embedded post-quantum chip**. Additionally, Optalysys launched the **world's first dedicated FHE-enabled server** for blockchain transactions.

Funding

SEALSQ raised $200 million **to accelerate its post-quantum go-to-market roadmap and deployment in the US**. Meanwhile, Zama raised $57 million to **support research efforts**.

Partnerships

Honeywell partnered with Nokia and Numana **to develop quantum safe communication solutions**. Telefónica signed an agreement with IBM **to integrate Quantum Safe technology into its cybersecurity services portfolio**.

M&A

SEALSQ acquired a 30% equity stake in WeCanGroup SA to integrate its Web3 and post-quantum cryptographic technologies **to develop advanced KYC and KYB solutions.**

Zero-knowledge is gaining traction due to its privacy preserving applications

Zero-knowledge cryptography

Matter Labs, polygon, Aleo, MINA, STARKWARE, AZTEC, Succinct, RISC ZERO, =nil; Foundation, Polyhedra, AXIOM, lagrange, ORACLE, INGONYAMA, SL DU LAB, marlin, RUMBLEFISH SOFTWARE DEVELOPMENT, ZKSpace, pixelplex, BLOCKCHAIN, VELANCE REWRITE YOUR IDEAS, ZKPASS

Fully-homomorphic encryption (FHE)

ZAMA NETWORKS, Secret network, Optalysys, Inco, LatticaAI, DECENTRIQ, inpher, galois, Duality, (fhenix*), Symbiosis AI Seamless. Customized. Intelligence.

Post-quantum cryptography

SEAL SQ semiconductors + quantum, IDQ, PQSHIELD, IDEMIA, CRYPTO4A, Q→NU, JUMPEDAL, QUANTINUUM, SANDBOXAQ, RESQUANT, QuSecure, ARQIT, QUANTUMXCHANGE

Note: This map only represents select top players and is not an exhaustive list of companies operating in the space

Source: SPEEDA Edge research

Potential applications span across public and commercial domains

Industry	Technique	Use case	Description	Benefits
Healthcare	Fully homomorphic encryption	Encrypted genomic analysis	To analyze patient genetic data while keeping it fully encrypted throughput computation	• Patient privacy preserved • Enables collaborative research without data exposure
Financial services	Zero-knowledge proofs	Private credit scoring	To prove creditworthiness to lenders without revealing specific transaction history or account balances	• Enhanced privacy • Reduced identity theft risk • Selective disclosure
Insurance	Fully homomorphic encryption	Encrypted actuarial modeling	To run risk assessment algorithms on encrypted customer health and lifestyle data without decryption	• Regulatory compliance • Zero data breach exposure • Enhanced customer trust
Supply chain	Zero-knowledge proofs	Confidential supplier verification	Companies prove supplier compliance with standards without revealing proprietary manufacturing details or pricing	• Trade secret protection • Verifiable compliance • Competitive advantage maintained
Defense and intelligence	Post-quantum cryptography	Secure military communications	To deploy quantum-resistant encryption for classified communications and command systems	• Long-term secrecy • Resilience against adversarial quantum capabilities

Note: This is not an exhaustive list of potential use cases

Source: SPEEDA Edge research

Outlook

- As proof generation costs continue to drop, building privacy-preserving applications at scale on top of zero-knowledge architecture may become more economically viable across traditional industries such as healthcare, financial services, and insurance.
- Due to NIST-standardization requirements, post-quantum algorithms will likely be embedded directly into all critical enterprise architecture by 2030.
- Further, by enabling ML models to operate directly on encrypted data without exposing sensitive datasets, FHE acceleration frameworks will allow enterprises to deploy confidential AI inference and analytics in regulated industries while maintaining strict data privacy compliance.

Key companies to look out for in 2026

Company details	Description	What to expect in 2026
SEAL SQ semiconductors + quantum HQ: 🇨🇭 YEAR: 1998 PS: GTM Total funding: $314.6 mn	Develops and manufactures quantum-resistant semiconductors, post-quantum cryptography solutions, and public key infrastructure services to address security challenges posed by quantum computing threats	Its $200 million **fundraise** is aimed at accelerating commercialization and expansion efforts. Its planned launch **of the Quantum Shield QS7001 hardware chip** with NIST-standardized post-quantum algorithms is expected to strengthen is market position
Optalysys HQ: 🇬🇧 YEAR: 2013 PS: GTM Total funding: $32.6 mn	Develops photonic computing chips to accelerate FHE	It is positioned to capitalize on enterprise FHE adoption across Web3 and cloud infrastructure through the launch **of LightLocker Node**
LatticaAI HQ: 🇮🇱 YEAR: 2023 PS: MVP Total funding: $3.3 mn	Offers a cloud-based platform for secure AI computation using FHE, enabling organizations to query AI models with encrypted data without decryption	It is likely to **add FHE hardware to its Homomorphic Encryption Abstraction Layer (HEAL) platform** for lower latency and cost, **expand SDKs** for easier deployment, and **form regulated sector partnerships** to drive secure, compliant AI adoption

HQ: Headquarters PS: Product stage MVP: Minimum viable product GTM: Go-to-market

Note:
The companies mentioned above are selected based on their activities during 2025 and the potential they hold to enhance their offerings in 2026

Transformative tech of the future

What are Humanoid robots?

- Humanoid robots are robotic systems designed to mimic human anatomy, enabling them to perform tasks that require human-like movements and interactions.
- These robots are equipped with sensors, cameras, and AI technologies that allow them to recognize faces, respond to voice commands, engage in conversations, and even exhibit human emotions.
- Unlike traditional industrial robots, humanoid robots can navigate complex settings, making them versatile and capable of performing a wide range of tasks.

1: Humanoid robots

The rapid integration of advanced AI into humanoid systems continued to transform real-world robotic capabilities in 2025. Companies strengthened their focus on scalable production, industrial deployment, and richer autonomy, enabling robots to perform complex tasks across manufacturing, logistics, and household environments.

Notable progress was also made in **delivering more human-like movement and expression**, which included Xpeng's "Iron," which boasts 200 degrees of freedom (DoF) and Aheadform's Elf V1, which delivers highly realistic facial expressions. Meanwhile, NVIDIA expanded its robotic AI models, aiming to advance the intelligent capabilities of next-gen humanoids, and Tesla revealed plans for mass-scale production of Optimus V3.

Notable startup activities in 2025

Product updates

Boston Dynamics unveiled **Atlas 2.0**, which uses advanced **large behavior models** to achieve autonomous, adaptive, whole-body control for real-world industrial tasks.

Funding

Startups raised over **$5 billion** across **36 rounds**, with three companies raising $1 billion or more. Among these, Figure's $1 billion raise at a $39 billion post-money valuation was notable.

Partnerships

NVIDIA partnered with Boston Dynamics and RealSense to **enhance robotic intelligence**, while Hyundai and Mercedes-Benz **advanced factory automation** through dedicated robotics collaborations.

M&A

Two M&A deals were tracked in 2025. Hugging Face acquired Pollen Robotics and Maxvision Technology Corp. acquired core assets, including IP rights, related to Nao and Pepper robots from Aldebaran.

Humanoid models at the forefront of innovation

Tesla: Optimus Gen 2

Lightweight humanoid with advanced actuators and 28 DoF, designed for repetitive factory and household tasks requiring balance, dexterity, and autonomous control

Boston Dynamics: Atlas

An electric-hydraulic robot with 50 DoF, known for extreme agility, backflips, and dynamic whole-body control for complex, unscripted tasks

Figure AI: Figure 03

AI-powered robot featuring Helix AI, the new F.03 battery with fast charging and compliant hands, designed for household chores and mass manufacturing

Apptronik: Apollo

Logistics robot with a 55 lbs payload capacity and hot-swappable four-hour battery packs, designed for safe, continuous warehouse work

Xpeng: Iron

A highly anthropomorphic robot, featuring 200 DoF motion, dexterous hands, 720 degree vision, and Turing AI chips, targeting factory, retail, and service scenarios

Note: This is not an exhaustive list of humanoid robot models
Source: SPEEDA Edge research

Humanoid robots show versatility across human and commercial applications

Personal support and caregiving

SoftBank Robotics, diligent, vtrac robotics, Unitree Robotics, AGIBOT, SANCTUARY AI, Sanbot, BLUE FROG THE ROBOT COMPANY, DEVANTHRO, OVERSONIC

Manufacturing and logistics

UBTECH, FIGURE, SANCTUARY AI, APPTRONIK, mimic, Agility Robotics, Unitree Robotics, AGIBOT, 1X, KAWADA Robotics, CYBORG LINE

Entertainment and social interaction

UBTECH, SoftBank Robotics, BLUE FROG THE ROBOT COMPANY, kokorO, SIMAROBOT, Furhat Robotics, promobot, ENGINEERED ARTS, Sanbot, HANSON ROBOTICS, tinbot ROBÓTICA

Humanoid-related technologies

AGILE ROBOTS, CARNEGIE ROBOTICS, QibiTech, PSYGIG, Boardwalk Robotics, INTUITIVE ROBOTS, HOOMANO, seed robotics, BEYOND IMAGINATION, SKILD AI

Research and education

UBTECH, HANSON ROBOTICS, SIMAROBOT, ROBOKIND ADVANCED SOCIAL ROBOTICS, EAGLE ROBOT LAB, PAL ROBOTICS, LEJU ROBOT 乐聚机器人, seed robotics

Customer service and hospitality

macco, 1X, CYBORG LINE, mimic

Note: This map only represents select top players and is not an exhaustive list of companies operating in the space

Source: SPEEDA Edge research

Humanoid robots are augmenting human labor for agile, safe, and efficient work

Industry	Use case	Customer	Product used	Description	Potential/claimed benefits	Source
Automobiles	Automotive manufacturing	Hyundai Motor Group	Boston Dynamics	To deploy the new electric Atlas humanoid in manufacturing settings (lineside part handling and other factory tasks)	Automating repetitive, ergonomically risky tasks, and increased throughput and uptime	Press release
Logistics and warehousing	Package manipulation	Helix Logistics	Figure	To autonomously identify, grasp, reorient, and sort diverse moving packages with high precision and throughput	Faster and flexible handling of irregular items, and reduced manual lifting and ergonomic injuries	Company blog
Speciality retail	Supply chain operations	Mark's	Sanctuary AI	To perform tasks like picking and packing, cleaning, tagging, labelling, and folding products	Enhanced overall satisfaction and efficiency by performing mundane tasks that employees had previously found unfulfilling	Press release
Healthcare	Healthcare administration	University of Texas Medical Branch	Diligent Robotics	To support clinical staff in non-patient-facing tasks such as delivering lab samples and retrieving supplies	Streamlined workflows, allowing nurses more time (up to 5,400 hours) for direct patient care, ultimately improving efficiency and bedside engagement	Case study

Note: This is not an exhaustive list of potential use cases
Source: SPEEDA Edge research

Outlook

- Humanoid robots are rapidly moving from prototype to large-scale production, with Tesla aiming for 100,000 Optimus units by 2026. Meanwhile, Chinese manufacturers are also planning mass-scale developments, driving unit costs below $10,000.
- Developments in more human-like mobility for humanoids can open up applications in areas like healthcare assistance, defense, and scientific research, while also improving social acceptance, allowing integration into human-centric spaces.
- China's humanoid robotics ecosystem, driven by strong government direction and a flexible domestic supply chain, is poised to maintain global leadership, with the US trailing closely.

1: Humanoid robots

Key companies to look out for

Company details	Description	What to expect
UBTECH HQ: China Year founded: 2012 PS: GTM Total funding: Public	Develops bipedal humanoid robots such as the Walker S for education, logistics, wellness, elderly care, and industrial services	Expected to scale commercial deployments after showcasing **swarm intelligence** and **autonomous battery-swap tech**, enabling continuous humanoid operation
XPENG HQ: China Year founded: 2014 PS: GTM Total funding: Public	Develops "Iron," a humanoid robot with industry-leading levels of DoF and powered the company's proprietary Turing AI chip	Aims to mass-produce Iron and **expand deployments** in commercial settings, while opening its platform to the public for **collaborative feature development**
TESLA HQ: US Year founded: 2003 PS: Incumbent Total funding: Public	Develops humanoid robots like Optimus, designed to perform tasks such as manufacturing assistance and labor-intensive activities	Expected to unveil the Optimus V3 prototype in early 2026 and plans to initiate a **million-unit production line** by year-end, using **internally developed components**

HQ: Headquarters PS: Product stage GTM: Go-to-market

Note:
The companies mentioned above are selected based on their activities during 2025 and the potential they hold to enhance their offerings in the future

What is neuromorphic computing?

- Neuromorphic computing represents a shift away from the **von Neumann model's rigid separation** of memory and processing, instead **emulating the brain's architecture** where computation and storage occur simultaneously.
- By using **spiking neural networks** and **neuron-like circuits** rather than traditional binary logic, it enables **massively parallel, event-driven computation** with exceptional energy efficiency.
- Advances in specialized chips, **synapse-like memory**, and enabling platforms like **photonics and advanced packaging** are driving this evolution, with complementary software accelerating the transition from research to real-world applications.

2: Neuromorphic computing

Neuromorphic computing has progressed from academic prototypes like the TrueNorth and SpiNNaker to commercial-grade developments such as Intel's Loihi 2 and Hala Point, demonstrating major gains in event-driven efficiency, scale, and real-time signal processing.

The landscape is **currently led by incumbents** like Intel, IBM, and Qualcomm alongside a handful of startups, including BrainChip and Syntiant, advancing the development of **commercially viable neuromorphic processors**. The rising power demands of AI workloads are expected to propel the industry into its next phase, with initial adoption expected to center around edge AI and autonomous systems.

Notable startup activities in 2025

Product updates

BrainChip launched its **Akida advanced neural networking processor** on the M.2 form factor. Additionally, Innatera launched **Pulsar neuromorphic microcontroller** for edge sensors.

Funding

Startups raised over **$341 million** across 10 rounds. Most of these centered around **enabling tech** like Celestial AI's $255 million Series C1 funding for expediting commercial rollout of photonic fabric technology.

Partnerships

Microsoft and Inait partnered to **develop a novel AI model** inspired by mammalian brains. Meanwhile, King's College London joined the UCL-led **Neuroware center** for brain-inspired computing innovations.

Innovations are primarily driven by full-stack systems and processor developments

Full-stack systems and processors

- MYTHIC
- SYNTIANT
- RAIN
- brainchip
- memryX
- innatera
- ASPINITY
- Synthara.ai
- SpiNNcloud
- BLUMIND
- femtoAI
- CogniFiber

Memory technologies

- CROSSBAR
- EVERSPIN TECHNOLOGIES
- intrinSic
- SAMSUNG
- Weebitnano The Future Memory
- ANAFLASH
- numem
- CerfeLabs

Software: AI algorithms and optimization

- neurala
- femtoAI
- Opteran
- CogniFiber
- natura
- ZETANE
- Deeplite

Vision and sensor applications

- PROPHESEE METAVISION FOR MACHINES
- KONIKU
- AI4V
- SynSense
- mindtrace
- TWINSENSE

Enabling technologies

- nepes
- celestial AI
- LUX SEMICONDUCTORS

Note: This map only represents select top players and is not an exhaustive list of companies operating in the space

Source: SPEEDA Edge research

Industries are already being transformed with low power, high accuracy solutions

Industry	Use case	Customer	Product used	Description	Potential/claimed benefits	Source
Aerospace and defence	Space situational monitoring	Western Sydney University	Prophesee	To use event-based vision as an alternative to space situational awareness models that help prevent collisions in space and track space debris	Offered a more efficient and low-power alternative for tracking and detection of satellites	Press release
Information technology	AI model optimization	Ericsson Research	Intel	To process telecom signal data at the edge with neuromorphic hardware, running spiking neural networks for efficient event sensing	Significantly lowered energy consumption while enabling efficient, real-time network managements	Company blog
Semiconductors	Object detection	Andes	Deeplite	To deploy highly compact deep learning models for person detection using low-power RISC-V MCU DSP platforms	Enabled 2.7% higher accuracy alongside 15% faster inference and reduced model size to fit on 256kb SRAM	Company blog
Healthcare	Covid-19 detection	NaNose Medical	BrainChip	To use BrainChip's Akida processor to support analysis and assessment of Covid-19 from patient breath samples	Enabled rapid, high-accuracy edge detection of volatile organic compounds biomarkers	Press release

Note: This is not an exhaustive list of potential use cases
Source: SPEEDA Edge research

Outlook

- Developing reliable, large-scale neuromorphic chips requires advanced materials, complex fabrication, and high R&D costs, which will likely limit participation to companies with large financial backing.
- The rising adoption of AI, edge computing, and IoT devices calls for energy-efficient and low-latency solutions, which are likely to propel advancements in neuromorphic solutions.
- Currently, the regulatory environments remain fragmented, with most efforts targeting areas like data protection and IP. However, as the landscape evolves, more standardized frameworks are expected to emerge, facilitated by organizations like NIST and NeuroBench.

2. Neuromorphic computing

Key companies to look out for

Company details	Description	What to expect
intel **HQ:** US YEAR: 1968 **PS:** Incumbent	A leader in the neuromorphic space, offering research neuromorphic processors and open-source software framework for neuro-inspired AI development	**Loihi 2** and **Hala Point** platforms will likely **shift from research to early commercial AI adoption** for edge devices, focusing on energy efficiency
IBM **HQ:** US YEAR: 1911 **PS:** Incumbent	Focuses on neuromorphic research, using on-chip memory for efficient data processing	It will likely focus on **advancing its NorthPole chip architecture** for digital neuromorphic applications, particularly for **real-time edge AI** and exploring **in-memory analog computing**
brainchip **HQ:** US YEAR: 2006 **PS:** Expansion **Total funding:** Public	Develops neuromorphic system-on-chips (NSoC), which mimics the neural networks of the human brain	It aims for **volume production** and **commercialization** of its second-generation Akida IP and chips, focusing on **on-chip learning** for energy-efficient **edge AI solutions**

HQ: Headquarters PS: Product stage

Note:
The companies mentioned above are selected based on their activities during 2025 and the potential they hold to enhance their offerings in the future

What is fault-tolerant quantum architectures?

- Quantum reliability refers to the **ability of quantum systems to maintain accuracy and stability** by detecting and correcting errors caused by decoherence, noise, and other quantum-level disturbances.
- Through q**uantum error correction (QEC)** techniques, qubits are encoded across multiple physical qubits to preserve information integrity, forming the foundation for dependable quantum computation.
- As these methods advance, they pave the way toward **fault-tolerant quantum architecture** capable of sustained, large-scale quantum operations with minimal error accumulation.

3: Fault-tolerant quantum architecture

Quantum reliability is emerging as a key enabler for next-generation quantum computing, moving beyond experimental prototypes toward **scalable, fault-tolerant systems**. Advances in photonic and superconducting qubits, modular architectures, and logical qubit management are paving the way for practical applications in AI, cryptography, and complex simulations.

A collaborative ecosystem of startups and established players is driving innovations in **error correction, hybrid quantum-classical integration, and scalable architectures**. These developments are reducing overhead, improving system reliability, and accelerating the path to universal fault-tolerant quantum computing, positioning quantum reliability as foundational for utility-scale deployment within the next decade.

Notable activities in 2025

Product updates

PsiQuantum and NVIDIA launched platforms for **fault-tolerant algorithms**, while IBM, Photonic, and Riverlane introduced advanced **QEC solutions**.

Funding

Startups raised over **$2.3 billion** across **10 rounds**. PsiQuantum's $1 billion Series E round and Quantinuum's $600 million funding to advance fault-tolerant architectures within the next few year stood out.

Partnerships

IQM, Riverlane, and Zurich Instruments partnered to develop a **QEC platform**. Additionally, QC Design and Oxford Ionics launched partnerships targeting **advancements in fault-tolerant architectures.**

M&A

IonQ acquired Lightsynq Technologies Inc. to supports its efforts to **scale modular, fault-tolerant quantum systems**. Pasqal acquisition of AEPONYX to **advance the path toward fault-tolerant quantum computing** was also notable.

Most startups focus on error mitigation, while incumbents drive full error correction

Error mitigation

- amazon
- D-Wave — The Quantum Computing Company™
- TreQ
- XANADU
- QUANDELA
- parityqc
- oxford ionics
- C12
- LIGHTSYNQ
- QCWARE
- equal1
- Terra Quantum
- ORCA Computing
- bleximo

Full quantum error correction

- Alphabet
- IBM
- Microsoft
- intel
- QCDESIGN
- QUANTINUUM
- PsiQuantum
- river lane
- photonic
- QπAI
- IONQ

Pre-fault-tolerant

- SANDBOXAQ
- seeqc
- Infleqtion
- BlueQubit
- rigetti
- QUDORA TECHNOLOGIES

Note: This map only represents select top players and is not an exhaustive list of companies operating in the space

Source: SPEEDA Edge research

Path to fault-tolerant quantum computing

Historical foundations (1980–2000s)

- First **universal quantum computer** is described, paving the way for future hardware development (1985)
- Peter Shor and Andrew Steane independently develop the first major **QEC codes** (1995–1996)
- Demonstration of the first **quantum algorithms** (1998)
- Achieves **99% gate fidelity** in early qubits, meeting the error threshold required for QEC (2000s)

NISQ era and error mitigation (2000s–2020)

- Development of **topological codes** and **surface codes**, establishing a maximum tolerable rate for scalable fault tolerance (2000s–2010s)
- Quantum processing made publicly accessible via the cloud through **IBM Quantum Experience** (2016)
- The rise of **noisy intermediate-scale quantum (NISQ)** computing, marking the current era of quantum computing (2018)

Current landscape (2020–present)

- Achieved **"beyond break-even,"** a logical qubit whose error rate is lower than the physical qubits that comprise it (2024)
- Rise of resource-efficient codes like **qLDPC**, **topological qubits**, and **hybrid architectures**, reducing error overhead and enhancing control (2024–2025)
- Development of networked, modular QPUs to scale total qubit count past single-chip limits (2025)

Future frontiers (beyond 2025)

- Integration of **real-time error decoding** into hardware
- Autonomous **QEC feedback loops,** development of **high-fidelity logical qubits,** and **cryogenic control electronics**
- Achieving **large-scale, fault-tolerant quantum computers** to tackle currently unsolvable problems across science and industry

Note: This map only represents a few notable events and is not an exhaustive list of all quantum reliability-related developments

Source: SPEEDA Edge research

Enhanced error correction and efficiency is enabling better fault tolerance

Company	Development	Expected outcome
QUANDELA	Announced that the company's new hybrid approach uses semiconductor quantum emitters to generate photonic qubits, reducing the number of required components by a factor of 100,000 compared with conventional photonic approaches	This approach promises faster achievement of error-correction capabilities, lower manufacturing costs, and reduced energy consumption.
amazon	Unveiled Ocelot, its first-generation quantum computing processor that focuses on quantum error correction, consisting of nine qubits on a centimeter-square chip that requires cryogenic cooling to operate	The new architecture reduces quantum error correction resource requirements by up to 90% compared with conventional approaches.
parityqc	Introduced "replacement-type" quantum gates, a novel class of gate operations designed to reduce quantum error correction overhead by using pre-prepared qubits in an extended Hilbert space instead of standard rotations and interactions	It claims to reduce the resource demands of QEC by preserving intrinsic noise bias, allowing asymmetric or classical codes to be used more effectively.
Terra Quantum	Launched QMM-Enhanced Error Correction, a hardware-validated method for suppressing quantum errors without mid-circuit measurements or added two-qubit gates	It claims QMM provides up to 35% error reduction and no extra two-qubit operations, enabling more performance per qubit, per dollar, and watt.

Note: This list only contains select developments and is not exhaustive
Source: SPEEDA Edge research

Outlook

- Accelerated funding and consortium-led R&D are expected to create momentum toward more established fault-tolerant quantum prototypes.
- Hardware-software co-designs integrating quantum error correction frameworks with hybrid HPC platforms are poised to enable scalable reliability solutions suited for quantum AI and industrial applications.
- Growing standardization efforts, driven by global collaborations and government-backed initiatives, will likely establish unified fault tolerance metrics and reliability certification standards over the next three to five years.

3: Fault-tolerant quantum architecture

Key companies to look out for

Company details	Description	What to expect
NVIDIA **HQ:** US : 1993 **PS:** Incumbent	Provides classical HPC/AI infrastructure like NVQLink and CUDA-Q for high-speed, real-time control, calibration, and decoding of error-correction codes across partner QPUs	Expected to make advancements in **logical qubit development, real-time error correction, and hybrid quantum-classical applications** through strategic partnerships
IBM **HQ:** US : 1911 **PS:** Incumbent	A leader in the quantum reliability space, with the industry's most detailed roadmap toward fault tolerance using sophisticated LDPC codes and modular architectures	Progress its roadmap toward **utility-scale quantum computing** and deliver Quantum Starling by 2029, which is capable of running quantum circuits comprising **100 million quantum gates** on **200 logical qubits** by 2029
IONQ **HQ:** US : 2015 **PS:** GTM **Total funding:** Public	Builds trapped-ion quantum processors leveraging intrinsic qubit stability and novel noise reduction methods to advance scalable fault-tolerant systems	Expects to deliver systems with **~100 physical qubits** and **99.999%+ logical two-qubit fidelity** by end 2025, scale to **10,000+ qubits** by 2027 and **2 million+** by 2030

HQ: Headquarters PS: Product stage GTM: Go-to-market

Note:
The companies mentioned above are selected based on their activities during 2025 and the potential they hold to enhance their offerings in the future

What is photonics?

- Photonics is the science of generating, manipulating, and detecting light particles called photons, enabling applications ranging from telecommunications and sensing to computing and medical devices.
- Unlike electronics, which uses electrons to transmit information through electrical circuits, photonics uses photons to achieve greater bandwidth, lower power consumption, reduced thermal effects, and minimal signal loss.
- Photonic integrated circuits (PICs) combine multiple photonic components such as lasers, waveguides, and modulators onto a single chip, allowing light-based data processing and transmission at terabit-per-second speeds, over 10x faster than electronic alternatives while consuming significantly less energy.

4: Photonic semiconductors

Photonic semiconductors have emerged as critical infrastructure for next-gen computing and telecommunications, driven by explosive AI data center demand and the physical limitations of copper interconnects. Manufacturing breakthroughs are now unlocking the practical deployment of these technologies at scale. For example, the silicon photonics frequency comb, which replaces the need for multiple separate lasers, has dramatically reduced equipment size, cost, and energy consumption in optical networks.

Similarly, the development of the first electrically pumped Group IV continuous-wave laser on silicon demonstrated that lasers could be built using standard semiconductor production processes, finally allowing all photonic components to be integrated on one chip at mass-production scale.

Notable activities in 2025

Product updates

Lightmatter achieved a **world-first 16-wavelength bidirectional dense wavelength division multiplexing (DWDM) optical link** on single-mode fiber, which delivered 800 Gbps bidirectional bandwidth per fiber**.**

Funding

Celestial AI raised the largest funding round of $255 million **to accelerate commercial deployment.** Other notable rounds included Q.ANT ($80 million), Scintil Photonics ($58 million), and nEye ($58 million).

Partnerships

Marvell partnered with TSMC **to develop AI semiconductors that integrate photonic silicon technology**. NVIDIA unveiled **co-packaged photonic optics switches** with a partner ecosystem including TSMC and SPIL.

M&A

AMD acquired Enosemi to **support the development of photonics for next-gen AI systems**. Teradyne acquired Quantifi Photonics **to deliver scalable photonic IC testing solutions** for silicon photonics manufacturing.

Photonic processor and interconnect manufacturers dominate the landscape

Photonic processor and interconnect manufacturers

QANT, LIGHTMATTER, celestial AI, SCINTIL PHOTONICS, n-eye, XSCAPE PHOTONICS, ephos, AyarLabs, dustphotonics, intel, LUMENTUM, NVIDIA, MARVELL, iPronics, RANOVUS

Fabless PIC design houses

PHOTON BRIDGE, OpenLight, VLC PHOTONICS A Hitachi Group Company, XSCAPE PHOTONICS, Alcyon PHOTONICS, SYNOPSYS, cadence

Photonic component and subsystem suppliers

QUIX QUANTUM, PHOTONPATH, EFFECT PHOTONICS, sicoya, COHERENT, SP SOURCE PHOTONICS, ST

Foundry and manufacturing services

AIM PHOTONICS, SMART PHOTONICS, LioniX INTERNATIONAL, GlobalFoundries, SKORPIOS TECHNOLOGIES, RAPID PHOTONICS, phix, tsmc

Note: This map only represents select top players and is not an exhaustive list of companies operating in the space

Source: SPEEDA Edge research

Low-power high-reliability photonics improves industries' data throughput

Industry	Use case	Customer	Product used	Description	Potential/claimed benefits	Source
AI data centers	AI infrastructure interconnects	Meta	Broadcom 3rd-gen Co-Packaged Optics (CPO) silicon photonics switches	To reliably increase performance for networks running AI workloads, while using less power and avoiding any brief connectivity disruptions	Achieved 1 million cumulative 400 Gb/s (400G) equivalent port device hours without a single link flap	Press release
Healthcare	Point-of-care cardiac biomarker detection	Emergency rooms and family doctors	BioPIC silicon-on-insulator (SOI) biosensor	To rapidly detect cardiac troponin proteins released after heart attacks	Fast detection for emergency diagnosis, cost-effective through CMOS-compatible fabrication	Case study
Public infrastructure	Fiber optic sensing for infrastructure health	Infrastructure operators	OKI ultra compact silicon photonics optical sensor chips	To detect, process, and transmit physical phenomena (vibration, strain, temperature) for monitoring aging infrastructure	Low power consumption, addresses aging infrastructure and labor shortage challenges	Press release

Note: This is not an exhaustive list of potential use cases
Source: SPEEDA Edge research

Outlook

- Technological breakthroughs in the manufacturing process of PICs such as silicon photonics (SiPh) frequency comb and electrically pumped Group IV continuous-wave laser will likely enable mass production at scale.
- The convergence of AI infrastructure expansion, autonomous vehicle deployment, and edge computing proliferation will drive photonic semiconductor adoption from niche telecommunications applications to mainstream infrastructure.
- With China aggressively investing in SiPh to secure self-sufficiency in the semiconductor space and the US supporting development via Department of Defense-led funding, government-backed supply chain security initiatives will emerge as critical enablers for market scaling.

Key companies to look out for

Company details	Description	What to expect
LIGHTMATTER HQ: US flag; Year: 2017 PS: GTM; Total funding: $822 mn	Offers a full stack of photonics solutions including an AI accelerator and a wafer-scale programmable photonic interconnect	LightMatter is positioned to deploy its technology at scale into hyperscale data centers in the next few years, supported by the launch of its two new photonic interconnect products **scheduled for 2026**
QANT HQ: German flag; Year: 2018 PS: GTM; Total funding: $71.9 mn	Develops photonic processors and quantum sensors for AI and high-performance computing applications	It is positioned to scale photonic analog processors for AI inference and physics simulations, supported by **$80 million funding** and the successful **deployment of its analog photonic co-processor at the Leibniz Supercomputing Centre**
celestial AI HQ: US flag; Year: 2020 PS: GTM; Total funding: $593.9 mn	Develops a proprietary Photonic Fabric optical interconnect technology platform for data center and edge AI computing solutions	It plans to scale the commercialization of terabit-scale optical interconnects for AI data centers, supported by its recent **$255 million in total funding** and the **strategic acquisition of Rockley Photonics' 200+ silicon photonics patents**

HQ: Headquarters PS: Product stage GTM: Go-to-market

Note:
The companies mentioned above are selected based on their activities during 2025 and the potential they hold to enhance their offerings in the future

What is artificial general intelligence?

- Artificial general intelligence (AGI) is a theoretical stage of AI development where a system matches or exceeds human cognitive abilities across virtually all intellectual tasks.
- Unlike AI agents, which are trained for specific competencies, AGI would demonstrate versatility, adaptability, autonomous learning, and the ability to transfer knowledge between different contexts without task-specific reprogramming.
- AGI could revolutionize industries and address existential challenges including drug discovery, climate modeling, pandemic prediction, scientific research, and cybersecurity threat detection at scales currently impossible for humans.

5: Artificial general intelligence

AGI represents the potential culmination of decades of AI/ML research and investment. The convergence of transformer architectures, reinforcement learning techniques, and massive computational scale has accelerated AGI timelines from speculative decades-long predictions to near-term possibilities.

Technological breakthroughs such as OpenAI's GPT-5 model demonstrating significant improvements in reasoning, coding, and multimodal integration, and Gemini 2.5 Pro demonstrating human-level multimodal performance across text, images, and audio, have led some industry leaders to suggest that early AGI-like systems could emerge between 2028 and 2030.

Notable activities in 2025

Product updates

AGI progress is being driven by multiple breakthroughs across advanced reasoning architectures, multimodal perception, open-source autonomous agentic frameworks, and safety alignment mechanisms.

Funding

The US is expected to invest over $470.9 billion in AI in 2025, with part of it intended to promote AI research.

Partnerships

OpenAI launched the NextGenAI University Consortium, partnering with 15 leading research institutions, including MIT, Harvard, Oxford, and Caltech, to accelerate AI research.

M&A

Meta acquired 49% of Scale AI, giving access to high-quality training data and evaluation frameworks. OpenAI also acquired StatSig, supporting iteration and testing of AGI capabilities in production.

Path to AGI deployment

Historical foundations (2018–2022)

- The concept of transformers are introduced, enabling parallel processing and long-range dependencies (2017)
- OpenAI demonstrates 175B parameter model proving language models scale predictably with compute/data and **establishing roadmap to AGI through scale** (2020)
- ChatGPT launches and reaches 100 million users in two months, **sparking the global AI race** (2022)

Early GenAI (2023)

- GenAI interest increases with **over $26.1 billion VC investment** in new startups (2023)
- **Open-source models such as LLaMA, Mistral, and Falcon democratize LLMs** with reinforcement learning from human feedback (RLHF) becoming the standard for alignment (2023)
- GPT-4 introduces multimodal capabilities, establishing a new benchmark for reasoning and model performance (2023)

Modern context (2024–2025)

- Advanced reasoning models are released with test-time compute scaling and deliberative alignment (2024)
- **Multimodal integration becomes commonplace** with native processing of text, code, images, audio, and video with up to 1M token context (2024)
- **LLMs transcend single-turn chat to agentic systems** that can autonomously orchestrate multi-step workflows (2025)

Reaching AGI (2026–2030)

- Critical gaps in robust common-sense reasoning beyond training data, reliable self-correction, and uncertainty quantification are addressed (est. 2026)
- Self-improving systems (AI designing better AI) enables embodied intelligence and integrates physical world understanding (est. 2027)
- Models begin achieving 95%+ human parity across professional benchmarks and AI matches human reasoning (est. 2030)

Note: This map only represents a few notable events and is not an exhaustive list of all quantum reliability-related developments

Source: SPEEDA Edge research

AGI can break barriers and accelerate innovation across major industries

Industry	Use cases	What agentic AI can deliver today	What AGI can unlock
Medicine and healthcare	• Accelerated diagnosis • Personalized treatment	**Automates diagnostics from patient data using pre-established criteria** and manages patient care administration through advanced workflows and virtual assistants	**Designs treatments beyond existing knowledge**, adapts seamlessly to **any patient** or condition, and assists clinicians with treatment plans
Scientific research	• Autonomous scientific discovery	**Analyzes large datasets, suggests research** pathways, runs simulations, automates literature reviews, and assists in experiment design **within defined domains**	**Independently generates new hypotheses**, adapts research methods **to any discipline**, and autonomously pursues **open-ended discovery** with **human-level creativity and reasoning**
Climate and environment	• Disaster prediction • Ecosystem modeling • Sustainability	Optimizes existing systems to deliver real-time risk warnings, **optimizes grid allocation,** and **coordinates data** for modelling **within identified frameworks**	Continuously **invents new systems** for managing emergent climate risks, adapts policies and interventions, and **creates breakthrough** sustainability solutions in real time globally
Public safety/government	• Crisis management • Pandemic response • Policy design	Automates incident and threat detection, supports coordination of emergency responses, and streamlines reporting and resource allocation by **matching patterns to known threats**	**Anticipates complex, unforeseen crises, adapts policies on the fly,** and coordinates national responses autonomously by synthesizing data from completely disparate fields to **anticipate black swan events**

Note: This is not an exhaustive list of potential use cases
Source: SPEEDA Edge research

Outlook

- AGI is expected to deliver transformational gains in productivity, scientific discovery, and problem-solving, reshaping entire industries from healthcare and finance to manufacturing and energy.
- However, there remains the risk of systems developing capabilities beyond human control, such as unintended goal pursuit, misaligned self-improvement, or rapid advancements and misuse leading to catastrophic outcomes.
- Robust regulatory frameworks will be critical in this context. However, overregulation may stifle beneficial innovation and underregulation could allow vulnerabilities or safety lapses.
- Although industry players remain optimistic, uncertainties around data scarcity, scalability, and model alignment **may extend the AGI timeline beyond 2030**.

Key companies to look out for

Company details	Description	What to expect
OpenAI **HQ:** US Founded: 2015 **PS:** GTM **Total funding:** $78,000 mn	Leads with its advanced generative models and agentic AI frameworks, aims for universal benefit, and is heavily focused on scalable alignment, safety, and major technical breakthroughs	Poised to lead AGI development through **rapid advancements in agentic models and reasoning** (o3, GPT-5), **infrastructure partnerships** (Stargate, NVIDIA, Oracle), and **strategic M&A** (io, Statsig)
Google **HQ:** US Founded: 1998 **PS:** Incumbent	Pioneers in deep reinforcement learning, multimodal AI (Gemini), and neuroscience-inspired architectures, with a track record in solving complex problems (AlphaGo, AlphaFold)	Advancing toward AGI with leading models **capable of complex reasoning and real-world action**, achievements in programming and mathematical problem-solving, and new technical AGI safety frameworks
Baidu **HQ:** China Founded: 1999 **PS:** Incumbent	Its ERNIE models have shown leading performance on several benchmarks, and Baidu is investing heavily in AGI, brain-inspired AI, and vertical applications	Expected to drive **China's AGI ambitions** with strong government backing, advances in its ERNIE and brain-inspired AI models, and major investments in autonomous agents, infrastructure, and real-world applications

HQ: Headquarters PS: Product stage GTM: Go-to-market

Note: The companies mentioned above are selected based on their activities during 2025 and the potential they hold to enhance their offerings in the future

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Report by Bhagya Wickramasinghe and Yohann Gunatilleke, CFA