एसटीपीआई
STPI

STPINEXT
INITIATIVES

EXPLORING THE DEEPTECH LANDSCAPE

INNOVATIONS, OPPORTUNITIES, & CHALLENGES

STPI KnowledgeUp Series

March, 2024

Key Message

Shri S. Krishnan
Secretary
Ministry of Electronics and Information Technology

As we navigate through an era of unprecedented technological advancements, it is imperative for us to recognize and embrace the profound impact of DeepTech on our startup ecosystem. DeepTech, characterized by its groundbreaking innovations rooted in scientific research and engineering, holds the key to unlocking new frontiers of growth and prosperity.

The term "DeepTech" encompasses cutting-edge research in a multitude of fields including nanotechnology, biotechnology, material sciences, quantum technologies, semiconductors, artificial intelligence, data sciences, robotics, and 3D printing, among others. These technologies are poised to play a pivotal role in addressing complex global challenges such as climate change, hunger, epidemics, energy access, mobility, physical and digital infrastructure, cybersecurity, and many more areas.

Our commitment to fostering a thriving DeepTech ecosystem is unwavering. We are inspired by the recommendations put forth by the Prime Minister's Science, Technology, and Innovation Advisory Council (PM-STIAC), culminating in the development of the National Deep Tech Startup Policy (NDTSP). The idea is to create a deep tech startup ecosystem by offering the right incentives to companies that invest time and money in innovation and research. More than 10,000 startups working in these technology domains were identified as part of the effort. This policy framework, crafted through extensive multi-stakeholder consultations, is poised to redefine the landscape for DeepTech startups in India.

Moreover, the recent proposals outlined by the Hon'ble Finance Minister, including the allocation of a substantial corpus to stimulate private investment in sunrise technologies and the introduction of a dedicated scheme to fortify deep-tech capabilities in defense, underscore the government's proactive stance towards fostering innovation-led growth ('atmanirbharta').

Ministry of Electronics & Information Technology (MeitY) has taken several initiatives such as GENESIS, TIDE 2.0, SAMRIDH, CoEs, NGIS to support the innovative startups in emerging technologies. Additionally, International Patent Protection in E&IT (SIP-EIT) Scheme of MeitY extends financial support to innovative startups & SMEs for international patent filing.

India DeepTech, our pan-industry alliance, stands as a testament to our collective vision of promoting DeepTech startups and driving scientific research and engineering innovation. Together, we are committed to transforming India into a global hub for technology-driven entrepreneurship, as we work towards realizing our $1 trillion digital economy goal.

In closing, let us reaffirm our commitment to embracing DeepTech as the next wave of our startup ecosystem. With innovation as our guiding force, let us chart a path toward a future defined by technological excellence and inclusive growth.

I congratulate STPI on bringing out this insightful report. This report will be a valuable source of information for start-ups, academia, industry, investors, and government departments and agencies working in the DeepTech start-up ecosystem.

Message

Dr. Devesh Tyagi
Senior Director
Software Technology
Parks of India

Amidst the dynamic shifts and challenges of the modern world, DeepTech emerges as a beacon of hope and opportunity. Its groundbreaking advancements, spanning artificial intelligence, quantum computing, biotechnology, and beyond, herald a new age of innovation and disruption.

We are dedicated to propelling advancement and nurturing entrepreneurship through the Software Technology Parks of India, positioning ourselves to embrace the DeepTech revolution and pave the way towards a future characterized by technological excellence and inclusive growth.

At Software Technology Parks of India, we understand the significance of cultivating an environment that nurtures DeepTech startups, providing them with the support and resources they need to thrive. Our unwavering commitment to innovation and collaboration serves as the cornerstone of our mission to propel the DeepTech ecosystem forward.

STPI has established 23 Centers of Entrepreneurship(CoEs) which are serving as hubs for DeepTech innovation. Electropreneur Park in Delhi and Bhubaneswar respectively spearheads electronic system development by fostering new gadgets and systems. OpenLab in Bengaluru and AIC STPI Bengaluru trailblazes smart tech for health and other domains, leading IoT innovation. VARCOE in Bhubaneswar pioneers virtual and augmented reality, revolutionizing digital experiences. FINBLUE in Chennai focuses on fintech, while NEURON in Mohali excels in Artificial Intelligence (AI) and smart technologies. MOTION in Pune enhances automotive technology, IMAGE in Hyderabad specializes in gaming and AI, and APIARY in Gurugram explores blockchain. MEDTECH in Lucknow pioneers health gadgets, while Octane centers across various locations drive exploration in emerging technologies. Fasal in Akola supports farmers with smart tools, while Kalpataru in Vizag, Efficiency Augmentation in Bengaluru, and EmTek in Rourkela elevate factory operations.

Today, I am thrilled to present to you an insightful report unveiling the transformative impact of DeepTech as the next wave of India's startup ecosystem. This report delves into the dynamic landscape of DeepTech innovation, showcasing its role as a catalyst for driving economic growth and fostering entrepreneurship across the nation. It explores how DeepTech initiatives have propelled innovation landscape to unprecedented heights. As we navigate through this report, let us celebrate our achievements and seize the vast opportunities that lie ahead of us in shaping a future defined by technological excellence and inclusive growth.

Together, let us embark on this transformative journey, where ingenuity knows no bounds, and the possibilities are limitless. By harnessing the power of DeepTech, we can redefine the boundaries of what's possible and shape a future that is brighter, sustainable, and more prosperous for all.

I would like to congratulate team STPI/STPINEXT for their concerted effort in bringing this report together for individuals, start-ups, industry, academia and policy makers.

Foreword

Shri Subodh Sachan
Director
Software Technology
Parks of India

In today's scenario, DeepTech holds immense importance as it drives innovation, economic growth, and societal progress. By harnessing the power of DeepTech, businesses can improve efficiency, develop groundbreaking products and services, and address pressing issues like climate change, healthcare, and cybersecurity.

Embracing DeepTech not only fosters technological advancements but also opens doors to new opportunities, fuels entrepreneurship, and enhances competitiveness in the global market. As a leader, it is imperative to recognize the significance of DeepTech and champion its adoption to drive sustainable development and create a better future for all.

This report delves into the realm of DeepTech, where complex and revolutionary technologies strive to address humanity's most pressing challenges. From upgrading existing systems to complete overhauls, DeepTech innovations span various industries, including healthcare, energy, agriculture, and manufacturing. Notably, global investments in DeepTech have surged, with significant contributions from the USA, China, and France. In India, government initiatives like the National Blockchain Framework and academic-industry partnerships are driving DeepTech development. Looking ahead, advancements in AI, quantum computing, and space exploration promise exciting prospects, further fueled by government partnerships and corporate collaborations. DeepTech startups are poised to thrive by targeting niche markets and leveraging key growth drivers like new technologies integration and better resource accessibility.

This report not only illuminates the current state of DeepTech but also provides invaluable insights into future trends and growth strategies. It is my sincere hope that this compilation serves as a catalyst for meaningful discourse and action, inspiring stakeholders across sectors to embrace the transformative power of DeepTech and pave the way for a brighter, more prosperous future.

I also express my appreciation to the start-up community, the driving force behind our nation's strides in DeepTech innovation. Your boldness, resilience, and unwavering commitment to pushing the boundaries of technology are instrumental in shaping the future landscape of India. Your innovative spirit serves as a beacon of inspiration to us all.

I urge policymakers, industry leaders, investors, and stakeholders to leverage the insights presented in this report to steer the DeepTech ecosystem towards unprecedented growth. Let us continue to cultivate an environment that fosters and sustains DeepTech start-ups, promoting collaboration, facilitating access to capital, and establishing the requisite infrastructure for innovation to thrive.

With every sunset, a new dawn emerges, beckoning us to venture further, dream bigger, and innovate ceaselessly. It is this spirit of relentless exploration that defines us, driving us to push the boundaries of what is possible and shape the future with our ingenuity.

Message

Shri Arvind Kumar
Director General
Software Technology
Parks of India

As we delve into the realm of DeepTech, it's essential to recognize its pivotal role in shaping the future of India's startup ecosystem. DeepTech brings exciting innovations that could change our world. Some people explore space, while others use these inventions to keep our planet safe.

We are currently engaged in the development of smaller, faster, and energy-efficient technologies such as chips and robots. These innovations are designed to perform various tasks, ultimately enhancing convenience and safety in our daily lives. Additionally, we are actively exploring improved methods for energy generation and energy conservation, such as nuclear fusion, and battery technologies. Our efforts extend innovation in smart transportation systems and electric mobility systems.

Moreover, the integration of everything with the Internet is revolutionizing manufacturing processes, residential living, and urban planning. Furthermore, advancements in quantum mechanics enable us to achieve unprecedented levels of computing speed, leading to the realization of previously unimaginable possibilities. In India, significant investments are being made in these groundbreaking ideas, fostering the growth of startups and facilitating significant societal impact.

Today, DeepTech has become the next wave of entrepreneurial revolution in our country. Over the past few years, we have witnessed a remarkable surge in investments flowing into Indian DeepTech startups. In 2023 alone, these startups attracted over $0.9 billion investments, reflecting a growing recognition of their potential to disrupt traditional industries and drive sustainable growth. The government's unwavering support for DeepTech innovation has been instrumental in propelling its growth trajectory. Initiatives such as the National Deep Tech Startup Policy (NDTSP) and the allocation of a substantial corpus of Rs. 1 lakh crore in the Interim Union Budget underscore the commitment to fostering a conducive environment for DeepTech startups to thrive.

From the bustling streets of Bengaluru to the vibrant tech hubs of Hyderabad and Pune, India's DeepTech revolution is unfolding across diverse geographies. This regional diversity not only reflects the democratization of innovation but also presents abundant opportunities for collaboration and ecosystem development. Indian DeepTech startups are increasingly gaining recognition on the global stage for their groundbreaking innovations. Whether it's pioneering advancements in artificial intelligence, space technology, or biomanufacturing, Indian entrepreneurs are rewriting the narrative of innovation and entrepreneurship on a global scale.

At the heart of the DeepTech revolution lies the promise of inclusive growth. By harnessing the power of technology to address pressing societal challenges, DeepTech startups are not only driving economic prosperity but also fostering social empowerment and sustainability. As we embark on this transformative journey, let us reaffirm our commitment to embracing DeepTech as the catalyst for India's socio-economic progress.

I extend my sincere gratitude to the experts for their invaluable contribution in creation of this report. With collaborative efforts and visionary thinking, we can propel DeepTech to the forefront of the startup ecosystem, paving the way for a brighter and prosperous tomorrow.

Executive summary: DeepTech- The future of technology (1 / 2)

Section	Findings
DeepTech overview	• DeepTech typically focuses on **complex & revolutionary technologies** and aims to **solve humanity's problems** by addressing societal & environmental concerns • DeepTech innovations are classified on the basis of **degree of added value, impact, complexity** and **time to scale** – **Tech substitute:** Incremental upgrades or replacements – **System upgradation:** Upgrade of existing systems & processes – **System transformation:** Altering or changing a system or process – **System of system transformation:** Complete overhaul of an existing system or process • DeepTech startups focus on revolutionary technologies, High-Tech startups focus on specific problems and Low-Tech startups focus on basic needs • DeepTech startups are playing a **crucial role** in creating jobs, managing data, natural resources & labor, ensuring traceability and strengthening the start-up's ecosystem
DeepTech applications	• DeepTech is applied in various industries not limited to: – **Healthcare:** Remote patient monitoring, disease diagnosis, & blockchain power health management system – **Energy:** Renewable energy optimization, energy storage management, & carbon capture – **Agriculture:** Precision spraying, monitoring crop health, automated harvesting, & supply chain management using AI1 – **Manufacturing & industrial automation:** Predictive maintenance, supply chain optimization & process optimization – **Logistics:** Inventory management, delivery drones, route optimization, automated report generation & predictive maintenance – **Material science & nano-technology:** Atomistic representation, Computational materials design & biomedical nanotechnology • In the **IT industry**, by **CY25**, **~51% of IT expenditure** will move from traditional solutions to **public cloud**
DeepTech market landscape	• Global **investments** in DeepTech **peaked in CY21** amounting to **~US$ 140B**, whereas the **number of global DeepTech deals** peaked in **CY21 to ~4,720** – In **CY21**, **PE / VC** firms invested **~US$ 100B** in DeepTech – In **CY23,** DeepTech startups based out of the **USA, China & France** received the most investment from **PE / VC firms,** amounting to **~US$ 40B** – **Europe:** The funding peaked in **CY21** reaching to **~US$ 25B**, with number of deals being **~1,215** – **Asia-Pacific:** Governments are focusing on developing the DeepTech ecosystem for improvement in **quality of life** of their citizens

Notes: 1. Artificial Intelligence
Source(s): 1Lattice analysis

Executive summary: DeepTech- The future of technology (2 / 2)

Section	Findings
DeepTech market landscape (contd.)	• India DeepTech market: – The investments in DeepTech peaked to **~US$ 4B** in CY20 with number of deals closing at **~350,** in CY23 **~US$ 1B** was invested – In **India**, top-tier academic institutions are partnering with industry leaders to develop DeepTech in fields of **AI[1] / ML[2], robotics, quantum computing, blockchain** and **extended reality** – **GoI[3]** has taken different initiatives like the **National Blockchain Framework (NBF), Cyber Surakshit Bharat, Personal Data Protection Bill, Drone Rules 2021** and others to promote the adoption & development of DeepTech in India – **International collaborations** like U.S. India Artificial Intelligence (USIAI) Initiative, UK-India Tech Alliance, India-Russia Joint Technology Assessment & Accelerated Commercialization Programme and others are undertaken to promote the development of DeepTech • In terms of **technology**, the majority of start-ups are focusing on **AI, blockchain, IoT[4] & big data analytics**, most **popular use cases** being in **drones, cyber security, web 3** and **robotics** • **Technology, retail and energy industries** across the globe are showing the highest interest in **AI & cognitive algorithms**
DeepTech growth drivers & challenges	• Key growth drivers for DeepTech companies include new technologies integration, better accessibility to resources and availability of high capital – In **service-based** companies, the average investments have increased significantly, frequently **exceeding US$ 100M** – For **product-based** companies, easy access to advanced computing hardware, manufacturing and 3D printing is **a key growth driver** • For **product-based** companies, the **challenges are more** due to the longer adoption time, high cost of expansion and requirement of huge funds **compared to service-based companies**
DeepTech future trends & strategies	• **Key future trends in DeepTech** include advancements in AI, quantum computing, space exploration and others – New **AI architectures & algorithms** will focus on developing explainable AI, privacy-enhancing AI and other developments – **Computing development** will increase to quantum, wearables, ambient computing, IoT, cloud, etc. – **SpaceTech** will focus on **reducing satellite development costs** for space manufacturing, earth observation, asteroid mining, etc. • **Government partnerships & corporate collaborations** are key growth strategies for DeepTech start-ups – **Government programs** like the Clean Energy Research Initiative and Atal Innovation Mission **will strengthen the DeepTech ecosystem** – **Corporate investment** in DeepTech startups will provide support and nurture growth • Targeting **niche markets** is another crucial **growth strategy** for DeepTech start-ups – Niche market will have **less competition & can offer rapid growth and scalability**

Notes: [1]Artificial Intelligence [2]Machine Learning [3]Government of India [4]Internet of Thing
Source(s): 1Lattice analysis

Agenda

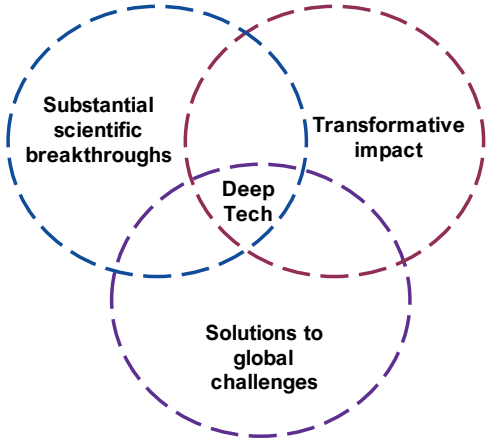
- **DeepTech: Overview**
  - Definition
  - Levels
  - Benefits to economy
  - Comparison with High-Tech & Low-Tech
  - Focus area

DeepTech refers to technology based on scientific breakthroughs or engineering innovations

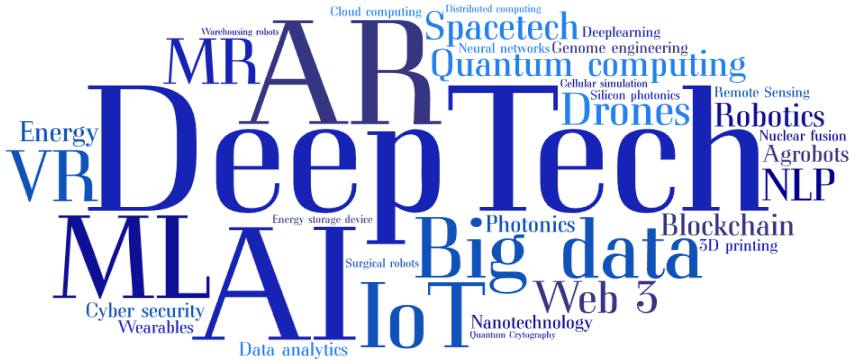
What is DeepTech?

- DeepTech or Deep Technology refers to technology based on **substantial scientific breakthroughs** or engineering innovations
  - Goes **beyond surface-level** advancements & relies on fundamental discoveries
  - For e.g., **DeepTech ventures** are trying to develop technologies to enable **manufacturing in space**, that can be beneficial for products like medicines, semiconductors & other products which requires vacuum, zero-gravity & sanitized conditions
- Possesses potential to create **transformative impact** across industries & sectors
  - Requires **significant** amount of **time**, **resources** & **expertise** to develop
  - For e.g., **Quantum computing** can exponentially **increase computing power**, considerably reducing **processing time**
- Focuses on solving complex **societal problems** & creating significant **economic value** in the long term
  - Leverages **interdisciplinary collaboration**
  - For e.g., **Personalized medicine** leverages genetics, computer science, biology, data science, etc. to create personalised **treatment & diagnosis for patients**

DeepTech solves global challenges by creating transformative impact through scientific breakthroughs



Major technologies in DeepTech



Source(s): Industry reports, 1Lattice analysis

DeepTech scope innovations can be classified based on the degree of added value, impact, complexity, and time to scale

	Tech substitution	System upgradation	System transformation	System of system transformation
Definition	• Involves **incremental upgrades** or **replacements**	• Involves **upgrade of existing systems** & processes	• Involves **altering or changing** a **system or process**	• Involves **complete overhaul** of an **existing system or process** • Generally, requires **policy intervention**
Added value, functionality & efficiency	• Few ways of tech substitution: – Hardware, software, data, methodology, infrastructure	• Few types of upgrading: – Hardware, software, data, algorithm, infrastructure, integration	• Key aspects of system transformation: – Rethinking goal & vision, redesigning infrastructure & processes	• Key aspects of system of system: transformation: – Architecture & design, data integration & analytics, resilience & security
Scale of impact	• Product or product line	• Product or product line	• Product line or organization wide	• Region or nation wide
Complexity				
Time to scale			• 5-20 years	• >20 years
Examples	• **Replacing a solid-state battery** with newer materials, to improve safety, energy density & cost	• **Adding sensors** to vehicles to detect nearby objects while driving, enhancing the functionality of the vehicle • **Adding solar panels** to buildings to utilize solar energy, enhancing the functionality & real estate value	• **Constructing a charging network for electric vehicles** increases the value of existing electric automotive transportation for manufacturers and their customers	• **Electrifying the entire automotive sector** in a region increases the efficiency of transportation in that area

Source(s): Media reports, research reports, company websites, 1Lattice analysis

Impact, complexity & added value

Low — High

Time to scale

High — Low

DeepTech startups crucial for creating jobs & managing data, resources & labor, ensuring traceability, & strengthening startup ecosystem

Meta data management

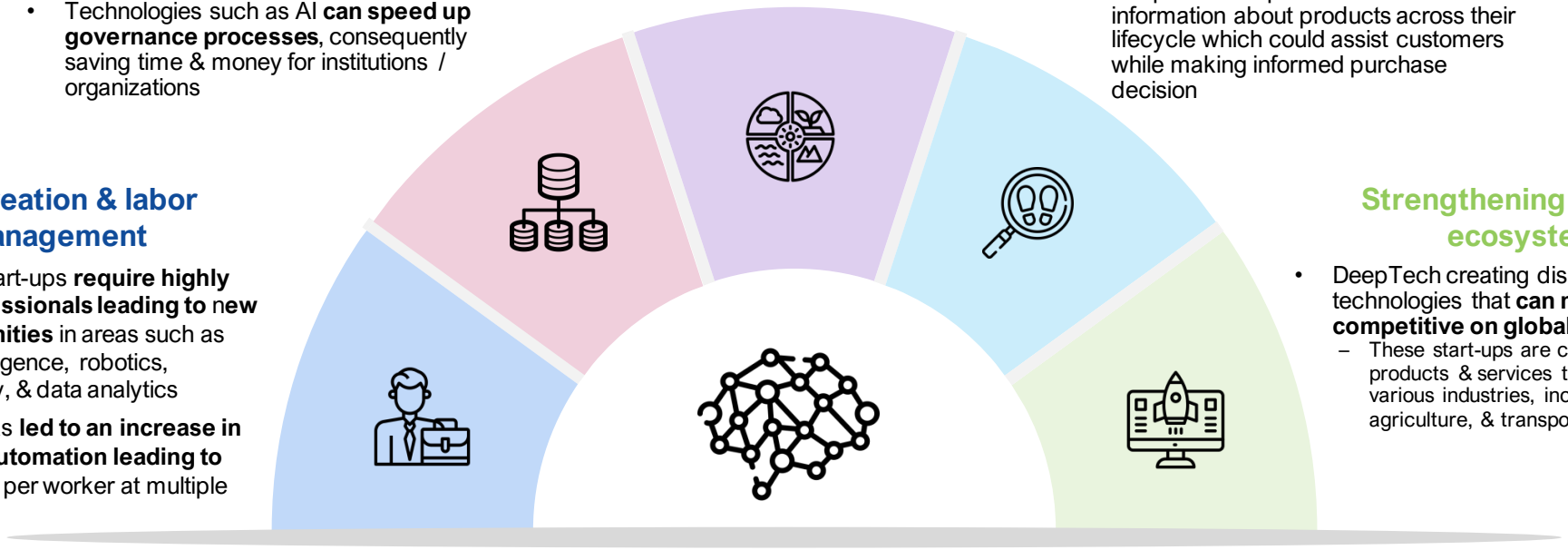
- DeepTech plays a crucial role in **securing country's data sovereignty** by actively working towards preventing data breaches
- Technologies such as AI **can speed up governance processes**, consequently saving time & money for institutions / organizations

Resource management

- Use of DeepTech to harness information about groundwater, oil, gas, etc., & manage resources effectively
- Subsequent DeepTech-based resource planning can be carried out for **addressing capacity planning, consumption** or any other contingency-related issue

Transparency & traceability

- Use of advanced technologies such as blockchain to manage supply chain of essential goods
- DeepTech can provide access to information about products across their lifecycle which could assist customers while making informed purchase decision



Job creation & labor management

- DeepTech start-ups **require highly skilled professionals leading to new job opportunities** in areas such as artificial intelligence, robotics, cybersecurity, & data analytics
- DeepTech has **led to an increase in workforce automation leading to** better output per worker at multiple levels

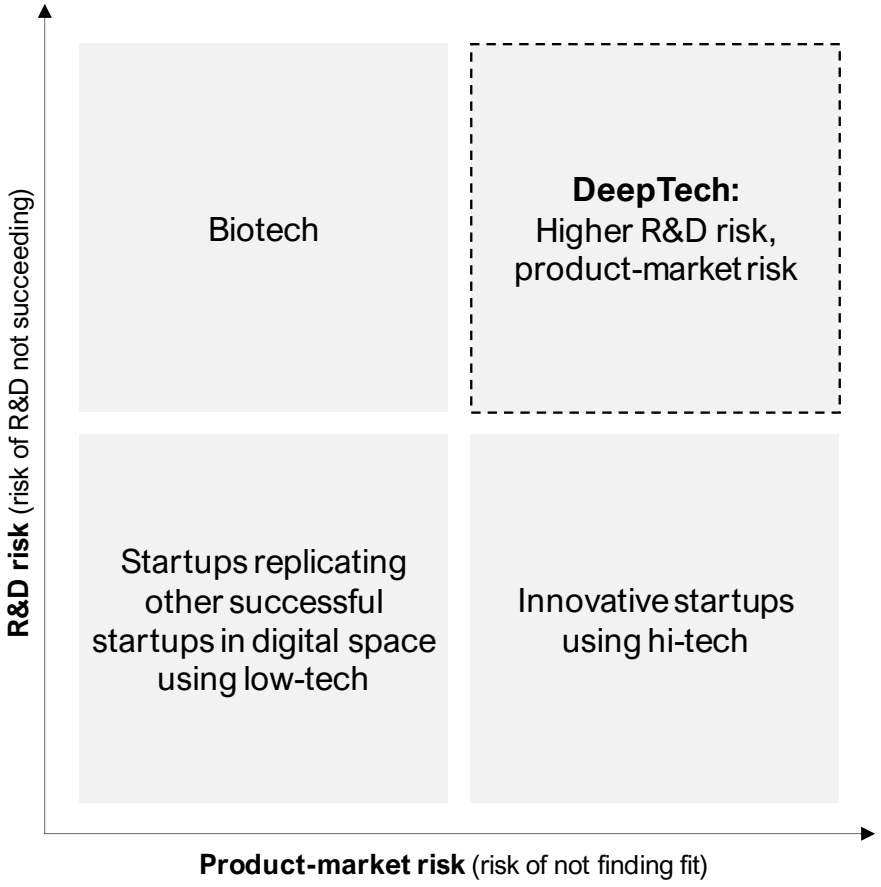
Strengthening start-up ecosystem

- DeepTech creating disruptive technologies that **can make India more competitive on global stage**
  - These start-ups are creating new products & services that can transform various industries, including healthcare, agriculture, & transportation

Source(s): Media articles, NASSCOM Tech Start-up Report 2022, 1Lattice analysis

DeepTech startups focus on solving humanity's problems, high-tech startups, specific business problems & low-tech startups, basic needs

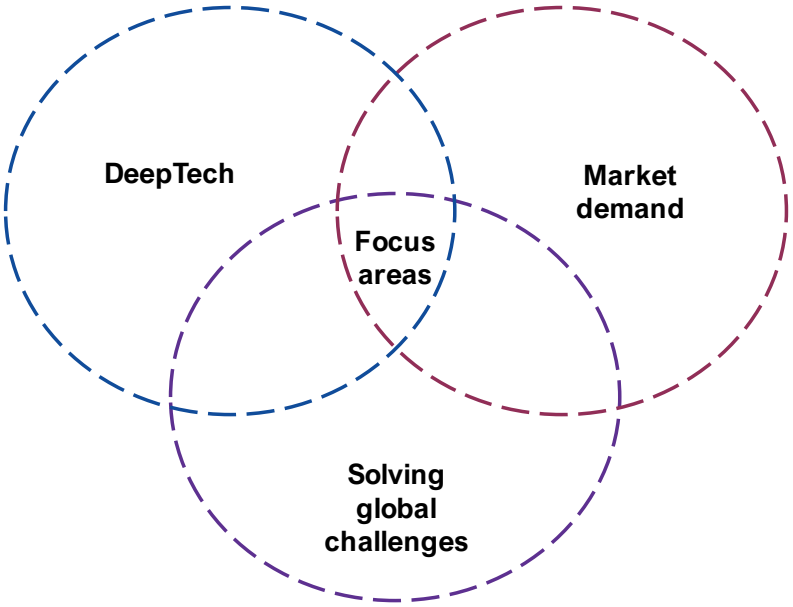
	DeepTech	High-tech	Low-tech
Focus area	• Seeks to solve humanity's problems by **addressing societal & environmental concerns**	• Typically focuses on specific business & industry problems	• Focuses on meeting basic needs such as energy, food, water access, or health
Market preference	• Specialized markets that are typically **smaller & more niche**	• Tends to enter newer unexplored markets with an aim to capture market share	• Works in existing markets leading to increased competition
Market entry	• **Longer time of market** entry in comparison with high-tech	• Longer time of market entry in comparison with low-tech	• Easy & fast entry to market
Technology	• Typically focuses on **complex, revolutionary technologies**	• Focuses on technologies that require high-level experts	• Easy to create & produce
IP	• **Difficult to replicate** • Patented technology, typically commercialized	• Lower risk of product copying as compared to low-tech startups	• High risk of product being copied
Investments	• Requires **substantial long-term investment** to support R&D efforts	• Requires significant investments & time for return	• Low-tech innovation is inexpensive
Examples	SKYROOT AEROSPACE, RACEnergy	PLAID, OLA	upGrad, Urban Company



Source(s): Media publications, 1Lattice analysis

Focus of DeepTech lies at the intersection of market demand, global needs & DeepTech capabilities

Factors determining focus areas



Focus areas of DeepTech

Healthcare
(Drug development, personalized diagnostic & treatment, & precision surgeries)

Climate change
(Electricity generation, temperature control & carbon alternatives)

Food sustainability
(Cell culture technology, alternative to animal products & agriculture modernization)

SpaceTech
(Satellite technology, surveillance & communication)

Logistics & mobility
(Delivery system, warehouse management & autonomous driving system)

Energy
(Clean energy sources, energy storage system & efficiency of power management)

Source(s): World Economic Forum, Dealroom, Tech in Asia, Media reports, 1Lattice analysis

Agenda

DeepTech application areas

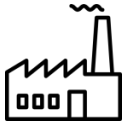
- Key application areas
- Application in different industries
- IT industry landscape
- IT industry trends

Application of DeepTech is spreading across various industries & is being used for different purposes

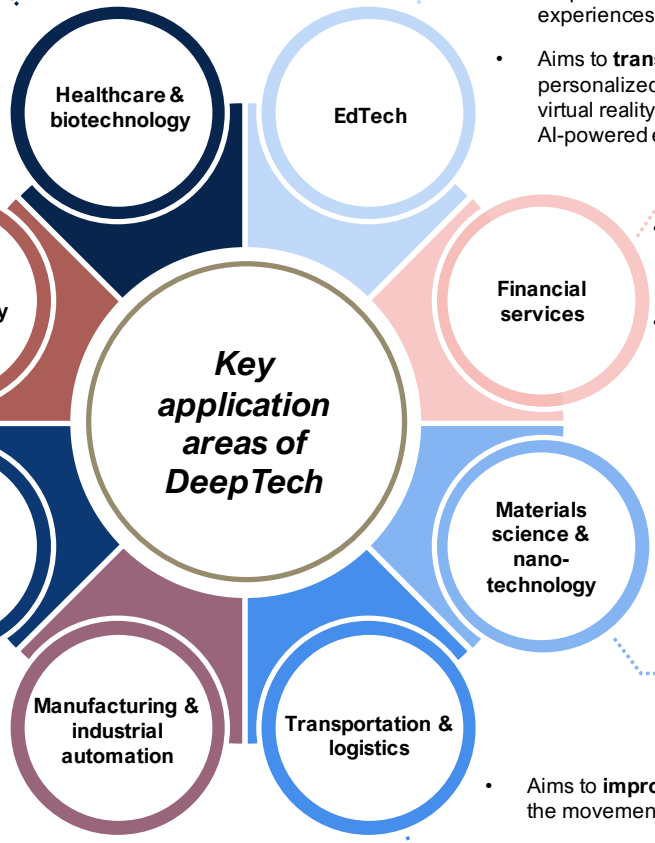
- Advancements in genomics, personalized medicine, drug discovery, medical imaging, diagnostics, & telemedicine leading to **revolutionized healthcare industry & improved patient outcome**
- Includes areas such as **precision medicine, bioinformatics, gene-editing, regenerative medicine**, & **AI-powered** healthcare systems

- Helps in development of sustainable energy **solutions** & addressing **climate change**
- Includes areas such as **renewable energy** technologies (solar, wind, hydro), **energy storage** (batteries, fuel cells), **smart grids**, **carbon capture** & **storage**, & **energy efficiency**

- Helps to increase crop yields, **optimize resource usage**, & **improve food safety**
- Aims to transform **the agricultural sector** through precision farming, remote sensing, IoT-enabled smart farming, vertical farming, genetic engineering, & food processing technologies

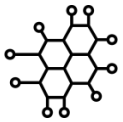


- Enables **improved efficiency**, **product quality**, **customization**, & **cost-effectiveness** in industries such as automotive, aerospace, electronics, & consumer goods
- Helps in **enhanced manufacturing processes** through robotics, automation, 3D printing, IoT, & predictive maintenance



- Helps in enabling **more effective** & **engaging** learning experiences
- Aims to **transform the education sector** through personalized learning platforms, adaptive learning systems, virtual reality (VR) & augmented reality (AR) applications, & AI-powered educational tools

- Innovations help in **improving security**, **transparency**,& **efficiency** in financial transactions
- Aims to optimize the process of algorithmic trading, risk assessment, fraud detection, robo-advisory services, blockchain technology, & digital currencies



- Innovation in materials science & nanotechnology by the **development of new materials with enhanced properties**, such as strength, conductivity, flexibility, & self-healing capabilities
- Such materials find applications in various industries, including electronics, healthcare, construction, & aerospace

- Aims to **improve safety**, **efficiency**, & **sustainability** in the movement of goods & people
- **Drives innovation** in transportation & logistics through autonomous vehicles, smart transportation systems, route optimization, predictive maintenance, & drone delivery

Source(s): Economic Times, SaasWorthy, 1Lattice analysis

Remote patient monitoring, disease diagnosis, & cancer treatment management system, major applications of DeepTech in healthcare

- Surgeons increasingly adopting simulation-based platforms over live operating theater for training & skill assessment
- With computer vision, simulation platforms **enhance surgical skills, ensuring safety & better patient care**

Smart medical training

Remote patient monitoring

- Refers to delivery of **healthcare services** without the need for the patient & healthcare provider to be in the same place
- **Remote monitoring devices** are used for:
  - Collecting patient data
  - Analyzing patient data
  - Monitoring patient health

- **Reduced need** for face-to-face appointments by using AI-powered chatbots & virtual assistants, which provide **24/7 access** to health information & advice

Chatbots

Disease diagnosis

- Application of AI/ML techniques in healthcare aids in diagnosing diseases & medical conditions. It helps healthcare professionals in making **accurate & timely** decisions
- It involves analysis of patient data such as:
  - Medical images
  - Lab results
  - Electronic health records

Applications of DeepTech in healthcare & biotechnology

- Analyzing historical healthcare data to identify patterns & trends to **predict future events**
- Some advantages are:
  - Predictions about patient treatment outcomes
  - Improved care quality
  - Reduced healthcare costs
  - Efficient treatment

Data-driven predictive modelling

Cancer treatment

- Leveraging DeepTech, mammograms or radiology scans can **precisely detect suspicious tumors** that might otherwise remain undetected
- **Deep learning** technology in digital imaging improve detection & classification of cancer

- DeepTech helps researchers **analyze** chemical structures & biological data to evaluate drug efficacy & safety
- DeepTech is leading to **new drug discovery**, making the process highly efficient & affordable

Drug discovery

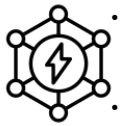
Blockchain powered health management system

- Blockchain can tackle issues like **data privacy & security** by:
  - Eliminating the necessity for intermediaries
  - Reducing costs associated with intermediaries
- Ensuring **patient consent & data ownership,** it provides for:
  - Storage of patient data
  - Sharing of electronic health records (EHRs)

Source(s): NASSCOM report, Press releases, 1Lattice analysis

Renewable energy optimization, energy storage management, & carbon capture, major applications of DeepTech in energy & sustainability

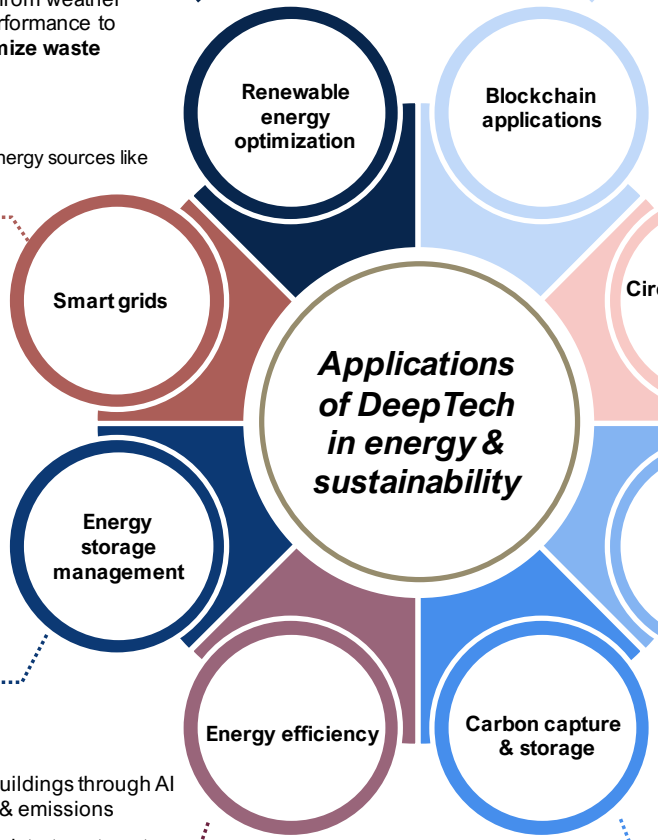
- Deep learning algorithms analyze data from weather patterns, energy demand, & system performance to **maximize energy production & minimize waste**
- DeepTech:
  - Enhances efficiency
  - Reduces operating costs
  - Improves management of renewable energy sources like wind, solar, hydro, etc.



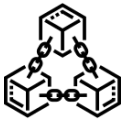
- DeepTech applications like ML & data analytics can be utilized in **smart grids development**
- These grids can:
  - Predict energy demand
  - Detect faults
  - Manage distributed energy resources
  - Optimize energy distribution

- ML optimizes the design & operation of energy storage devices (ESDs) & systems (ESSs) including batteries, capacitors, fuel cells, & other ESDs
- Deep learning **enhances ESS efficiency & lifespan** by analyzing energy usage & battery data

- DeepTech optimizes energy-efficient buildings through AI & ML algorithms, cutting consumption & emissions
- These algorithms analyze sensor & IoT data to automate **energy management & enhance efficiency**



- Blockchain ensures **secure & transparent records** of renewable energy generation, enhancing accountability
- Facilitates power purchase agreements (PPAs) between energy buyers & sellers



- DeepTech develops circular economy solutions; resources are reused, recycled, & repurposed to **minimize waste & environmental impact**
- IoT & AI in circular economy cut environmental impact via:
  - Automated waste sorting
  - Sustainable materials
  - Efficient supply chains

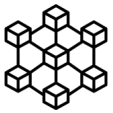
- Deep learning aids climate modeling to:
  - Analyze vast amounts of environmental data
  - Simulate future climate scenarios
- Quantum algorithms **predict El Nino effect* & other environmental changes** ahead of time, surpassing traditional forecasting

- DeepTech advances **carbon capture, usage, & storage (CCUS)** technologies for mitigating CO_2 emissions from refineries & industries
- ML algorithms help designing efficient capture processes & identifying suitable geological formations for **long-term storage**
- Quantum computing models chemical reactions like ammonia production for carbon capture, cutting CO_2 emissions

Note(s): *Refers to a warming of the ocean surface, or above-average sea surface temperatures, in the central & eastern tropical Pacific Ocean
Source(s): Energy Digital, Media articles, Press releases, 1Lattice analysis

Precision spraying, monitoring crop health & supply chain management using AI*, major applications of DeepTech in agriculture

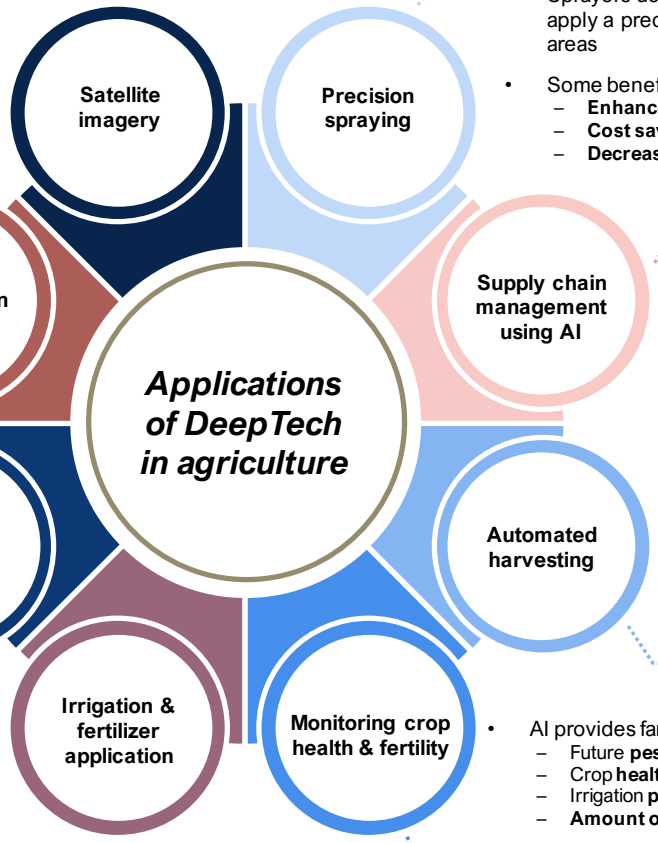
- **Track weather patterns** over large areas, provide valuable information about upcoming weather events
- Satellite imagery provides **valuable information about crop health & growth**, to predict yield
  - Helps farmers make better decisions about planting & harvesting
  - Helps farmers prepare for weather-related risks, such as floods or droughts



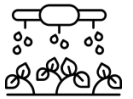
- Blockchain technology tracks plant data including seed quality & growth, aiming for sustainability
- Four broad categories:
  - Intelligent farming
  - Insurance of agriculture
  - Agricultural product transactions
  - Smart agriculture

- Computer vision automates sorting & grading with superior **accuracy & speed** compared to manual methods
- It helps in:
  - Meeting quality standards
  - Enhancing buyer confidence

- Remote sensing technology, such as high-resolution satellite imagery & aerial drone imagery, used to monitor **crop growth & soil conditions**
- This helps farmers target specific areas for **irrigation & fertilizer application**, leading to:
  - Efficient resource usage
  - Improved crop yields



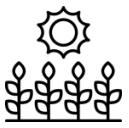
- Sprayers using DeepTech **identify weeds in real-time** & apply a precise quantity of herbicides to specifically targeted areas
- Some benefits of using sprayers with DeepTech are:
  - **Enhanced crop quality**
  - **Cost savings**
  - **Decreased use of herbicide (by~70%)**



- AI-driven solutions help in:
  - **Automating** tracking process
  - **Monitoring & analyzing** the entire supply chain, from farm to store shelf
  - **Identifying potential risks & providing insights** into performance of the supply chain

- AI-powered robots, also known as AgRobots, use DeepTech to perform harvesting with **unmatched efficiency, precision & effectiveness**

- AI provides farmers with predictions about:
  - Future **pest outbreaks**
  - Crop **health**
  - Irrigation **patterns**
  - **Amount of harvest** based on weather forecasting
- Such models forecast potential issues, allowing farmers to:
  - **Reduce** errors
  - **Minimize** crop failure risk



Note(s): *Artificial intelligence
Source(s): NASSCOM report, Press releases, 1Lattice analysis

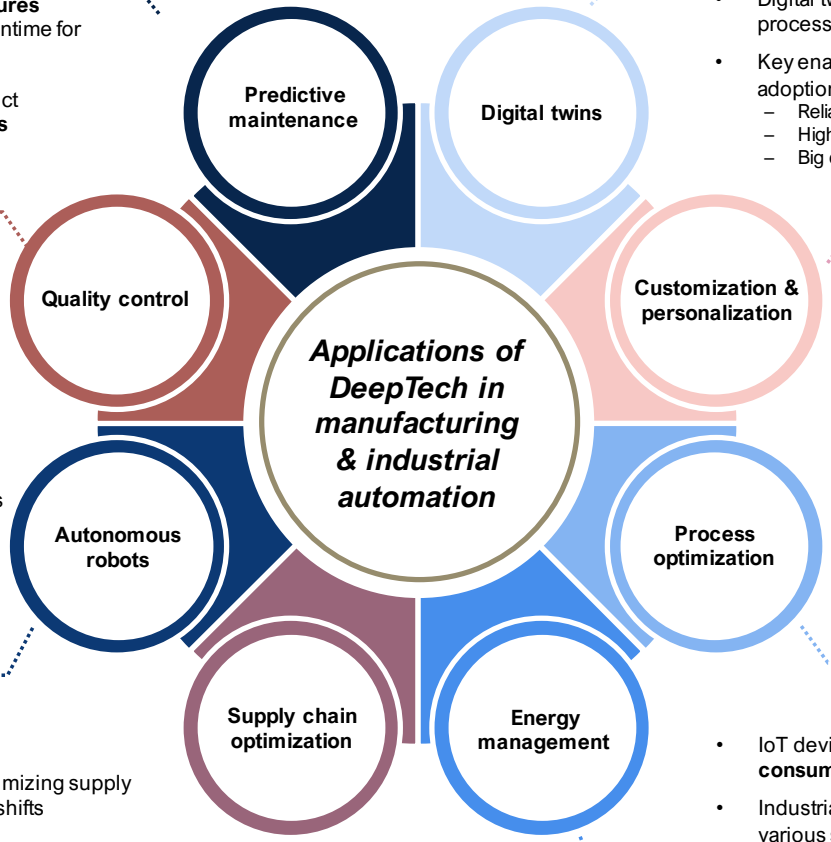
Predictive maintenance, quality control & autonomous robots, major applications of DeepTech in manufacturing & industrial automation

- Deep learning models **predict machine failures** using real-time sensor data, minimizing downtime for companies
- Big data tools analyze machine data to predict failures & **optimize maintenance schedules** efficiently

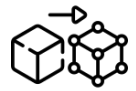
- Computer vision systems automate quality control, reducing production losses by **detecting defects early**
- AI & ML integration **enhances quality control** by
  - Optimizing operations
  - Ensuring consistent high-quality standards through smart decision-making

- Deep learning robots with advanced sensors
  - Boost productivity
  - Cut errors
  - Speed up assembly lines autonomously
- DeepTech startups create autonomous robots **enhancing efficiency, safety, & precision** in manufacturing

- Deep learning forecasts demand, optimizing supply chains for agile responses to market shifts
- Cloud-based warehouse management systems offer real-time access, **improving communication & visibility** for stakeholders



- Digital twins; **virtual representations of physical assets**, processes, or systems, formed from sensor & IoT data
- Key enabling IoT technologies for successful digital twin adoption include:
  - Reliable sensors
  - High-speed networks
  - Big data analytics



- Manufacturers gather diverse data, which AI segments to **tailor products & services** for individual needs
- Utilizing AI configurators for customer-driven product customization, offering a range of options for **personalized products**

- Deep learning analyzes data, revealing hidden patterns & **process improvements**
- Advanced analytics reveal process improvement opportunities through:
  - Statistical analysis
  - Data mining
  - Optimization algorithms

- IoT devices aid energy management with **real-time consumption data** for better decisions
- Industrial IoT (IIoT) platforms integrate data from various sensors & systems to provide insights:
  - Energy usage patterns
  - Identification of inefficiencies
  - Optimization of energy-intensive processes

Source(s): FutureBridge, Media articles, 1Lattice analysis

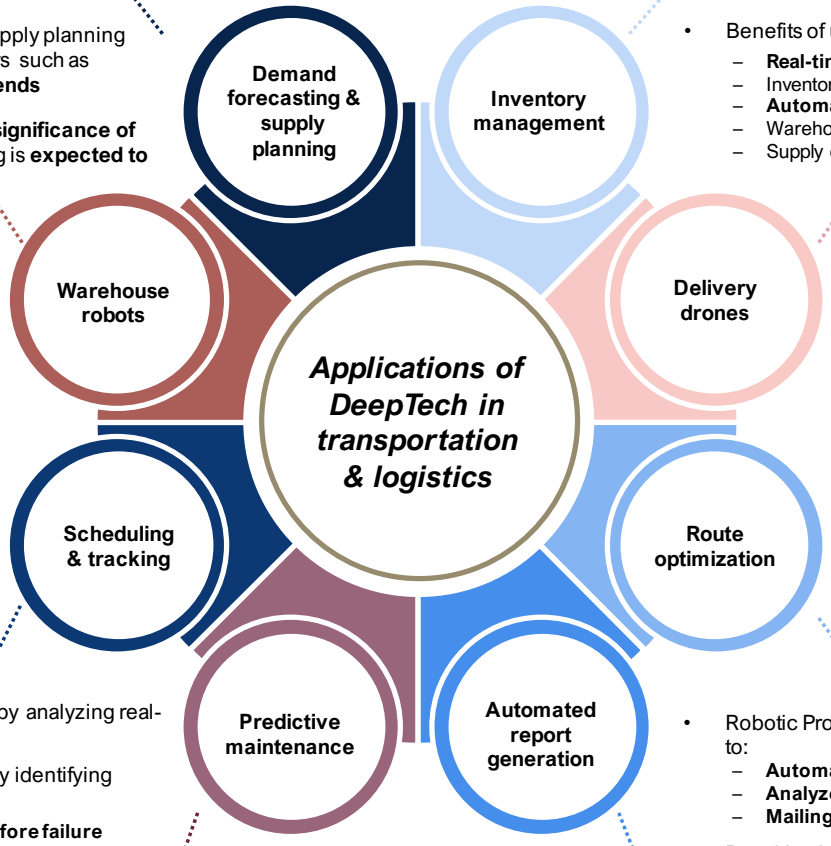
Inventory management, delivery drones, route optimization & predictive maintenance, major applications of DeepTech in logistics

- Leveraging AI for demand forecasting & supply planning enhances **accuracy** by incorporating factors such as **weather, news events, & social media trends**
- As data becomes increasingly accessible, **significance of AI** in demand forecasting & supply planning is **expected to rise**

- Help to **transport** materials, supplies, & inventory **within** warehouse facilities
- Used in operations **to replace** manually driven forklifts or pick carts
- These robots can **identify** obstacles & avoid collisions

- AI systems can be useful in logistics by:
  - **Scheduling** transportation
  - **Organizing** pipelines for shipments
  - **Assigning & managing** employees to particular stations
  - **Tracking** shipments in warehouse

- Predicting **potential machine failures** by analyzing real-time data collected from IoT sensors
- ML tools enhance predictive analytics by identifying patterns enabling:
  - Technicians to proactively intervene **before failure**
  - **Optimizing** maintenance strategies
  - **Minimizing** disruptions



- Benefits of using AI for inventory management:
  - **Real-time** inventory tracking
  - Inventory **in-sync** across all locations
  - **Automated** reordering
  - Warehouse storage **optimization**
  - Supply chain **efficiency**

- Delivery drones prove valuable where businesses need to deliver products to locations that are **unsafe** or **unreliable** for ground delivery
- Especially in healthcare industry as pharmaceutical products have **limited shelf life**

- Real-time logistics route optimization considers traffic, road restrictions, & weather for peak efficiency
- Shortest-path algorithms **optimize routes, cutting costs & time** for businesses

- Robotic Process Automation (RPA) tools can be leveraged to:
  - **Automatically** generate routine reports
  - **Analyze** report contents
  - **Mailing** relevant stakeholders
- Resulting in **timely communication** with managers & fostering **alignment** across entire company

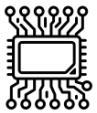
Source(s): Press releases, 1Lattice analysis

Atomistic representation & biomedical nanotechnology, major applications of DeepTech in material science & nano-technology

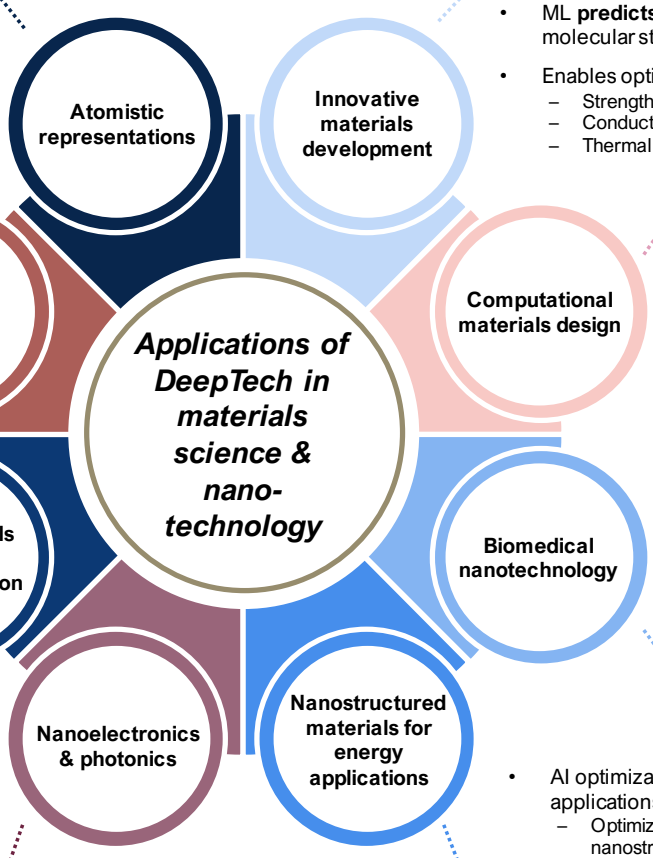
- Deep learning can be used to establish structure-property relationship between atomic structure & their properties with high accuracy
- Deep learning for **atomistic materials applications** include:
  - Force-field development
  - Material property predictions
  - Materials screening

- ML optimizes electronic materials, **enhancing performance & reliability** through predictive modification analysis
- DeepTech **innovations in advanced materials** like graphene, gallium nitride, & organic semiconductors revolutionize electronics for smaller, faster, energy-efficient devices

- Data analytics **predicts nanomaterial properties**, aiding customization for various applications like
  - Catalysis
  - Energy storage
  - Electronics
- AI-driven algorithms can extract valuable insights from complex datasets generated during nanomaterial characterization



- Advanced data analytics improve sensor & imaging device performance in nanoelectronics & photonics for diverse applications
- Quantum computing leveraging quantum properties of materials like superconductors & topological insulators, **boost computation power & information processing**



- ML **predicts material properties** based on atomic & molecular structures for innovative materials development
- Enables optimization for specific applications:
  - Strength
  - Conductivity
  - Thermal stability

- DeepTech techniques like molecular dynamics simulations & density functional theory, **design materials** at the atomic level for **desired properties**
- Using ML & quantum computing to predict
  - Material properties
  - Optimize compositions
  - Discover new materials

- Deep learning models aid in **repairing damaged tissues & organs** by
  - Designing & fabricating nanomaterial scaffolds for tissue engineering
  - Predicting scaffold properties, cell-material interactions, & tissue regeneration outcomes

- AI optimization tailors nanostructured materials for energy applications
  - Optimizes compositions, doping, surface treatments, & nanostructuring
  - Aims for **improved energy conversion, storage, & efficiency**

Source(s): Nature, Research papers, Media articles, 1Lattice analysis

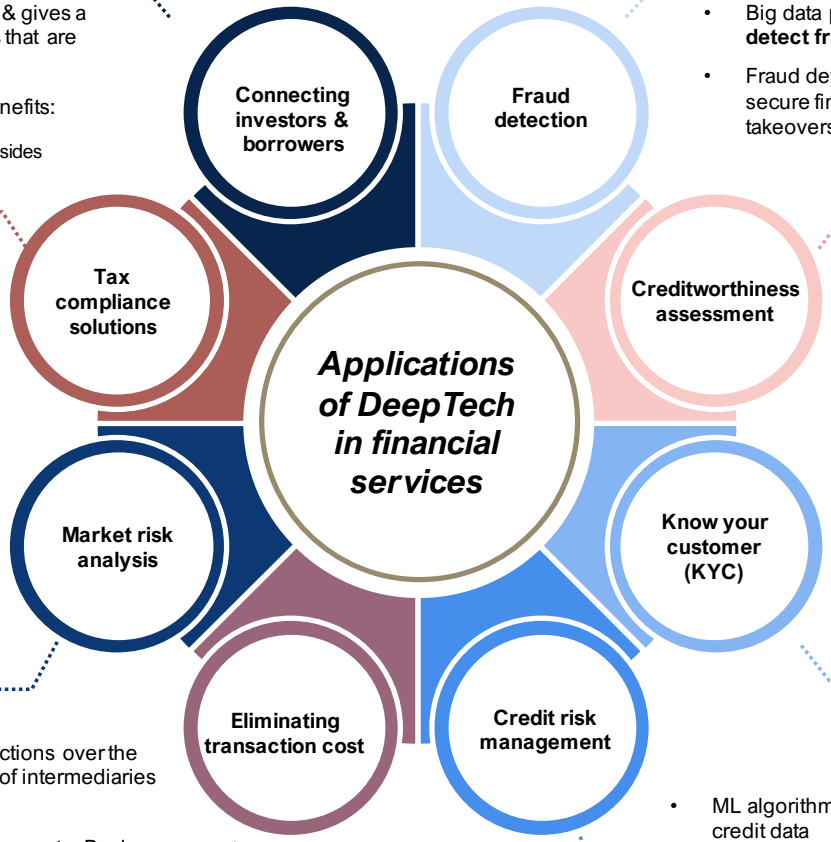
Fraud detection, creditworthiness assessment & collection process optimization, major applications of DeepTech in financial services

- Blockchain **mitigates risks** on both sides & gives a chance to **connect** investors & borrowers that are omitted in the traditional finance system
- This technology provides the following benefits:
  - A way to transfer assets
  - Sign deals with terms transparent to both sides
  - Automate debt management

- AI is being **used for taxation purposes** in the following ways:
  - Identifying cases with high tax evasion risk
  - Identifying taxpayers to send reminders for advance tax payments
  - Prompting specific taxpayers about apparent mismatches in income tax returns

- Banks use AI to process & analyze large volumes of data such as:
  - **Financial reports**
  - **Market trends**
  - **Customer data**
  - **Regulatory documents**
- This empowers banks to make **better informed decisions**

- Blockchain enables direct P2P# transactions over the internet, thereby eliminating the need of intermediaries & their costs
- It also **eliminates delays in online payments**. Real-time data updating feature further ensures smooth, error-free operations & prevents extra charge



- Big data platforms can analyze diverse data in real-time to **detect fraud patterns & anomalies**
- Fraud detection systems use **advanced cybersecurity** to secure financial data & prevent account fraud like account takeovers & identity theft

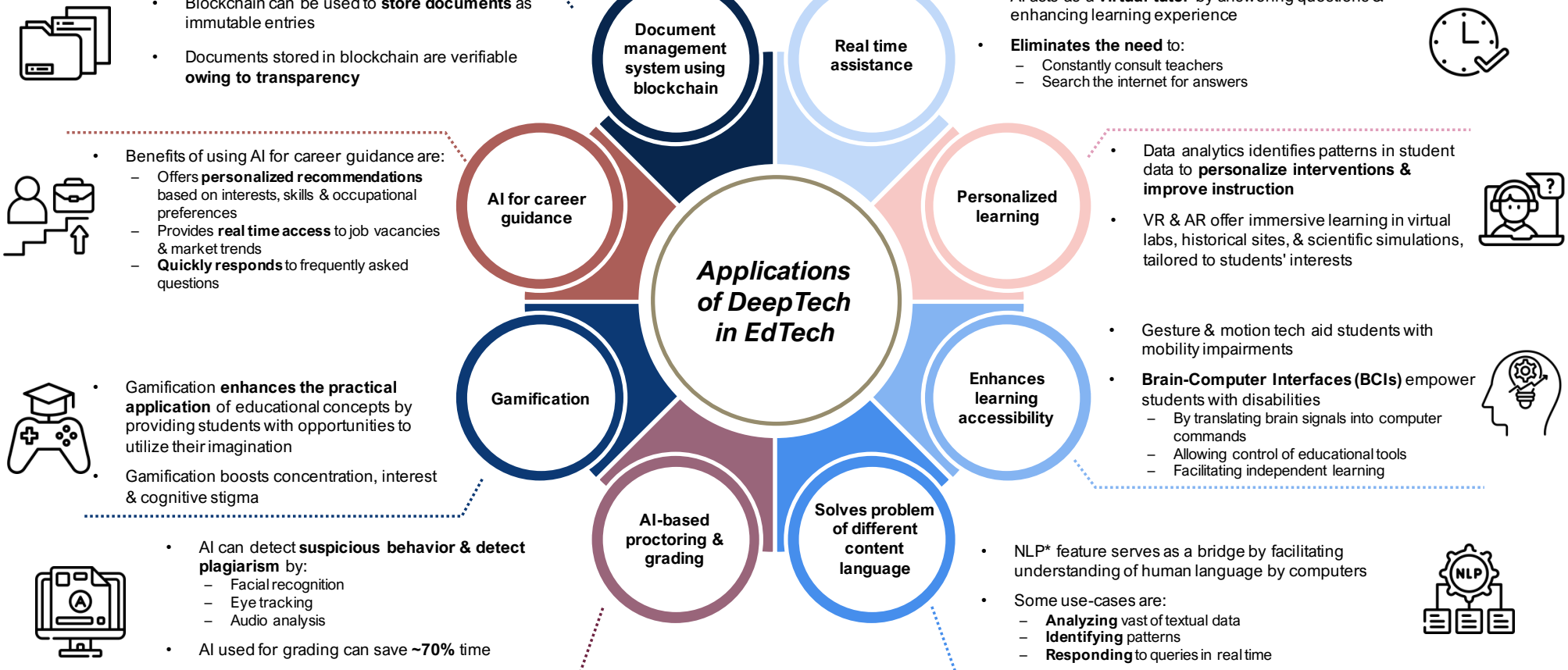
- Financial institutions often use AI algorithms to create models offering:
  - **More accurate** default probability
  - Loss **severity**
- Predictive models **evaluate borrower creditworthiness** using multiple factors like credit history & income

- Blockchain technology can enhance KYC process by providing **secure & transparent ecosystem** for:
  - Identity verification
  - Enhancing security through access controls
  - Mitigating data tampering risks
  - Ensuring data integrity

- ML algorithms predict credit defaults by analyzing historical credit data
- ML-based risk scoring can provide **real-time credit assessment** for faster, accurate lending decisions

Note(s): #Peer-to-peer
Source(s): NASSCOM report, Press releases, 1Lattice analysis

Real time assistance, personalized learning & enhanced learning accessibility, major applications of DeepTech in EdTech



Note(s): *Natural Language Processing
Source(s): NASSCOM report, Press releases, 1Lattice analysis

In IT industry, DeepTech ecosystem is a mix of large & medium companies, & start-ups, providing a mix of products & services

Large (Revenue >US$ 50M, employee size >400)

MAVENIR
cradlepoint
sisense
data iku
fractal
fastly
NVIDIA
HPE aruba networking

Medium (Revenue US$ 3-50M, employee size 100-400)

Qubole
HASURA
alchemy
ThoughtSpot
LUMIQ
APTOS LABS
SPIRE
H2O.ai
Mysten Labs
Digital Asset
C3.ai
cerebras
GRAPHCORE
rigetti
PsiQuantum
tenstorrent
Codasip

Start-ups (Revenue <US$ 3M, employee size <100)

deepfence
KrypC
arcana
quickwork
CONCEPTBYTES
ZSCORE
Akridata
XREX
METIS
polygon
InfuseAI
itm
PASSION FOR PRECISION
DRONA AVIATION
SASTRA ROBOTICS
SKYLARK DRONES
accio robotics.
SYSTEMANTICS sensible robotics

Source(s): Media articles, company websites, 1Lattice analysis

Product-based companies

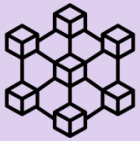
By CY25, ~51% of IT expenditure to move from traditional solutions to public cloud; accompanied by a global investment of ~US$ 200B in AI

Cloud computing

- Global business spending on cloud computing platforms to **exceed ~US$ 1T in CY24**
- **~51%[1] of IT spending** in application & infrastructure software, business process services, & system infrastructure markets will have shifted from traditional solutions to the public cloud by CY25
- **~66%[1] of spending on application software** will be directed toward cloud technologies in CY25

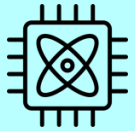
Artificial intelligence

- Private equity investment into generative AI reached **~US$ 2.2B in CY23 with 22 deals**
- Gartner predicted that **~65%[2] of application development** would be done with low-code/no-code tools by CY24.
- AI investment could approach **~US$ 100B[3] in the U.S. & ~US$ 200B[3] globally by CY25**
- India can paternally add **US$ 359-438B by CY29** to GDP on account of adoption of generative AI



Blockchain

- Global blockchain services market to reach a value of **~US$ 19.8B by CY27**
- Greater regulation around cryptocurrencies with international deal to **combat crypto tax evasion** to take effect in CY27
- By CY26 the business value added by blockchain will increase to over **~US$ 360B[4] & by CY30, that will increase to more than ~US$ 3T[4]**



Quantum computing

- **~5,000 quantum computers** are expected to be operational by CY23
- Quantum computing talent is predicted to be in short supply with **<50% of quantum jobs** to be filled by CY25
- IBM plans to build **4,000-qubit processer** by CY25
- Quantum computing market to potentially be worth **US$ 1.3T by CY35**
- Potential future business use cases for quantum computing are **simulation, AI, optimization & search & encryption**

Note(s): *Decentralized application, ** Information Technology / Information Technology Enabled Services / Electronics System Design and Manufacturing
Source(s): [1]Gartner press article , [2]Forbes report, [3]Goldman Sachs report, [4]Gartner report Deloitte report, [5]McKinsey report, [6]Finra article, Insider Intelligence article, 1Lattice analysis

Agenda

- **DeepTech market landscape**
  - Global investment trends
  - PE / VC global investments
  - PE / VC investments in top countries
  - Notable global investments
  - Global landscape
  - Emerging markets
  - Region-wise analysis
    - United States
    - Europe
    - Asia-Pacific
    - India

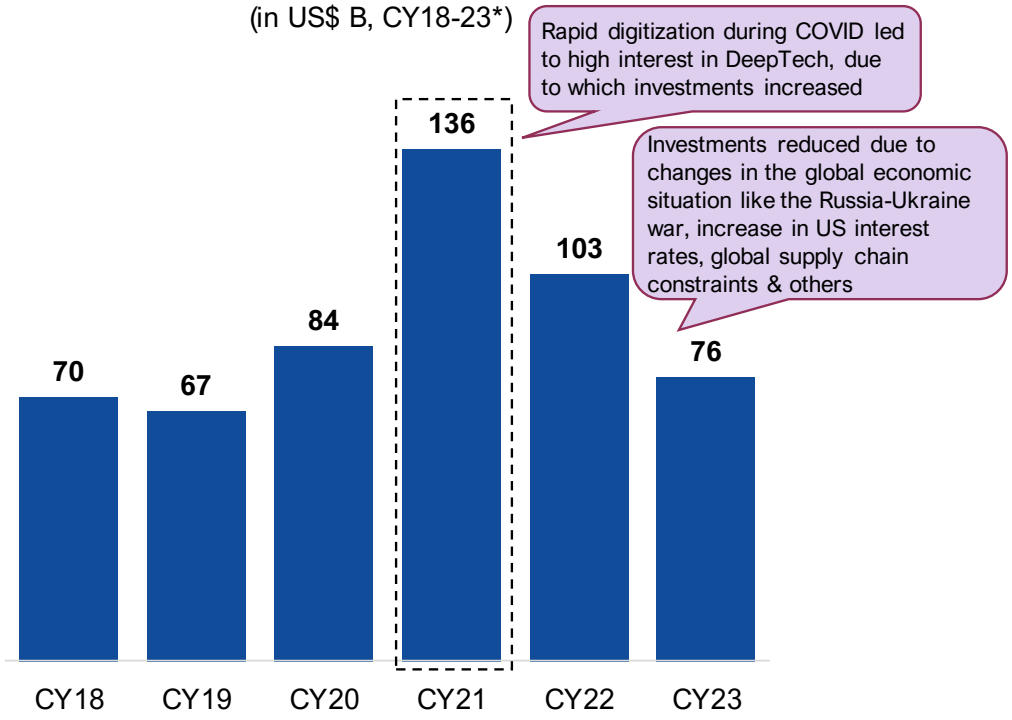
Global investments in DeepTech peaked in CY21 amounting to ~US$ 135B with ~4,720 deals

Global investments in DeepTech sector peaked during CY21 amounting to ~US$ 135B

Global # DeepTech deals peaked during CY21 with ~4,720 deals

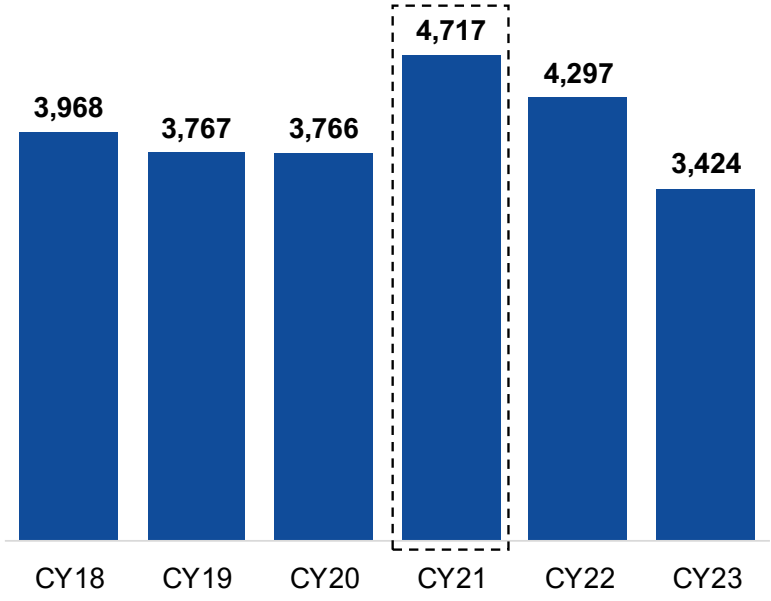
Total investments in DeepTech (Global)

(in US$ B, CY18-23*)



Funding deals in DeepTech (Global)

(# deals, CY18-23*)



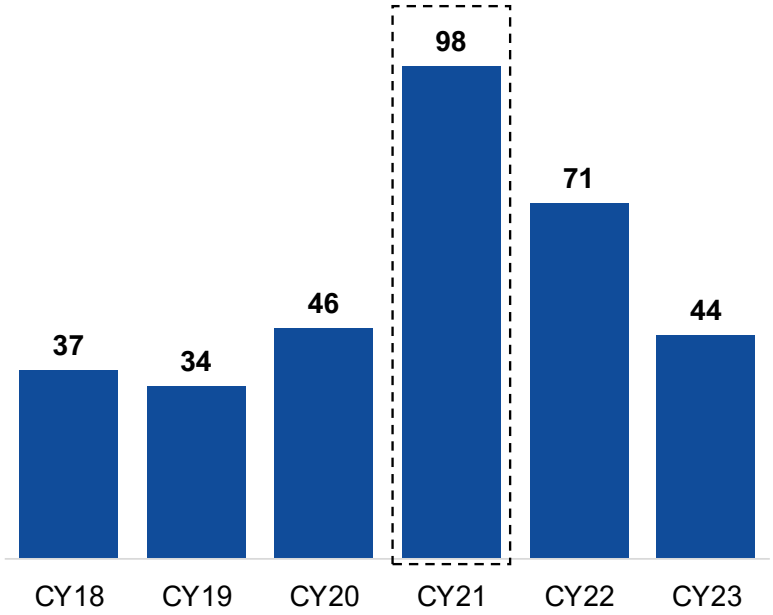
Note(s): *As on 4th March, 2024
Source(s): Tracxn, 1Lattice analysis

PE / VC investments & deals in DeepTech peaked during CY21 amounting to ~US$ 100B & ~2,810 deals respectively

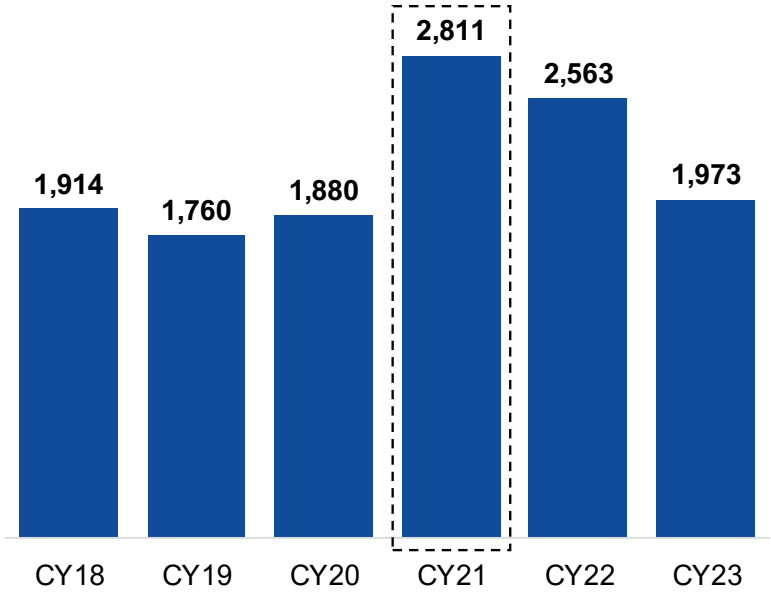
PE / VC investments in DeepTech sector peaked during CY21 amounting to ~US$ 100B

PE / VC # DeepTech deals peaked during CY21 with ~2,810 deals

PE / VC investments in DeepTech (Global)
(in US$ B, CY18-23*)



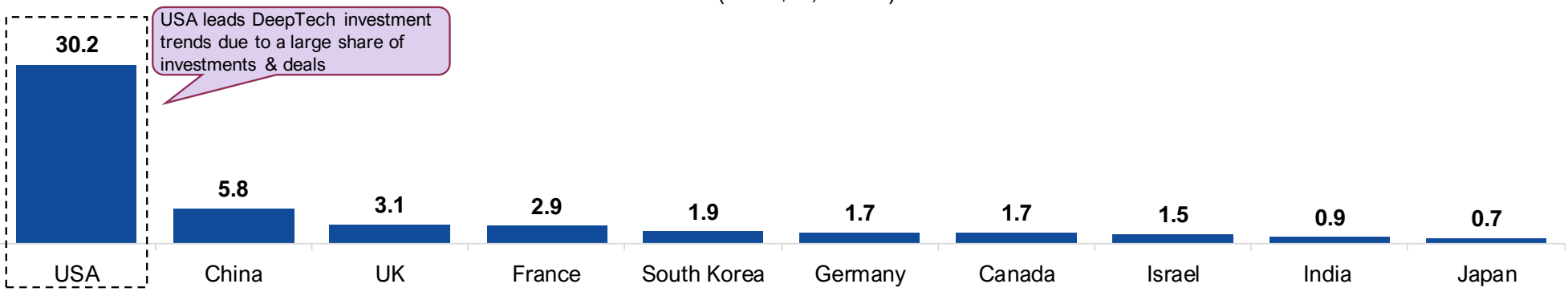
PE / VC deals in DeepTech (Global)
(# deals, CY18-23*)



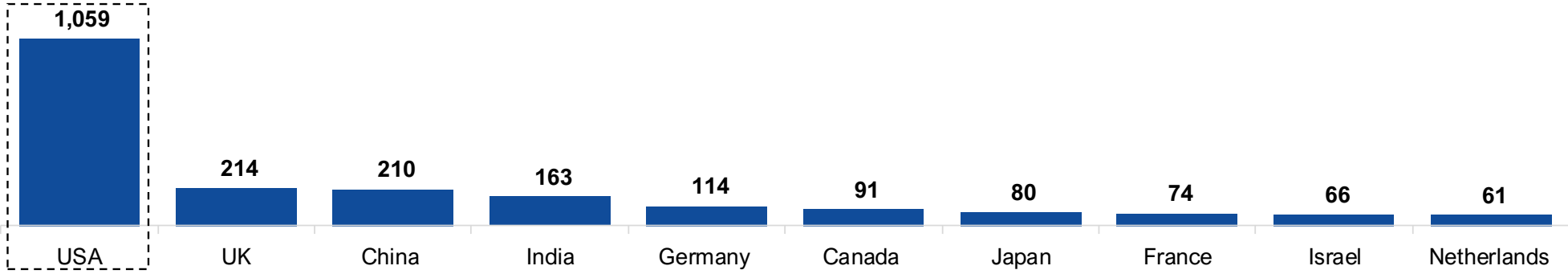
Note(s): *As on 4th March, 2024
Source(s): Tracxn, 1Lattice analysis

In CY23, USA had most PE / VC investment in DeepTech globally (~US$ 30B) and # DeepTech deals globally (~1,060)

PE / VC investments in DeepTech (Top countries)
(in US$ B, CY23*)



PE / VC deals in DeepTech (Top countries)
(# deals, CY23*)



Note(s): *As on 4th March, 2024
Source(s): Tracxn, 1Lattice analysis

Notable global investments in DeepTech during CY 2023 [1/3]

	Company	Technologies used	Founded year	Headquarter	Amount raised (US$ M)	Funding round	Latest funding year	Key institutional investors
Global DeepTech players	AssemblyAI	AI/ML	2017	United States	~50	Series C	Dec 2023	Accel, Insight Partners, Smith Point Capital, Y Combinator & other angel investors
	replit	AI/ML	2016	United States	~20	Series D	Nov 2023	Craft Ventures
	xage SECURITY	Blockchain*, Cybersecurity	2016	United States	~20	Series B	Nov 2023	Piva Capital, March Capital, Overture, Valor Equity Partners, Chevron, Saic, SCF Partners
	May Mobility	IoT*	2017	United States	105	Series D	Nov 2023	Toyota Ventures, BMWi Ventures, Trucks Venture Capital, NTT, Aioi Nissay Dowa Insurance, Cyrus Capital Partners
	QUANTUM SYSTEMS	Drones	2014	Germany	~67	Series B	Oct 2023	HV Capital, DTCP, Project A, Thief Capital, Bayern Kapital, Omnes Capital, Airbus Ventures
	SKYROOT AEROSPACE	Robotics*, Advance material science	2018	India	~27	Series B	Oct 2023	Temasek
	STOKE	Advance material science	2019	United States	~100	Series B	Oct 2023	Industrious Ventures, Sparta Group, Long Journey Ventures, Breakthrough Energy, Y Combinator, Point72 Ventures, NFX, Mac Venture Capital, Toyota Ventures, In-Q-Tel, University of Michigan
	CMR SURGICAL	Surgical robots	2014	United Kingdom	~165	Series D	Sep 2023	Ally Bridge Group, Cambridge Innovation Capital, LGT Capital Partners, Lightrock, SoftBank Vision Fund, Watrium, Railpen, Tencent
	Shield AI	AI/ML	2015	United States	~200	Series F	Sep 2023	U.S Innovative Technology Fund, Riot Ventures, Snowpoint Ventures, a16z, Point72 Ventures, ARK Investment Management, Homebrew
	Hugging Face	AI/ML	2016	France	~235	Series D	Aug 2023	Sound Ventures, Salesforce, Google, IBM Amazon, NVIDIA, Intel, AMD, Qualcomm

Note(s): *Indicates the major technology domain used
Source(s): Tracxn, Company website, 1Lattice analysis

Notable global investments in DeepTech during CY 2023 [2/3]

	Company	Technologies used	Founded year	Headquarter	Amount raised (US$ M)	Funding round	Latest funding year	Key institutional investors
Global DeepTech players	VIOME (VIOME)	Biotechnology*, AI/ML	2016	United States	~86	Series C	Aug 2023	Khosla Ventures, Bold Capital Partners, WestRiver Group & angel investor
	Primer	AI/ML	2015	United States	~69	Series D	Jul 2023	Addition, U.S Innovative Technology Fund
	LeddarTech	AI based software technology	2007	Canada	~43	Series D	Jun 2023	Quebec
	Inflection	AI/ML	2022	United States	~1300	Series E	Jun 2023	NVIDIA, Microsoft, CoreWeave & other angel players
	FarmWise	AI/ML, Robotics*	2016	United States	~51	Series B	May 2023	Fall Line Capita, Middleland Capital, Google Ventures, Calibrate Ventures, Taylor Farms, SVG Ventures, Wilbur-Ellis, Playground
	LIGHTMATTER	AI, Photonics & Electronics*	2012	United States	~154	Series C	May 2023	SIP Global Partners, Viking Global Investors, Google Ventures, Aliya, Fidelity Investments, HP Enterprise
	Zipline	Drones*, AI/ML, Blockchain, Advance material science	2014	United States	~330	Series F	May 2023	Katalyst Ventures, Sequoia Capital, Google Ventures, a16z
	Magic	Blockchain-based services	2020	United States	52	Series B	May 2023	Cherubic Ventures, Northzone, Volt Capital, PayPal, Synchrony, x Systems
	BandLab	AI/ML	2014	Singapore	~25	Series B	May 2023	Prosus, Cercano Management
	OpenAI	AI/ML	2015	United States	~300	Series E	Apr 2023	Flat Capital, Tiger Global Management, Sequoia Capita, a16z, Thrive Capital, K2 Global, Founders Fund

Note(s): *Indicates the major technology domain used
Source(s): Tracxn, Company website, 1Lattice analysis

Notable global investments in DeepTech during CY 2023 [3/3]

	Company	Technologies used	Founded year	Headquarter	Amount raised (US$ M)	Funding round	Latest funding year	Key institutional investors
Global DeepTech players	covariant	AI, Robotics	2017	United States	~75	Series C	Apr 2023	Radical Ventures, Amplify Partners, AIX Ventures, Northgate Capital
	LayerZero.	Blockchain	2021	Canada	~120	Series B	Apr 2023	Sequoia Capital, Samsung NEXT, Bond Capital, Lightspeed Ventures a16z
	VARJO (VARJO)	AR, VR & XR	2016	Finland	~3	Series D	Apr 2023	Nordic Secondary Fund
	LEDGER	Blockchain	2014	France	~109	Series C	Mar 2023	TGV, DFG, VaynerFund, Caphorn, Morgan Creek Capital Management, Cathay Innovation, Korelya Capital, Molten Ventures, Draper Dragon, 10T, Cite Gestion & other facilitators
	HEMAB (HEMAB THERAPEUTICS)	Biotechnology	2019	Denmark	~135	Series B	Feb 2023	Access Biotechnology
	Skydio	AI/ML, Drones*	2014	United States	~230	Series E	Feb 2023	Linse Capital, a16z, Next47, IVP, Walton Family Foundation, Ntt Docomo Ventures, UP Partners, Hercules Capital, Axon, NVIDIA, TASER International
	DreamVu	Robotics	2017	United States	~0.25	Series A	Jan 2023	Chiratae Ventures & Ben Franklin Technology Partners
	ripple	Blockchain	2011	United States	~0.1	Series C	Jan 2023	Tokentus
	QuickNode	Blockchain	2017	United States	~60	Series B	Jan 2023	10T Holdings
	iQIYI	AR, VR & XR	2016	China	~70	Series C	Jan 2023	Verity Venture

Note(s): *Indicates the major technology domain used
Source(s): Tracxn, Company website, 1Lattice analysis

DeepTech startups across different technologies & use cases / products are driving technological advancement & creating new opportunities

Technologies

Artificial Intelligence

iz.ai, nuro, Cropin, UPTAKE, Dataminr, data iku, AMD XILINX, DeepMind, NUMERAI, adarga

Blockchain

coinme, coinbase, BlockFi, CIRCLE, CONSENSYS, MoonPay, Ava Labs., BITFURY

Internet of Things

samsara, arm MARKETS, ptc, verizon, Spectrum, GE Digital, Telit Cinterion, RingCentral, AlertMedia, SimpliSafe, Johnson Controls

Big Data & Analytics

iTechArt, argyle, splunk>, teradata., Veeva, ASCEND.IO, rudderstack, People Data Labs, Craft

Use case / products

Drones

Skydio, VOLTELA, Dedrone, SKYWORD, DroneSense, VALQARI, DroneUp

Cyber security

paloalto NETWORKS, CROWDSTRIKE, TREND MICRO, okta, onetrust, tenable, DARKTRACE, CLOUDFLARE, CYBEROPS, detectify

Web 3

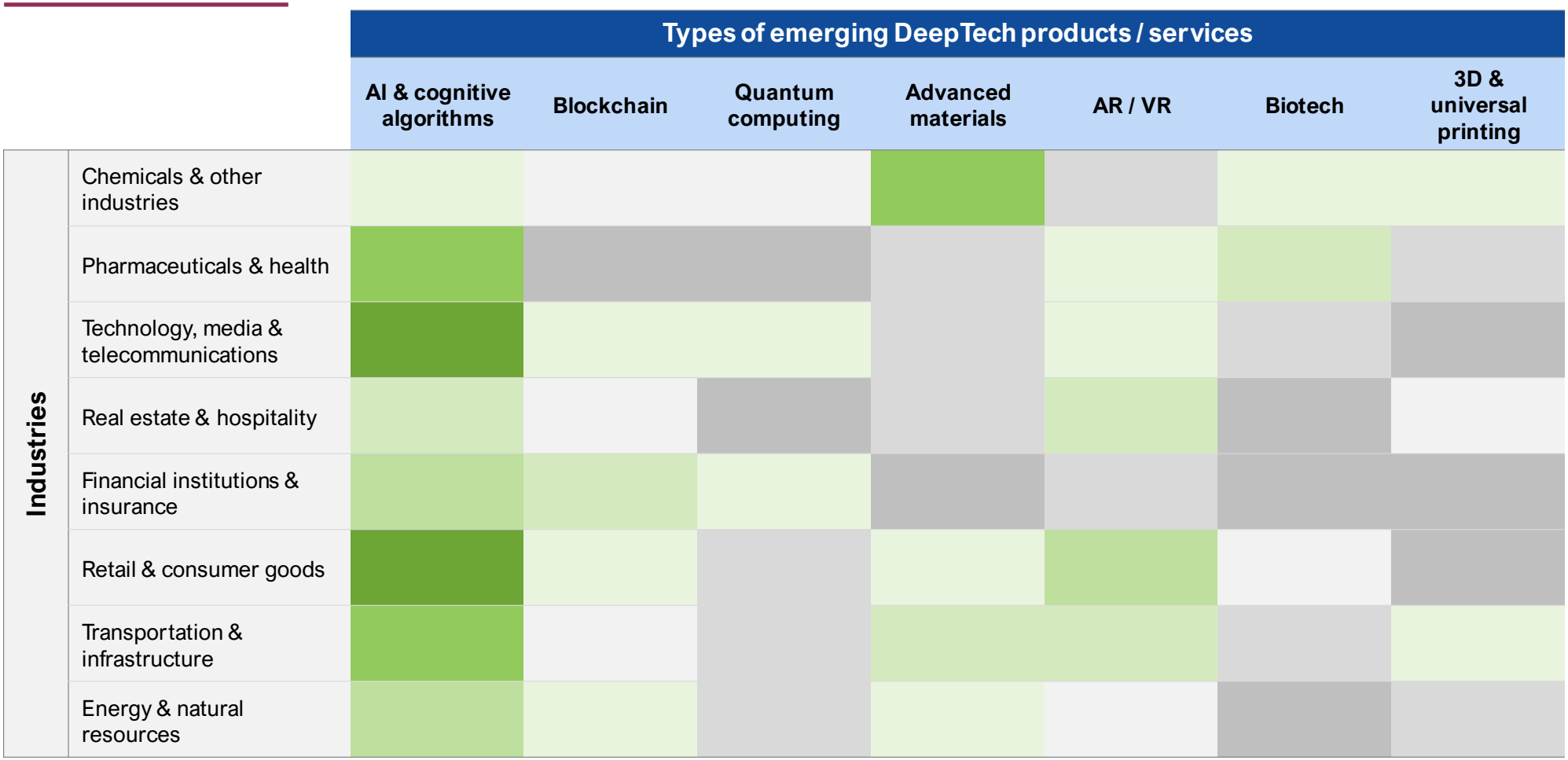
MESSARI, Pinata, Covalent, neeva, HUDDLE 01, Terra

Robotics

Kawasaki, Kawasaki Robotics (USA), Inc., OMRON, FANUC, KUKA, ABB, YASKAWA

Source(s): Media articles, Company websites, 1Lattice analysis

AI & cognitive algorithms is an emerging DeepTech product / service receiving highest interest from technology & retail industries globally



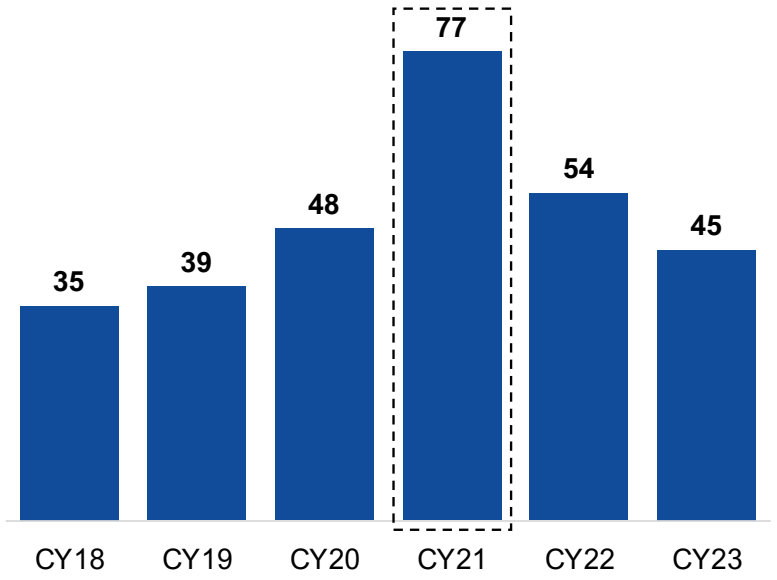
Source(s): Media reports, Research reports, 1Lattice analysis

In US, funding of DeepTech companies peaked during CY21 amounting to ~US$ 80B with ~1,890 deals

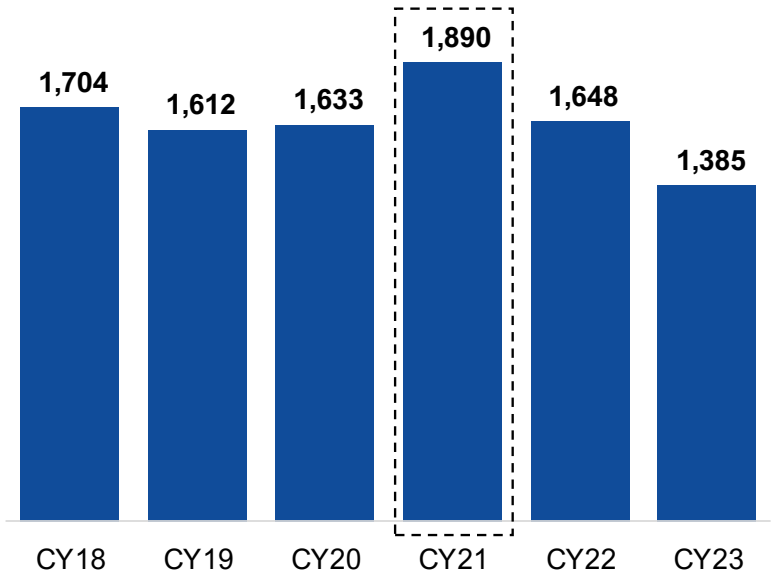
Funding in DeepTech companies in US peaked during CY21 amounting to ~US$ 80B

 # DeepTech deals in US peaked during CY21 with ~1,890 deals

Funding trends in DeepTech (US)
(in US$ B, CY18-23*)



Funding trends in DeepTech (US)
(#, CY18-23*)



Note(s): *As on 4th March, 2024
Source(s): Tracxn, 1Lattice analysis

In US, DeepTech technologies in focus are AI, blockchain, IoT & big data, key use cases being drones, cyber security, web 3 & robotics

Technologies

Artificial Intelligence

- SHOONYA
- NEURAL MAGIC
- clarifai
- Centaur Labs
- eyrene
- DYNO THERAPEUTICS
- HYPERSCIENCE
- Otter.ai

Blockchain

- ripple
- OpenSea
- alchemy
- NYDIG
- Chainalysis
- CERTIK
- AXONI
- Algorand

Internet of Things

- SENZARY
- bulzi
- SimpliSafe
- 75F
- SIGHT MACHINE
- iApartments.
- happiest baby

Big Data & Analytics

- Sparkfish
- imply
- rudderstack
- Bigeye
- Narrator
- OKERA
- IN—COR—TA
- ZENYSIS

Use case / products

Drones

- AEROBOTICS7
- ANDURIL
- Skydio
- DroneDeploy
- DEUCE 2 DRONE
- ELROY AIR
- DroneUp
- Zipline

Cyber security

- SafeStamp®
- DASHLANE
- Socure
- illumio
- BigID
- secureframe
- Security Scorecard
- corelight

Web 3

- consensys
- brave
- METAMASK
- StormX
- BlockFi
- VedasLabs.io
- Celsius
- MESSARI

Robotics

- Pipedream
- Boston Dynamics
- LOCUS ROBOTICS
- RAPID ROBOTICS
- AUTEV
- AGILITY ROBOTICS
- Tortuga
- GHOSTROBOTICS

Source(s): Press releases, Company websites, 1Lattice analysis

General Electric (GE) has a rich history of innovation & manufacturing excellence led by the continuous integration of digital technologies

Founding year
1892

Headquarters
Boston, USA

Total revenue
~US$ 76.6B*

Offerings
Manufacturing & industrial solution provider in various sectors

Overview

- A **prominent manufacturer** of a wide range of products, including power generation equipment, aircraft engines, locomotives, medical imaging devices, appliances, lighting, & more
- Integrates digital technologies into their products & services to **optimize performance &** provide **data-driven insights**

Business expansion

- Acquired **33 companies** with Opus One Solutions being its latest acquisition
- Company has spent over $ 28.71B for the acquisitions

Key competitors

SIEMENS, 3M, Honeywell, HITACHI

Key digital solutions

Feature	Offering	Feature	Offering
Additive Manufacturing (3D Printing)	• Utilization of 3D printing techniques to **produce** complex parts, prototypes, & components for various industries • Allows **improved design flexibility**, **reduced material waste**, & **faster production** times	**Advanced Materials & Composites**	• Use of advanced materials & composites in their manufacturing processes, offering **enhanced strength, durability, & weight reduction**
Digital Manufacturing & Industrial IoT	• **Utilization** of sensors, alarms, connectivity, & data analytics to monitor & optimize production processes which **improve efficiency**, & **enables predictive maintenance**	**Robotics & Automation**	• **Automated systems & robots** employed for tasks such as assembly, inspection, & material handling with an aim to **increase productivity, precision, & efficiency**
Supply Chain Optimization	• **Leverage** advanced data analytics & algorithms to **optimize** the **supply chain operations** • Includes demand forecasting, inventory management, logistics planning, & supplier relationship management	**Quality Control & Inspection**	• Employment of **advanced inspection** & **quality control** technologies to **ensure** the high standards of their manufactured products • Includes non-destructive testing techniques, automated inspection systems, & advanced imaging technologies to detect defects & ensure product integrity
Energy Efficiency & Sustainability	• Integrates **energy-efficient practices & sustainability initiatives** into their manufacturing operations • Includes the adoption of energy-efficient equipment, waste reduction, & environmental sustainability programs	**Automation**	• Includes the use of **robotics**, **computer numerical control** (CNC) machines, & **advanced automation systems** to enhance precision, productivity, & quality control

Note(s): *As on 31-12-2022
Source(s): Tracxn, Company website, Startup Talky, 1Lattice analysis

iCapital, a B2B FinTech company offering technology-driven solutions provider for wealth management firms, financial advisors & individuals

iCapital

Founding year
2013

Headquarters
New York, USA

Total funding
~US$ 670M

Offerings
Solution for wealth management firms, financial advisors,& individuals

Overview

- A FinTech platform **providing access** to alternative investments
- Serves as a **technology-driven solution provider** for wealth management firms, financial advisors, & high-net-worth individuals, offering a streamlined & efficient way to invest in private equity, hedge funds, & other alternative assets
- Platform acts as a **marketplace**, connecting investors with a curated selection of investment opportunities from top-tier fund managers

Business expansion

UBS SIMON AXIO

- Acquired **11 companies** in last 10 years with UBS Fund Advisor being its latest acquisition

Key competitors

FNZ Altruist NUCLEUS FINANCE

Key digital solutions

Feature	Offering	Feature	Offering
Investment Platform	• **Online investment platform** connecting investors, & registered investment advisors • Platform **facilitates the end-to-end investment process**, from browsing investment options to executing transactions	**Machine Learning & AI**	• ML & AI techniques **leveraged** to enhance various aspects of their platform including algorithmic analysis of investment data, personalized investment recommendations, risk assessment models, & fraud detection systems
Digital Investor Onboarding	• **Enables efficient onboarding** of new investors onto the platform • Through digital interfaces & streamlined processes, investors can create accounts, complete necessary documentation, & undergo verification processes	**Portfolio Monitoring & Reporting**	• Investors are provided with **portfolio monitoring tools** & reporting capabilities • Technology **aggregates** investment data & performance metrics, allowing investors **to track** the progress & performance of their alternative investments
Data Analytics	• Advanced analytics algorithms utilized to **process** & **analyze** data, providing investors with **insights**, performance metrics, & customized **reporting**	**Integration with Partner Systems**	• **Seamless integration** with partner systems, including those used by registered investment advisors & wealth management firms
Due Diligence & fund selection	• **Technology-driven due diligence** process evaluates factors such as fund track records, investment strategies, risk management, & operational infrastructure	**Workflow Automation**	• **Automation** of various workflows within their platform, reducing manual tasks & improving operational efficiency
API Integrations	• Application Programming Interfaces (APIs) utilized to **integrate** with third-party systems • **Enable seamless data exchange** & **interoperability** between different systems, streamline processes & enhance user experience	**Cloud Infrastructure**	• Company leverages **cloud computing infrastructure** to host & manage their platform • Cloud services provide scalability, flexibility, & high availability of data allowing efficient operations

Source(s): Tracxn, Company website, Startup Talky, 1Lattice analysis

AMP Robotics; revolutionizing AI-powered smart robots to economically & sustainably improve the global recycling system

Founding year
2015

Headquarters
Louisville, USA

Total funding
~US$ 178M

Offerings
AI-based waste sorting robot developer

Overview

- Created a **smart robot** (AMP Cortex™) that uses **AI** to sort **recyclables** from mixed waste on conveyor belts in facilities handling **construction**, **demolition** & **e-waste**
- AI identifies waste, a **machine learning** system **records material types**, & operational data is analyzed with graphs on a web platform

Key investors

- Secured **US$ 8M** in funding on May 9, 2023, with **Microsoft** Climate Innovation Fund as the investor
- Raised a total funding of **US$ 178M** over 6 rounds

Key competitors

SMARTER SORTING, PELLENC ST, ISHITVA ROBOTIC SYSTEMS, EVERESTLABS

Key digital solutions

Markets & materials	Offering	Markets & materials	Offering
Plastics	• **Smart sorting system:** Uses fast & intelligent robot that swiftly sorts plastics by material, color, transparency & shape with precision • **Smart recycling solution:** Uses AI to sort plastics into custom bundles for diverse buyers & efficiently recycles with robots for valuable resale in diverse markets	**Construction**	• **Boosts efficiency & prevent loss:** The robot system boosts efficiency, preventing loss of leftover materials with the use of smart robotics • **Specialized identification:** Cortex excels in identifying construction materials, with its delta-style robots grabbing smaller items for precise recovery & resale opportunities
Paper	• **Contamination removal system:** AMP Cortex™ robot rapidly cleans fiber lines, improving recycled cardboard, mixed paper & office paper quality • **Better pricing with cleaner bales:** Advanced AI boosts sorting efficiency, producing cleaner material bales for better prices in the market	**Electronics**	• **Perfect for e-scrap recovery:** The robot excels at e-scrap recovery, identifying & sorting tiny pieces at a rapid rate of over 80ppm* • **Accurate sorting for value -** Cortex reliably sorts precious metals, components & plastics for maximum recovery value from materials
Metals	• **Superfast metal recovery:** The robot recovers metals twice as fast as humans, ensuring quick & consistent metal retrieval • **Contamination prevention:** Prevents contamination, speeds up pure metal sorting & is perfect for recovering metals from used containers	**Organics**	• **Boost compost value:** Boosts compost value using AI & robotics, regardless of contamination levels • **Transform waste into environmental impact:** Transform waste into eco-friendly materials with AMP Cortex

Note(s): *Picks per minute
Source(s): Tracxn, Company website, Media articles, 1Lattice analysis

UbiQD, Inc. is a cleantech & advanced materials company manufacturing harmless quantum dots (QDs) & nanocomposites

Founding year
2014

Headquarters
Los Alamos, USA

Total funding
~US$ 12.9M

Offerings
Quantum dots (QDs*) & nanocomposites manufacturer

Overview

- Produces low toxicity quantum dots at low cost with applications in safety, design, solar energy, lighting, security, & personal care
- Creates ideal conditions for reproducible nanomaterial production
- Awarded **'Best overall venture'** at National Renewable Energy Laboratory industry growth forum in May 2023.

Key Investors

- **Nanosys** & **Keiretsu Capital** are the most recent investors
- Company has raised **~$10.2M** over 9 funding rounds from 10 different investors

Key competitors

polySpectra

D-Wave The Quantum Computing Company

Key digital / DeepTech solutions

Feature	Offering	Feature	Offering
Advanced materials	• **Develops** & **manufactures** advanced materials that incorporate quantum dots, such as films, coatings, & inks • Integration of advanced materials into various products & technologies to **enhance** performance, efficiency, & functionality	**AgriTech enhancement**	• Luminescent greenhouse films improve photosynthetic efficiency by shifting UV radiations, enhancing chlorophyll absorption • Emits light in all directions, **maximizing** light absorption by lower leaves & optimizing plant growth
Sustainable solutions	• Committed to developing **environmentally sustainable** solutions • Quantum dots designed are **less-toxic** & environmentally friendly, making them suitable for a range of applications that prioritize sustainability	**Photovoltaic & electronic system**	• **Sunlight harvesting window** aids in efficient power generation by absorbing sunlight without visual disruptions • Designed to fit into existing **manufacturing** & **installation** practices, these are seamlessly incorporated into buildings of today & tomorrow
Customization	• Offers **custom quantum dot** development services to cater to specific application requirements • Works closely with partners to develop tailored quantum dot solutions to wide range of **industries & applications**	**Security enhancement**	• **Quantum dot security ink** offers a unique optical signature that is recognizable & challenging to replicate • **Tunable Optical Properties** allows for a controlled & distinct optical signature for enhanced security
Energy harvesting	• Ability of quantum dots to **absorb & emit light** efficiently helps in **energy harvesting** systems • Develop solutions for **improved energy conversion** & storage in **solar cells & energy-efficient** lighting	**Optical filters & sensors**	• Utilizes QDs to create optical filters & sensors with **enhanced performance** & **versatility.** • **Applied** in fields such as spectroscopy, imaging & sensing, enabling precise detection & measurement of various substances & phenomena

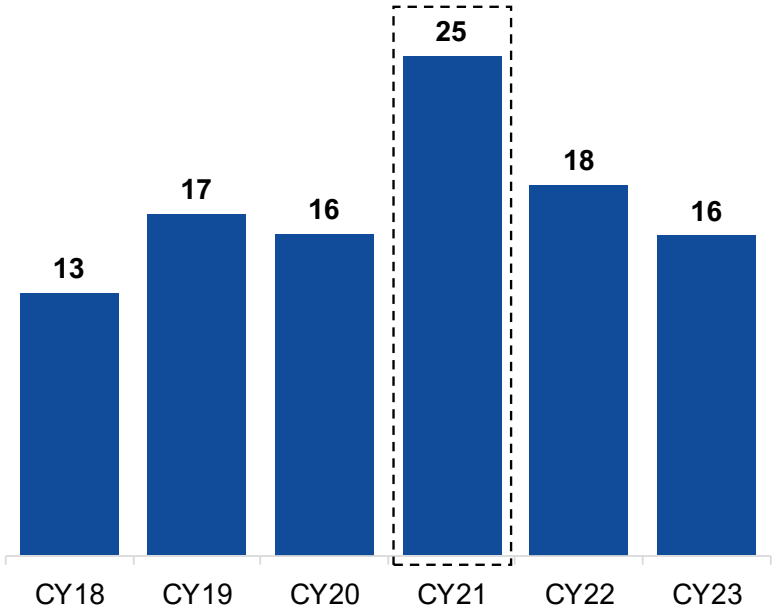
Note(s): *Quantum Dots are nanoscale semiconductor particles that exhibit unique optical & electronic properties
Source(s): Tracxn, Company website, Media reports, 1Lattice analysis

In Europe, funding of DeepTech companies peaked during CY21 amounting to ~US$ 25B with ~1,215 deals

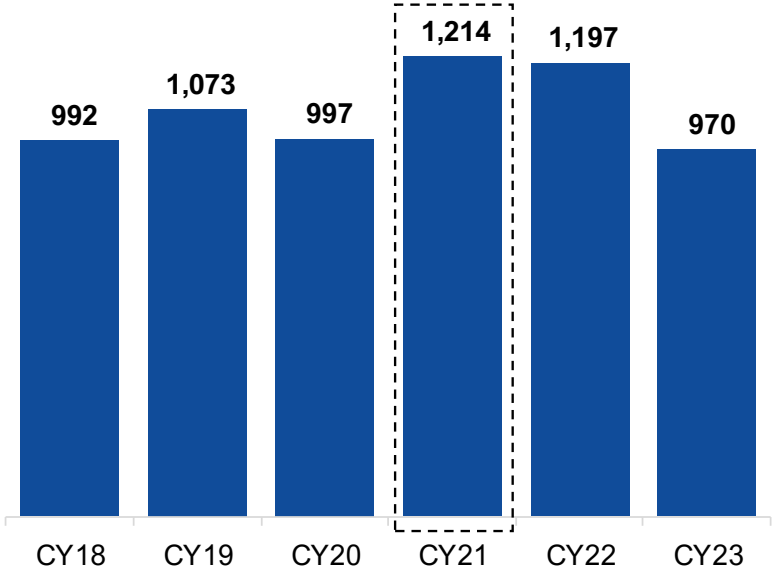
Funding in DeepTech companies in Europe peaked during CY21 amounting to ~US$ 25B

 # DeepTech deals in Europe peaked during CY21 with ~1,215 deals

Funding trends in DeepTech (Europe)
(in US$ B, CY18-23*)



Funding trends in DeepTech (Europe)
(#, CY18-23*)



Note(s): *As on 4th March, 2024
Source(s): Tracxn, 1Lattice analysis

Oxa pioneers smart self-driving software using less power, with laser vision, radar & cloud tools, making industries more independent

Inception
2014

Headquarters
Oxford, UK

Total funding
US$ 246M

Offerings
Self-driving solutions for autonomous vehicles

Overview

- Offer a **software platform** & **services** that enable any **vehicle** to be **self-driving** in any environment & for any purpose
- Enable organizations to deploy **self-driving** vehicle **technology** sooner for **safer**, more **efficient** operations

Key investors

- Raised a total funding of **US$ 246M** over 7 rounds
- Secured **funding** at an undisclosed amount, led by **Google**, in its latest funding round on **Oct 8, 2023**

Key competitors

TuSimple, ISEE, Kodiak, Plus, einride

Key digital solutions

Feature	Offering	Product	Offering
Modular compose architecture	• Offers software with high **modularity** & **performance** • Allows users to **utilize** individual **components**, a few selected ones, or the entire platform to meet user **specific needs**	**oxa Driver**	• Any sensor, vehicle or platform • **Low-energy, high-performance** • Highly **accurate** & **safe** • Integrate full stack, or **embed** specific **components** into other products & **technology** platforms
Open autonomy by design	• Provides **flexibility** by avoiding hardware, vehicle & sensor lock-ins • Enables users to benefit from **future innovations** & seamlessly integrate with other business platforms	**oxa MetaDriver**	• Train AV technology to perceive & **predict better** • Model the performance of AV operations using **virtual simulation** • Over **1,000x faster verification** & **validation** than driving real-world miles • Full suite of **tools**, or access tools individually, depending on your **requirements**
Safety first at all levels	• Prioritize **safety** by incorporating comprehensive **resilience** & **redundancy** at all levels • Ensures **maximum safety** for everyone inside & outside the vehicle, whether on public roads or off-road **environments**	**oxa Hub**	• **Command, control** & **manage** fleets of autonomous vehicles • Respond in situations of elevated risk by sending **remote assistance** command • **Integrate** with third-party fleet & data-management platforms • Underpinned by the **security** & **scalability** of **Google** Cloud

Source(s): Tracxn, Company website, Media articles, 1Lattice analysis

In Asia Pacific region, countries plan to use DeepTech to improve QoL[1], governments are focusing on creating a DeepTech ecosystem

Singapore

- As part of national AI strategy, Singapore plans to **triple the pool (to 15K)** of AI/ML experts, scientists & engineers
- **Increased government incentives** by backing accelerator programs for AI startups & encouraging companies to set up AI Centers of Excellence

South Korea

- Focus on **expanding AI infrastructure** by promoting public availability of data
- Government & private players to contribute worth **~US$1.5B** by CY27 to establish **the Startup Korea Fund by CY27** to support the global expansion of DeepTech ecosystem

Hong Kong

- Government initiatives like HKSTPC* aims at helping **DeepTech startups** research & develop innovative solutions
- Under this program, startups can receive **~US$ 0.2M** as assistance to cover tech & business development expenses

Australia

- In 2018, the Australian Government announced **~US$30M** for advancement in AI & ML technologies
- CSIRO**, announced **US$19M** on AI & ML solutions on:
  - Food security & quality
  - Healthcare
  - Sustainable energy & resources
  - Security

Taiwan

- 5+2 Industrial Innovation Plan, budgeted at US$3.3B, aims to shift its industries away from traditional manufacturing to a sector combining manufacturing & technology:
  - **Smart machinery**
  - **Biomedicine**
  - **New agriculture**
  - **Green energy**
  - **Security & defense**
  - **Circular economy**
  - **Internet of Things**

Indonesia

- In 2020, Indonesia announced the National AI Strategy plan for next 25 years with five priorities areas:
  - **Health**
  - **Government services**
  - **Education & research**
  - **Food security**
  - **Mobility & smart cities**
- National Research & Innovation Agency (BRIN) established an AI & Cybersecurity Research Centre in 2022

Japan

- Under Society 5.0 initiative, Big Data collected by IoT to be converted into a new type of intelligence by AI & **to reach every corner of society**
- Some advantages of Society 5.0 are:
  - Usage of AI & robots at **hospitals**
  - **Improvement of distribution & logistics efficiency** by introducing a single driver truck in a convoy using drones
  - Usage of Sensors, AI & robots to **inspect & maintain** roads, bridges, tunnels & dams

Note(s): [1]Quality of life *Hong Kong Science & Technology Parks Corporation; **Australia's national science agency
Source(s): Deep Knowledge Analytics report, Artificial Intelligence report by Australian Government, 1Lattice analysis

Optibus harnesses capabilities of machine learning & optimization algorithms to revolutionize planning & operation of mass transportation

optibus

Founding year
2014

Headquarters
Tel Aviv, Israel

Total funding
US$ 260M

Offerings
AI-enabled SaaS platform for planning & operating public transportation

Overview

- Provides **cloud-native solution** powered by **AI &** advanced optimization algorithms driving efficiency, improving service quality, & reducing costs
- Trusted by transportation agencies & operators in **over 2,000 cities** worldwide
- Promotes **sustainable transportation &** enhances efficiency & ridership

Key Investors

- **Volvo Group VC** & **Bessemer Venture Partners** are the most recent investors
- Company has raised ~**$260M** over 6 funding rounds from 12 different investors

Key competitors

fleetx

AGARI

Key digital solutions

Integrating various transportation services into a single platform

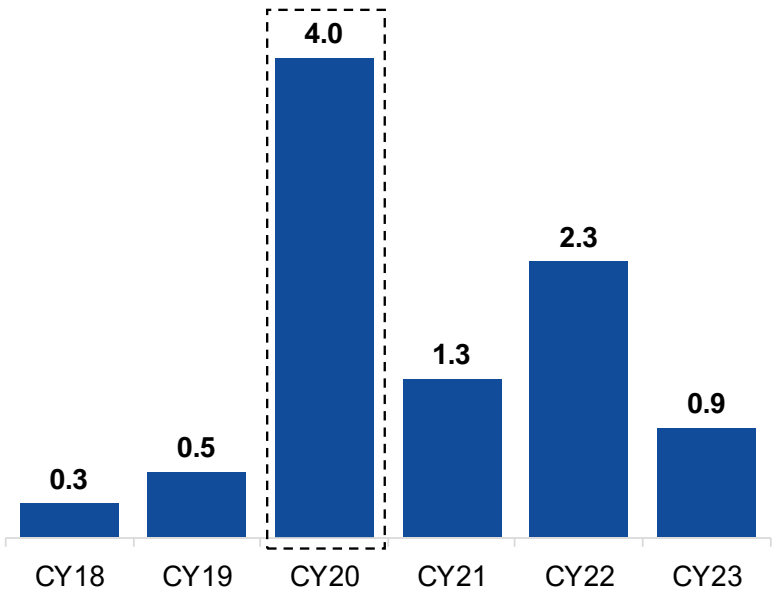
Feature	Offering	Feature	Offering
Route optimization	• **Optimizes routes** considering factors such as passenger demand, traffic conditions & operational constraints • Plans routes, minimizes travel time & **improves service quality**	**Mobility-as-a-service (MaaS) integration**	• Supports **integration** with **Mobility-as-a-Service** platforms, facilitating seamless integration of multiple modes of transportation & offering travelers a unified & **convenient mobility experience**
Demand forecasting	• Leveraging **machine learning** & **historical data** to predict passenger demand patterns • Helps operators to **allocate resources** effectively, **adjust service levels**, & proactively respond to changing demand	**Dynamic Scheduling**	• Offers dynamic scheduling capabilities, allowing for **real-time adjustments** to routes & schedules based on live data feeds • Helps optimize operations & adapt to changing conditions on the go, ensuring efficient service delivery
Data analytics & reporting	• Offers comprehensive **data analytics** & reporting features, allowing operators to gain valuable insights • Enables operators to analyze key performance indicators, identify improvement areas, make **data-driven decisions**, & **optimize** resource allocation	**AI-powered predictive maintenance**	• Utilizes **AI algorithms** to analyze vehicle & equipment data, predicting maintenance needs & proactively scheduling maintenance activities • Helps reduce downtime, **increase fleet reliability**, & lower maintenance costs.
Real-time monitoring & dispatching	• Enables operators to **track vehicles**, monitor performance, & make **real-time adjustments** to maintain optimal level of operations • Enhances operational control & responsiveness to unforeseen events	**Capacity planning**	• Assists in determining the optimal fleet size & composition based on **demand patterns** & operational requirements • Ensures efficient resource allocation & helps **minimize costs** while meeting service demands

Source(s): Tracxn, Company website, Crunchbase, 1Lattice analysis

In India, funding of DeepTech companies peaked during CY20 amounting to ~US$ 4B, while # deals peaked in CY21 total being ~340

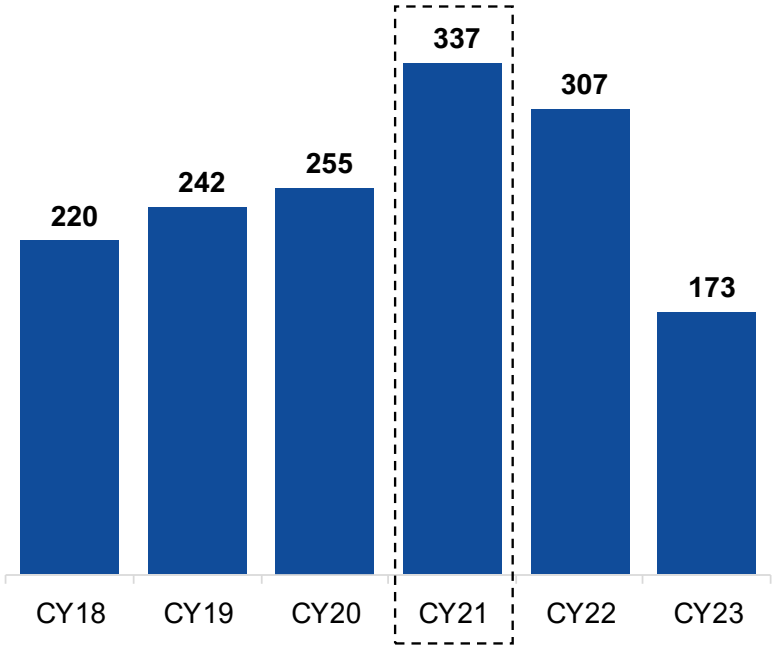
Funding in DeepTech companies in India peaked during CY20 amounting to ~US$ 4B

Funding trends in DeepTech (India)
(in US$ B, CY18-23*)



 # DeepTech deals in India peaked during CY21 with ~340 deals

Funding trends in DeepTech (India)
(#, CY18-23*)



Note(s): *As on 4th March, 2024
Source(s): Tracxn, 1Lattice analysis

DeepTech startups in India driving innovation across AI, blockchain, drones, big data, IoT[1], cybersecurity, web 3, & robotics

Technologies

Artificial Intelligence

Nayam Innovations, AGARA, Intello Labs, solvio, ORBO, COGKNIT, Streamoid, evueme, Instoried, CamKit.ai, ACTIVE.Ai, senseforth.ai, AIGROEDGE

Blockchain

UNOCOIN, arcana, SOMISH, polygon, wazirx, the dapp list., KOINEX, Mudrex, Mindeft, SIGNZY, KOINEARTH

Use case / products

Drones

ideaForge, CDSpace, TECHEAGLE, SKYLARK DRONES, Qubicon, asteria aerospace, AUS, flytbase, DRONA AVIATION

Cyber security

technisanct, appknox, CYWARE, UNIKEN, KRATIKAL, CloudSEK, SEQURETEK, deepfence, TAC Security, SAFE

Internet of Things

Probus, SenseGiz, Ayasta, GODAAM, ALTIZON, silvan, cariQ, TRAK TELL, nemocare, aeris, cubical

Big Data & Analytics

Magenta Bi Actionable Analytics, DATAWEAVE, e6data, Flutura, CRE MATRIX, aknamed, TheMathCompany, Ideata, germin8 Social Intelligence

Web 3

LYSTO, INSTAAPP, THE TOKEN LIST, GITCOIN, QuickNode, JUMP, koinfox, UniLend, KrypC, Playcent, one rare

Robotics

PLANYS, GreyOrange, accio robotics, SYSTEMANTICS sensible robotics, TARTAN SENSE, SASTRA ROBOTICS, ALOG, comofi MEDTECH, Niramai, gridbots

Note(s): [1]Internet of things
Source(s): Media articles, NASSCOM Tech Start-up Report 2022, 1Lattice analysis

DeepTech startups in India are advancing across IT, healthcare, business services, fashion, retail & other domains respectively

	Company	Description	Founded year	Headquarter	Operating sector
Indian DeepTech players	GoCodeo	Provider of AI-powered fully autonomous copilot for unit testing	2023	Bengaluru	Software development
	Heva AI	Provide of diagnosing neurological disorders using AI	2023	Bengaluru	Healthcare
	AttentionKart	Provider of intelligent user engagement analytics SAAS platform	2022	Mysore	Software development
	harvested ROBOTICS	Provider of tractor-mounted laser weeding robotic platform	2022	Hyderabad	Agriculture
	oorja.energy	Provider of battery design software to empower automotive companies	2022	Bengaluru	Automotive
	SPUTNIK BRAIN	Provider of non-surgical brain modulation device to help alleviate stress	2022	Bengaluru	Healthcare
	CODINCITY CODING THE FUTURE	Provider of application development, cloud, devops & UI design services	2021	Bengaluru	Information technology & services
	AI Borne	Provider of world's 1st AI & AR based end-to-end visually empowered Inspections-as-a-Service (IaaS) platform	2020	Delhi	Insurtech & automotive
	Hindonics	Provider of touchless interactive screens	2020	Gorakhpur	Consumer durables

Source(s): Tracxn, Media articles, Company websites, 1Lattice analysis

Top-tier academic institutions partner with industry leaders in fields of AI / ML, robotics, quantum computing, blockchain & extended reality

AI/ML

- Partnership between **IIT-Madras**' Robert Bosch Centre for Data Science & Artificial Intelligence (RBCDSAI) & **Taylor & Francis Group** to advance AI & data science research
- Establishment of **Kotak-IISc AI/ML Centre** by Kotak Mahindra Bank Limited & IISc
- Establishment of **Mehta Family School of Data Science & AI** by IIT Roorkee & Mehta Family Foundation, provides degree programs for skilled professionals
- Partnership between **IIT Bombay** & **Amazon**, to support research projects, PhD fellowships & community events

Robotics

- **BetaTANK Robotics**, an IIT Guwahati-incubated startup, is transforming the petroleum industry through advanced robotic solutions
- Establishment of **Nokia Centre of Excellence** specializing in Networked Robotics by Nokia & IISc
- Indo-EU collaboration project, **Robotics & Autonomous Systems in India** (IRAS-HUB), aimed at addressing skilled talent shortage in robotics technology to be led by IIIT-Delhi

Quantum Computing

- Partnership between **IBM** & 11 **top-tier Indian academic institutions** including IISc Bangalore, IIT Kharagpur, etc. to boost advanced training & research in quantum computing
- Collaboration between **HARMAN** & **BITS Pilani** for advance research & innovation in applied quantum computing applications
- Partnership between **IIT-Madras** & **Mphasis** (IT solutions provider) for applied research in quantum computing

Blockchain

- Collaboration between **RV University** & **Social3** (Web 3.0 hiring platform) to enhance blockchain education for students
- Collaboration of **Timespro** with **top industry partners** & **IITs** is developing courses for web 3.0, blockchain, cryptocurrency, etc.

Extended Reality

- Collaboration between **IIT Madras** & **ISRO** for **Indian Human Spaceflight Program** to develop applications of extended reality
- Collaboration between **Steel Authority of India Limited** & **IIT Madras** to develop the applications of extended reality & other technologies in **steel manufacturing**
- Partnership between **AIIMS** & **Microsoft India** to advance digital innovation through extended reality in **healthcare services, medical education & research**

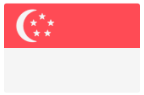
Source(s): Press release, 1Lattice analysis

India is collaborating & partnering with global stakeholders to promote innovation & technology in the DeepTech industry [1/2]

 **United States**	• **U.S. India Artificial Intelligence (USIAI) Initiative** focuses on AI cooperation in healthcare, smart cities, materials, agriculture, energy & manufacturing • Initiative on **Critical & Emerging Technologies (iCET),** a collaboration between both countries in technologies like AI, quantum computing, semiconductors, etc.
 **United Kingdom**	• **MoU** signed for **UK-India Tech Alliance,** aimed at increasing collaboration on skills, new technologies, policy development & innovation • **MoU** signed for collaboration on **science & innovation** aims to**:** – To enhance scientific collaboration – To boost the economic growth of both countries
 **Russia**	• India-Russia Joint **Technology Assessment & Accelerated Commercialization Programme,** bilateral initiative focused on strengthening the relationship based on science, technology & innovation
 **United Arab Emirates**	• **MoU** signed to collaborate on the **development of industries & advanced technologies,** aims to strengthen industries in both nations through investments, technology transfer & deploying key technologies
 **Germany**	• **Bilateral discussions** on **advance AI** through joint efforts in **startups**, **research** & **practical applications,** aims to foster a higher degree of application of AI in sustainability & healthcare across both nations

Source(s): Press release, 1Lattice analysis

India is collaborating & partnering with global stakeholders to promote innovation & technology in the DeepTech industry [2/2]

 **Australia**	• **Australia-India Cyber & Critical Technology Partnership (AICCTP) program** aims to: – Prioritize security – Provide resilient & trusted technology for concurrent advancements in national security – Provide economic growth for both countries
 **Japan**	• **MoU** signed to develop **semiconductor ecosystem,** aims to concentrate on advancements in manufacturing, research, design, equipment research, talent acquisition & supply chain development
 **Israel**	• **MoU** signed on **Industrial Research & Development Cooperation,** bilateral initiative to strengthen collaboration in innovation & startups
 **Singapore**	• India-Singapore **Collaborative Industrial Research & Development Programme,** aims to promote collaboration between institutions & industries across the two countries • **MoU** signed on **cooperation in the fields of science, technology & innovation,** aims to promote, foster & facilitate collaborative projects in mutually interesting fields
 **South Korea**	• **Trilateral technology dialogue** between India, the United States & South Korea aims to enhance: – Technological cooperation – Innovation across the three nations

Source(s): Press release, 1Lattice analysis

Government has taken several initiatives to promote the adoption of DeepTech & create a conducive environment for their development

Blockchain

- MeitY[#] initiated a project focusing on developing a **National Blockchain Framework (NBF)** which is a shared blockchain infrastructure & offering as a service (**BaaS**)
- MeitY supported a project **Distributed Center of Excellence in Blockchain Technology** which aims to create blockchain-based POCs for multiple domains

Artificial Intelligence

- **AIRAWAT**, an AI-specific Cloud Computing infrastructure, which will be set up by NITI Aayog focusing on R&D to help businesses & governance use cases
- NITI Aayog has established National Program on AI, focusing on R&D in emerging technologies

Drones

- **Drone Rules 2021**, published by the Ministry of Civil Aviation aims to provide a framework for the drone ecosystem & make India the drone hub by 2030
  - **Platforms like Digital Sky will focus on the registration & licensing of drones**
- Seeing opportunities in the future, government wants to enable it with a **liberalized drone policy**

Cybersecurity

- MeitY has launched the **Cyber Surakshit Bharat** initiative with an aim to strengthen the cybersecurity ecosystem in India & following the Government's vision of a "digital India"
- Approval of the **Personal Data Protection Bill** by the Union government to protect Indian users from global breaches, which focuses on data localization

Quantum computing

- Indian government established **collaborations** with international organizations & companies to promote the development of quantum computing in India
  - **DST**** has signed a Memorandum of Understanding with IBM to establish a quantum computing education & research initiative in India

Note(s): *Government of India #Ministry of Electronics & Information Technology, ** Department of Science & Technology
Source(s): NASSCOM Tech Start-up Report 2022, 1Lattice analysis

STPI, founded in 1991, offers several services for start-ups, including incubators, infrastructure, mentorship, funding, investment, etc.

Founded 1991
Under MeitY

Software Technology Parks of India (STPI)

- Promote the **development and export of software and software services** including IT Enabled Services/Bio-IT
- Provide statutory and other **promotional services** to the exporters **by implementing Software Technology Park**/Electronics and Hardware Technology Park Schemes
- Provide **data communication services** including value-added services to IT/IT enabled services related industries
- Promote **micro, small and medium entrepreneurs** by creating a conducive environment for entrepreneurship

Infrastructure

- **Ready to work** 'Plug and Play' space
- Health Informatics Lab/IoT Lab, Fab Lab, AI/Data Analytics Lab
- **Year-around operational** workspace
- Testing and validation facility

Facilities include fully air-conditioned incubation spaces, uninterrupted power supply, 24x7 security, workstations, cubicles, conference halls, internet bandwidth etc.

Marketing

- Support in **end-to-end marketing plans** to attract visibility
- Technical & business knowledge sessions, road shows, networking events, social media outreach
- **Partnerships** with key international promotional agencies for cross-border collaboration

Intellectual Property Rights

- MoU with NRDC for filing Intellectual Property Rights
- **Patenting** (drafting & filing), **Trademark**, **Copyright** and other related legal or statutory support

Monitoring

- **Monitoring and guiding** through dedicated portfolio managers and start-up support executives
- **Reviewing and monitoring** the progress and performance periodically
- Taking necessary actions as and when required

Mentorship

- Needs-based **mentoring sessions** on legal, compliance, branding, cybersecurity, tech
- Transformation from idea level to prototype level, prototype level to MVP (Minimum Viable Product) level, MVP level to GTM (Go-To Market) level, and **graduating the start-ups** into full-fledged company status
- **Networking with other players** in the ecosystem

Funding & Investment

- **Support in raising funds** by leveraging connections with potential investors
- **Networking** with HNI (High Net Income) individuals, VCs (Venture Capitalists), corporates as per the size of start-ups
- Grants, equity, debt

Source(s): STPI, Secondary research, 1Lattice analysis

Centers of Entrepreneurship (CoEs) are technology incubators set up for building India's start-ups leadership

Centre of Entrepreneurship (CoE)

Centers of Entrepreneurship (CoEs) **are technology incubators** which have been established by STPI for building India's start-ups leadership

A CoE is a facility where **the highest standards and best practices** are made available for specific focus areas

CoE	Location	Technology area	Start-ups Incubated (#)
Electropreneur Park	New Delhi	Electronics Systems Design and Manufacturing	59
OPENLAB	Bengaluru	Internet of Things	60
STPINEXT INITIATIVES		IoT in Health & Pharmaceuticals	35
Electropreneur Park	Bhubaneswar	Electronics Systems Design and Manufacturing	27
VARCoE		Virtual & Augmented Reality	11
mTek		Analytics, Machine learning and AI	Selection underway
FinBlue	Chennai	Financial Technology	47
NEURON	Mohali	AI/Data analytics, Internet of Things	50
MOTICN	Pune	Autonomous Connected Electric & Shared Mobility	52
IMAGE	Hyderabad	Gaming, Animation, VFX, Computer Vision, AI	43
apiary	Gurugram	Blockchain	28

CoE	Location	Technology area	Start-ups Incubated (#)
MedTech	Lucknow	Medical Technology	
OCTANE	Guwahati	Internet of Things in Agriculture	27
	Shillong	Animation	
	Imphal	Emerging technology (Augmented/Virtual Reality)	
	Itanagar	Geographic Information System	
	Aizwal	Gaming Technology	
	Kohima	Graphic Designing	
	Gangtok	IT application in Healthcare & Agritech Technology	
	Agartala	Data Analytics	
vasat	Akola	Internet of Things in Agriculture	27
KALPATARU	Visakhapatnam	Industry 4.0	4

Source(s): STPI, Secondary research, 1Lattice analysis

NGIS scheme, launched by STPI, a comprehensive incubation scheme, provided seed investment of ~ INR 22.77Cr to 103 start-ups to date

NGIS Next Generation Incubation Scheme

Launched by **STPI** under **MeitY**

A **futuristic and comprehensive** incubation scheme

Focusing on **12 Tier 2 locations**

Locations include Agartala, Bhilai, Bhopal, Bhubaneswar, Dehradun, Guwahati, Jaipur, Lucknow, Prayagraj, Mohali, Patna & Vijayawada

Aim to support **300 start-ups** in the field of IT/ITeS/ESDM

Budgetary outlay of **INR 95Cr** for 3 years

Incentives	Description
Physical incentives	• Ready to work **P&P incubation** within the constraint of lockdown & thereafter • Full-fledged **security & vulnerability testing** of software products through Software Product Security Testing (SPST) facility • **Additional facilities and services** of the pan-India domain-specific CoEs of STPI may be leveraged
Soft support	• **Mentoring** support • **Access to VCs** for funding support • Networking opportunities/Industry connect and **go-to market** support for exhibiting/showcasing products/solutions through various National / International events/workshops/exhibitions • **Facilitation support** for IRP/Patent filling
Financial incentives	• **Cloud Credits** from leading third-party service providers • **Pre-incubation programs** and mentoring for up to six months with **stipend support** of upto **INR 30K per month** • **Seed funding of up to INR 25L** available to beneficiary/supported start-ups based on innovativeness of idea, novelty of solutions, strength of team & soundness of business proposal
CHUNAUTI	• **Challenge Hunt Under NGIS for Advanced Uninhibited Technology Intervention** is a series of online challenges under NGIS for the selection of start-ups working towards **developing of products/solutions in Emerging Tech**

Outcomes

1. Created a start-up support ecosystem comprising of **128 mentors and 48 knowledge partners**
2. Total **550** beneficiary start-ups have generated **4,500+ jobs**
3. About **44%** of the beneficiary start-ups are **women-led entrepreneurs**
4. Beneficiary start-ups have contributed significantly to **IP generation and product creation**
5. **103** start-ups have received **seed investments** of **INR ~22.77Cr**

Source(s): STPI, Secondary research, 1Lattice analysis

IdeaForge provides mapping & surveillance solutions using unmanned arial vehicles (UAVs)

ideaForge™ Create. Inspire

Founding year
2007

Headquarters
Mumbai, India

Total funding
~US$ 46.5M

Offerings
Unmanned aircraft systems (UAS) for mapping, security & surveillance purposes

Overview

- **Market leader** in the UAS market with 6 UAVs in IdeaForge's product portfolio
- UASs have **applications** in mapping, security & surveillance
- First player to develop & manufacture UAVs with **vertical landing & takeoff** in India in 2009

Investments & collaborations

- Prominent investors include Qualcomm Ventures, Infosys, BlackStone & Celesta Capital

Key competitors

DRAGOON, GUS, REDWING, AZUR DRONES

Key digital solutions

Feature	Offering	Feature	Offering
Land survey	• **UAV** based land survey solutions to ensure accurate property mapping • Provides **3D models, digital elevation models & digital terrain models**	**Traffic monitoring**	• **UAV based** traffic monitoring system with features & benefits such as **bottleneck** identification, managing **development work**, **investigation** of accidents, **incident response** & **parking** management
Mining area planning & mapping	• Aids the mining planning & execution process by **mapping** the area, identifying hauling **route optimization** & ensuring the **safety** of workers through **surveillance**	**Disaster management**	• UAV based disaster management solution capable of monitoring **inaccessible** disaster zones to aid **search & rescue** missions
Volumetric estimation	• UAV based volumetric estimation services aimed at oil, gas & mining industries • Results in **faster decision making**, greater collection of **information**, improved **productivity** & improved worker **safety**	**Forest & wildlife**	• UAV based solutions to monitor **forest & wildlife** areas • Aids in collecting accurate natural & wildlife data including **species population count** • Assists in monitoring for **illegal activates** such as unlawful deforestation or **poaching**
Construction & real estate	• **UAV based** solutions for site surveying & mapping prior to construction • Allows for real time **project monitoring** & aids in **identifying** potential risks	**Border security**	• UAV based **national borders** monitoring solution • UAV capable of covering a range of **2-15 Km**

Notes: 1. Unmanned aircraft systems
Source(s): Tracxn, Company website, Media articles, 1Lattice analysis

Intello Labs uses computer vision & AI to develop solutions for quality assessment & grading of agricultural produce

INTELLO LABS

Founding year
2016

Headquarters
Gurugram, India

Total funding
~US$ 16.6M

Offerings
Objective quality assessment & grading solutions for agricultural produce using AI

Overview

- An AgriTech startup that enables farmers, traders, & buyers to make **informed decisions based** on accurate & unbiased quality assessments
- Leverages **computer vision algorithms** to analyze images of agricultural produce & assess various quality parameters such as size, shape, color, & defects
- Eliminates subjective judgments & brings objectivity to the **grading process**

Key Investors

- **Agfunder & Avaana Capital** are the most recent investors
- Company has raised **~$16.5M** over 9 funding rounds from 11 different investors

Key competitors

Cropin, AGNEXT, DeHaat, waycool

Key digital solutions

Feature	Offering	Feature	Offering
Param	• Buyer to seller matching based **online marketplace** for agriculture products	**Intello Sort**	• Digital sorting solution to **physically segregate** hard fruits & vegetables as per **color, size & visual defects** • Allows for segregation as per needs of **growers, packers, aggregators, traders** & **retailers**
Intello Track	• **Mobile app** for agriculture producers allowing for supply chain optimization & adoption of standardized processes through AI aided workflow plans • Allows users to **trace commodity journey** & get **consistent quality**	**Intello Pack**	• **Automated packaging** solution for fruits & vegetables – **10x faster** compared to manual packing • Packaged though vertical **fill & seal** technique
Intello ShelfEye	• **AI enabled** shelf monitoring solution • Allows users to **ensure freshness** of produce with hourly quality checks • Uses **AI & data analytics** to allow users to optimize quality, customer satisfaction & **increase consistency**	**Intello fruit sort**	• Automated sorting solution optimized to handle **soft fruits** • 360-degree integrated **lighting & camera solution** to capture all surfaces of the fruit • Allows for segregation basis **size, color, weight & defects**
Competition benchmarking	• Allows for competitive benchmarking for users to **better understand performance** relative to other agribusinesses	**Intello grade**	• Automated AI based **grading solution** for nuts, spices & coffee grading • Grading done basis **size, color, weight & volume**

Source(s): Tracxn, Company website, Media articles, 1Lattice analysis

QNu Labs is a leader in quantum cryptography, quantum encryption, & quantum communication products & solutions

Q→NU

Founding year
2016

Headquarters
Bangalore, India

Total funding
~US$ 13.5M

Offerings
Quantum encryption, quantum data security, quantum-powered VPN

Overview

- Leader in **quantum-safe cryptography** products & solutions, offering unconditional & forward security of data on the internet & cloud
- Provider of **cloud-based & quantum cryptography**-based **cybersecurity solutions** for secure communication

Key investors

SPECIALE INVEST

Tetrasoft Engineering Professionals

CYIENT

Key competitors

Bhavy DIGITAL

Omni CYBER SECURITY

DataSec Peripherals Pvt Ltd

CSA cloud security alliance®

Key digital solutions

Offerings	Description
Quantum Key Distribution for data security	• Involves complex deep-tech technology strength to create **unconditional security** • Used by sectors like governments, banks, data center, health care, telecom, defence, automobiles, BFSI, etc.
Quantum Random Number Generator	• Typical software-based algorithm that generates data from a seed number & converts into random values • Uses **quantum mechanic** principles to generate unique numbers
Post Quantum Cryptography	• Allows quick quantum-resistant encryption of existing crypto infrastructure **without expensive replacements needs**
Qosmos (Entropy as a service)	• **Solves** the **entropy starvation problem** of **systems**, whether in a cloud, embedded systems or at the edge • Used for security in web browser, mail encryption, video conferencing, firewall, remote monitoring & management software
Qverse (Quantum secured messenger)	• Enables **seamless user verification** & **quantum security** of messages between parties • Used for group chat encryption, forward security, two-stage authentication, user verification, session time-outs & quantum-secured HD quality for voice
QVPN (Quantum safe VPN)	• Future-oriented link security encryption system enhanced with **quantum-resistant unpredictable keys** • Used for enterprise security, watchtower communication security, ship-to-shore security, premises security

Source(s): Tracxn, Company website, Press releases, Media articles, 1Lattice analysis

Embibe is AI & ML focused Ed-Tech platform which is backed by Reliance Industries (primary investor)

EMBIBE

Founding year
2012

Headquarters
Bangalore, India

Total funding
~US$ 11.7M

Offerings
Artificial intelligence-based Ed-Tech solution provider

Overview

- **Artificial intelligence** based Ed-Tech platform with a focus on learning through practice
- Personalized **feedback & guidance** provided to students though AI enabled technologies
- Utilizes machine learning & AI to optimize services using **leaning patterns** of students

Investments & collaborations

Reliance Industries Limited

- Multiple **investments** by **Reliance Industries** totaling US$ 250M
- **MoU** signed with **Goa** to make platform available to government & aided schools

Key competitors

BYJU'S, unacademy, Vedantu, Meritnation (Class 1st to 12th — A Unit of Aakash)

Key digital solutions

Feature	Offering	Feature	Offering
Personalised test generation	• Personalized test generation through **AI enabled chatbot** • Questions based on student's **learning history** • Available in **vernacular languages**	**MEDHAS**	• **Natural language understanding** technology providing students with personalized learning content to allow them to achieve **desired learning outcomes**
Problem solving capabilities	• Ability to **solve mathematical word problems** in real time • Assists students with **step-by-step solutions**	**Personalized achievement journey**	• Personalized & **optimal learning path** for each student basis their **current knowledge**, time duration, curriculum, concepts, **target exam** & effort required
Doubt resolution	• **AI based** doubt resolution for all curriculum related queries of students • Achieved trough **character or diagram recognition** & validation with similar questions in **data bank**	**Regional language support**	• In-built **neural machine translation** for 11 Indian languages • Each model able to translate **academic English into various languages**
Knowledge classification & tagging	• **Knowledge database** with ~74,000 nodes representing a discrete unit of knowledge • Proprietary MetaTags Ranker tool in place to allow subject matter experts to tag nodes to specific **subjects, units, chapters, etc.**	**Knowledge Buddy**	• AI enabled chatbot which answers student queries, **assesses the student's learning** as per desired outcomes & **translates** questions into vernacular languages

Source(s): Tracxn, Company website, Media articles, 1Lattice analysis

Fabheads specializes in advanced manufacturing technologies, specifically in the field of composite materials & 3D printing

fabheads

Founding year
2015

Headquarters
Chennai, India

Total funding
~US$ 3.4M

Offerings
Robotic 3D printing solutions for fabrication of complex composite parts

Overview

- Specializes in manufacturing of composites parts of automobiles, drones, robots, aviation etc.
- Focuses significant resources on developing better, more reliable, automated fabrication technologies for composites parts
- **First company in Asia** with **in-house developed fiber 3D printing capabilities**

Key Investors

ROCKSTUD CAPITAL LLP

- **Rockstud Capital & Bliss Flow** are the most recent investors
- Raised **~US$ 1M** over 2 funding rounds from 9 different investors

Key competitors

CMP COMPOSITES · ETHEREAL · GRAVITA INDIA LIMITED · AXISCADES

Key solutions

Feature	Offering
Prototyping	• Quick Proof of Concept (POC) or Minimum Viable Product (MVP) development • Rapid prototyping of product designs • Iterative testing & refinement of product concepts
Hybrid Manufacturing	• Combining multiple materials in the manufacturing process • Hybrid structures with a combination of carbon fiber, composites, & other materials • Enhanced performance & functionality through material combinations
Mass Manufacturing	• Scaling up production for large volumes • Streamlining manufacturing processes for efficient mass production • Consistent quality control & cost-effective production at scale
Design & CAD & FEA	• Quick design & analysis assistance to progress your product towards the fabrication stage • Utilizing Computer-Aided Design (CAD) & Finite Element Analysis (FEA) techniques
Design For Manufacturing	• Optimizing designs for efficient & cost-effective manufacturing using composites • Collaborating on design review & providing recommendations for manufacturability

Applications/ Use cases

Sector	Offering
Auto	• Lightweight automotive parts • Carbon fiber body panels • Suspension components
Drones	• Lightweight drone frames • Reinforced composite wings & fuselage • Payload compartments • Antenna enclosures • Rapid prototyping of drone components • Customized drone designs
Space / Aviation	• Aerospace-grade carbon fiber components • Satellite parts • UAV (Unmanned Aerial Vehicle) structures • Reinforced composite aircraft wings & fuselage • Spacecraft fairing
Robotics	• Lightweight robotic frames • Carbon fiber arms & grippers • Composite robot end-effectors • Robotic exoskeleton components
Industrial	• Carbon fiber tooling & molds • Reinforcement components for machinery • Wear-resistant components • Tooling & fixtures

Source(s): Tracxn, Company website, Media reports, 1Lattice analysis

Oorja revolutionizing EV battery safety & efficiency with subscription-based service

oorja

Founding year
2022

Headquarters
Bangalore, India

Total funding
~US$ 1.5M

Offerings
Provider of battery design software

Overview

- Empower automotive companies to **design batteries** by combining cutting-edge **technology**, **machine learning** & physics
- Offers an **integrated hybrid platform** for accurate, fast degradation studies, thermal analysis & pack design
- Enables automotive OEMs to make informed decisions to **optimize battery** packs by **reducing time** to market & **costs**

Key investors

micelio

CAPITAL-A

- **Micelio & Capital A** are the major investors; out of total 6 investors
- Raised a total funding of **US$ 1.5M** over 2 rounds

Key competitors

Geli

ABOUT:ENERGY

ACE

geniess

Key digital solutions

Features	Offering	Features	Offering
Custom material & design creation	• **Build** or **utilize** existing databases for cell & pack materials in your projects • Online **tool** for swift design of intricate **battery packs** & **cooling systems**, supporting diverse cell form factors	**Cell venting**	• Consider **two-stage venting** to **enhance** accurate **predictions** in modeling how a battery pack heats up & spreads during a thermal emergency
Automatic data cleanup & thermal predictions	• Upload & preprocess cycler data with **built-in algorithms** to clean spikes, fill missing points & prepare for **analysis** • **Forecast** & **improve** battery pack **heat management**, design & safety using a fast & accurate **hybrid** approach	**Pack degradation**	• Consider differences between individual cells & **predict** how a battery pack **degrades** during **real-life driving conditions**
Range & fade prediction	• **Predict** vehicle **performance** & **range** accounting for real-world driving, road conditions & temperature changes over its lifespan • **Forecast** battery wear & tear in real-world use using **smart algorithms** that consider both physical damage & manufacturing uncertainties	**Accuracy & speed**	• **Outperforming** the closest competitor by completing tasks six times **faster** & achieving a **5%** higher level of **accuracy**
Capacity & discharge efficiency calculation	• **Predict** initial cell **performance** by using advanced physics-based models to estimate behavior with different electrode & electrolyte design parameters	**Affordability**	• No need for hardware investments; run as many jobs as you need on **secure servers** with **flexible plans** tailored to your company's simulation requirements

Source(s): Tracxn, Company website, Media articles, 1Lattice analysis

Agenda

DeepTech: Growth drivers & challenges

- Growth drivers
- Challenges

New technologies integration, better accessibility, high capital; key growth drivers for DeepTech companies & start-ups

Parameters	Service-based companies	Product-based companies
Rise of new technologies	• Advanced technologies like **machine learning & AI** are bringing tangible benefits across various sectors • Biotech startups are harnessing ML to analyze numerous possibilities for potential cancer treatments	• Parallel surge is occurring in **quantum computing hardware**, generating momentum in industrial revolutions • Biotech startups utilizing quantum computing to model protein folding for developing cancer-curing agents
Better accessibility	• With diminishing barriers, technological progress builds upon, with innovators benefiting from a rich reservoir of capabilities • **Software is now accessible as open-source** & through widespread service availability	• **Affordable & robust PCs**, along with potent cloud-based services eliminate the need for substantial upfront capital • **Easy access** to advanced computing hardware, manufacturing, & 3D printing contributes to this cost-saving trend
Diverse approaches	• Due to reduced barriers, companies worldwide are exploring innovative paths, for advancement in technology • Major corporations are **broadening their innovation initiatives, utilizing CVC[1]** & other venture tools to access emerging technologies	• Large corporations are increasingly utilizing diverse innovation investment & development approaches • Commonly employed methods encompass **innovation labs, traditional research & development functions, & M&A**
Growth in available capital	• Both emerging DeepTech startups & established companies have garnered more funding compared to other tech firms • **Average investment** in DeepTech has notably risen, with many now exceeding **~US$ 100M**	• In recent years, a surplus of venture capital has fueled startups, enabling them to reach unprecedented milestones • This surge in success has **prompted investors to inject hundreds of billions of dollars** into these small enterprises
Government initiatives	• Government entities play a vital role in shaping favorable policies, funding mechanisms, & regulatory frameworks • Israel, offers the **High-Tech Work Visa 5,** enabling foreigners to engage in DeepTech R&D activities for five years	• Several governments are streamlining processes for entrepreneurs, simplifying business startup procedures • In CY23, **Germany & France** introduced DeepTech-focused funds of **~US$ 1.1B & ~ US$ 550M**, along with special visas

Note(s): [1]Corporate venture capital
Source(s): The Dawn of the DeepTech Ecosystem: BCG X hello tomorrow; DeepTech Solutions for Emerging Markets, IFC; Breaking ground, EY X NASSCOM; 1Lattice analysis

Producing tangible DeepTech products comes at a higher production cost when compared to service-oriented products

Parameters	Service-based	Product-based
Adoption time	**Shorter adoption time** • Researchers spent many years creating the basic technology for AI, & now companies are quickly adopting it & creating new & creative ways to use it	**Longer adoption time** • Quantum computers have been under development for years & can be used in areas like pharmaceuticals & chemistry but are likely to be ready for use in the next five years
Scaling up	**Low-cost expansion** • Scaling up services is cheaper than advanced DeepTech physical products due to the additional costs for expanding being lower	**High-cost expansion** • Scaling up a physical DeepTech product is much more complex & often requires significant investments in infrastructure
Funding	**Low funding required** • Funding required for developing services provided through blockchain costs only about ~US$ 0.2M which is much lower than physical DeepTech products	**Huge funding required** • Funding required for physical DeepTech products is much higher, for example developing the first prototype in biotech costs an average of almost US$ 1.3M
Customization	**Require customization** • Service-based startups often need to customize their solutions for each client, leading to increased complexity & potential scalability issues	**Require market fit products** • Identifying the right product-market fit & convincing customers to adopt a novel DeepTech product can be challenging

Source(s): The Dawn of the DeepTech Ecosystem: BCG X hello tomorrow, 1Lattice analysis

Agenda

DeepTech: Future trends & growth strategies

- Future trends
- Growth strategies

Future trends in DeepTech are driven by AI, computing, space technology, energy, computational biology & chemistry, etc.

DeepTech future trends: Focus areas

Artificial intelligence

- Refers to **new AI[1] architectures** & **algorithms** used for:
  - Explainable AI
  - Privacy enhancing AI, etc.

Computing

- New **advances** in computing:
  - Quantum
  - Wearable
  - Ambient computing & IoT[2]
  - Cloud, etc.

SpaceTech

- Reducing satellite launch costs creating new opportunities:
  - Space manufacturing
  - Earth observation
  - Asteroid mining, etc.

Energy

- Breakthroughs across **energy life cycle such as:**
  - Hydrogen
  - Fusion
  - New battery chemistries, etc.

Computational biology & chemistry

- Leveraging **new computational technology** for:
  - Drug discovery
  - Efficiency in R&D

Advanced materials

- Refers to **development** & **production** of **new materials:**
  - Green concrete
  - Graphene
  - Novel alloys, etc.

Robotics & drones

- New advances in robotics:
  - Humanoid robots
  - Nanorobots
  - Drones, etc.

Others

- **Breakthrough** innovations
  - Lab-grown food
  - Synthetic biology, etc.

Note(s): [1]Artificial Intelligence, [2]internet of things
Source(s): 1Lattice analysis

Artificial intelligence: Smaller models, specialised models & multi-modality discussion regarding safety & privacy are key trends

Smaller models

Microsoft tested phi 1.5, **1/100th** the size of ChatGPT but architecturally similar

- AI models are **resource-intensive** to train & deploy
- Models cannot continue to grow indefinitely, given scarce resources
- Thus, rising interest in **smaller models (SMLs)**, with specialised & curated datasets
- Microsoft released phi 2.0, follow up on phi 1.5, a more capable & relatively compact

Specialised models

Salesforce introduced **Einstein GPT** to provide customers with out-of-the-box generative AI capabilities

- Current foundational models are **publicly accessible** & likely to provide generic results
- Value could be unlocked by training models on **private data** & fine-tuning models
- **Private data sets** may enable use-case specific models

Multi-modality

DeepL

DeepL combines **neural networks, deep learning & NLP[1]** to provide high-quality translations for a wide range of content including websites

- Models employ multiple approaches
- **Combining** different layers like **neural network models, deep learning** & NLP[1] may enable systems to mimic human like perception & comprehension
- Enables natural language understanding, advanced image recognition etc.

AI in healthcare

PathAI is a research platform designed to improve accuracy & efficiency of cancer diagnosis & treatment

- Medicine is one of the **fastest growing** applications of AI
- AI can be utilized for **various** use cases
  - Personalized medicine
  - Predictive analysis
  - Image reading
- **Google Health** achieved precise **skin diagnostics** using AI

Safety & privacy

Recent research by **Anthropic** highlighted serious security concerns surrounding **LLM[2]**

- AI took the world by storm in CY22
- AI models may also be prone to **manipulation & bias**, making them less accurate
- Rising consensus & demand for **AI regulation**
- Anthropic released Claude, a **constitutional AI**, capable of giving 'safe' responses

Note(s): [1]Natural language processing, [2]Large language models
Source(s): Company websites, news articles, industry reports, 1Lattice analysis

Computing: Quantum computing, silicon photonics, AR[2] / VR[3] / MR[4], brain-computer interface & distributed computing are key trends

Quantum computing

Leading tech companies are involved in **quantum computing race**

- Quantum computing utilizes **quantum bits** to perform calculations
- Current trends include
  - Quantum stability
  - Error correction
  - Quantum algorithms for practical usage
- Future development aims to achieve **scalable, fault-tolerant** quantum computers capable of solving problems in **cryptography, optimization & material science**

Silicon photonics

DustPhotonics announced its single-chip 800G-DR8 photonic chip for data center applications

- Silicon photonics fabricates optical & EIC[1] on **silicon microchip**
- Development of communication technology has increased **demand** for **fast & efficient transmission** & **reception** of data
- Few players have finally moved into the **commercialization** phase & starting to provide **silicon photonics products**

AR[2] / VR[3] / MR[4]

Apple's **Vision Pro** headset marks beginning of alternate realities going **mainstream**

- Alternate realities:
  - **AR[2]**: Overlaying virtual objects
  - **VR[3]**: Immersive virtual environment
  - **MR[4]**: Blending real-virtual worlds
- Companies shifting from experimentation to **practical use-cases**
- Enhancements like **AR avatars** enable businesses to **offer**
  - Remote assistance
  - Training
  - Product visualization, etc.

Brain-computer linking

Neuralink has started applications for its first human clinical trials

- Brain-computer interface enables **communication** between brain's electrical activity & external devices
- Neural devices are on a pathbreaking track
  - In CY23, devices achieved a speed of **150 words / minute** while translating neural signals into sentences
  - **Photonic silicon** is being used to improve speeds
- Such devices help
  - Overcome disabilities
  - Advance human capabilities

Distributed computing

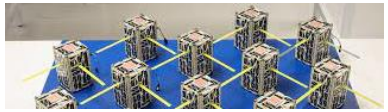
Distributed computing **adds scale** to systems & **maintains data consistency**

- Distributed computing refers to making multiple computers **work together** on a **single problem**
- Can be applied across domains:
  - HLS[5]: Process large volumes & **complex images** (MRIs, X-rays, etc.)
  - Financial services: Use distributed databases to support a **high volume** of transactions
  - Environment: Stream & consolidate **seismic data**

Note(s): [1]Electronic integrated circuits, [2]augmented reality, [3]virtual reality, [4]mixed reality, [5]healthcare & life sciences
Source(s): Forbes article on quantum trends, company websites, 1Lattice analysis

SpaceTech: SmallSats[1], reusable vehicles, enhanced communications, improved surveillance capability & space manufacturing are key trends

SmallSats



Companies like **Spire Global & Planet Labs** are utilizing specialised SmallSats for weather forecasting, imaging & others

- With private companies entering the **global space race**, the need for innovations with high utility has increased
- SmallSats are being preferred over large satellites owing to **cost effectiveness**
- Multiple advantages
  - Quicker deployment
  - Reduced launch expenses
  - Enhanced efficiency

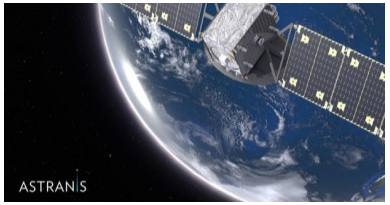
Reusable vehicles

SPACEX

SpaceX is one of the pioneers of reusable rocket technology, drastically reducing mission costs

- Traditionally, rockets were **single use** as they crash-landed after usage
- **In reusable rockets the first stage of the rocket returns to Earth**, allowing it to be reused
- Reusable rockets increase accessibility by reducing-
  - Launch prices
  - Environmental footprint

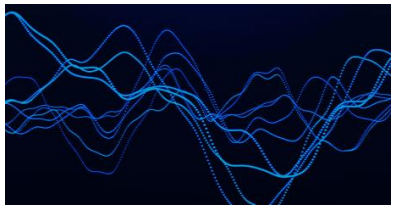
Communications



Astranis provides internet access in remote regions through small & low-cost telecommunication satellites

- Modern communication services suffer from **poor connectivity** in remote areas
- Satellite based networks offer **fast, secure & direct** connectivity
- Networks typically deploy **large constellations** of satellites, offering good coverage

Surveillance



HawkEye 360 is a space-based radio frequency technology for geospatial data analytics

- Maritime trade is constantly **threatened** by **piracy & robbery**
- Satellite based **geotagged radio frequency data** helps
  - **Monitor** areas of interest
  - **Identify** trends & specific activity
  - Deploy resources efficiently
  - Tips & cues to identify unknown activities

Manufacturing

SPACE FORGE
MAKING SPACE WORK FOR HUMANITY

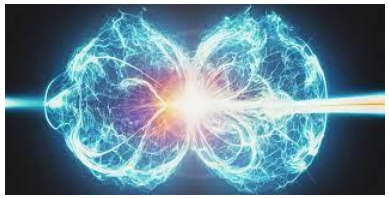
Space Forge aims to manufacture supermaterials, medicines & electronics in space

- Space is full of challenging conditions
  - Vacuum
  - Lack of gravity
- Zero contamination, **flawless mixing & extreme temperatures** are resource intensive processes but are favourable conditions for manufacturing
  - Medicines
  - Advanced materials
  - Electronics
- Space replicates **clean room** & offer ideal conditions

Note(s): [1]Small satellites
Source(s): Company websites, news articles, 1Lattice analysis

Energy: Nuclear fusion, battery technology, innovative storage solutions, supercapacitors & new-age solar cells are key trends

Nuclear fusion



In CY22, after a decade of effort, nuclear fusion was successfully produced at US NIF[1]

- Nuclear fusion involves combining **two light atomic nuclei** to form a **single** heavier one to release energy
- Nuclear fusion is challenging due to **high energy requirements** & lack of materials able to handle plasma
- **Commercial viability** of nuclear fusion remains a **key challenge**

Battery technology

QuantumScape

QuantumScape is developing solid state lithium metal batteries for electric vehicles

- **Lithium-ion** batteries are used extensively; however, **degradation** concerns drive search for alternate & improved battery sources
- **Solid state** batteries are one **alternative** that has many benefits:
  - Faster charging
  - More compact
  - Less weight
  - Longer life
  - Fireproof
- Lithium-sulfur batteries, sodium-ion batteries are a few alternatives

Innovative storage

Form Energy has pioneered iron-air batteries, capable of storing electricity for 100 hours

- **Cost effective technologies** capable of storing electricity for multiple days are needed to build a **clean grid**
- Iron-air batteries, made of **low-cost** iron, water & air, offer a cheap & reliable battery storage solution, helping in cases of
  - Extreme weather
  - Grid outages
  - Periods of low generation

Supercapacitors

MIT engineers recently created an **inexpensive** supercapacitor from cement, water & carbon black

- **Supercapacitors** are family of energy storage devices with **remarkably high specific power**
- Useful for applications requiring **frequent small charges/ discharges**
  - **Electric vehicles:** Provide power during **acceleration,** etc.
  - **Medical:** Devices like **defibrillators, implants**
  - **IoT devices:** Devices like **smart camera, PoS[2]** devices to reduce battery cycling

New-age solar cells

Exeger partnered with **Adidas** to offer **headphones** with **endless** playtime

- **Traditional solar cells** typically require bright & unhindered sunlight to operate
- **Exeger's** solar cells transform any kind of light – **indoor** / **outdoor**, into electrical power
  - Cells are **flexible** & **customizable** to offer seamless integration into devices
  - Once integrated to devices, they can make devices **self-powered** (in presence of light sources)

Note(s): [1]National Ignition Facility, [2]point of sale
Source(s): Forbes article on quantum trends, company websites, 1Lattice analysis

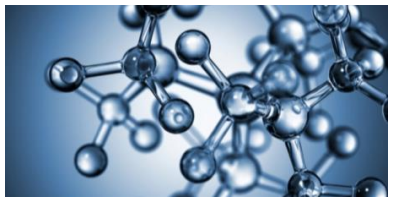
Computational biology & chemistry: Cell simulation, data driven drug discovery, disease reversal & genome engineering are key trends

Cellular simulation

Vcell is an open-source platform for modelling & simulation of living organisms

- Cell science has progressed significantly by focusing on understanding individual **cellular processes**
- It is **challenging** to **integrate** this large knowledge database for practical applications
- Need for next-gen **virtual cells / dynamic 3D models** that integrate information from biophysical models, image-based models, etc.

Drug discovery



Insitro deploys data-driven drug discovery & development platform to bring better drugs to patients

- Computer-aided drug discovery isn't new
  - Recent surge in data around **ligand properties** & binding to therapeutic targets has created a shift
- Modern computational drug discovery involves **structure-based virtual screening** of gigascale chemical spaces, facilitated by fast iterative screening

AI powered pathology

PathAI aims to transform pathology by developing AI models for analysis of patient tissue samples

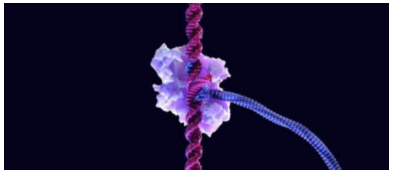
- Using **AI-powered pathology** to advance drug & diagnostic development
- Drive **biomarker & drug discovery** by unlocking insights at **tissue & cellular level** using custom algorithms across disease categories
- **PathAI** has created software to power **digital pathology workflows** & **AI applications**

Disease reversal

Altos Labs aims to restore cell health & embraces ML[1] & computation to understand biological systems

- Cells in healthy, resilient states, **resist stressors,** protecting against diseases
  - This **capacity,** however, **decreases** with **ageing**
- Early experiments suggest this capacity can be **restored**
- **Generative models** are used to **unravel language** of cells, organ health & their **relationship**

Genome engineering



Tessera is a genome engineering technology writing therapeutic messages into genomes

- **Gene writing** can permanently make **alterations** to human genome
- Use **tissue-targeted non-viral** delivery technology to make **genomic alterations** as needed
- Gene writing can address **major unmet needs** with potentially **curative** & accessible therapies

Note(s): [1]Machine learning
Source(s): Company websites, news articles, industry reports, 1Lattice analysis

Advanced materials: Nanotechnology & development of alternate fuels, graphene, green concrete & aerogel are key trends

Nanotechnology

TiO_2 nanoparticles used in **sunscreens** to absorb ultraviolet radiations, also used in water-purification

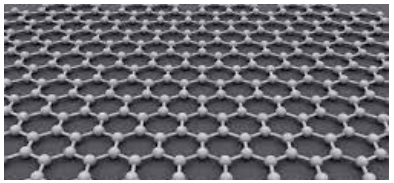
- **Nanotechnology** refers to manipulating materials at nanoscale, roughly one-billionth of a meter
- Allows the creation of **materials** with **enhanced properties** like increased **strength & conductivity**
- Also used to **improve properties** of existing materials
- Applications in
  - Medicines
  - Electronics, etc.

Alternate fuels

Fulcrum BioEnergy pioneers the creation of drop-in transportation fuels from landfill waste

- **Alternative fuels** have recently become popular basis **climate change** & **finite supply of fossil fuels**
- Reducing **reliance** on traditional fuels can help improve **air** quality, reduce **dependence** on foreign oil & create new economic opportunities
- For e.g. **biofuels** can be made from crops that absorb CO_2 as they grow, which **may offset emissions** produced when fuel is burned

Graphene



Graphene, is only one atom thick, however 100x stronger than steel

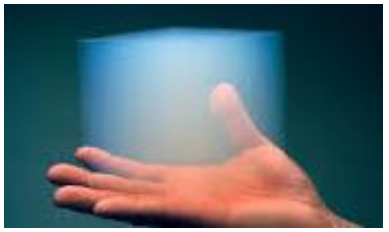
- **Graphene** is made of pure carbon arranged in one atom thick, single & transparent sheet
- It is extremely strong but lightweight
  - Good **heat & electricity conductor**
- Multiple applications:
  - **Electronics**: High speed transistors, flexible touchscreen & computer chips
  - **Medicine**: Biosensors to detect diseases for drug delivery systems

Green concrete

Eco Material's proprietary pre-treatment of **fly ash** allows mixing fly ash into concrete, reducing **carbon footprint by 99%**

- **Green concrete** uses industrial waste materials like fly ash, to be used as a replacement for concrete ingredients
- **Typically** fly ash was mixed in cement up to **~20%,** however, new treatment processes take it b/w **50-100%**
- **Green concrete** is not only **cleaner** but much stronger than traditional concrete

Aerogel



NASA[2] uses aerogel to keep rocket fuel at **cryogenic temperatures**

- **Aerogel** is a **synthetic porous ultralight** material with 99.8% empty space
- Capable of **carrying 20,000x** its **own weight**
- **Pores** in aerogel range from **<1 to 100 nanometers** (diameter)
- Extremely **low thermal conductivity** makes it highly effective for insulation

Note(s): [1]National Aeronautics & Space Administration
Source(s): Industry newsletters, news articles, company websites, 1Lattice analysis

Robotics & drones: Warehousing robots, humanoid robots, military drones, delivery drones & surgical robots are key trends

Warehousing robots

amazon

Quarter-of-a-million robots are employed across Amazon's facilities

- **Mobile robots** autonomously pick, sort & replenish products with precision, significantly improving efficiency in operations & reducing costs for **warehouses & distribution** centres
- **Amazon** recently spurred warehouse **automation**-
  - Launched **'Sequoia'** (warehouse-management system)
  - Started testing "**humanoid** bots"

Humanoid robots

Atlas, developed by Boston Dynamics is an **agile & athletic humanoid** robot

- While **hardware** technology is mostly **ready**, software is still needed; **End-to-end AI** could enable much **faster** humanoid robot **iterations**
  - Robotic LLMs[1] development in CY23 include launch of **PaIM-E** & **RT-2**, along with Tesla's end-to-end AI approach
- AI enablement, also makes humanoid robots suitable for **dangerous & hazardous** tasks

Military drones

Anduril, a US based startup has made cutting edge drones for national security

- Military drones connect autonomous **sensemaking, & command & control** capabilities with open, modular & **scalable** hardware components for a layered family of systems approach
- These unmanned aerial vehicles are utilized for **different purposes**
  - Reconnaissance
  - Intelligence gathering
  - Precise operations

Delivery drones

Zipline is one of the pioneers of drone-based logistics, offering services for restaurants, pharmacies, etc.

- **Air flow sensors in drones** allow them to measure airspeed, temperature, etc. to assist with package delivery / landing
- Drone based delivery offer multiple advantages
  - Faster delivery
  - Lower cost
  - Low emissions
  - Easy integration into logistics

Surgical robots

Intuitive Surgical is the maker of **da Vinci surgical system**, a minimally invasive surgical robot

- Robotic surgery has the potential to **increase access** to life-enhancing care
- **Micron level accuracy** is crucial in surgery, especially in small organs like **eye, brain or vascular systems**
- Robotic surgery can **stabilize** natural tremors & achieve **ten-fold precision**, resulting in clinically better outcomes

Note(s): [1]Language learning models
Source(s): Forbes article on DeepTech for surgery, company websites, 1Lattice analysis

Development of plant-based meat, 3D printing, carbon capturing technology & urban infrastructure are other key trends in DeepTech

Plant-based meat

Brands like **Impossible Foods** & **Beyond Meat** have become increasingly **popular** amongst customers

- **Plant-based meat** is made by heating **proteins** (extracted from raw materials) through a process called **"extrusion"** to **structure / texturize proteins**
- **Plant-based meats** provide **similar nutrients** as animal-based meats while **lowering environmental impact**
- **Focus** is to make them **less-processed** & more **whole foods based**

3D printing

ICON

Icon Build is working on technology to build 3D printed homes

- **3D printing** emerged as a major technology due to a wide range of applications
- Used for
  - **Precision medicine**: Create **organs**, skin grafts, etc.
  - **Homes**: Homes can now be printed in less than **10 hours**, costing **< US$ 10K**
  - **Food**: **Oil & powder cartridges** used to create food
- 3D printing **reduces** manufacturing **time** & **saves costs**

Carbon capture tech

climeworks

Climeworks specializes in direct air capture technology, filtering **CO_2** directly from ambient air

- **CCUS**[1] involves the capture of CO_2, from **large point sources** like powerplants using fossil fuels
- If captured CO_2 is not **utilized on site**, it is **transported** for varied applications **or injected deep** into depleted oil reservoirs or salt aquifers
- **Direct air capture, cryogenic capture & membrane gas separation** are some technologies involved

Urban infrastructure

NEXII

Nexii is an innovative building material company exploring different methods to combine sustainable products

- **Sustainable building materials** aren't new, however, **integrating** them into sustainable & **functional buildings** remains a key challenge
- **Nexii**, along with offering green building **products**, culminates them into **high-performance** & functional buildings
- Nexii panels, along with sustainability **reduce construction time**

Livestock breeding

Forever Oceans combines **off-shore aquaculture** & unique **innovations**

- Animal **consumption** has risen **year-on-year**
- **Commercial** fishing produces many ill-effects like **by-catch**, unsustainable hunt rates
- Forever Oceans raises fish far **offshore**, possible through patented technology
- It leverages AI to select **genetically superior** stock, increasing fish quality & quantity

Note(s): [1]Carbon capture, utilization & storage
Source(s): News articles, company websites, 1Lattice analysis

Strategic collaborations, partnerships, niche market solutions & focused group of investors help a DeepTech startup grow & succeed

Growth strategies implemented by DeepTech startups

Government partnerships

- DeepTech ventures in India receive support from **government programs** such as Clean Energy Research Initiative, **Atal Innovation Mission**, sustainable finance scheme, etc.
- Government initiatives such as Telangana government's "**Medicine from the sky**' program for drone delivery of pharmaceuticals

Corporate collaborations

- **Investment** by firms in DeepTech startups provides **support** & **pushes growth**
- **30+ mergers** & **acquisitions** in CY21
- Investment of **~US$ 132M** into Addverb, a robotics firm for a **~54%** stake by Reliance to support its business expansion plan

Global partnership

- DeepTech startups access **new markets**, **tap** into **local customer bases**, & gain a **competitive edge** by forming global partnership
- Opportunity to share knowledge, exchange best practices, collaborate R&D efforts, leverage existing infrastructure & distribution channels leads to **increased market penetration**

Solutions for niche

- Targeting niche markets lead to rapid growth & scalability due to **less competition**, **strong market position** & **premium** price for **unique solutions**
- For e.g.,Spyne is an AI-powered software solution tool offers **image editing features** & **virtual tour** creation services to automotive dealerships & businesses

Test beds

- Test beds offer DeepTech startups a **controlled** & **collaborative environment** to showcase their technologies helping them to build a strong foundation for successful **commercialization** & **market adoption** of their DeepTech innovations
- Maruti Suzuki winning the **MAIL program** helped them raise their first round of funding

Focused investors

- **Industry expertise**, **access to networks** & **partnerships, alignment of vision** & **goals**, **financial support** provided by investors significantly contribute to the success & acceleration of DeepTech startups
- Blume ventures supports GreyOrange in every funding round; Continuous growth of a startup results from **regular investment** & **trust** from a **reliable partner** & **investor**

Source(s): Media articles, NASSCOM Tech Start-up Report 2022, 1Lattice analysis

Agenda

Recommendations

Problem identification along with building a strong tech team are key recommendations for DeepTech startups to succeed

Problem identification	• Identification of a significant **problem** or an **opportunity** where DeepTech can make a **significant impact** is important • DeepTech startups often thrive when they address real-world challenges or tap into emerging opportunities
Set up of a strong technical team	• **Strong technical team foundation** possessing necessary expertise to develop & implement DeepTech solutions is important • A **diverse team** with **complementary skills** bring different perspectives & contribute to innovative problem-solving
Protection of Intellectual Property	• **Protection** of the **intellectual property** (IP) early on to establish a **competitive advantage** & prevent others from copying or replicating the technology is required • Legal experts can help navigate the IP landscape & ensure proper protection
Early validation & proof-of-concept testing	• Proto-typing & proof-of-concept testing helps in **validating** the technology & the concept before scaling up the business • Determines feasibility, efficacy, & potential impact of the technology in real-world scenarios
Development of strong network	• **Building relationships** with **key stakeholders** by attending industry conferences, joining relevant professional associations, & engaging in networking activities is essential • Helps to **expand the network** & **stay updated** on industry trends
Embracement of agility & iterations	• **Embracing agility**, **iterating technology** & business model based on feedback & market insights is necessary to remain competitive in the market • Being **adaptable**, **responsive** to changes, **continuously learning** & **refining the approach** leads to success of the startup

Source(s): Media articles, NASSCOM Tech Start-up Report 2022, 1Lattice analysis

Agenda

- Glossary

Glossary of keywords

Keyword	Definition
DeepTech	Cutting-edge technologies that build on advanced science & engineering innovations
FinTech	Integration of technology into offerings by financial services companies to improve usage & delivery to consumers
EdTech	Use of technology to support & enhance learning & teaching
Cloud computing	Storing & accessing data on remote servers hosted on the internet
Artificial intelligence	Simulation of human intelligence in machines that are programmed to think & act like humans
Blockchain	A shared, immutable ledger facilitating transaction recording & asset tracking in a business network
Quantum computing	Calculation that uses principles of fundamental physics to solve extremely complex problems very quickly
Cybersecurity	Application of technologies, processes & controls to protect systems, networks, programs, devices & data from cyber attacks

Source(s): Press releases, Media reports, 1Lattice analysis

Transmittal Disclaimer

- This report has been prepared for Software Technology Parks of India (STPI) by 1Lattice (which is the trade name of Lattice Technologies Private Limited referred as "1Lattice" hereunder) with the intent to showcase the capability and disseminate learnings to start-ups, industry, policy makers & potential partners/associates
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Software Technology Parks of India (STPI) is a premier S&T organization under Ministry of Electronics and Information Technology (MeitY) engaged in promoting IT/ITES Industry, innovation, R&D, start-ups, product/IP creation in the field of emerging technologies like IoT, Blockchain, Artificial Intelligence (AI), Machine Learning (ML), Computer Vision, Robotics, Robotics Process Automation (RPA), Augmented & Virtual Reality, Animation & Visual effect, Data Science & Analytics for various domains like Gaming, FinTech, Agritech, MedTech, Autonomous Connected Electric & Shared(ACES) Mobility, ESDM, Cyber Security, Industry 4.0, Drone, Efficiency Augmentation, etc.

Since its inception in 1991, STPI has been working towards equitable and inclusive IT-led growth pan-India which in turn has helped promoting Software exports, Science, Technology & Innovation (STI) and Software product development. With 11 jurisdictional directorates and 64 centers, STPI has expanded its presence pan-India to support IT/ITeS Industry. Working closely with all stakeholders, STPI has played a key role in transforming the country as the preferred IT destination.

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AIC STPINEXT INITIATIVES, a Special Purpose Vehicle set up by STPI, is aligned with STPI's vision to promote and grow the culture of innovation leading to successful start-ups & entrepreneurs. AIC STPINEXT INITIATIVES acts as the nodal agency and common implementation vehicle for various start-up and entrepreneurship activities at STPI

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