Published by :
https://www.ijert.org/
An International Peer-Reviewed Journal

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 14 Issue 11 , November - 2025

Spatial Computing Challenges

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What Is Spatial Computing?

Spatial computing refers to the technology that merges the digital and physical worlds, enabling intuitive and immersive interactions between people and computers. It is an umbrella term that encompasses technological experiences such as virtual reality (VR), augmented reality (AR), mixed reality (MR), extended reality (XR). It leverages spatial mapping and advanced recognition of people, places, and objects in the real environment—creating a digital layer that aligns, indexes, and integrates with the physical world. By redefining how humans engage with their surroundings, spatial computing is poised to transform global communication and unlock new business models and opportunities across multiple industries. Through intelligent data collection and analysis, spatial computing enables machines to optimize and automate processes. For example, in a smart building, sensors track movement and adjust lighting and temperature automatically to improve efficiency and comfort.

Scope: Spatial computing is a broader concept that encompasses, and goes beyond, Augmented Reality (AR) and Virtual Reality (VR). It aims to enhance Human-Computer Interaction (HCI) by making digital content feel like a natural part of the physical environment.

How Does Spatial Computing Work?

Spatial computing works by using a combination of sensors, cameras, and advanced software to understand and interact with the physical world. These systems capture data about the environment—such as location, movement, and objects—and then process it through technologies like: Augmented and Mixed Reality (AR/MR): AR overlays digital elements onto real-world settings, while MR integrates physical and virtual components for seamless interaction. Edge and Cloud Computing: These provide the processing power and real-time rendering needed for complex visuals and AI tasks, ensuring smooth, immersive experiences through hybrid local–cloud processing AI and Machine Learning: They enable devices to understand and respond to the physical world by processing sensor data, powering intuitive interactions like hand tracking and generating 3D/4D models for dynamic environments. Spatial Mapping and Visualization: Using computer vision and 3D reconstruction techniques, spatial computing creates realistic digital representations of physical spaces. These technologies also support digital twins for applications in training, collaboration, and content creation. Together, these components allow spatial computing to create intelligent, interactive environments that seamlessly connect digital and physical worlds.

Why Spatial Computing?

Spatial Computing is an emerging technology that merges the digital and physical worlds. Its adoption is driven by key market needs and offers distinct benefits that redefine how humans and computers interact with the environment.

Key Drivers:

These are the primary forces fueling the growth and adoption of Spatial Computing:

-Growing Consumer Demand: There is an increasing public appetite for highly immersive and interactive experiences, particularly in key consumer areas such as gaming, media, and e-commerce.

-Enterprise Needs: Businesses require more sophisticated tools for visualization to support better decision-making and efficiency. This is especially critical in complex, data-heavy industries like healthcare, retail, and manufacturing.

Business Opportunities: Significant investments and the development of ecosystems by major technology players (such as Nvidia and Qualcomm) are fostering content creation, growing developer communities, and creating new avenues for monetizing interactions between the physical and digital worlds.

Key Benefits:

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ISSN: 2278-0181
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Spatial Computing provides several core advantages over traditional computing methods:

Seamless Integration: It connects the digital and physical worlds, enabling intuitive, immersive interactions where digital content feels like a natural part of the physical environment.

Enhanced Collaboration: The technology allows multiple users to effectively collaborate with digital content within shared virtual or mixed reality environments, improving remote work and design processes.

Training and Simulation: It provides a platform for safe, effective training and simulation in complex or high-risk environments, allowing users to practice without real-world danger or expense.

Advanced Experiences: The technology leverages a combination of state-of-the-art systems, including Augmented Reality (AR), Mixed Reality (MR), Artificial Intelligence (AI), spatial mapping, and digital twins, to create realistic 3D and 4D interactive experiences.

What Are Spatial Computing Challenges?

To unlock the full potential of spatial computing, developers need to overcome several key challenges and practical considerations:

High Computational Needs Real-time rendering of complex environments requires powerful GPUs and edge/cloud support

Low Latency Seamless experiences need minimal delay; edge and cloud deployments help achieve this **AI Integration** Contextualizing environments for adaptive interactions requires robust AI models and toolkits

Realistic Immersion Photorealistic visuals and natural interactions depend on advanced graphics, sensors, and gesture/voice tracking

Accessibility & Inclusion Adaptive interfaces improve usability for visually impaired users and support remote collaboration

New Use Cases & Monetization Virtual collaboration, training, digital twins, and consumer experiences create opportunities but require ecosystem support.

There are several critical issues that must be addressed for widespread adoption:

Interoperability: The lack of open APIs and established data standards hinders communication across diverse spatial computing devices and platforms.

Sensor Fusion Accuracy: Challenges exist in accurately synchronizing and harmonizing data from multiple sensors (e.g., cameras, accelerometers) to achieve precise spatial alignment for AR overlays.

Data Processing and Latency: The need for efficient, parallelized processing of massive, complex spatial datasets (e.g., in epidemiology) to reduce lag and ensure real-time performance.

Hardware and Cost: Spatial computing experiences typically require resource-intensive and expensive, high-quality hardware, which limits accessibility.

Adoption and User Education: The technology has a steep learning curve, and the interfaces and interaction paradigms are fundamentally different from traditional computing, requiring intuitive design and comprehensive educational programs.

What Are Spatial Computing Use Cases?

Spatial computing has transformative use cases across various industries, enhancing both functionality and user experience.

Global Collaboration: VR enables geographically dispersed design and engineering teams to conduct real-time design reviews in a shared virtual space, accelerating the development cycle and breaking down geographical barriers.

2. Manufacturing and Training

On the factory floor, spatial computing enhances precision, efficiency, and worker safety.

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Digital Twins for Production: Manufacturers create a digital twin of the assembly line, fed by real-time data from IoT sensors on machinery. This allows them to simulate production flows, optimize factory layouts, identify bottlenecks, and minimize errors before affecting the real process.

AR-Guided Assembly and Quality Control: Workers use AR headsets to overlay step-by-step assembly instructions, technical schematics, or torque specifications directly onto the physical vehicle part they are working on. This increases precision, reduces errors, and is particularly valuable for complex tasks like wiring harness inspection or quality control checks.

Remote Assistance: Technicians in the field can use AR glasses to connect with remote experts who can see exactly what the technician sees and overlay visual instructions, diagrams, or annotations onto the live view to guide complex diagnostics and repairs.

Immersive Training: VR simulations provide factory workers and mechanics with risk-free, hands-on training for complex procedures or maintenance tasks (e.g., servicing an Electric Vehicle battery system) without requiring the shutdown of a physical production facility.

3. Customer Experience and In-Car Applications

Spatial computing is redefining the sales process and the driving experience itself.

Virtual Showrooms (VR/AR): Dealerships and manufacturers offer VR or AR experiences that allow customers to view vehicles in a virtual showroom or place a 3D model of a car in their driveway using a smartphone app. Customers can customize every option—from paint color and wheel design to interior trim—in a highly engaging and personalized way.

Enhanced Driving Assistance (AR HUDs): Advanced Augmented Reality Head-Up Displays (AR HUDs) project navigation directions, speed limits, and safety alerts directly onto the windshield, spatially anchored to the real world (e.g., an arrow appears to be floating over the exact turn lane). This improves situational awareness and safety.

Autonomous Vehicles (AVs): Spatial computing is the foundational technology for self-driving cars. It uses sensor fusion (combining data from LiDAR, radar, and cameras) and AI to create a detailed 3D map of the environment, enabling the vehicle to perceive obstacles, understand spatial relationships, and make real-time path planning decisions.

The application of augmented and virtual reality in the car industry is demonstrated in this video. How Augmented & Virtual Reality Are Revolutionizing the Car Industry

Automotive Design

Spatial computing is revolutionizing Automotive Design by merging high-fidelity digital models with the physical world, dramatically improving collaboration, speeding up prototyping, and enhancing product quality. It relies heavily on Augmented Reality (AR), Virtual Reality (VR), and Digital Twins to integrate virtual content into the design workflow.

Here is a summary of its applications in automotive design:

1. Virtual Prototyping and Design Review

Spatial computing eliminates the reliance on costly, time-consuming physical prototypes for initial design iterations.

Immersive VR Review: Designers and engineers use Virtual Reality (VR) headsets to enter and explore a full-scale, three-dimensional CAD model of a vehicle. This allows them to:

Evaluate Ergonomics: Check cabin space, driver and passenger sightlines, and reachability of controls from various perspectives (e.g., simulating a taller or shorter user).

Instant Iteration: Make real-time modifications to the design, changing materials, colors, and features instantly without waiting for a new physical mock-up.

Global Collaboration: Remote teams can collaboratively review the same virtual model in a shared space, accelerating decision-making and breaking down geographical barriers.

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Augmented Reality (AR) Mock-ups: Designers use AR projection (Spatial AR) to overlay virtual elements onto physical clay models or component mock-ups. They can project different textures, lighting, and paint colors onto the physical surface to make crucial design and aesthetic decisions based on realistic visualization.

2. Manufacturing and Quality Control

The technology extends beyond design into the production phase to enhance precision and efficiency.

Digital Twins for Production: A Digital Twin of the production line (e.g., a welding station or assembly robot) is created. This virtual replica is fed by IoT sensors on the physical equipment, allowing engineers to:

Optimize Workflow: Simulate new production layouts and identify bottlenecks before they impact the real factory.

Predictive Maintenance: Use the real-time data to predict equipment failures, reducing downtime and operational costs.

AR-Guided Assembly: Assembly workers use AR glasses to overlay step-by-step instructions, technical diagrams, or torque specifications directly onto the physical car part they are working on, ensuring high accuracy and reducing errors, especially for complex or custom jobs.

3. Safety Testing and Driver Experience

Spatial computing enables sophisticated testing and enhances the final user experience.

Virtual Crash and Performance Testing: Virtual Reality and Digital Twins allow engineers to perform realistic crash simulations, stress tests, and aerodynamics assessments on the digital model without requiring costly and destructive physical prototypes. This accelerates development and improves vehicle safety.

In-Car AR Displays: The technology directly influences the driving experience through Augmented Reality Head-Up Displays (AR HUDs). These systems project critical information (like navigation arrows, speed, and safety alerts) onto the windshield, spatially anchored to the real world, improving driver awareness and safety.

Indoor Navigation

Spatial computing fundamentally transforms Indoor Navigation by using sensors and advanced localization algorithms to create highly accurate, persistent, and engaging guidance experiences that traditional GPS cannot provide.

It essentially merges the physical structure of a building with a digital map, allowing devices to track their position within that space and overlay real-time, context-aware information.

Replacing GPS

Traditional GPS is ineffective indoors because satellite signals are blocked by building structures. Spatial computing replaces this with specialized systems:

Simultaneous Localization and Mapping (SLAM): This is the backbone of indoor navigation. Devices (like smartphones or AR glasses) use their cameras, depth sensors, and Inertial Measurement Units (IMUs) to simultaneously map the environment and track their precise position within that map in real-time.

Sensor Fusion: Systems fuse data from multiple indoor technologies to achieve high accuracy:

Wi-Fi/Bluetooth Beacons (BLE): Used for coarse positioning.

LiDAR/Depth Cameras: Used for generating high-fidelity 3D point clouds of the interior space.

Computer Vision: Algorithms recognize landmarks, floors, and rooms to quickly re-localize the user.

Persistent Digital Map: A detailed, 3D model (a form of Digital Twin) of the indoor space—including walls, doors, stairs, and furniture—is created and stored, serving as the "world data" against which the user's location is constantly verified.

-Applications and Use Cases

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Spatial computing allows for intuitive, step-by-step guidance that goes beyond a simple blue dot on a 2D map.

Augmented Reality (AR) Wayfinding: This is the most popular form of indoor spatial navigation. Users hold up their phones or wear AR glasses, and the navigation system overlays 3D digital arrows, signs, or animated guiding paths directly onto the real-world view of the hallway or room.

Example: Guiding a customer through a shopping mall to a specific store or item.

Context-Aware Information: Navigation isn't just about location; it's about context. As a user walks, the system can automatically:

Display relevant information overlays on points of interest (e.g., product details in a store or exhibit descriptions in a museum).

Provide turn-by-turn spoken directions in noisy environments without the need to look down at a screen.

Operational Efficiency (Warehouses/Hospitals):

Route Optimization: Guiding staff along the most efficient path through complex facilities (e.g., a nurse to a specific room or a warehouse worker to an inventory bin).

Asset Tracking: Using the spatial map to track the real-time location of movable assets (e.g., beds, equipment, or forklifts) within the facility.

Accessibility: Assisting visually impaired users with highly detailed, non-visual cues and guidance, allowing them to navigate complex buildings independently.

Benefits

The result of using spatial computing for indoor navigation is a user experience that is:

More Accurate: Location accuracy can be brought down to centimeter level, critical for crowded areas.

More Intuitive: Users follow visual cues superimposed on the real world, reducing cognitive load.

More Engaging: The experience is interactive and rich with relevant digital content tied to the physical space.

Surgical Planning & Training

Spatial computing is fundamentally transforming Surgical Planning & Training by providing immersive, interactive, and patient-specific three-dimensional environments that enhance precision, reduce errors, and accelerate skill development. It leverages Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) to merge diagnostic data with the real world or create realistic simulations.

1. Surgical Planning and Preoperative Assessment

Spatial computing creates an interactive Digital Twin of the patient's anatomy, allowing surgeons to prepare for complex procedures with unprecedented detail.

3D Visualization and Interaction (VR): By converting 2D images (from CT scans, MRI, or Ultrasound) into interactive, high-resolution 3D models, surgeons can virtually hold, rotate, and examine a patient's organs, tumors, and vascular structures in a fully immersive Virtual Reality (VR) environment.

Personalized Approach: This allows the surgical team to identify the exact location of a tumor, determine the optimal trajectory for an incision, and anticipate complications specific to the patient's unique anatomy.

Rehearsal: Surgeons can virtually rehearse the entire procedure, identifying the best instrument paths and refining their technique before ever entering the operating room, which has been shown to reduce operative time and blood loss in real surgeries.

Collaborative Review (MR/VR): Remote specialists can join a shared mixed reality space to collaboratively review the patient's 3D model, fostering better communication and planning among multidisciplinary teams.

2. Intraoperative Guidance and Navigation

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During the actual surgery, spatial computing provides the surgeon with "X-ray vision" by overlaying critical digital information directly onto the patient's body in real-time.

Augmented Reality (AR) Overlay: Surgeons wear AR headsets (like Microsoft HoloLens) that display critical data superimposed on the patient on the operating table. This information includes:

Subsurface Anatomy: Projection of the precise path of blood vessels, nerves, and organs that are hidden beneath the skin and tissue.

Guidance Cues: Digital lines or holograms that mark the planned incision location, tumor margins, or the exact trajectory for placing screws or implants (e.g., in orthopedic or spinal surgery). Studies have shown AR guidance can significantly improve cutting accuracy and implant alignment.

Hands-Free Data Access: The AR systems are typically hands-free (controlled by voice, gaze, or gesture), allowing the surgeon to consult medical images, vital signs, or procedural checklists without breaking focus or sterilizing their hands.

3. Surgical Training and Education

Virtual Reality and Mixed Reality have created a risk-free, repeatable, and scalable training environment that surpasses traditional methods like using cadavers or observing live procedures.

VR Surgical Simulators: Trainees use VR simulators combined with haptic feedback devices that mimic the sensation of touch, resistance, and texture of real tissue and instruments. This allows them to:

Practice Complex Procedures: Repeatedly perform rare or high-risk operations (e.g., neurosurgery or laparoscopic procedures) in a safe environment.

Objective Assessment: The system can track metrics like efficiency, error rate, and tremor, providing objective, quantitative feedback to the trainee. VR-trained surgeons often show greater efficiency and reduced error rates compared to those trained traditionally.

Remote Mentoring: Experienced surgeons can use Mixed Reality (MR) to remotely guide a trainee in another location. The mentor can draw digital annotations or project virtual tools into the trainee’s field of view in real-time, effectively providing over-the-shoulder guidance from anywhere in the world.

Physical AI

The core idea is that Extended Reality (XR) devices, such as Augmented Reality (AR) headsets and smart glasses, are the ideal hosts for Physical AI (AI that operates directly within the user's physical environment).

AI Collaboration in the World: The advancement of AI has created a demand for devices that enable AI collaboration to move "off-screen and into the world." Hands-free XR devices fulfill this need by providing an interface that integrates digital AI assistance with the user's physical surroundings.

Building & Product Design: Spatial computing is rapidly transforming the Building and Product Design industries by bridging the gap between digital models and physical reality. It allows designers, engineers, and clients to visualize, interact with, and collaborate on complex 3D data in a natural, intuitive, and contextual way.

Here are the primary applications of spatial computing in these fields:

1. Digital Twins for Construction and Operations

Spatial computing is the interface for interacting with Digital Twins, which are real-time virtual replicas of physical buildings, facilities, or products.

Virtual Replication: A digital twin of a factory or building can be constructed by combining a 3D model (shape data) with real-time data pulled from IoT sensors on machinery, equipment, and utility systems (time-series and contextual data).

Operational Optimization: By feeding this data into a digital twin, companies can simulate, monitor, and mine insights to increase efficiency, predict maintenance failures, and optimize energy consumption before problems occur in the physical world.

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Real-Time Monitoring: Maintenance workers can use AR devices to overlay real-time performance metrics (e.g., temperature, pressure, maintenance history) directly onto the physical machinery, improving diagnostics and reducing downtime.

2. Immersive Design and Visualization (AR/VR)

Spatial computing tools fundamentally change the design and evaluation phase for both buildings and products.

Architectural Walkthroughs (VR): Architects can convert 2D plans or 3D models into fully immersive Virtual Reality (VR) experiences. Clients can "walk through" a building, apartment, or factory floor before construction begins, identifying flaws or changes easily.

Augmented Design Review (AR): Designers can use Augmented Reality (AR) headsets to overlay a 3D product prototype onto a physical table, allowing them to collaboratively inspect the model as if it were physically present. This speeds up the prototyping process.

Virtual Prototyping: In product design (e.g., for semiconductor chips or consumer goods), engineers can develop a digital twin of the product design environment to simulate and analyze design iterations without the cost and time of physically producing each prototype.

3. Training and Workforce Enablement

Spatial computing provides scalable, safe, and effective ways to train workers who must interact with complex equipment or dangerous environments.

Immersive Training: Workers can use VR or AR devices for guided training on complex systems, where virtual instructions, animations, and tools are superimposed over the real equipment.

Safety Simulation: Workers in dangerous environments (like utilities or manufacturing) can practice procedures in a risk-free virtual replica of the job site, preparing them for potential field issues and ensuring compliance with evolving regulations.

4. Sales and Customer Engagement

Spatial computing streamlines the sales and evaluation process, especially for large, complex, or expensive products.

Virtual Demonstrations: Manufacturers of large equipment (e.g., compactors or cranes) can offer customers immersive VR experiences with interactive 3D models, eliminating the need for costly and complex physical demonstrations.

Simplified Evaluation: By providing detailed virtual simulations, companies shorten lengthy sales cycles and make the product evaluation process more convenient and cost-effective for Business-to-Business (B2B) clients.

Education /Training

-the essential technologies that allow the seamless merger of the digital and physical worlds:

Artificial Intelligence (AI): AI, particularly Computer Vision, is crucial for understanding the scene, identifying and tracking real-world objects, recognizing user gestures, and handling object occlusion to make virtual objects appear realistically.

Tracking and Mapping Systems: These systems (e.g., inside-out and outside-in tracking) precisely position virtual objects and interpret user actions. Simultaneous Localization and Mapping (SLAM) techniques are used for real-time environmental mapping.

IoT and Hardware: Spatial computing relies on embedded hardware like depth sensors, LiDAR, RGB cameras, and other sensors to gather data about the physical environment. GPUs (Graphics Processing Units) are vital for the real-time processing and rendering of high-quality 3D graphics.

5G and Beyond (6G): Advanced network technologies provide the ultra-low latency, increased bandwidth, and higher data rates necessary to process vast amounts of data in real-time, enabling features like haptic communication and tactile feedback.

3. Applications and Impact

Spatial computing has a wide range of applications across various sectors:

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Education and Training: Creating remote learning classrooms and applications for surgical training.

Healthcare and Accessibility: Enhancing the visual experience for people with visual impairments (e.g., using devices like the Apple Vision Pro), medical diagnostics, and surgical training.

Disaster Management: Integrating real-time event data and geoinformatics to enhance situational awareness, inform decision-making, and optimize resource allocation.

Industrial/Design: Applications in architecture, interior design, and industrial maintenance (overlaying digital information onto physical machinery to reduce downtime).

Transportation: Improving Autonomous Vehicle (AV) safety through enhanced sensor data and computer vision for precise navigation.

Gaming and Entertainment: Creating highly immersive and interactive experiences.

Here are some example of spatial computing in action:

TAKENAKA

► Problem

Traditional 3D scanning of construction sites and building systems was slow, expensive, and required specialized personnel.

► Solution

Used Matterport's spatial computing platform to create digital twins— interactive 3D models—of construction sites and MEP1 systems. This enabled virtual inspections, remote collaboration, and accurate monitoring of building systems.

Results:

► 90% faster 360° photography

► Reduced scanning, travel, and labor costs

► Digital twins of ~1,000 locations improved collaboration and project management

1-MEP systems (Mechanical, Electrical, and Plumbing) Source: Gartner, Nvidia, Corporate Strategy Team

What Is the future of Spatial Computing?

The future of spatial computing is poised for transformative growth, with significant implications for how individuals and organizations interact with their environments. As technologies mature and standards are established, spatial computing will redefine user experiences across various sectors, driving innovation and new business models.

THE FUTURE OF SPATIAL COMPUTING

2030 >> Crowdsourced data Municipal residents and visitors provide real-time, local updates.

2029 >> Open standards Spatial computing experiences become widely accessible.

2028 >> Spatial web domains Organizations, institutions and governments register/secure rights to spatial web domains.

2027 >> Persistent, Fixed content Anchored, geoposed digital content drives onsite digital advertising.

Source: Gartner, Corporate Strategy Team

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How will spatial computing change the way we work?

Although spatial computing is still a young discipline, there are several examples of how mixed reality could be applied, both by consumers and in the workplace.

Gaming is one obvious application, with Marvel now allowing fans to become part of its superhero universe in an hour-long mixed-reality experience.

But spatial computing isn't just for would-be superheroes. Nasa used it in construction of the Orion spacecraft, part of its Artemis program to take people back to the moon and, eventually, to Mars. When Lockheed Martin started to assemble the seats in Orion's crew module, there was no sign of instruction booklets or drawings. Everything the technicians needed to know came from the HoloLens 2 devices they were wearing: voice commands talked them through every step of the assembly, with holographic images of the parts overlaid onto the seats to show where and how they needed to be mounted.

How AI, robotics and automation will reshape the diagnostic lab of the future

Spatial computing: Why the future of the internet is 3D

What is a metaverse identity?

"They found that using spatial computing reduced labor costs and hours by 90%. That is an early example, a very unique case," Hackl told the World Economic Forum. "It's starting to prove that spatial computing can give us superhuman powers of sorts, augmenting our workforce."

Similarly, there are now examples in the medical field, such as a fully functional, immersive model of a human heart. Using Apple's Vision Pro headset, trainee clinicians can virtually interact with the life-like heart simulation that reacts just like the real thing.

Hackl also pointed to the Forum's Global Collaboration Village, which encourages problem-solving through partnership, as a stepping stone towards mixed reality.

What will it take for spatial computing to come to fruition?

Four key components make up spatial computing. Hardware is one of them, not just mixed-reality headsets but also new technologies including wearable AI devices such as the AI Pin and Rabbit R1, says Hackl. She foresees an explosion of these over the next few months.

When it comes to the next component, software, she stresses the importance of computer vision to enable computers to understand objects and people around them

"It's really important to understand that everything that's been happening in the AI boom is what's starting to help spatial computing truly happen. Because you need these spatial computers to understand the physical world. They can only do that through computer vision. For that, you need to create and train large models to understand the world."

Large language and vision models in AI, along with game engines, have been paving the way for this, Hackl adds.

Another key component in spatial computing is data, with new types of data emerging and others being replaced. She points to 2D pixels being replaced by 3D "voxels".

"For all of this to work and actually happen, you're going to need connectivity at levels we have never seen. 5G is not even going to cut it. You're going to need 6G and everything in between."

In what ways does spatial computing pose new challenges?

"Spatial computing isn't one single technology or one single device. Spatial computing is almost like a new technological field," Hackl points out.

And, as AI has shown over the last few years, new technology paradigms come with new challenges.

"When you expand computing into the physical world, you also have to start thinking about something called virtual air rights."

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“Who owns the air around me? Who has the right to put an ad in front of me? Who has the right to put audio in it? That's where I think virtual air starts to become a bigger conversation that is going to impact absolutely everyone.”

But a big technological shift such as this also has implications for the type of talent companies need to exploit the opportunities opening up. Getting close to a generation that has grown up as digital natives will play a big part in succeeding at this.

“Generation Alpha is a generation I do a lot of work with and study very closely. My three children are Generation Alpha. To them, what happens in the virtual space isn’t less real than what happens in the physical space. They move between both realms.”

“When you look at Gen Alpha, they are more in the gaming space. They're very entrepreneurial. They are ‘world builders’. They have been building worlds in Minecraft and Roblox,” highlights Hackl. “That in itself puts a different spin on what companies need to do to hire professionals, retain them and train them.”

To attract the youngest customer demographic, business leaders will need to immerse themselves in the mixed reality world that comes naturally to Gen Alpha. Hackl recommends the proverbial “getting down with the kids”, joining them in their digital pursuits, to truly get to grips with what makes this generation tick.

MARKET UPDATES

Jeel & Mambu partner to power Saudi fintech sandbox

Saudi Arabia –October 27 ,2025 - Jeel and Mambu announced a collaboration to develop Banking as-a-Service infrastructure under the Saudi fintech sandbox program. The initiative aims to accelerate financial inclusion and strengthen domestic cloud-based banking solutions.

Continue Reading: https://www.zawya.com/en/press-release/companies-news/jeel-and-mambu-join-forces-to-power-saudi-arabias-fintech-sandbox-and-pave-the-way-for-banking-as-a-service-pq1ogvnp?utm_source=chatgpt.com

The press release detailing the partnership between Jeel and Mambu to enhance Saudi Arabia's FinTech ecosystem can be summarized in the following key points:

I. The Partnership and Its Goal

Partners: Jeel, the innovation and technology subsidiary of Riyad Bank, has partnered with Mambu, the global cloud-native core banking platform.

Target: The collaboration is designed to enhance the Jeel Sandbox, Saudi Arabia's pioneering FinTech sandbox accelerator (developed by Jeel in collaboration with FinTech Saudi).

Goal: The primary objective is to drive innovation and lay the foundation for scalable Banking-as-a-Service (BaaS) in the Kingdom, fully aligning with Saudi Vision 2030.

II. The Jeel Sandbox Platform

Role: The Jeel Sandbox is a cornerstone of Saudi Arabia's FinTech roadmap, acting as a critical enabler of the national innovation agenda.

Purpose: It empowers startups, financial institutions, and technology innovators to test, validate, and deploy digital financial solutions efficiently.

Impact: It bridges the gap between ideation and commercial deployment, reducing time-to-market for new financial products.

Technology Stack:

It is powered by Mambu's composable banking architecture.

It is hosted on Google Cloud Platform (GCP).

It is in full alignment with the Saudi Central Bank (SAMA)'s cloud regulations, combining agility with regulatory-grade security.

III. Services and Capabilities

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Progressive Innovation: The platform provides a progressive innovation journey, starting from:

Mock APIs

Wallet-as-a-Service (WaaS) capabilities

Moving towards a full Banking-as-a-Service (BaaS) platform.

Ecosystem: This foundation creates a unified ecosystem where FinTechs can seamlessly build, test, and scale their solutions.

IV. Future Outlook and Commitment

Cohort Onboarding: The first pilot cohort of FinTechs is expected to be onboarded later this year (2025).

Benefits for FinTechs: Participants will benefit from enhanced testing capabilities, regulatory readiness, and seamless pathways to commercial deployment through Jeel's BaaS offering.

Mambu's Commitment: Mambu views the partnership as a pivotal moment to increase its presence in Saudi Arabia and support Vision 2030 by enabling financial institutions in their growth stages.

Regional Position: The collaboration aims to position Saudi Arabia as the regional FinTech launchpad.

SEC acquires 30% stake in NAMI to boost advanced manufacturing

Saudi Arabia –October 25 ,2025 - The Saudi Electricity Company (SEC) has taken a 30% stake in NAMI , a move to drive additive manufacturing and engineering across reverse critical industrial sectors. The partnership marks a major step toward self reliant production ecosystems.

Continue Reading: https://www.arabnews.com/node/2620213/corporate-and-sponsored-content?utm_source=chatgpt.com

This text summarizes a major strategic partnership in Saudi Arabia focused on industrial localization and advanced manufacturing.

Here is the summary:

Summary of the NAMI, SEC, Dussur, and 3D Systems Partnership

The Saudi Electricity Company (SEC) has joined the National Additive Manufacturing and Innovation Company (NAMI) as a strategic investor, alongside founding shareholders the Saudi Arabian Industrial Investment Company (Dussur) and 3D Systems. This landmark agreement significantly boosts Saudi Arabia's capabilities in advanced manufacturing and reverse engineering, particularly within the energy sector.

Key Highlights of the Collaboration:

Reinforced Leadership in Additive Manufacturing (AM): SEC's investment solidifies NAMI's position as the national champion for additive manufacturing, accelerating the industrial transformation and digitization goals of Saudi Vision 2030.

Strategic Rationale for SEC: SEC is investing to digitize its inventory, optimize its supply chain, lower spare parts costs, and increase agility. The company will also adopt NAMI's 3D printing solutions to deliver high-performance components (like pump impellers, burners, and heat exchangers).

NAMI's Capabilities: Founded in 2022, NAMI has built a fully capable application and component manufacturing center in Riyadh, utilizing advanced 3D Systems technology (including the DMP Factory 500, DMP Flex 350 Dual for metal, and Figure 4, SLS 380, and SLA 750 for polymer components).

Future Initiatives: With SEC's backing, NAMI is set to launch several strategic initiatives, including:

Developing a comprehensive digital inventory for SEC’s spare parts.

Building a robust additive manufacturing supply chain for the energy sector and other industries.

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Expanding production capabilities to meet industrial scale demand.

Market Impact: The partnership de-risks investment in 3D printing infrastructure by securing consistent demand from a major national entity. This is expected to attract more industrial players, thereby accelerating the growth of the 3D printing market and supporting the broader national goal of localizing advanced industrial capabilities.

Governance: NAMI's governance framework will be strengthened by adopting SEC's corporate policies and procedures.

Saudi Arabia spotlights ethical AI at UNESCO Week

Saudi Arabia –October 25 ,2025 - The Saudi Data & AI Authority emphasized the importance of ethical AI frameworks at UNESCO's "AI for Good" sessions. The Kingdom presented policy models addressing deepfakes, misinformation, and bias in AI training data.

Continue Reading: https://www.arabnews.com/node/2620249/saudi-arabia

Here is the combined summary:

Summary of Recent Saudi Arabian International and AI Developments

1. Ethical AI and Misinformation Risks (SDAIA, ICAIRE, and UNESCO)

Event: The Saudi Data and AI Authority (SDAIA), in collaboration with the International Center for AI Research and Ethics (ICAIRE), hosted a virtual session during UNESCO's Global Media and Information Literacy Week (beginning Oct. 24).

Focus: The session addressed the risks associated with deepfakes and misinformation.

Goal: To enrich the global dialogue on responsible AI and showcase the Kingdom's experience in addressing manipulated content, thus enhancing trust and credibility in media platforms.

Deepfakes Context: The technology uses advanced AI to create highly realistic (but often misleading) audio and visual content, raising critical ethical and legal concerns despite its potential for use in areas like education.

2. Commemoration of Saudi-Japan Diplomatic Relations

Event: Saudi Arabia and Japan held a ceremony in Riyadh on November 4, 2025, to commemorate the 70th anniversary of diplomatic relations (which began in 1955).

Significance: Saudi Vice Minister of Foreign Affairs Waleed Al-Khereiji stated that the cooperation plays a crucial role in promoting regional and global stability and prosperity.

Strategic Framework: The relationship is guided by the Saudi-Japan Vision 2030, which established a comprehensive strategic partnership to achieve common goals.

Economic Ties: Saudi Arabia is Japan's primary supplier of crude oil, and Japan is a significant partner in trade and investment. Cooperation includes efforts in decarbonization.

Saudi Arabia spotlights ethical AI at UNESCO Week

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Continue Reading: https://www.arabnews.com/node/2620249/saudi-arabia

The provided text summarizes the efforts of the Saudi Data and AI Authority (SDAIA), in cooperation with the International Center for AI Research and Ethics (ICAIRE), to promote the ethical use of Artificial Intelligence (AI).

Here is a summary of the key points:

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Event and Timing: The initiative was highlighted during UNESCO's Global Media and Information Literacy Week, which started on October 24th.

Purpose: The main goal is to enrich the global dialogue on responsible AI and share Saudi Arabia's experience and international best practices for dealing with manipulated content.

Session Focus: As part of the event, the SDAIA hosted a virtual session specifically addressing the risks of deepfakes and misinformation.

Goal of the Initiative: The SDAIA and ICAIRE are working to raise awareness about AI ethics, highlight the dangers posed by deepfake technology, and support research aimed at protecting societies from the irresponsible use of AI.

Deepfakes Defined: The text defines deepfakes as technology that uses advanced AI models to replicate human features, voices, and behaviors, creating highly realistic audio and visual content that is hard to distinguish from reality.

Dual Nature of Deepfakes: The text acknowledges that while deepfakes have potential benefits (e.g., in education), they also raise serious concerns regarding privacy, credibility, and protection from misuse.

Saudi tech innovators shine at GITEX GLOBAL 2025

Saudi Arabia –October 14 ,2025 - models and Over 40 Saudi companies showcased emerging solutions in AI, fintech, and digital transformation at GITEX. The national “Saudi Technology” pavilion highlighted homegrown startups driving smart-city and industrial automation projects, underscoring Saudi Arabia’s rising influence

Continue Reading: https://www.arabnews.com/node/2618822/business-economy?utm_source=chatgpt.com

The companies are showcasing a range of products and solutions in telecommunications and information technology, highlighting the Kingdom’s ongoing digital transformation efforts.

This year’s edition of GITEX highlights the fusion of technology, economic strategy, and geopolitical ambition. Opening the discussions on the main stage, Abdulla Bin Touq Al-Marri, UAE minister of economy and tourism, addressed the theme “The Race Beyond Innovation: AI, Geopolitics, and the Global Economic Reset,” underscoring how innovation and economic diversification remain at the heart of the UAE’s national strategy, the Emirates News Agency reported.

Other discussions featured global leaders, including Ekaterina Zaharieva from the European Commission, and Evan Solomon, Canada’s minister for artificial intelligence and digital innovation, who explored the influence of deep-tech ecosystems and the role of AI as defining economic infrastructure.

The companies present are demonstrating a wide array of cutting-edge solutions and innovative products in telecommunications and information technology, reflecting the profound technological progress and digital transformation agenda currently underway within the Kingdom.

Saudi delegation strengthens AI & tech ties in US

Saudi Arabia –October 12 ,2025 - A Saudi delegation led by the Minister of Communications and IT visited top US tech firms and government agencies to explore collaboration in AI, cybersecurity, and quantum computing. The visit reinforced Vision 2030’s goal to position the Kingdom as a global AI hub

Continue Reading: https://www.arabnews.com/node/2618638/saudi-arabia

Saudi Arabia has rapidly emerged as a global leader in data and artificial intelligence in only six years, a transformation spearheaded by the Saudi Data and Artificial Intelligence Authority since its establishment in 2019, the Saudi Press Agency noted in a recent report.

The authority has developed a strategic roadmap to boost the Kingdom’s global competitiveness by leveraging data and AI to drive economic growth, enhance human capabilities and support integrated government services.

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SDAIA also emphasizes the responsible and ethical use of AI, creating regulatory frameworks aligned with the Personal Data Protection Law to ensure privacy and compliance.

Cisco and G42 build secure AI infrastructure across the UAE

GLOBAL UPDATES Global–October 28 ,2025 - Cisco and G42 announced an expanded technology partnership to establish secure, end-to-end AI infrastructure in the UAE. The initiative focuses on data sovereignty, AI readiness, and digital innovation in government and enterprise sectors.

Continue Reading: https://www.zawya.com/en/press-release/companies-news/cisco-and-g42-deepen-us-uae-technology-partnership-to-build-secure-end-to-end-ai-infrastructure-in-the-uae-tej8x8hm?utm_source=chatgpt.com

A Trusted Foundation for the UAE's AI Economy

Cisco will power, connect, and secure a large-scale AI cluster deployed by G42 featuring AMD's advanced MI350X GPUs. This deployment integrates Cisco's full-stack, secure AI infrastructure, including compute, networking, security, storage, optics, as well as observability and analytics tools, delivering scalable performance and unified management for the region's most advanced AI workloads.

Cisco will also act as the technology integrator within G42's Regulated Technology Environment (RTE), a gold-standard compliance and security framework designed to ensure that advanced compute infrastructure operates with the highest levels of protection, transparency, and governance, preventing unauthorized access, transfer, or misuse of advanced compute systems.

The collaboration builds on joint efforts under the broader US–UAE AI Acceleration Partnership, a key program advancing bilateral technology goals, whose flagship projects include the 1GW Stargate UAE cluster undergoing construction in Abu Dhabi and the 5GW UAE-US AI technology campus that was announced during President Trump's state visit to the UAE in May 2025.

Peng Xiao, Group CEO of G42, said: "This collaboration with Cisco represents the next phase of deepening trust and technological alignment between the US and UAE under the AI Acceleration Partnership. It reinforces our shared commitment to building high-performance, secure, sovereign and compliant AI infrastructure that enables global innovation while upholding the highest standards of governance."

Chuck Robbins, Chair and CEO of Cisco, said: "Cisco is proud to deepen our partnership with G42, powering the UAE's next wave of AI innovation by delivering secure, trusted, high-performance infrastructure. This collaboration strengthens the US-UAE AI Acceleration Partnership and underscores Cisco's role in the UAE's digital transformation journey. Together, we are building the foundation for a future driven by responsible and impactful innovation."

Dr. Lisa Su, Chair and CEO, AMD, said: "AMD is proud to partner with Cisco and G42 to power the next generation of AI infrastructure in the UAE. Our AMD Instinct MI350X accelerators deliver the performance, efficiency, and scalability needed to advance secure, sovereign AI innovation. This initiative strengthens the UAE's position as a global leader in innovative AI development and demonstrates how technology initiatives like the US-UAE AI Acceleration Partnership can drive national digital ambitions."

Driving the Region's Digital Momentum

According to Cisco's latest AI research, 92% of organizations in the UAE plan to deploy AI agents, and 41% expect them to work alongside employees within a year. Yet only 25% have robust GPU capacity. It is a gap that this partnership aims to close by delivering scalable, secure AI infrastructure built for growth.

With AI rapidly becoming the main driver of innovation, Cisco's engagement in digital transformation across the UAE has never been more vital. This collaboration represents another bold step in Cisco's strategy - turning innovation into impact and accelerating the region's digital future.

Cisco's Secure, End-to-End AI Infrastructure

Cisco uniquely delivers an end-to-end AI-ready data center solution, combining compute, networking, security, automation and optics. The deployment will leverage Cisco's end-to-end AI-ready data center portfolio, featuring Cisco UCS 885A servers equipped

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with AMD MI350X GPUs for compute, high-speed Nexus 9K 800G switches for networking, the VAST AI Operating System hosted on UCS servers, Firepower 4200 next-generation firewalls for security, Nexus Dashboard and Intersight for network automation and compute management. In addition, it will feature the latest Cisco optics to enable the highest performing and most reliable networks, and Cisco Advanced Services for planning, design, and implementation.

The collaboration further strengthens G42's network of trusted US technology partners contributing to the Regulated Technology Environment (RTE) framework, reinforcing a model grounded in transparency and accountability.

G42 and Cisco will work in close coordination with relevant U.S. government agencies to obtain the necessary licenses and regulatory clearances for deployment, which is expected to advance in the coming months pending final approvals.

Oracle and AMD expand global partnership for AI computing power

Global–October 14 ,2025 - Oracle and AMD are deepening their partnership with the rollout of more than 50,000 GPUs designed for large-scale AI workloads. The collaboration aims to strengthen Oracle Cloud Infrastructure's ability to support enterprise-level generative AI applications.

Continue Reading: https://apnews.com/article/oracle-advanced-micro-devices-artificial-intelligence-ai-2c20a60eb0df903f24744cdf2124de2a

Some industry analysts and financial institutions fear that the rapid growth in tech stock prices have stretched companies' market valuations beyond their actual worth, comparable to the peak of the 2000 dotcom bubble, which eventually deflated and led to a recession.

Huawei unveils AI-powered innovations at GITEX GLOBAL 2025

Global–October 13 ,2025 - Huawei showcased a new generation of AI-powered technologies at GITEX GLOBAL 2025, emphasizing sustainability, digital intelligence, and smart enterprise transformation. The company highlighted partnerships regional aimed at enabling intelligent industry ecosystems.

Continue Reading: https://www.zawya.com/en/press-release/companies-news/huawei-to-present-ai-powered-innovations-and-next-generation-industry-intelligence-at-gitex-global-2025-iioy413j?utm_source=chatgpt.com

From October 13 to 17, Huawei will take part in GITEX GLOBAL 2025, one of the world's most prominent technology gatherings, at the Dubai World Trade Centre. With the theme "All Intelligence," Huawei, as a Platinum Sponsor of GITEX GLOBAL 2025, will introduce its newest advancements in AI-driven networks, storage, cybersecurity, cloud technologies and more, underscoring company's continued commitment to advancing intelligent infrastructure and its position as a preferred partner in digital transformation. Throughout the event, Huawei will connect with customers, partners, policymakers, and technology leaders to exchange ideas and explore partnerships for accelerating intelligent transformation across the Middle East and Central Asia.

Covering an area of 1,200 square meters, the Huawei booth features five key themes: Accelerate Industrial Intelligence, Partner Park, Huawei Cloud, Intelligent Data Center, and Intelligent Campus. Visitors will have the opportunity to engage with interactive demonstrations of cutting-edge technologies, explore real-world use cases, and gain insights into best practices shaping the future of industry intelligence.

Phillip Gan, President of Huawei Middle East and Central Asia, stated that "AI and digital technologies are advancing at unprecedented speed, reshaping industries and redefining possibilities. Our goal is to make this powerful technology accessible and actionable for every industry. At GITEX, we moved beyond theory to showcase the practical future of AI, providing the reliable infrastructure that allows businesses to deploy AI with confidence and innovate at scale. By working closely with customers and partners, we are turning these capabilities into practical solutions that drive industry-wide progress, strengthen ecosystems in the Middle East and Central Asia.

Empowering Industries: Showcasing Innovations and Forging Strategic Partnerships

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Featuring over 80 solutions and 40 interactive demos, Huawei is showcasing innovations such as the Xinghe AI Network, next-generation optical solutions, AI Data Lake storage, and AI-native cloud platforms, all designed to provide the indispensable foundation for scalable AI. These technologies are applied in scenario-based solutions across sectors including Public Utilities, Government Services, Finance, Transportation, Oil & Gas, Electric Power, and Education, empowering smart cities, optimising financial data centers, enabling AI-powered grid inspections, and automating industrial operations.

Allen Tang, President of ICT Marketing & Solution Sales Department at Huawei Middle East and Central Asia, highlighted that "To accelerate national digital transformation, we will unveil its GovTech1.0 framework, a strategic blueprint designed to fast-track government modernization. Huawei will provide top-level solution design and specific offerings tailored for government agencies which is built on four foundational pillars: Application Intelligentization, Data Harmonization, Platform Standardization, and Network Broadbandization."

A core tenet of Huawei's strategy is collaboration. At GITEX GLOBAL 2025, the company is reaffirming its commitment to building a win-win partner system by launching over 20 new industry solutions and 30 SME-focused products, alongside the introduction of a dedicated Partner Park and new Accelerated Growth Partner policies to empower distributors and solution partners. Huawei is also hosting over 100 expert-led sessions, spanning five main speeches, 18 industry forums, and 23 open talks, designed to foster knowledge exchange and collaboration in key areas such as cybersecurity, digital power, and AI-driven innovation.

As the Lead Sponsor of GITEX Cyber Valley, hosted by the UAE Cybersecurity Council, Huawei will present its vision for securing the intelligent era. Sean Yang, Global Cyber Security & Privacy Officer, will deliver a keynote speech on "Strengthening Data and AI Infrastructure Security and Safeguarding All Intelligence" at the GITEX Cyber Stage on October 14. The session will also spotlight Huawei's advanced security portfolio powered by AI, including the Xinghe Intelligent SASE Solutions, designed to protect enterprises in an increasingly complex threat landscape.

Sean Yang, Huawei's Global Cyber Security and Privacy Officer, commented: "As AI becomes deeply embedded across industries, the risks and threats surrounding it are evolving just as rapidly. At Huawei, we are focused on helping organizations strengthen the security of their AI and data infrastructures through robust governance, advanced technical safeguards, and industry best practices. We aim to build systems that are secure, trustworthy, and resilient, enabling digital growth with confidence. Huawei is dedicated to working with global ecosystem partners to build a trusted, inclusive, and intelligent future."

Advancing AI Across Connectivity, Cloud, and Education

In the Carrier market, Huawei continues to work with global carriers to advance intelligent connectivity. By end-2024, 5G users worldwide surpassed 2.1 billion, with both public and private networks driving productivity and efficiency across industries. The company is also deploying 5.5G networks to enable new experience-based services such as livestreaming, gaming, and business travel. At GITEX GLOBAL 2025, Huawei will host the B2B Digital Transformation Forum, focusing on fostering collaborative growth with carriers in the AI era.

In the cloud domain, Huawei offers AI compute service where Model-as-a-Service (MaaS) supports all major open-source foundation models. This showcases the company's transition from Cloud-native to AI-native with AI innovation and extensive industry intelligence practices. Visitors can explore Huawei Cloud's AI full-stack solutions, including the model development platform – ModelArts, enterprise-grade intelligent agent platform – Versatile, next-generation databases and data analytics service – GaussDB, TaurusDB, Data Warehouse Service and MapReduce Service, and DataArts Studio – a one-stop platform for data governance and analytics services.

Smart Education will be another focus for Huawei at GITEX GLOBAL 2025, highlighted by the Smart Education Forum on October 14. The forum will explore AI's role in transforming education, featuring Huawei's new blueprint for Intelligent Education on accelerating the digital journey of education. In collaboration with UNESCO, Huawei aims to promote inclusive, equitable, and intelligent education powered by innovation and global partnerships.

GITEX GLOBAL 2025 will be held at the Dubai World Trade Centre from October 13 to 17. Huawei welcomes all attendees to visit its booth in Hall 22 to explore the latest innovations and engage with its team of experts.

About Huawei

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Founded in 1987, Huawei is a leading global provider of information and communications technology (ICT) infrastructure and smart devices. We have more than 208,000 employees, and we operate in more than 170 countries and regions, serving more than three billion people around the world.

Our Vision and mission is to bring digital to every person, home and organization for a fully connected, intelligent world. To this end, we will drive ubiquitous connectivity and promote equal access to networks; bring cloud and artificial intelligence to all four corners of the earth to provide superior computing power where you need it, when you need it; build digital platforms to help all industries and organizations become more agile, efficient, and dynamic; redefine user experience with AI, making it more personalized for people in all aspects of their life, whether they're at home, in the office, or on the go.

Open AI teams up with Broadcom to design next-generation AI chips

Global–Ocktober 13 ,2025 - OpenAI announced a strategic partnership with Broadcom to co-develop custom AI accelerators aimed at improving efficiency in training large language models. The move signals OpenAI's growing focus on building a vertically integrated AI hardware ecosystem.

Continue Reading: https://apnews.com/article/openai-broadcom-ai-accelerators-ethernet-1bef0e0216d3878feefcb003e89b08e4

OpenAI said it is working with chipmaker Broadcom to design its own artificial intelligence computer chips.

The two California companies didn't disclose the financial terms of the deal but said they will start deploying the new racks of customized "AI accelerators" late next year.

It's the latest big deal between OpenAI, maker of ChatGPT, and the companies building the chips and data centers required to power AI.

OpenAI in recent weeks has announced partnerships with chipmakers Nvidia and AMD that will supply the AI startup with specialized chips for running its AI systems. OpenAI has also made big deals with Oracle, CoreWeave and other companies developing the data centers where those chips are housed.

Many of the deals rely on circular financing, in which the companies are both investing in OpenAI and supplying the world's most valuable startup with technology, fueling concerns about an AI bubble. OpenAI doesn't yet turn a profit but says its products now have more than 800 million weekly users.

What's real about this announcement is OpenAI's intention of having its own custom chips," said analyst Gil Luria, head of technology research at D.A. Davidson. "The rest is fantastical. OpenAI has made, at this point, approaching $1 trillion of commitments, and it's a company that only has $15 billion of revenue

OpenAI CEO Sam Altman said the work with Broadcom to develop a custom chip began about 18 months ago. Broadcom also works with other leading AI developers, including tech giants Amazon and Google.

Broadcom CEO Hock Tan said on the same podcast that OpenAI needs more computing capacity as it progresses toward a "better and better frontier model and towards superintelligence."

"If you do your own chips, you control your destiny," he added.

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Nvidia and Fujitsu partner to advance AI robotics and computing Global –October 3 ,2025 Continue Reading >> Continue Reading>> Nvidia and Fujitsu have announced a new collaboration to develop advanced AI robotics and high-performance computing systems. The partnership focuses on building next-generation AI platforms to power automation, robotics, and industrial intelligence.

Continue Reading: https://apnews.com/article/nvidia-fujitsu-ai-japan-technology-3e800f495124c9f66fa654deaec41e52?utm_source=chatgpt.com

technology company Nvidia and Fujitsu, a Japanese telecommunications and computer maker, agreed to work together on artificial intelligence to deliver smart robots and a variety of other innovations using Nvidia’s computer chips.

“The AI industrial revolution has already begun. Building the infrastructure to power it is essential in Japan and around the world,” Nvidia Chief Executive Jensen Huang said, hugging his Fujitsu counterpart Takahito Tokita on stage.

“Japan can lead the world in AI and robotics,” Huang told reporters at a Tokyo hotel.

The companies will work together on building what they called “an AI infrastructure,” or the system on which the various futuristic AI uses will be based, including health care, manufacturing, the environment, next-generation computing and customer services. The hope is to establish that AI infrastructure for Japan by 2030.

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It initially will be tailored for the Japanese market, leveraging Fujitsu's decades-long experience here, but may later expand globally, and will utilize Nvidia's GPUs, or graphics processing units, which are essential for AI, according to both sides.

The two executives did not outline specific projects or give a monetary figure for planned investments. But exploring a collaboration in AI for robots with Yaskawa Electric Corp., a Japanese machinery and robot maker, was noted as a possible example. AI will be constantly evolving and learning, they said.

Fujitsu and Nvidia have been working together on AI, speeding up manufacturing with digital twins and robotics to tackle aging Japan's labor shortages.

Tokita said the companies were taking a "humancentric" approach aimed at keeping Japan competitive.

"Through our collaboration with Nvidia, we aim to create new, unprecedented technologies and contribute to solving even more serious social issues," said Tokita.

Comparison Table: Spatial Computing and Related Technologies

Feature/Technology	Spatial Computing (SC)	Augmented Reality (AR)	Virtual Reality (VR)	Mixed Reality (MR)	Extended Reality (XR)
Definition	Refers to the use of computer technology to interact with the physical world in three dimensions.	A digital layer that augments reality by overlaying digital information on the physical world.	A completely immersive experience in a computer-generated environment.	ital material that can be mixed in and interact with physical objects in reality.	An umbrella term comprising AR, VR, and MR, and may include other immersive technologies like spatial audio and IoT.
Interaction with Physical World	Integrates digital information seamlessly into the real-world environment.	Augments the real world with digital overlays but does not allow for interaction between digital and physical objects.	Creates a completely virtual world with no direct interaction with the physical environment.	Allows for interaction between digital and physical objects in a context-aware manner.	Encompasses technologies that allow for varying degrees of interaction with the physical world.
Hardware Requirements	May require sensors, cameras, and other input devices to capture spatial data.	Widely available through smartphones and tablets with AR capabilities.	Requires head-mounted displays and other sensory inputs for a fully immersive experience.	Requires specialized hardware like the Microsoft Hololens for context-aware interactions.	Can include a range of devices from AR glasses to VR headsets, depending on the specific technology used.
Use Cases	Can be used in warehouse automation, self-driving cars, and supply chain automation.	Used in mobile apps for gaming, navigation, and information overlay.	Used in gaming, simulations, and training applications.	Used in environments where digital and physical objects need to interact, such as expos and trade shows.	Covers a broad spectrum of applications across various industries, including gaming, training, and spatial planning.
Level of Immersion	Aims to create immersive experiences by bridging the gap between digital and physical worlds.	Provides an enhanced experience by adding digital elements to the physical world.	Offers a sense of presence in a completely digital environment.	Offers a richer, more customized experience by combining the physical and digital worlds.	Provides complete control over the level of immersion, from fully physical to fully digital environments.
Examples	Smart home automation, digital	Pokémon Go, Snapchat filters, AR navigation apps.	VR gaming headsets, flight	Microsoft Hololens applications,	Devices that can switch between AR, VR, and MR

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Feature/Technology	Spatial Computing (SC)	Augmented Reality (AR)	Virtual Reality (VR)	Mixed Reality (MR)	Extended Reality (XR)
	twins, autonomous vehicles.		simulators, virtual tours.	interactive trade show displays.	modes, such as Apple's Vision Pro.

Here is an arranged and explained overview of the top spatial computing development companies.

Top Spatial Computing Development Companies

The following companies specialize in Spatial Computing—which includes Augmented Reality (AR), Virtual Reality (VR), and Extended Reality (XR)—to build immersive and innovative digital solutions for enterprise and marketing clients.

1. Treeview

Treeview is recognized as one of the world's leading spatial computing development studios. It operates as a high-end boutique studio with an exclusive focus on AR/VR software development since its founding. Its primary market is enterprise clients, for whom it builds advanced AR/VR products and solutions.

Detail	Data
Specialization	Enterprise
Pricing	$100 - $149 / hr
Founded	2016
Location	New York City, Montevideo
Key Clients	Meta, Microsoft, ULTA Beauty, Medtronic, NEOM

2. Next/Now

NEXT/NOW is an innovation agency driven by a defined process, with a focus on experience design. The company specializes in creating immersive mixed reality solutions, using a blend of creative vision, strategy, and innovation to help major brands adapt and thrive in the emerging mixed reality landscape.

Detail	Data
Specialization	Marketing
Pricing	$100 - $149 / hr
Founded	2011
Location	Chicago
Key Clients	Cubs, Weber, Whirlpool

3. TriggerXR

Trigger XR is a globally operating XR agency. They work with some of the world's largest intellectual properties (IPs) to provide strategic, development, and operational support for AR, VR, and immersive solutions. They are known for pushing the boundaries of mobile and Head-Mounted Display (HMD) technologies to effectively communicate brand stories.

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Detail	Data
Specialization	Marketing
Pricing	$100 - $149 / hr
Founded	2010
Location	LA
Key Clients	3M, Roche, Werfen

4. Areyes

Areyes is described as a creative technology studio dedicated to exploring new formats of visual communication. Their core expertise lies in building unique digital experiences through AR/VR, with a specific focus on crafting playable Augmented Reality applications to engage users.

CONCLUSION (SYNTHESIZED)

Spatial Computing represents the next evolutionary leap in Human-Computer Interaction (HCI), moving digital assistance off-screen and seamlessly merging the digital and physical worlds to enable intuitive, immersive interactions.

The technology, encompassing VR, AR, MR, and XR, is poised to transform global communication and unlock new business models across key sectors. Its transformative capabilities are evident across numerous use cases, including:

Manufacturing and Training: Utilizing Digital Twins for predictive maintenance and workflow optimization, and AR-Guided Assembly for enhanced precision and error reduction on the factory floor.

Healthcare: Revolutionizing Surgical Planning & Training by enabling surgeons to rehearse complex procedures on interactive, patient-specific 3D models and providing real-time AR Overlay guidance during surgery.

Design and Navigation: Allowing designers to use Virtual Prototyping for rapid design iteration and providing highly accurate, intuitive Augmented Reality (AR) Wayfinding that solves the limitation of GPS indoors.

However, the path to widespread adoption is challenged by the need for high-performance hardware, low latency, interoperability standards, and robust AI models to ensure realistic immersion and contextual understanding. Overcoming these challenges will cement Spatial Computing as the foundational technology that enables machines to optimize and automate processes, redefining how humans engage with their surroundings and driving the next wave of innovation.

RECOMMENDATIONS (SYNTHESIZED)

Based on the challenges and opportunities presented in the document, the following recommendations are critical for achieving the widespread adoption and full potential of Spatial Computing:

1. Prioritize Standardization and Interoperability

The industry must focus on developing open APIs and established data standards to allow diverse spatial computing devices and platforms to communicate seamlessly. This is essential for unlocking a robust, competitive ecosystem and driving widespread accessibility.

2. Invest in Latency Reduction and Data Processing

Further research and investment are required in efficient, parallelized processing of massive and complex spatial datasets to reduce lag and guarantee the real-time performance and low latency needed for seamless, immersive experiences. This requires greater utilization of edge and cloud computing for complex visuals and AI tasks.

3. Improve Accessibility and Reduce Hardware Costs

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 14 Issue 11 , November - 2025

To move beyond early enterprise adoption, manufacturers must focus on developing more cost-effective and less resource-intensive hardware to limit the high cost that currently restricts accessibility. Simultaneously, focus on adaptive interfaces to improve usability for all users, including those who are visually impaired.

4. Enhance User Education and Intuitive Design

Developers and organizations should focus on intuitive design and comprehensive educational programs to overcome the steep learning curve associated with the technology. Interaction paradigms must be fundamentally different from traditional computing, making the experience feel like a natural part of the physical environment.

Finally, some points

Nvidia Blackwell GPU platform and the new B200 "Blackwell" GPU

In short, Nvidia's "monster" new AI chip isn't just an incremental update; it's a foundational technology designed to power the next generation of generative AI, scientific discovery, and complex simulations, while simultaneously locking in its market leadership for years to come.

A 2.5x generational performance increase for training is not just an incremental step; it's a massive leap that accelerates the entire pace of AI innovation, reduces barriers to entry, and enables the creation of more powerful and capable artificial intelligence. It's a core part of what makes the Blackwell B200 such a game-changing release.

Photolithography: Using light (and now extreme ultraviolet, EUV) to project the intricate patterns of the circuits onto the silicon,

like a super-advanced photographic process.

-Etching: Chemically or physically carving away material to create the tiny structures.

Doping: Precisely introducing impurities into the silicon to change its electrical properties in specific areas.

-Deposition: Layering on thin films of various materials (like metals for wires or insulators).

"Millions or Even Billions of Transistors"

This is the heart of the chip's function and power.

Transistor: The fundamental building block. It acts as a tiny, ultra-fast switch that can either block an electrical current (representing a 0) or allow it to pass (representing a 1). This binary on/off state is the basis of all digital computation.

-The Scale: The number is mind-boggling. A high-end modern processor can have over 20 billion transistors. To visualize this, if a transistor were the size of a grain of rice, a chip with 20 billion transistors would cover an area larger than 200 football fields. This immense scale is what enables the complex calculations our devices perform instantly.

The insatiable demand for advanced AI compute (the 80B transistors) is the primary engine behind the soaring energy footprint of data centers (the 1.5% of global electricity). Managing this growth is one of the most pressing issues for the tech industry.

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