

# Advanced Electronics Technologies for AI 2026-2036: Neuromorphic Computing, Quantum Computing and Edge AI

<https://marketpublishers.com/r/ADDDFF386F09AEN.html>

Date: September 2025

Pages: 692

Price: US\$ 2,100.00 (Single User License)

ID: ADDFF386F09AEN

## Abstracts

The artificial intelligence revolution stands at a critical inflection point. As AI applications proliferate across every sector of the global economy—from autonomous vehicles navigating complex urban environments to personalized medical diagnostics processing vast genomic datasets—the computational demands have outstripped the capabilities of traditional silicon-based architectures. The convergence of neuromorphic computing, quantum computing, and edge AI processors represents not merely an evolutionary advancement, but a fundamental paradigm shift that will determine the trajectory of artificial intelligence for the next decade and beyond. This technological convergence emerges from the recognition that different AI workloads require fundamentally different computational approaches. Traditional von Neumann architectures, which have powered the digital revolution for over half a century, face insurmountable challenges in meeting the diverse requirements of modern AI systems: the massive parallel processing demands of training large language models, the ultra-low latency requirements of autonomous systems, the energy constraints of mobile and IoT devices, and the real-time adaptation capabilities needed for dynamic environments.

The semiconductor industry's adherence to Moore's Law—the observation that transistor density doubles approximately every two years—has reached fundamental physical limits. As transistors approach atomic dimensions, quantum effects, manufacturing costs, and power density challenges have made continued scaling increasingly difficult. This limitation has profound implications for AI development, as the exponential growth in model complexity and data volumes can no longer be supported through traditional scaling approaches. The response has been a decisive shift toward domain-specific architectures optimized for particular AI workloads. Graphics Processing Units (GPUs) initiated this transformation by providing massively parallel processing capabilities for

training deep neural networks. Tensor Processing Units (TPUs) followed, offering specialized acceleration for matrix operations core to machine learning algorithms. However, these solutions represent only the beginning of a more profound architectural revolution.

Neuromorphic computing draws inspiration from the human brain's remarkable efficiency and adaptability, implementing spiking neural networks that process information only when events occur, dramatically reducing power consumption compared to traditional continuously-operating processors. This event-driven processing paradigm proves particularly valuable for applications requiring always-on sensing and real-time adaptation, such as autonomous vehicles processing sensor data or IoT devices monitoring environmental conditions. The technology's commercial viability has been demonstrated through pioneering implementations including Intel's Loihi 2 neuromorphic research chip and IBM's TrueNorth processor. Startups like BrainChip have commercialized neuromorphic accelerators for edge AI applications, while companies like Prophesee have developed neuromorphic vision sensors capable of capturing high-speed motion with microsecond temporal resolution and minimal power consumption. Beyond energy efficiency, neuromorphic systems offer unique advantages in handling temporal data, performing in-memory computation, and enabling continuous learning without extensive retraining. These capabilities prove essential for applications ranging from industrial predictive maintenance to augmented reality systems requiring real-time environmental understanding.

Quantum computing represents perhaps the most revolutionary advancement in computational capability since the invention of digital computers. By leveraging quantum phenomena including superposition and entanglement, quantum systems can potentially solve certain classes of problems exponentially faster than classical computers. For artificial intelligence, this capability promises transformative advances in optimization, pattern recognition, and machine learning algorithm development. Quantum machine learning algorithms like quantum support vector machines and quantum neural networks demonstrate the potential for processing vast datasets more efficiently than classical approaches. Quantum optimization algorithms show particular promise for solving complex combinatorial problems common in AI applications, from drug discovery molecular simulations to financial portfolio optimization and supply chain management. Major technology companies including IBM, Google, and IonQ have developed increasingly sophisticated quantum processors, while cloud-based quantum computing services democratize access to quantum capabilities for AI researchers and developers. The integration of quantum and classical computing through hybrid architectures enables practical applications that leverage quantum advantages while

maintaining compatibility with existing AI workflows. The proliferation of connected devices and the need for real-time AI processing has driven the development of specialized edge AI processors capable of running sophisticated algorithms directly on mobile devices, IoT sensors, and embedded systems. This distributed intelligence paradigm addresses critical limitations of cloud-based AI processing: network latency, bandwidth constraints, privacy concerns, and the need for autonomous operation in connectivity-challenged environments.

Edge AI processors employ diverse architectural approaches including dedicated neural processing units (NPUs), analog computing techniques, and neuromorphic processing elements optimized for specific workloads. Companies like NVIDIA with their Jetson ecosystem, Qualcomm with integrated AI accelerators, and startups like Mythic with analog matrix processors are pioneering solutions that deliver increasingly sophisticated AI capabilities within the power and size constraints of edge devices.

The convergence of these three technological domains creates unprecedented opportunities for solving AI's most challenging problems. Neuromorphic principles could enhance quantum error correction and control systems. Quantum algorithms might accelerate neuromorphic network training and optimization. Edge processors could enable hybrid quantum-classical computing workflows and distribute neuromorphic processing capabilities across IoT networks. This technological convergence is reshaping not only the capabilities of AI systems but also the economic dynamics of the technology industry. The market represents a fundamental shift from general-purpose computing platforms to specialized architectures optimized for specific AI workloads, creating new competitive dynamics and investment opportunities across the entire technology ecosystem.

Advanced Electronics Technologies for AI 2026-2036 analyzes the convergence of three revolutionary electronics technologies reshaping the artificial intelligence landscape: neuromorphic computing, quantum computing, and edge AI processors. The report provides detailed market forecasts spanning 2026-2036, examining market dynamics across multiple technology vectors that collectively represent a transformative shift from conventional von Neumann architectures to specialized, brain-inspired, quantum-enhanced, and edge-distributed computing platforms. Our analysis reveals a rapidly accelerating market trajectory driven by exponential demand for energy-efficient, real-time AI processing capabilities across autonomous systems, healthcare applications, industrial automation, and smart city infrastructures.

Technology convergence analysis examines synergistic interactions between these

three domains, identifying cross-platform opportunities where quantum algorithms enhance neuromorphic training, where edge processors enable hybrid quantum-classical workflows, and where neuromorphic principles improve quantum error correction systems. The report provides detailed assessments of hybrid computing architectures, multi-modal AI processing systems, and ecosystem standardization requirements driving interoperability across diverse computing platforms. Market segmentation delivers granular analysis across vertical applications including automotive (autonomous vehicles, ADAS), healthcare (medical devices, diagnostics, prosthetics), industrial IoT (predictive maintenance, quality control), smart cities (traffic management, environmental monitoring), aerospace/defense (UAVs, satellite imaging, cybersecurity), and data center infrastructure (high-performance computing, cloud services). Regional market analysis covers North America, Europe, Asia-Pacific, and emerging markets, examining technology adoption patterns, government initiatives, and investment landscapes.

Competitive landscape intelligence provides comprehensive profiles of >400 companies across all three technology domains. Neuromorphic computing profiles span chip manufacturers, sensor developers, memory technology providers, and software framework developers. Quantum computing coverage includes platform providers, specialized hardware companies, software developers, and materials suppliers. Edge AI processor analysis encompasses established semiconductor companies alongside innovative start-ups.

Investment analysis evaluates funding trends, strategic partnerships, and market opportunities across \$2+ trillion in combined market potential through 2036. The report includes detailed venture capital analysis, government funding initiatives, corporate R&D investments, and strategic acquisition activity shaping competitive dynamics. Manufacturing capacity analysis addresses supply chain vulnerabilities, quality control procedures, and fabrication process requirements for next-generation computing architectures.

### **Report contents include:**

#### Neuromorphic Computing

Market overview with global revenues 2024-2036 and segmentation analysis

Moore's Law limitations driving neuromorphic adoption

Technology architectures: spiking neural networks, memory approaches, hardware processors

Sensing technologies: event-based sensors, hybrid approaches, bio-inspired designs

Application markets: mobile/consumer, automotive, industrial, healthcare, aerospace/defense, datacenters

Competitive landscape with 144 company profiles

Regional market analysis and forecasts

Technology roadmaps and emerging trends

Investment landscape and strategic partnerships

Regulatory considerations and sustainability impact

## Quantum Computing

First and second quantum revolution context

Current market landscape with technical progress assessment

Investment analysis covering \$billions in funding 2024-2025

Global government initiatives across major economies

Business models and market dynamics

Hardware technologies: superconducting, trapped ion, silicon spin, photonic, topological qubits

Software stack and quantum algorithms

Infrastructure requirements and cloud services

Applications across pharmaceuticals, chemicals, transportation, financial services, automotive

Materials requirements: superconductors, photonics, nanomaterials

200+ company profiles spanning entire value chain

## Edge AI Processors

Market size evolution and geographic distribution

Technology architectures: NPUs, SoC integration, power optimization

Application analysis: industrial IoT, smartphones, automotive, smart cities, healthcare

Competitive landscape covering established players and startups

Market drivers: latency requirements, privacy imperatives, bandwidth limitations

49 detailed company profiles

Technology trends and future roadmaps

Profiles of 401 companies. Companies profiled include ABR (Applied Brain Research), AiM Future, AI Storm, AlpsenTek, Amazon Web Services, Ambarella, Ambient Scientific, AMD, ANAFLASH, Analog Inference, AnotherBrain, Apple, ARM, Aryballe Technologies, Aspinity, Avalanche Technology, Axelera AI, Baidu, Beijing Xinzhida Neurotechnology, A\* Quantum, AbaQus, Aegiq, Agnostiq, Airbus, Alice&Bob, Aliro Quantum, Alpine Quantum Technologies, Anyon Systems, Archer Materials, Arclight Quantum, Arctic Instruments, ARQUE Systems, Atlantic Quantum, Atom Computing, Atom Quantum Labs, Atos Quantum, Baidu, BEIT, Bifrost Electronics, Advanced Micro Devices, Alpha ICs, Amazon Web Services, Ambarella, Anaflash, Apple, Axelera AI, Axera Semiconductor, Blaize, BrainChip Holdings, Cerebras Systems, Corerain Technologies, DEEPX, DeGirum, EdgeCortex, Efinix, Enerzai, Google, Graphcore, GreenWaves Technologies and more.....

## Contents

### 1 INTRODUCTION

- 1.1 Neuromorphic-Quantum Computing Convergence Potential
- 1.2 Edge AI and Neuromorphic System Integration
- 1.3 Hybrid Computing Architecture Development
- 1.4 Multi-Modal AI Processing System Evolution
- 1.5 Ecosystem Standardization Requirements

### 2 NEUROMORPHIC COMPUTING

- 2.1 Overview of the neuromorphic computing and sensing market
  - 2.1.1 Global Market Revenues 2024-2036
  - 2.1.2 Market segmentation
  - 2.1.3 Ending of Moore's Law
  - 2.1.4 Historical market
  - 2.1.5 Key market trends and growth drivers
  - 2.1.6 Market challenges and limitations
  - 2.1.7 Future outlook and opportunities
    - 2.1.7.1 Emerging trends
      - 2.1.7.1.1 Hybrid Neuromorphic-Conventional Computing and Sensing Systems
      - 2.1.7.1.2 Edge AI and IoT
      - 2.1.7.1.3 Quantum Computing
      - 2.1.7.1.4 Explainable AI
      - 2.1.7.1.5 Brain-Computer Interfaces
      - 2.1.7.1.6 Energy-efficient AI at scale
      - 2.1.7.1.7 Real-time learning and adaptation
      - 2.1.7.1.8 Enhanced Perception Systems
      - 2.1.7.1.9 Large-scale Neuroscience Simulations
      - 2.1.7.1.10 Secure, Decentralized AI
      - 2.1.7.1.11 Robotics that mimic humans
      - 2.1.7.1.12 Neural implants for healthcare
      - 2.1.7.1.13 New Application Areas and Use Cases
      - 2.1.7.1.14 Disruptive Business Models and Services
      - 2.1.7.1.15 Collaborative Ecosystem Development
      - 2.1.7.1.16 Skill Development and Workforce Training
    - 2.1.7.2 Technology roadmap
- 2.2 Neuromorphic computing and generative AI

- 2.3 Market value chain
- 2.4 Market map
- 2.5 Funding and investments
- 2.6 Strategic Partnerships and Collaborations
- 2.7 Regulatory and Ethical Considerations
  - 2.7.1 Data Privacy and Security
  - 2.7.2 Bias and Fairness in Neuromorphic Systems
  - 2.7.3 Intellectual Property and Patent Landscape
- 2.8 Sustainability and Environmental Impact
  - 2.8.1 Carbon Footprint Analysis of Neuromorphic Systems
  - 2.8.2 Energy Efficiency Metrics and Benchmarking
  - 2.8.3 Green Manufacturing Practices
  - 2.8.4 End-of-life and Recycling Considerations
  - 2.8.5 Environmental Regulations Compliance
- 2.9 Introduction
  - 2.9.1 Definition and concept of neuromorphic computing and sensing
  - 2.9.2 Main neuromorphic approaches
    - 2.9.2.1 Large-scale hardware neuromorphic computing systems
    - 2.9.2.2 Non-volatile memory technologies
    - 2.9.2.3 Advanced memristive materials and devices
  - 2.9.3 Fabrication Processes for Neuromorphic Systems
  - 2.9.4 Key Material Suppliers
  - 2.9.5 Supply Chain Vulnerabilities and Mitigation
  - 2.9.6 Manufacturing Capacity Analysis
  - 2.9.7 Quality Control and Testing Procedures
  - 2.9.8 Comparison with traditional computing and sensing approaches
  - 2.9.9 Neuromorphic computing vs. quantum computing
  - 2.9.10 Key features and advantages
    - 2.9.10.1 Low latency and real-time processing
    - 2.9.10.2 Power efficiency and energy savings
    - 2.9.10.3 Scalability and adaptability
    - 2.9.10.4 Online learning and autonomous decision-making
  - 2.9.11 Markets and Applications
    - 2.9.11.1 Edge AI and IoT
    - 2.9.11.2 Autonomous Vehicles and Robotics
    - 2.9.11.3 Cybersecurity and Anomaly Detection
    - 2.9.11.4 Smart Sensors and Monitoring Systems
    - 2.9.11.5 Datacenter and High-Performance Computing
- 2.10 Neuromorphic Computing Technologies and Architecture

- 2.10.1 Spiking Neural Networks (SNNs)
  - 2.10.1.1 Biological inspiration and principles
  - 2.10.1.2 Types of SNNs and their characteristics
  - 2.10.1.3 Advantages and limitations of SNNs
- 2.10.2 Memory Architectures for Neuromorphic Computing
  - 2.10.2.1 Conventional memory approaches (SRAM, DRAM)
  - 2.10.2.2 Emerging non-volatile memory (eNVM) technologies
    - 2.10.2.2.1 Phase-Change Memory (PCM)
    - 2.10.2.2.2 Resistive RAM (RRAM)
    - 2.10.2.2.3 Magnetoresistive RAM (MRAM)
    - 2.10.2.2.4 Ferroelectric RAM (FeRAM)
  - 2.10.2.3 In-memory computing and near-memory computing
  - 2.10.2.4 Hybrid memory architectures
- 2.10.3 Neuromorphic Hardware and Processors
  - 2.10.3.1 Digital neuromorphic processors
  - 2.10.3.2 Analog neuromorphic processors
  - 2.10.3.3 Mixed-signal neuromorphic processors
  - 2.10.3.4 FPGA-based neuromorphic systems
  - 2.10.3.5 Neuromorphic accelerators and co-processors
- 2.10.4 Software and Frameworks for Neuromorphic Computing
  - 2.10.4.1 Neuromorphic programming languages and tools
  - 2.10.4.2 Neuromorphic simulation platforms and frameworks
  - 2.10.4.3 Neuromorphic algorithm libraries and repositories
  - 2.10.4.4 Neuromorphic software development kits (SDKs)
- 2.11 Neuromorphic Sensing Technologies and Architectures
  - 2.11.1 Event-Based Sensors and Processing
    - 2.11.1.1 Neuromorphic vision sensors
    - 2.11.1.2 Neuromorphic auditory sensors
    - 2.11.1.3 Neuromorphic olfactory sensors
    - 2.11.1.4 Event-driven processing and algorithms
  - 2.11.2 Hybrid Sensing Approaches
    - 2.11.2.1 Combination of conventional and event-based sensors
    - 2.11.2.2 Fusion of multiple sensing modalities
    - 2.11.2.3 Advantages and challenges of hybrid sensing
  - 2.11.3 Neuromorphic Sensor Architectures and Designs
    - 2.11.3.1 Pixel-level processing and computation
    - 2.11.3.2 Sensor-processor co-design and integration
    - 2.11.3.3 Bio-inspired sensor designs and materials
  - 2.11.4 Signal Processing and Feature Extraction Techniques

- 2.11.4.1 Spike-based Encoding and Decoding
- 2.11.4.2 Temporal and Spatiotemporal Feature Extraction
- 2.11.4.3 Neuromorphic Filtering and Denoising
- 2.11.4.4 Adaptive and Learning-Based Processing
- 2.12 Market Analysis and Forecasts
  - 2.12.1 Mobile and Consumer Applications
    - 2.12.1.1 Smartphones and wearables
    - 2.12.1.2 Smart home and IoT devices
    - 2.12.1.3 Consumer health and wellness
    - 2.12.1.4 Entertainment and gaming
  - 2.12.2 Automotive and Transportation
    - 2.12.2.1 Advanced Driver Assistance Systems (ADAS)
    - 2.12.2.2 Autonomous vehicles and robotaxis
    - 2.12.2.3 Vehicle infotainment and user experience
    - 2.12.2.4 Smart traffic management and infrastructure
  - 2.12.3 Industrial and Manufacturing
    - 2.12.3.1 Industrial IoT and smart factories
    - 2.12.3.2 Predictive maintenance and anomaly detection
    - 2.12.3.3 Quality control and inspection
    - 2.12.3.4 Logistics and supply chain optimization
  - 2.12.4 Healthcare and Medical Devices
    - 2.12.4.1 Medical imaging and diagnostics
    - 2.12.4.2 Wearable health monitoring devices
    - 2.12.4.3 Personalized medicine and drug discovery
    - 2.12.4.4 Assistive technologies and prosthetics
  - 2.12.5 Aerospace and Defense
    - 2.12.5.1 Unmanned Aerial Vehicles (UAVs) and drones
    - 2.12.5.2 Satellite imaging and remote sensing
    - 2.12.5.3 Missile guidance and target recognition
    - 2.12.5.4 Cybersecurity and threat detection:
  - 2.12.6 Datacenters and Cloud Services
    - 2.12.6.1 High-performance computing and scientific simulations:
    - 2.12.6.2 Big data analytics and machine learning
    - 2.12.6.3 Cloud-based AI services and platforms
    - 2.12.6.4 Energy-efficient datacenter infrastructure
  - 2.12.7 Regional Market Analysis and Forecasts
  - 2.12.8 Competitive Landscape and Key Players
    - 2.12.8.1 Overview of the Neuromorphic Computing and Sensing Ecosystem
    - 2.12.8.2 Neuromorphic Chip Manufacturers and Processors

- 2.12.8.3 Neuromorphic Sensor Manufacturers
- 2.12.8.4 Emerging Non-Volatile Memory (eNVM) Manufacturers
- 2.12.8.5 Neuromorphic Software and Framework Providers
- 2.12.8.6 Research Institutions and Academia
- 2.12.9 Competing Emerging Technologies
  - 2.12.9.1 Quantum Computing
  - 2.12.9.2 Photonic Computing
  - 2.12.9.3 DNA Computing
  - 2.12.9.4 Spintronic Computing
  - 2.12.9.5 Chemical Computing
  - 2.12.9.6 Superconducting Computing
  - 2.12.9.7 Analog AI Chips
  - 2.12.9.8 In-Memory Computing
  - 2.12.9.9 Reversible Computing
  - 2.12.9.10 Quantum Dot Computing
  - 2.12.9.11 Technology Substitution Analysis
  - 2.12.9.12 Migration Pathways
  - 2.12.9.13 Comparative Advantages/Disadvantages
- 2.13 Neuromorphic Computing Company Profiles 179 (144 company profiles)

### **3 QUANTUM COMPUTING**

- 3.1 First and Second quantum revolutions
- 3.2 Current quantum computing market landscape
  - 3.2.1 Technical Progress and Persistent Challenges
  - 3.2.2 Key developments
- 3.3 Investment Landscape
  - 3.3.1 Quantum Technologies Investments 2024-2025
- 3.4 Global Government Initiatives
- 3.5 Market Landscape
- 3.6 Recent Quantum Computing Industry Developments 2023-2025
- 3.7 End Use Markets and Benefits of Quantum Computing
- 3.8 Business Models
- 3.9 Roadmap
- 3.10 Challenges for Quantum Technologies Adoption
- 3.11 SWOT analysis
- 3.12 Quantum Computing Value Chain
- 3.13 Quantum Computing and Artificial Intelligence
- 3.14 Global market forecast 2025-2046

- 3.14.1 Revenues
- 3.14.2 Installed Base Forecast
  - 3.14.2.1 By system
  - 3.14.2.2 By technology
- 3.14.3 Pricing
- 3.14.4 Hardware
  - 3.14.4.1 By system
  - 3.14.4.2 By technology
- 3.14.5 Quantum Computing in Data centres
- 3.15 Introduction
  - 3.15.1 What is quantum computing?
  - 3.15.2 Operating principle
  - 3.15.3 Classical vs quantum computing
  - 3.15.4 Quantum computing technology
    - 3.15.4.1 Quantum emulators
    - 3.15.4.2 Quantum inspired computing
    - 3.15.4.3 Quantum annealing computers
    - 3.15.4.4 Quantum simulators
    - 3.15.4.5 Digital quantum computers
    - 3.15.4.6 Continuous variables quantum computers
    - 3.15.4.7 Measurement Based Quantum Computing (MBQC)
    - 3.15.4.8 Topological quantum computing
    - 3.15.4.9 Quantum Accelerator
  - 3.15.5 Competition from other technologies
  - 3.15.6 Market Overview
    - 3.15.6.1 Investment in Quantum Computing
    - 3.15.6.2 Business Models
      - 3.15.6.2.1 Quantum as a Service (QaaS)
      - 3.15.6.2.2 Strategic partnerships
      - 3.15.6.2.3 Vertically integrated and modular
      - 3.15.6.2.4 Mixed quantum stacks
    - 3.15.6.3 Semiconductor Manufacturers
- 3.16 Quantum Algorithms
  - 3.16.1 Quantum Software Stack
    - 3.16.1.1 Quantum Machine Learning
    - 3.16.1.2 Quantum Simulation
    - 3.16.1.3 Quantum Optimization
    - 3.16.1.4 Quantum Cryptography
      - 3.16.1.4.1 Quantum Key Distribution (QKD)

- 3.16.1.4.2 Post-Quantum Cryptography
- 3.17 Quantum Computing Hardware
  - 3.17.1 Qubit Technologies
    - 3.17.1.1 Overview
    - 3.17.1.2 Noise effects
    - 3.17.1.3 Logical qubits
    - 3.17.1.4 Quantum Volume
    - 3.17.1.5 Algorithmic Qubits
    - 3.17.1.6 Superconducting Qubits
      - 3.17.1.6.1 Technology description
      - 3.17.1.6.2 Initialization, Manipulation, and Readout
      - 3.17.1.6.3 Materials
      - 3.17.1.6.4 Market players
      - 3.17.1.6.5 Roadmap
      - 3.17.1.6.6 Swot analysis
    - 3.17.1.7 Trapped Ion Qubits
      - 3.17.1.7.1 Technology description
      - 3.17.1.7.2 Initialization, Manipulation, and Readout
      - 3.17.1.7.3 Hardware
      - 3.17.1.7.4 Materials
        - 3.17.1.7.4.1 Integrating optical components
        - 3.17.1.7.4.2 Incorporating high-quality mirrors and optical cavities
        - 3.17.1.7.4.3 Engineering the vacuum packaging and encapsulation
        - 3.17.1.7.4.4 Removal of waste heat
      - 3.17.1.7.5 Roadmap
      - 3.17.1.7.6 Market players
      - 3.17.1.7.7 Swot analysis
    - 3.17.1.8 Silicon Spin Qubits
      - 3.17.1.8.1 Technology description
      - 3.17.1.8.2 Initialization, Manipulation, and Readout
      - 3.17.1.8.3 Integration with CMOS Electronics
      - 3.17.1.8.4 Quantum dots
      - 3.17.1.8.5 Market players
      - 3.17.1.8.6 SWOT analysis
    - 3.17.1.9 Topological Qubits
      - 3.17.1.9.1 Technology description
        - 3.17.1.9.1.1 Cryogenic cooling
      - 3.17.1.9.2 Initialization, Manipulation, and Readout of Topological Qubits
      - 3.17.1.9.3 Scaling topological qubit arrays

- 3.17.1.9.4 Roadmap
- 3.17.1.9.5 Market players
- 3.17.1.9.6 SWOT analysis
- 3.17.1.10 Photonic Qubits
  - 3.17.1.10.1 Photonics for Quantum Computing
  - 3.17.1.10.2 Technology description
  - 3.17.1.10.3 Initialization, Manipulation, and Readout
  - 3.17.1.10.4 Hardware Architecture
  - 3.17.1.10.5 Roadmap
  - 3.17.1.10.6 Market players
  - 3.17.1.10.7 Swot analysis
- 3.17.1.11 Neutral atom (cold atom) qubits
  - 3.17.1.11.1 Technology description
  - 3.17.1.11.2 Market players
  - 3.17.1.11.3 Swot analysis
- 3.17.1.12 Diamond-defect qubits
  - 3.17.1.12.1 Technology description
  - 3.17.1.12.2 SWOT analysis
  - 3.17.1.12.3 Market players
- 3.17.1.13 Quantum annealers
  - 3.17.1.13.1 Technology description
  - 3.17.1.13.2 Initialization and Readout of Quantum Annealers
  - 3.17.1.13.3 Solving combinatorial optimization
  - 3.17.1.13.4 Applications
  - 3.17.1.13.5 Roadmap
  - 3.17.1.13.6 SWOT analysis
  - 3.17.1.13.7 Market players
- 3.17.2 Architectural Approaches
- 3.18 Quantum Computing Infrastructure
  - 3.18.1 Infrastructure Requirements
  - 3.18.2 Hardware agnostic platforms
  - 3.18.3 Cryostats
  - 3.18.4 Qubit readout
- 3.19 Quantum Computing Software
  - 3.19.1 Technology description
  - 3.19.2 Cloud-based services- QCaaS (Quantum Computing as a Service)
  - 3.19.3 Market players
- 3.20 Markets and Applications for Quantum Computing.
  - 3.20.1 Pharmaceuticals

- 3.20.1.1 Market overview
  - 3.20.1.1.1 Drug discovery
  - 3.20.1.1.2 Diagnostics
  - 3.20.1.1.3 Molecular simulations
  - 3.20.1.1.4 Genomics
  - 3.20.1.1.5 Proteins and RNA folding
- 3.20.1.2 Market players
- 3.20.2 Chemicals
  - 3.20.2.1.1 Market overview
  - 3.20.2.2 Market players
- 3.20.3 Transportation
  - 3.20.3.1 Market overview
  - 3.20.3.2 Market players
- 3.20.4 Financial services
  - 3.20.4.1 Market overview
  - 3.20.4.2 Market players
- 3.20.5 Automotive
  - 3.20.5.1 Market overview
  - 3.20.5.2 Market players
- 3.20.6 Other Crossover Technologies
  - 3.20.6.1 Quantum chemistry and AI
    - 3.20.6.1.1 Technology description
    - 3.20.6.1.2 Applications
    - 3.20.6.1.3 Market players
  - 3.20.6.2 Quantum Communications
    - 3.20.6.2.1 Technology description
    - 3.20.6.2.2 Types
    - 3.20.6.2.3 Applications
    - 3.20.6.2.4 Market players
  - 3.20.6.3 Quantum Sensors
    - 3.20.6.3.1 Technology description
    - 3.20.6.3.2 Applications
    - 3.20.6.3.3 Companies
- 3.20.7 Quantum Computing and AI
  - 3.20.7.1 Introduction
  - 3.20.7.2 Applications
  - 3.20.7.3 AI Interfacing with Quantum Computing
  - 3.20.7.4 AI in Classical Computing
  - 3.20.7.5 Market Players and Strategies

- 3.20.7.6 Relationship between quantum computing and artificial intelligence
- 3.20.8 Materials for Quantum Computing
  - 3.20.8.1 Superconductors
    - 3.20.8.1.1 Overview
    - 3.20.8.1.2 Types and Properties
    - 3.20.8.1.3 Temperature ( $T_c$ ) of superconducting materials
    - 3.20.8.1.4 Superconducting Nanowire Single Photon Detectors (SNSPD)
    - 3.20.8.1.5 Kinetic Inductance Detectors (KIDs)
    - 3.20.8.1.6 Transition Edge Sensors (TES)
    - 3.20.8.1.7 Opportunities
  - 3.20.8.2 Photonics, Silicon Photonics and Optical Components
    - 3.20.8.2.1 Overview
    - 3.20.8.2.2 Types and Properties
    - 3.20.8.2.3 Vertical-Cavity Surface-Emitting Lasers (VCSELs)
    - 3.20.8.2.4 Alkali azides
    - 3.20.8.2.5 Optical Fiber and Quantum Interconnects
    - 3.20.8.2.6 Semiconductor Single Photon Detectors
    - 3.20.8.2.7 Opportunities
  - 3.20.8.3 Nanomaterials
    - 3.20.8.3.1 Overview
    - 3.20.8.3.2 Types and Properties
      - 3.20.8.3.2.1 2D Materials
      - 3.20.8.3.2.2 Transition metal dichalcogenide quantum dots
      - 3.20.8.3.2.3 Graphene Membranes
      - 3.20.8.3.2.4 2.5D materials
      - 3.20.8.3.2.5 Carbon nanotubes
        - 3.20.8.3.2.5.1 Single Walled Carbon Nanotubes
        - 3.20.8.3.2.5.2 Boron Nitride Nanotubes
      - 3.20.8.3.2.6 Diamond
      - 3.20.8.3.2.7 Metal-Organic Frameworks (MOFs)
    - 3.20.8.3.3 Opportunities
- 3.20.9 Market Analysis
  - 3.20.9.1 Key industry players
    - 3.20.9.1.1 Start-ups
    - 3.20.9.1.2 Tech Giants
    - 3.20.9.1.3 National Initiatives
- 3.21 Quantum Computing Company Profiles 475 (218 company profiles)

## **4 EDGE AI PROCESSORS**

- 4.1 Market overview
  - 4.1.1 Market Size
  - 4.1.2 Geographic Market
  - 4.1.3 Technology Architecture Evolution Timeline
- 4.2 Edge AI Technology Architectures
  - 4.2.1 Neural Processing Unit (NPU) Implementations
  - 4.2.2 System-on-Chip (SoC) Integration Strategies
  - 4.2.3 Power Efficiency and Performance Optimization
    - 4.2.3.1 Sub-7W Thermal Envelope Requirements
    - 4.2.3.2 TOPS/W Optimization Methodologies
    - 4.2.3.3 Model Compression and Quantization
  - 4.2.4 Analog Computing and In-Memory Processing
  - 4.2.5 Dedicated Neural Processing Unit Architectures
  - 4.2.6 GPU-Based Edge Solutions vs. Specialized DPUs
- 4.3 Application Market Analysis
  - 4.3.1 Industrial IoT and Manufacturing Applications
    - 4.3.1.1 Predictive Maintenance Systems
    - 4.3.1.2 Quality Control and Inspection
    - 4.3.1.3 Real-time Analytics and Optimization
  - 4.3.2 Smartphone and Mobile Device Integration
    - 4.3.2.1 AI-Capable CPU Integration
    - 4.3.2.2 Specialized AI Accelerator Implementation
    - 4.3.2.3 Always-On Processing Capabilities
  - 4.3.3 Automotive and Transportation Systems
  - 4.3.4 Smart Cities and Infrastructure Applications
  - 4.3.5 Healthcare and Wearable Device Integration
  - 4.3.6 Consumer Electronics and Home Automation
- 4.4 Competitive Landscape and Market Players
  - 4.4.1 Established Semiconductor Giants
    - 4.4.1.1 NVIDIA
    - 4.4.1.2 Intel
    - 4.4.1.3 Qualcomm
    - 4.4.1.4 Xilinx
  - 4.4.2 AI-Focused Startup Companies
    - 4.4.2.1 Mythic
    - 4.4.2.2 Syntiant
    - 4.4.2.3 Kneron
    - 4.4.2.4 DeepX

#### 4.4.3 Cloud Provider Edge Solutions

4.4.3.1 Google Edge TPU

4.4.3.2 AWS Inferentia

#### 4.5 Market Drivers and Technology Trends

4.5.1 Latency Requirements and Real-Time Processing Demands

4.5.2 Data Privacy and Security Imperative Analysis

4.5.3 Bandwidth Limitation and Connectivity Challenge Solutions

4.5.4 IoT Device Proliferation Impact Assessment

4.5.5 Edge-Cloud Computing Architecture Evolution

4.5.6 Power Efficiency and Battery Life Optimization

4.5.7 Autonomous System Processing Requirements

#### 4.6 Edge AI Processor Company Profiles 632 (49 company profiles)

## 5 REFERENCES

## List Of Tables

### LIST OF TABLES

Table 1. Overview of the neuromorphic computing and sensing market.

Table 2. Global market for neuromorphic computing and sensors, 2024-2036 (Millions USD).

Table 3. Neuromorphic Computing and Sensing Market Segmentation 2020-2036.

Table 4. Key market trends and growth drivers.

## I would like to order

Product name: Advanced Electronics Technologies for AI 2026-2036: Neuromorphic Computing, Quantum Computing and Edge AI

Product link: <https://marketpublishers.com/r/ADDF386F09AEN.html>

Price: US\$ 2,100.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

[info@marketpublishers.com](mailto:info@marketpublishers.com)

## Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/ADDF386F09AEN.html>