Edge AI & TinyML: Real-World Applications

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Dubai (UAE)

UK Traininig
PARTNER



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Why This Course

Artificial Intelligence is rapidly moving from the cloud to the edge — closer to where data is generated.

Edge AI and TinyML Tiny Machine Learning are transforming industries by enabling real-time, low-power, and privacy-preserving intelligence on devices such as sensors, wearables, and embedded systems.

This program provides participants with a comprehensive understanding of how to design, deploy, and manage AI models on edge devices. It blends theory with hands-on applications, preparing professionals to leverage Edge AI and TinyML for innovation across manufacturing, healthcare, energy, transportation, and smart environments.

What You'll Learn and Practice

By joining this program, you will:

- Understand the core principles and architectures of Edge AI and TinyML.
- Learn how to design and optimize machine learning models for low-power devices.
- Explore deployment frameworks and hardware platforms for Edge AI.
- Gain practical experience in building and testing TinyML applications.
- Develop strategies to implement edge intelligence across real-world use cases.

The Program Flow

Day 1: Introduction to Edge AI and TinyML

- The evolution of AI — from cloud computing to edge intelligence.
- Overview of Edge AI, TinyML, and their role in the AI ecosystem.
- Advantages: low latency, efficiency, privacy, and offline capabilities.
- Hardware landscape: microcontrollers, edge processors, and IoT boards.
- Case study: how leading companies deploy Edge AI for real-time analytics.



Day 2: Fundamentals of Machine Learning at the Edge

- Overview of supervised, unsupervised, and deep learning principles.
- Data preprocessing and feature extraction for limited-resource devices.
- Model selection and training for TinyML e.g., CNNs, decision trees, RNNs.
- Understanding model compression, pruning, and quantization.
- Workshop: training a simple classification model for an edge device.

Day 3: Edge AI Hardware and Deployment Frameworks

- Overview of popular TinyML frameworks TensorFlow Lite for Microcontrollers, Edge Impulse, PyTorch Mobile.
- Edge AI hardware platforms: Arduino, Raspberry Pi, NVIDIA Jetson, ESP32, and STM32.
- Deployment workflows — from model training to inference optimization.
- Managing memory, computation, and energy efficiency at the edge.
- Practical exercise: deploying an ML model onto a microcontroller.

Day 4: Real-World Applications of Edge AI and TinyML

- Industrial IoT and predictive maintenance.
- Smart cities: traffic management, lighting, and surveillance systems.
- Healthcare and wearables: activity detection, biometrics, and diagnostics.
- Environmental monitoring and agriculture automation.
- Simulation: designing a real-world Edge AI application pipeline.

Day 5: Challenges, Ethics, and the Future of Edge Intelligence

- Data privacy, security, and ethical considerations in Edge AI systems.
- Managing scalability, reliability, and model updates on distributed devices.
- Integrating Edge AI with 5G, cloud, and hybrid architectures.
- Future trends: federated learning, neuromorphic computing, and AI chips.
- Action workshop: developing a roadmap for Edge AI adoption within your organization.

Individual Impact

- Gain practical skills in deploying AI models on embedded and IoT devices.
- Strengthen technical knowledge of ML optimization and deployment workflows.
- Build confidence in identifying and executing Edge AI projects.
- Enhance understanding of system integration, scalability, and innovation.
- Develop readiness to drive digital transformation through Edge AI solutions.



Work Impact

- Accelerate innovation and automation through intelligent edge applications.
- Improve operational efficiency, response time, and data privacy.
- Reduce costs associated with cloud processing and data transfer.
- Strengthen competitive advantage through next-generation AI capabilities.
- Support sustainable and secure AI-driven transformation.

Training Methodology

This program combines technical learning, hands-on experimentation, and real-world case studies for a balanced and applied experience.

Learning methods include:

- Practical labs using microcontrollers and TinyML frameworks.
- Industry case studies across manufacturing, healthcare, and smart cities.
- Group discussions and problem-solving simulations.
- Demonstrations of model compression and deployment workflows.
- Step-by-step toolkits and project templates for implementation.

Beyond the Course

Upon completion, participants will be equipped to design, develop, and deploy AI models on edge and embedded systems.

They will leave with the knowledge, tools, and vision to apply Edge AI and TinyML technologies that drive innovation, efficiency, and intelligence across real-world environments.

