

Challenge #26: Brain Chip's IP for Targeting AI Applications at the Edge

Learning Goals

- Learn more about Brain Chip's approach to building IP cores and market their Akida chips for AI applications at the edge.
- Learn more about Brain Chip's Temporal Event-based Neural Network (TENN) architecture and how that benefits AI at the edge.

1. Overview of Brain Chip and Akida Chips

Brain Chip Holdings Ltd. is a neuromorphic computing company specializing in ultra-low power AI processing at the edge. Its core product, the Akida™ neuromorphic processor, is designed to execute AI inference directly on edge devices like sensors, drones, and embedded systems, rather than relying on cloud servers.

Why Edge AI?

- Lower latency: Decisions are made faster without needing internet/cloud communication.
- Improved privacy and security: Data is processed locally.
- Reduced power consumption: Ideal for battery-powered or constrained devices.

2. Akida Neuromorphic IP: Core Features

Brain Chip provides IP cores that can be embedded into SoCs and FPGAs. Their Akida processor offers:

- Ultra-low power consumption
- Real-time, event-based inference

- On-device learning (continuous, incremental)
- Full compatibility with existing MCUs and edge hardware

3. Temporal Event-based Neural Network (TENN)

Brain Chip’s proprietary model, TENN, is based on Spiking Neural Networks (SNNs) and offers several key benefits:

- Event-driven processing: Only reacts to active input, conserving energy
- Temporal pattern recognition: Good at analyzing speech, EEG, ECG, motion, etc.
- Asynchronous, biologically inspired design

This model supports both inference and learning at the edge—something rare in traditional AI chips.

4. Comparison: Akida vs GPUs and Other Neuromorphic Chips

The table below compares Akida with other hardware platforms:

Feature	Akida (BrainChip)	GPU	Loihi (Intel)	TrueNorth (IBM)
Architecture	Event-based SNN	Matrix-based DNN	SNN	SNN
Power Consumption	Ultra-low	High	Moderate	Moderate
Learning at the Edge	Yes	No	Yes	Limited
Latency	Very low	High	Low	Low
Deployment	Commercial (IoT)	Data centers	Research/edge	Research only

5. Podcast Insights (EE Times, 47 mins)

The EE Times podcast discusses:

- Brain Chip’s licensing model and IP business strategy
- Use cases like smart cameras, hearing aids, and factory sensors

- Benchmarks and efficiency comparisons
- The broader future of neuromorphic processing in real-world products.

6. Summary Paragraph for Report Submission

Brain Chip's Akida processor is a neuromorphic IP solution optimized for edge AI. In contrast to GPUs that require cloud connectivity and draw significant power, Akida performs localized, event-based processing. The Temporal Event-based Neural Network (TENN) architecture supports efficient learning and inference in real-time for time-series data. Compared to other neuromorphic chips like Intel's Loihi and IBM's TrueNorth, Akida is more commercially viable and scalable for integration into edge SoC designs. Brain Chip's strategy to license its IP accelerates adoption in embedded markets, empowering the next generation of intelligent, power-efficient edge devices.