# BrainChip’s IP for AI at the Edge

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**Subject: ECE 410/510 - Spring 2025**

## BrainChip’s IP for Targeting AI Applications at the Edge

## Introduction

In this challenge, I explored BrainChip's approach to enabling AI at the edge using their Akida chip. I listened the EETimes podcast where BrainChip explained how their IP works, especially focusing on their event-based neural network system. What I found interesting is how different their approach is from normal GPUs or CPUs, and also from other neuromorphic chips we studied in class like Intel's Loihi or IBM's TrueNorth.

**What is Akida?**

Akida is BrainChip's neuromorphic processor IP designed mainly for edge AI applications. The name means 'intelligence' in Swahili, and the chip is built to process information using spiking neural networks (SNNs). The most unique part is its use of something called TENN – Temporal Event-based Neural Network – which only processes information when events happen (like changes in audio or visual data). This is similar to how our brain works – it doesn’t react unless there’s a stimulus.

Akida is not trained on the chip itself; it’s usually trained offline and then deployed. But once deployed, it can do real-time inference with very low power (even less than 1 watt). It’s designed for things like audio keyword spotting, gesture recognition, and vision tasks.

**Comparison to GPUs**

GPUs like those made by NVIDIA are built for high-performance workloads, especially for training AI models. But they consume a lot of power – sometimes up to 250W. Akida, in contrast, is designed for inference at the edge, not training. Its event-based model only uses compute when needed, which saves a lot of energy.

| Feature | BrainChip Akida vs GPU |
|---|---|
| Processing Model | Event-based (TENN) vs Frame-based |
| Power Usage | Very Low (<1W) vs High (15W–250W) |
| Real-time Inference | Yes vs Depends |
| On-device Training | No vs Yes |
| Target Use Case | Edge devices vs Data centers |

**Comparison to Other Neuromorphic Chips**

We also studied Intel’s Loihi and IBM’s TrueNorth. These chips are also based on spiking neurons, but they are mainly research-focused and not commercially available in the same way Akida is. Loihi, for example, has advanced on-chip learning features, but it’s still in research labs. Akida, on the other hand, is already being used in real-world products.

| Feature | Akida vs Loihi & TrueNorth |
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|---|---|
| Availability | Commercial IP vs Research only |
| Developer Tools | Easy SDK vs Academic tools |
| On-chip Learning | No vs Yes (Loihi), No (TrueNorth) |
| Deployment Readiness | Edge-ready vs Research-only |

**Conclusion**

I think BrainChip is doing something really practical with Akida. Instead of just being a research chip, it's already available for use and is designed to solve real problems in edge AI. It uses less power, reacts faster because of its event-based model, and is easier to integrate for real-world products. Compared to GPUs and research-only neuromorphic chips, Akida offers a good mix of innovation and practicality.