Case Study

How Grinn and Synaptics Are Accelerating Edge AI Adoption and Innovation

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Introduction

From smart cities to industrial automation, organizations are rethinking how and where data is processed. The answer, increasingly, is at the Edge—where devices can analyze information in real time without sending it to the cloud. This approach improves responsiveness, enhances security, and reduces reliance on network connectivity.

Recognizing this shift, Grinn Global, a leader in IoT electronics design, and Synaptics, a global leader in AI-native SoCs for embedded compute, have partnered to enable the next generation of energy-efficient Edge AI hardware. Their joint solution—the Grinn AstraSOM-1680 powered by Synaptics' Astra SL1680 processor—delivers high-performance AI in a compact, scalable design. The result is a ready-made platform that accelerates product development and unlocks new possibilities for IoT, vision, voice, and multimodal applications at the Edge.

The Edge AI Imperative

Edge AI is quickly becoming essential across sectors. From smart cities and industrial automation to personalized consumer devices, there is growing demand for solutions that process data locally, deliver real-time insights, and maintain contextual awareness. In efforts to reduce reliance on cloud-based compute and connectivity, this localized intelligence improves latency, enhances security, and drives efficiency.

However, delivering effective Edge AI solutions can be a complex undertaking. From hardware design and software development to manufacturing and certification, there are a lot of aspects that OEMs need to get correct. Building upon a solid platform based on highly integrated and well-tested components is a key to success. Grinn and Synaptics are combining expertise and innovation to provide developers with robust processing power, dedicated AI acceleration, and multimedia capabilities: all optimized within a small, power-efficient package.

Grinn AstraSOM-1680: Small Form, Big Capability

The Grinn AstraSOM-1680, a high-performance System on Module (SoM), integrates Synaptics' Astra SL1680 processor. The collaboration features a quad-core Arm® Cortex®-A73 processor, up to 4GB of LPDDR4X RAM, 16GB of eMMC storage, and a Neural Processing Unit (NPU) capable of 7.9+ TOPS, for advanced Edge workloads.

Grinn's compact LGA196 package eliminates bulky connectors, increases connection reliability, improves thermal performance, and lowers cost. As a compact SoM at 43mm x 37mm with an LGA footprint, it's well-suited for space-constrained and rugged environments.

Synaptics Astra SL1680: A Platform Built for the Edge

The Astra SL1680 processor is a true multimedia AI engine, designed with a balanced, scalable architecture and embedded intelligence. Alongside its CPU and NPU, it integrates a PowerVR GE9920 GPU, multiple MIPI and HDMI interfaces, and audio-visual processing pipelines. It supports 4K60 video, multi-stream decoding, far-field voice recognition, and real-time video inference.

Backing the hardware is Synaptics' Astra SDK: a suite of open, secure, and optimized software and tools that simplify AI model deployment. Based on Yocto Linux, with pre-integrated tools and a board support package, it offers an expandable base for developers to build on. It supports popular AI model formats like TensorFlow Lite and ONNX while utilizing Synaptics' SyNAP™ framework for model optimization and hardware acceleration.

Grinn AstraSOM-1680 exemplifies how the Astra platform delivers right-sized AI-native multimodal processing for Edge AI. Combined with secure, open-source tools and a thriving partner ecosystem, it accelerates application development and shortens time to market.

More Than the Sum of Its Parts

The strength of the Grinn–Synaptics collaboration lies in tight integration and joint optimization. Grinn works directly with customers to implement, fine-tune, and deploy Edge AI applications—from camera-based analytics to intelligent audio interfaces. Their expertise spans hardware design, embedded software, and AI model implementation, enabling faster time-to-market without sacrificing flexibility. Fully documented modules allow developers to create entirely new solutions independently.

Synaptics values Grinn's customer expertise, which provides OEMs valuable insight into real-world use cases, design constraints, and customers' operational challenges. This customer knowledge, combined with Synaptics' silicon expertise, drives joint advancements in hardware design, software benchmarking, and system optimization.

A Real-World Impact: AI-Powered License Plate Recognition

One clear example of the partnership's potential is Grinn's deployment of the Grinn AstraSOM-1680 in a smart license plate recognition system. Designed for high-traffic environments like office parks, the solution replaces traditional card-based gate openers with a real-time AI camera system. Two cameras (for entry and exit) and a CNN model, accelerated with the NPU, identify vehicles and grant access within seconds. All processing occurs at the Edge in a 10x10 cm enclosure, removing the need for server rooms or
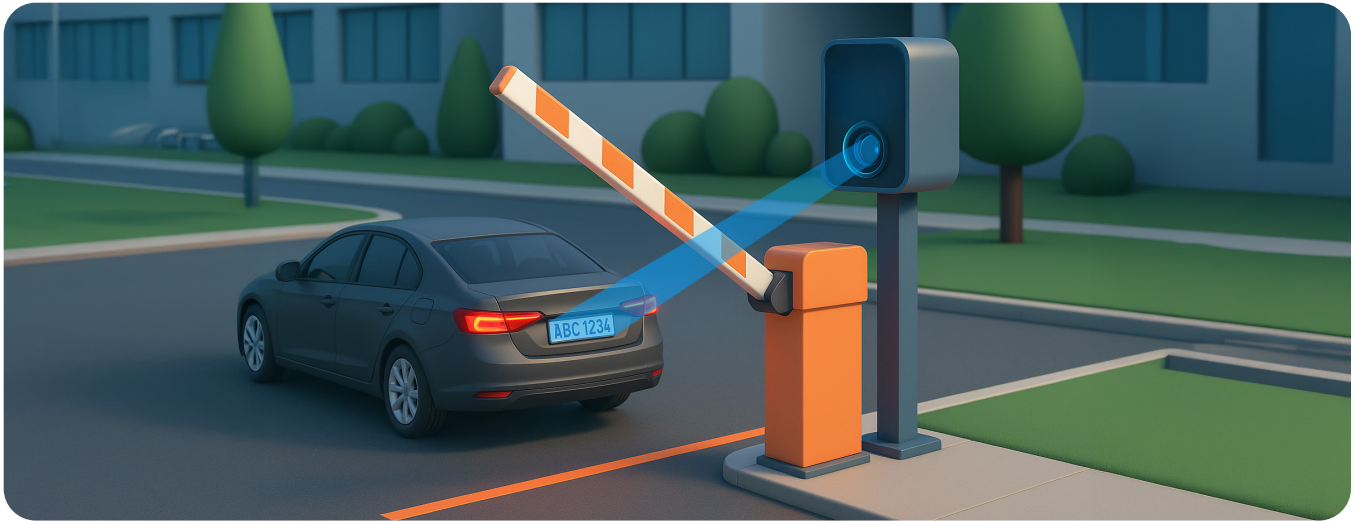
cloud computing, cutting energy costs, reducing latency, and enhancing privacy (since no video data is transmitted off-site). It's the perfect illustration of how Edge AI should work: it's fast, secure, energy-efficient, and easy to deploy.

By leveraging Astra SL1680, Grinn demonstrated a massive performance boost, achieving 7.5x faster inference speeds when using the NPU. This enabled the ability to process multiple video streams in real-time at a higher frame rate, boosting the capability from 12 fps to 90 fps.

What is even more exceptional is that the performance gains were achieved while also improving power efficiency. Utilizing the NPU frees up the CPU for other tasks, while accelerating the AI workload using less power.

Enabling Multimodal, Voice-Driven, and Language-Aware Interfaces

Beyond vision, the Grinn AstraSOM-1680 powers multimodal applications. This includes smart speakers with integrated language models for natural voice interactions without cloud dependency.

Inspired by the capabilities of Synaptics Astra processors, Grinn is developing audio-based AI systems that detect user intent, provide spoken feedback, and even integrate emotional recognition or contextual awareness, testing devices that recognize not just words, but user frustration or impatience.

Combining vision and audio enables richer interactions for smart homes, industrial guidance, and healthcare.

Future-Proofed and Scalable

The current Grinn AstraSOM-1680 targets mid-to high-performance applications. As Synaptics continues to expand the Synaptics Astra family of processors to serve other price-performance tiers, Grinn is aligned to enable joint customers through best-in-class SoMs. This includes hardware optimized for lightweight modules for constrained IoT devices and future platforms with transformer-capable NPUs for LLM acceleration at the Edge.

A Strategic Advantage for OEMs and Developers

Ultimately, the Grinn–Synaptics partnership lowers the barrier to innovation. Developers can move faster and start with a well-documented SoM, robust toolchain, and engineering resources.

Key advantages include:

- Accelerated time to market with pre-integrated AI and multimedia capabilities

- Reduced BoM cost through optimized hardware layout and elimination of bulky connectors

- Superior quality through increased connection reliability and enhanced thermal performance

- Flexible design possibilities based on Grinn's reference designs or custom hardware and software builds

- Future scalability through alignment with Synaptics' processor roadmap
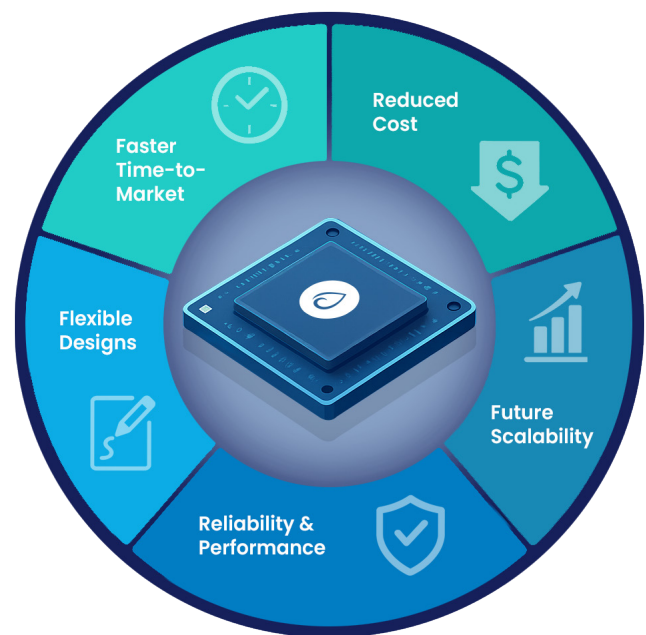
In an increasingly intelligent and connected world, Synaptics and Grinn are enabling smart, efficient, and secure devices. Their collaboration on the Grinn AstraSOM-1680 demonstrates that when cutting-edge silicon is paired with practical design expertise and a focus on developer experience, the result is much more than the sum of its parts.

For innovators building the future of IoT, smart cameras, voice assistants, and beyond, this partnership offers a ready-made path to delivering real-world AI at the Edge.

Talk to us about how we can help bring your Edge AI application to life.