SYNTIANT®

Making Edge AI a Reality™

SYNTIANT SELECTION GUIDE

NEURAL DECISION PROCESSORS™
FOR VISION APPLICATIONS

Deploying Highly Accurate Computer Vision Models

Syntiant's family of Neural Decision Processors™ (NDPs) are specifically designed to run deep learning models, providing 100x the efficiency and 30x the throughput of existing low-power MCUs.

The company's hardware can equip almost any device with powerful advanced intelligence, enabling real-time data processing and decision making with near-zero latency.

.

If an ARM A53 has a battery life of 3.5 days, Syntiant's NDP200 can run uninterrupted for 1 year executing the same machine learning workload.

Syntiant Core 2™ @ 32 Mhz = Arm A53 @ 1 Ghz using 1% of the energy*

	NDP200	Arm A53	Syntiant Advantage
Inferences per million cycles	1.346	0.0471	~ 30x
μJ per inference	166	16,131	~ 100x

*Identical MobileNet V1 0.25 int8 network on A53 & NDP200 (Syntiant Core 2) tinyMLPerf-style test mechanics: single, identical input vector
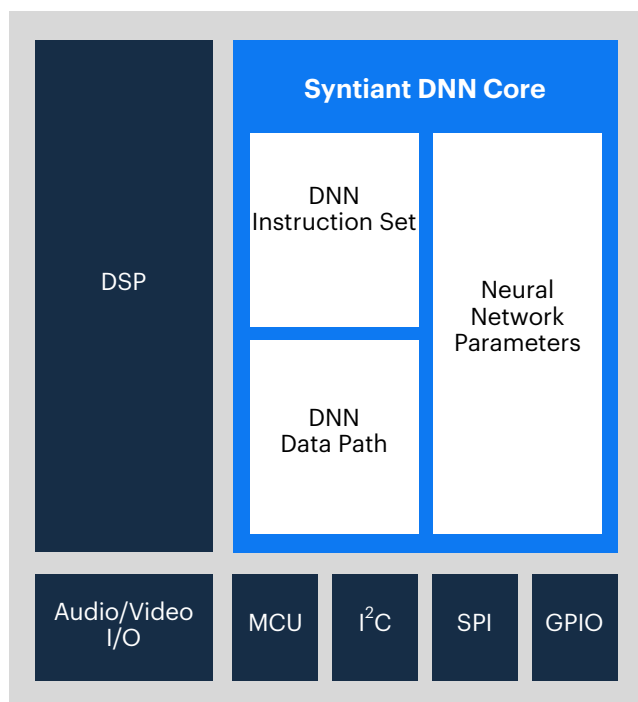
▶ **Detection** (e.g., person, vehicle, pose)
▶ **Classification** (e.g., animal)
▶ **Identification** (e.g., face, license plate)
▶ **Segmentation** (e.g., background removal)

Syntiant's field-proven models solve critical problems directly on compute-constrained embedded devices, interpreting the visual world with the highest accuracy and lowest latency, supporting a broad range of computer vision applications.

Syntiant DNN Core

DSP

DNN Instruction Set

Neural Network Parameters

DNN Data Path

Audio/Video I/O | MCU | I^{2}C | SPI | GPIO

Seamless Integration

Syntiant's core architectures process neural network layers directly without any compilers, enabling larger networks at significantly lower power, greatly increasing battery life, privacy and responsiveness, while decreasing infrastructure costs.

With I/O support for a variety of sensor modalities, including vision, audio and motion, the NDPs bring AI to edge applications in all kinds of domains, from earbuds and doorbells to automobiles and manufacturing machinery.

VIDEO DOORBELLS AND SECURITY CAMERAS

Syntiant Edge AI filters

- Improve meaningful event detection accuracy
- Reduce meaningless event recordings
- Minimize cloud costs
- Improve user experience

How effective is Edge AI in improving customer experience and reducing cloud costs?
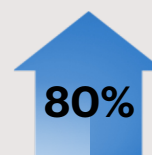
Results of a 6-week, 100 user smart home case study:

- Total Unfiltered Motion Events: 130,000
- Deploying Syntiant Edge AI event detection filters resulted in:

99%
Reduction in
Event Clips

90%
Estimated
Reduction in
Cloud Costs

80%
Improvement
in Customer
Experience

AI Models:
- ✓ Person
- ✓ Vehicle
- ✓ Animal/Pet Detection
- ✓ Package Detections
- ✓ Visual Analytics

ALWAYS-ON AUTOMOTIVE VISION AND AUDIO-BASED SECURITY

Syntiant's NDP enable always-on automotive security for ICE and electric vehicles

- Power consumption under 10mW (includes NDP processor and image sensor) enables always-on security even for internal combustion vehicles parked for several weeks.

AI Models:
- ✓ Vision-based intruder detection
- ✓ Glass-break detection

NDP250 Neural Processor	STANDARD	PREMIUM
Models/Algorithms	Vision/Person Detection	Vision/Person Detection Audio/Automotive Glass-Break Detection
# Mics	0	1
Features	Person Detection • Precision: 80% • Frames per Second (FPS): 5 • Distance: 20 feet * Field of View (FoV): 100 degree	Person Detection • Precision: 80% • Frames per Second (FPS): 5 • Distance: 20 feet * Field of View (FoV): 100 degree Detects glass-break
Benefits	• Accuracy • Low-power consumption • Automotive grade part and system integration	• Accuracy • Low-power consumption • Automotive grade part and system integration • Enhanced audio security

SYNTIANT®
Making Edge AI a Reality™

CUSTOM DETECTIONS:
BATTERY OPERATED CAMERAS

- Syntiant's training tools allow customers to build detection models for a variety of detection needs.
- The NDP will keep battery powered cameras operating in a low-power state.
- Custom detection models can be built with Syntiant's proprietary edge framework and deployed on an NDP.

NDP PROCESSORS - SPECIFICATIONS

	NDP200	NDP250 (sampling)
Target Use Case	Image, Audio & Speech, Sensors	Image, Audio & Speech, Sensors
Neural Layer Types Supported	All (GRU, Convolutional, etc.)	All (GRU, Convolutional, etc.)
Embedded MCU	M0 (48KB RAM)	M0 (512KB RAM)
Neural RAM	1 MiB neural RAM	6 MiB neural RAM [sharable with ISP and HiFi]
Neural throughput	6.4 GOPS	30 GOPS
On-Chip DSP	Xtensa HiFi3, 0.3 MiB RAM up to 100MHz secure boot & host communication	Xtensa HiFi3, 1.5 MiB RAM up to 120MHz secure boot & host communication
Image I/O	8-bit/1-bit VGA DVP	2 x 8-bit/1-bit VGA DVP dual DNN & encoder ISPs JPEG encoder
Audio I/O	48kSPS @ 16-bit/channel 1 x audio in 2 ch PDM/I2S/TDM8 1 x audio out I2S/TDM8	48kSPS @ 16-bit/channel 3 x audio in 2 ch PDM/I2S/TDM8 1 x audio out I2S/TDM8
GPIO	26 GPIO pins	58 GPIO pins
Package	5mm x 5mm 40-pin QFN	5.1 x 6.1 mm BGA @ 0.5mm 4 x 5 mm BGA @ 0.4 mm

ADDITIONAL RESOURCES
NDP Portfolio: www.syntiant.com/hardware