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STMicroelectronics to boost AI at the edge with new NPU-accelerated STM32 microcontrollers

- *New machine-learning capabilities make it possible to run computer vision, audio processing, sound analysis and more consumer and industrial applications at the edge*
- *STM32N6 MCU series is the most powerful in STM32 family, and first to feature proprietary Neural-ART Accelerator™ NPU, architected for embedded inference*
- *Combination of software and tools ecosystem continues to lower the barrier to entry for developers to take advantage of AI-accelerated performance for real-time operating systems*

Geneva, Switzerland, December 10, 2024 – STMicroelectronics (NYSE: STM), a global semiconductor leader serving customers across the spectrum of electronics applications, is making embedded artificial intelligence (AI) truly here-to-help with a new microcontroller series integrating, for the first time, accelerated machine-learning (ML) capabilities. This enables cost-sensitive, power-conscious consumer and industrial products to provide high-performance features leveraging computer vision, audio processing, sound analysis and other algorithms, until now beyond the capabilities of small embedded systems.

The STM32N6 microcontroller (MCU) series is ST's most powerful to date, and the first to embed ST's proprietary neural processing unit (NPU), the Neural-ART Accelerator, delivering 600 times more machine-learning performance than a high-end STM32 MCU today. The STM32N6 has been available to selected customers since October 2023 and is now ready to be offered in high volumes.

"*We are on the verge of a significant transformation at the tiny edge. This transformation involves the increasing augmentation or replacement of our customers' workloads by AI models. Currently, these models are used for tasks such as segmentation, classification, and recognition. In the future, they will be applied to new applications yet to be developed*," said **Remi El-Ouazzane, President, Microcontrollers, Digital ICs and RF Products Group (MDRF) at STMicroelectronics**. "*The STM32N6 is the first STM32 product to feature our Neural-ART Accelerator NPU. It will utilize a new release of our unique AI software ecosystem package. This marks the beginning of a long journey of AI hardware-accelerated STM32, which will enable innovations in applications and products in ways not possible with any other embedded processing solution.*"

"It is a common misconception that AI is purely a big datacenter, power hungry application," says ***Tom Hackenberg, Principal Analyst, Memory and Computing Group at Yole Group****. "This is no longer true. Today's IoT edge applications are hungry for the kind of analytics that AI can provide. The STM32N6 is a great example of the new trend melding energy-efficient Microcontroller workloads with the power of AI analytics to provide computer vision and mass sensor driven performance capable of great savings in the total cost of ownership in modern equipment."*[1]

[1] Source: Status of the Microcontroller industry report, Yole Intelligence, 2024

Comments on STM32N6 from early customers

LG is a multinational corporation known for its electronics, chemicals, and telecommunications products, including smartphones, home appliances, and televisions.

“The STM32N6 delivers remarkable AI performance and provides excellent flexibility in a small silicon package ideal for embedded systems and wearable devices. The inference speed, powered by the groundbreaking Neural-ART Accelerator, has exceeded our expectations and ST’s developer-friendly software tools let us seamlessly integrate our AI models into the MCU."

Yehan Ahn, Task Leader, R&D, LG Electronics CTO Division

Lenovo Research is the innovation and research arm of Lenovo, focused on developing cutting-edge technologies and solutions in areas such as artificial intelligence, big data, cloud computing, and smart devices.

“We have rigorously evaluated ST’s latest microcontroller, STM32N6, in our labs, noting its outstanding neural processing performance and excellent power efficiency. This microcontroller represents the beginning of a new era, accelerating our research of “AI for All” technologies at the edge.”

Seiichi Kawano, Principal Researcher, Lenovo Research

Alps Alpine is a multinational corporation producing electronic devices, automotive infotainment systems, and communication devices.

“The new STM32N6 is ideal for our innovative cycling-related products. The speed and efficiency of the Neural-ART Accelerator, combined with extensive peripheral device expandability, lets us create compact devices that can execute many sensor-based AI inferences and deliver diverse and enhanced user experiences.”

Christian Fuchs, Senior Project Leader, Alps Alpine

Carlo Gavazzi, designs and manufactures electronic control components for the global building and industrial automation markets.

“The STM32N6 was the missing piece in the puzzle for our latest sensor project. Its Neural-ART Accelerator inspired us to use AI to solve some of the challenges, which we had not considered possible during the conceptualization phase. There are many further powerful features, including the MIPI-CSI Raw12 interface and Arm Cortex-M55 core, which combine to provide camera and response time capabilities that no other trusted brand can offer. Access to this latest, high-quality technology is essential for our development of the high-performance industrial sensors of tomorrow."

Allan Skou Thomsen, R&D Project Leader, Carlo Gavazzi

Meta-bounds is a leading innovator in the consumer-level AR glasses industry.

“*The STM32N6 has been a breakthrough microcontroller for our products with its high performance, power efficiency, and advanced features. The embedded Neural-ART Accelerator, enhanced camera interfaces and dedicated Image Signal Processor (ISP), allow us to deliver compelling features in an ultra-lightweight and compact form factor, enhancing the user experience without compromising battery life. The support from STMicroelectronics ensured a smooth development process – invaluable for companies like ours looking to enhance wearable technology with cutting-edge AI and graphics capabilities*.”

Dr. Zhou Xing, Founding Partner of Meta-bounds

Autotrak delivers first-class fleet management and stolen vehicle recovery solutions.
“In the trucking industry in South Africa, around 60% of fatal accidents are blamed on drivers being too tired behind the wheel. The STM32N6 could make a major impact on those numbers. By allowing fast and efficient AI inference within the vehicle we can give a real time audible warning to the driver to prevent an upcoming incident. It can literally save lives.”

Gavin Leask, Engineering Director, Autotrak

Technical features and support for AI development:

- *Up to 600x machine-learning performance vs typical high-end STM32 MCU*: ST’s Neural-ART Accelerator includes nearly 300 configurable multiply-accumulate units achieving up to 600 giga operations per second (GOPS).
- *The most powerful STM32 today*: The STM32N6 has an 800 MHz Arm® Cortex®-M55 core, delivering an unprecedented 3,360 CoreMark score. The MCUs are also available in a version without the Neural-ART accelerator, for applications requiring all the performance, interfaces and functionality of the STM32N6, without integrating advanced AI algorithms.
- *4.2 MB of RAM, the largest amount ever found on an STM32*: providing the memory to support the data-intensive AI and multimedia workloads. Two 64-bit AXI interfaces provide a high level of bandwidth to sustain the highest computation rate and unlock the full power of the Neural-ART Accelerator.
- *ST advanced Image Signal Processor (ISP), for the first time on an MCU*: the STM32N6 incorporates an ISP that provides direct signal processing, enabling the use of simple and affordable image sensors. This ISP can be configured using ST's free ISP IQTune software (STM32-ISP-IQTune), a cutting-edge tool that permits customizing image signal processing parameters such as exposure time, contrast or color balance.
- *Supported by ST’s Edge AI Suite*: offering comprehensive software tools for the development of edge machine-learning applications, including the possibility to bring your own model in various formats such as TensorFlow Lite, Keras and ONNX.
- The new microcontroller now supports a growing model zoo of AI models, offering enhanced performance and versatility for various applications. Users can explore the expanding collection of AI models to elevate their projects, achieve better results and shorten their time to market.

  More technical information is available at www.st.com/STM32N6

About STMicroelectronics
At ST, we are over 50,000 creators and makers of semiconductor technologies mastering the semiconductor supply chain with state-of-the-art manufacturing facilities. An integrated device manufacturer, we work with more than 200,000 customers and thousands of partners to design and build products, solutions, and ecosystems that address their challenges and opportunities, and the need to support a more sustainable world. Our technologies enable smarter mobility, more efficient power and energy management, and the wide-scale deployment of cloud-connected autonomous things. We are committed to achieving our goal to become carbon neutral on scope 1 and 2 and partially scope 3 by 2027. Further information can be found at www.st.com.

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