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STMicroelectronics' new inertial modules enable AI training inside the sensor

On-chip signal processing core, programmable with ST's NanoEdge AI Studio, is ideal for machine-learning applications

Geneva, June 16, 2022 – STMicroelectronics (NYSE: STM), a global semiconductor leader serving customers across the spectrum of electronics applications, has introduced new inertial sensors that contain the intelligent sensor processing unit (ISPU) to power the onlife era: interacting with trained devices with intelligence moving from "on" the edge to "in" the edge.

The [ISM330ISN](#) always-on 6-axis inertial measurement unit (IMU) for movement and position sensing uses its embedded intelligence to deliver unrivaled performance and accuracy for its size and power. Ideal for IoT and industrial applications, ST's new IMU sets to accelerate response time and extend battery life in equipment such as condition monitors for predictive maintenance, as well as battery-operated asset trackers and industrial applications such as robots.

The intelligence built into the ISM330ISN enables smart devices to perform advanced motion-detection functions in the sensor without interaction with the external microcontroller (MCU), thus saving power at system level. ST's approach integrates a specialized processor, the ISPU, in a small area directly on the sensor chip, optimized for machine-learning applications. This enables the ISM330ISN module to have a 50% smaller footprint and consume 50% less power than a typical co-packaged MCU.

Developers can program the ISPU using ST's NanoEdge AI Studio, a market-proven ST tool that many customers have used to deploy AI applications on STM32 microcontrollers. This technology is now available for programming the ISPU, enabling users to easily generate automatically optimized machine-learning libraries. Designing an anomaly detection library with AI learning capability directly inside the ISPU is possible with minimal data and just a few clicks. No specific data-science skills are needed.

"*Intelligence formerly implemented at the network edge, in an application processor, is now moving to the deep edge, inside the sensor,*" said Simone Ferri, General Manager of Marketing, Analog MEMS and Sensors Group, STMicroelectronics. *"Our ISM330ISN IMU heralds a new category of smart sensors, leveraging embedded AI to handle complex operations such as pattern recognition and anomaly detection with greatly increased efficiency and performance."*

While presenting new AI-powered creative opportunities, the ISM330ISN has the same 3mm x 2.5mm x 0.83mm package outline as conventional inertial modules.

Hence designers can upgrade their products quickly and cost-effectively with no obligation to change an established circuit board layout.

The ISM330ISN is covered by ST's 10-year longevity program, which provides long-term availability assurance for product designers and manufacturers.

Further technical information

The ISM330ISN is part of ST's iNEMO family of IMUs. It contains a 3-axis accelerometer and 3-axis gyroscope with low-noise sensing performance, and an output data rate (ODR) of 6.6kHz. With the ISPU, the sensor ensures consistently high accuracy while consuming only 0.59mA in combination mode with the accelerometer and gyroscope active.

ST's ISPU architecture, based on digital signal processing (DSP), is extremely compact and power-efficient, with 40Kbytes of RAM and occupying just 8000 gates on the sensor die. Performing floating-point operations with single-bit precision, ISPU is ideal for machine-learning applications and binary neural networks.

ST's ISPU and the NanoEdge.AI tools have been shortlisted for the Embedded Award at Embedded World 2022, in the Hardware and Software categories respectively. The event takes place in Nuremberg, Germany, June 21-23. ST will be exhibiting during the show, at booth no. 148 hall 4A.

The ISM330ISN is scheduled to enter production in H2 2022 and will be available from st.com or distributors for $3.48 for orders of 1000 pieces. NanoEdge AI Studio enabling the creation of libraries designed for specific ISPU part numbers is available at no charge on ST.com. Please contact your local ST sales representative or visit www.st.com.

For more information please visit www.st.com/ispu.

You can also read our blogpost at https://blog.st.com/ism330is-onlife/

About STMicroelectronics

At ST, we are 48,000 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 the Internet of Things and connectivity. ST is committed to becoming carbon neutral by 2027. Further information can be found at www.st.com.

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