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STMicroelectronics combines activity tracking and high-impact sensing in miniature AI-enabled sensor for personal electronics and IoT

Industry-first inertial measurement unit (IMU) with dual MEMS accelerometer and embedded AI measures accurately up to 320g full-scale range

Geneva, Switzerland, May 13, 2025 -- STMicroelectronics (NYSE: STM), a global semiconductor leader serving customers across the spectrum of electronics applications, has revealed an inertial measurement unit that combines sensors tuned for activity tracking and high-g impact measurement in a single, space-saving package. Devices equipped with this module can allow applications to fully reconstruct any event with high accuracy and so provide more features and superior user experiences. Now that it's here, markets can expect powerful new capabilities to emerge in mobiles, wearables, and consumer medical products, as well as equipment for smart homes, smart industry, and smart driving.

The new LSM6DSV320X sensor is an industry first in a regular-sized module (3mm x 2.5mm) with embedded AI processing and continuous registration of movements and impacts. Leveraging ST's sustained investment in micro-electromechanical systems (MEMS) design, the innovative dual-accelerometer device ensures high accuracy for activity tracking up to 16g and impact detection up to 320g.

"*We continue to unleash more and more of the potential in our cutting-edge AI MEMS sensors to enhance the performance and energy efficiency of today's leading smart applications*," said Simone Ferri, APMS Group VP, MEMS Sub-Group General Manager at STMicroelectronics. "*Our new inertial module with unique dual-sensing capability enables smarter interactions and brings greater flexibility and precision to devices and applications such as smartphones, wearables, smart tags, asset monitors, event data recorders, and larger infrastructure.*"

The LSM6DSV320X extends the family of sensors that contain ST's machine-learning core (MLC), the embedded AI processor that handles inference directly in the sensor to lower system power consumption and enhance application performance. It features two accelerometers, designed for coexistence and optimal performance using advanced techniques unique to ST. One of these accelerometers is optimized for best resolution in activity tracking, with maximum range of ±16g, while the other can measure up to ±320g to quantify severe shocks such as collisions or high-impact events.

By covering an extremely wide sensing range with uncompromised accuracy throughout, all in one tiny device, ST's new AI MEMS sensor will let consumer and IoT devices provide even more features while retaining a stylish or wearable form factor. An activity tracker can provide performance monitoring within normal ranges, as well as measuring high impacts for safety in contact sports, adding value for consumers and professional/semi-pro athletes. Other consumer-market opportunities include gaming controllers, enhancing the user's experience by detecting rapid movements and impacts, as well as smart tags for attaching to items and recording movement, vibrations, and shocks to ensure their safety, security, and integrity.

With its wide acceleration measurement range, ST's sensor will also enable new generations of smart devices for sectors such as consumer healthcare and industrial safety. Potential applications include personal protection devices for workers in hazardous environments, assessing the severity of falls or impacts. Other uses include equipment for accurately assessing the health of structures such as buildings and bridges.

The sensor's high integration simplifies product design and manufacture, enabling advanced monitors to enter their target markets at competitive prices. Designers can create slim, lightweight form factors that are easy to wear or attach to equipment.

Notes to editors
The 2.5mm x 3mm LSM6DSV320X integrates three micro-electromechanical systems (MEMS) sensors, comprising the ±16g and ±320g accelerometers and a MEMS gyroscope with ±4000dps range. The sensors are fully synchronized, making the modules easy to use and helping to simplify application development.

In addition to the MLC, which handles energy-efficient context awareness, the LSM6DSV320X integrates a finite state machine (FSM) that helps perform motion tracking in the module. The digital circuitry also includes ST's Sensor Fusion Low-Power (SFLP) technology for spatial orientation.

Like other smart MEMS sensors in ST's portfolio, the LSM6DSV320X features adaptive self-configuration (ASC) to optimize power consumption. Sensors with ASC can automatically adjust their settings in real-time upon detecting a specific motion pattern or signal from the MLC, without intervention from the host processor.

To facilitate tracking high-intensity impacts and at the same time maximize the accuracy on low-g events, ST has also created and patented the Motion XLF software library which fuses data from the low-g accelerometer and high-g accelerometer. Customers' engineering teams can use the software freely in their designs using the X-CUBE-MEMS1 package. ST also provides, free of charge, graphical design tools that help evaluate, configure, and test the LSM6DSV320X sensor and embedded AI and connect the projects with STM32 applications. These include MEMS Studio, part of the ST Edge AI Suite, and ST AIoT Craft, the web-based environment with tools for developing and provisioning node-to-cloud AIoT (Artificial Intelligence of Things) projects. The LSM6DSV320X is supported in ST Edge AI Suite now and will be added to ST AIoT Craft by the end of 2025.

For more information, please go to www.st.com/lsm6dsv320x

About STMicroelectronics
At ST, we are 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 on track to be carbon neutral in all direct and indirect emissions (scopes 1 and 2), product transportation, business travel, and employee commuting emissions (our scope 3 focus), and to achieve our 100% renewable electricity sourcing goal by the end of 2027.

Further information can be found at www.st.com.

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