Enhancing Real-Time Signal-to-Noise Ratios in Nonlinear Devices and Systems: A Novel Approach

New method for improving the signal-to-noise ratio of resonators and oscillators in real time.

- Real-Time Monitoring: Eliminate the need for lenghty measurements.
- Enhanced Signal-to-Noise Ratio: Achieve unparalleled data accuracy.
- Versatility: Applicable to a wide array of nonlinear devices.

Fields of application

- Automotive industry: sensors and actuators, robotics
- Healthcare: Sensors
- Metrology: Control and monitoring of resonators

By using this technology, the devices can work more accurately and reliably and therefore deliver better results. This is particularly important in areas such as metrology, navigation or healthcare, where precise measurements are essential.

Background

Modern technology and in particular the fields of automation, robotics and navigation rely on the use of sensors and detectors to produce accurate and reliable measurements and signals. An important aspect of these devices is the signal-to-noise ratio, which is the ratio between the measured signal and the background noise.

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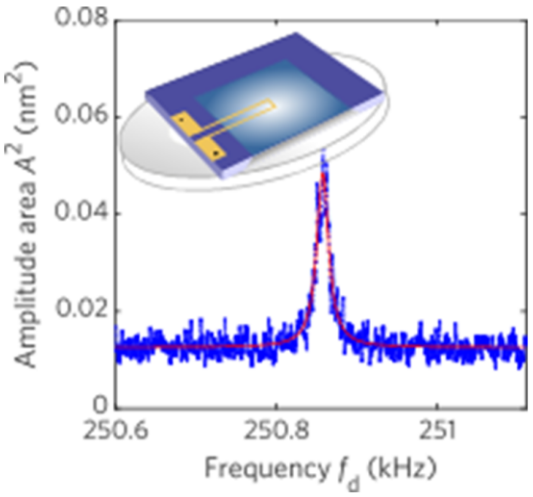
Service
The Technology Licensing Office of the Baden-Württemberg Universities (TLB GmbH) has been entrusted with exploiting this technology and assisting companies in obtaining licenses.

Problem

A suboptimal SNR (signal-to-noise ratio) can lead to system malfunctions, inaccurate measurements, and erratic behaviors in systems incorporating these sensors. The challenge intensifies with nonlinear devices, which necessitate sophisticated signal processing methods to boost the SNR.

Solution

Our innovative solution lies in real-time adaptive filtering techniques. This approach involves dynamically adjusting the filter in response to incoming signals, effectively isolating the target signal from disruptive noise and distortions. The implementation of this technique promises substantial enhancements in device accuracy and reliability, contributing significantly to fields where precision is critical, such as metrology, navigation, and healthcare.



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Publication and links

Fan Yang, Mengqi Fu, Bojan Bosnjak, Robert H. Blick, Yuxuan Jiang, and Elke Scheer, "Mechanically Modulated Sideband and Squeezing Effects of Membrane Resonators", Phys. Rev. Lett. 127, 184301 – Published 26 October 2021