EuroSciCon

International Conference on
Metal, Mining and Magnetic Materials

November 01-02, 2018
Paris, France

J Mat. Sci. 2018, Volume:6
DOI: 10.4172/2321-6212-C7-033

ADVANCED MAGNETIC SENSOR DESIGN: HIGH PERFORMANCE AND MINIATURIZATION CHALLENGES IN MAGNETIC SENSING

Sergey Y Yurish[1, 2]

[1]International Frequency Sensor Association (IFSA), Spain
[2]Frequency-to-Digital (F2D), Ireland

From the six sensor signal domains, the magnetic one takes an important place. Today many manufacturers produce different magnetic sensors and devices on its basis: Hall effect sensors, magnetoresistors, magnetodiodes, GMR, SQUID, magnetometers, navigation compasses, etc. for different applications. They allow contactless measurements of mechanical and electrical quantities, such as angle of rotation, angular speed, linear position, linear speed, and current. The global market for magnetic sensors has been growing at a steady pace, both in terms of technology and applications. The global magnetic sensor market is projected to reach US $ 3.33 billion by 2025, at a compound annual growth rate (CAGR) of 6.8 h sector, smartphones and consumer wearable devices such as smartwatches and health monitoring devices. Smart magnetic sensors with sensing elements and associated electronics such as amplification and signal conditioning on the same die are the latest trend. However, below the 50 nm technology, the design of analog and mixed-signal circuit becomes perceptibly more difficult. Such analog components are not process compatible. This is particularly true for low supply voltage near 1 V or below. The result is not only an increased design effort, long development time, high risk, cost and the need for very high volumes, but also growing power consumption, lost performance and flexibility. But the proposed advanced design approach eliminates these technological limitations. Digital magnetic sensors can be built based on so-called quasi-digital magnetic sensing devices with frequency, duty-cycle or PWM output and high-performance universal frequency-to-digital converters. This solution let us achieve many advantages due to properties of frequency-time signals as informative parameters of sensor's output and met all modern microminiaturization requirements. Such advanced design approach significantly reduced production costs, time-to-market, increased metrological performance, robustness and simplify the design process. Different examples of digital magnetic sensors and sensor systems will be given and discussed in details.

SYurish@sensorsportal.com