

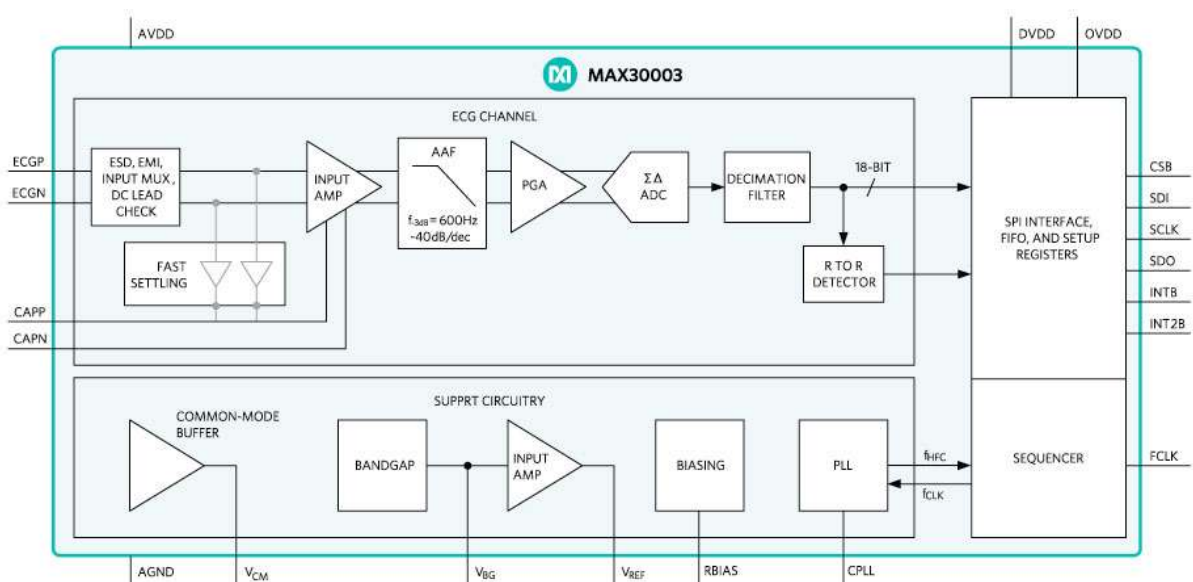
Sensor conditioning amidst a sea of focus on MEMS and sensors

[Steve Taranovich](#) - December 13, 2016

This article is part of EDN and EE Times' [Hot Technologies: Looking ahead to 2017](#) feature, where our editors examine some of the hot trends and technologies in 2016 that promise to shape technology news in 2017 and beyond.

We hear every day about the IoT and the billions of MEMS and sensors that will populate our environment, but let's not forget that without proper signal conditioning at the MEMS/sensor interface, we would have useless information to send to the processor for a pertinent outcome to users.

First of all, circuit designers will need good tools. One excellent solution emerging in 2016 was the Maxim Integrated Health Sensor Platform for wearables, the [MAXREFDES100#](#). Designers have an edict to get designs to market fast. This type of solution takes into account the myriad of ICs that need to be integrated into a complete MEMS and sensor conditioning front end. There are also [linearization and calibration circuits](#) that are needed to condition a whole group of sensors like programmable gain amplifiers (PGAs). I expect to see much more of these types of complete designer solution tools in 2017.



Human-machine interfaces (HMI) are another part of the sensors that need design and conditioning support. One such new area of sensors is the [inductive touch-on-metal button](#) design. Texas Instruments has much expertise in this area with its unique [inductance-to-digital converter \(LDC\)](#) solution, which has a good many application examples, [tutorials](#), and demo boards. We will see more of this new sensor evolution emerging in 2017 that will need specialized conditioning due to the

extraordinary nature of the particular sensor.

[Automotive ADAS solutions](#) abound in 2016 and the sensors associated with automobiles will all need their particular forms of sensor conditioning, especially when it comes to the autonomous vehicle. Although we will not see a fully autonomous vehicle for another few years, the automotive electronics industry is gradually adding ADAS solutions every year. You can expect more to come in 2017.

A good data acquisition system (DAS) will need wide dynamic range and very low distortion as well as proper input conditioning to the ADC interface. Articles like [this one](#) on designing an ultra-low distortion data-acquisition system will provide excellent technical guidance to circuit designers. Analog suppliers will be providing improved solutions in this area as well in the coming year.

Resistance temperature detector (RTD) ratiometric measurements are made accurate with specialized analog front end (AFE) designs like [this one](#) from Analog Devices. And how about this unique [one-wire interface-over-power pin for sensor signal conditioners](#)? The communication interface for a signal conditioning design can use a one-wire interface (OWI) that will save one wire from the traditional two-wire interface. More unique solutions like these will need to be created for the IoT to be truly practical from a cost and performance perspective and we should see a great many in 2017.

Also see:

- [Conditioning techniques for real-world sensors](#)
- [What a circuit designer needs for a robust, wearable health sensor system design](#)
- [One-wire interface over power pin for sensor signal conditioner calibration](#)
- [Linearization of sense element outputs using sensor signal conditioners](#)
- [How to design inductive touch-on-metal button panels](#)
- [How to design a –130-dB ultra-low distortion data-acquisition system](#)

Also watching:

- **High-speed signal chains:** With 5G expected in a few years, there will be new high speed transceiver designs being developed, especially with a focus on low power. This year, Analog Devices led the pack with their high speed offerings from [DC-to-wideband](#), making full use of the Hittite acquisition. Expect to see more innovative designs pushing the envelope to higher speed, [reduced footprint](#), lower cost, and lower power in 2017. Also, [e2v](#) and [Peregrine](#) got into the race early on in 2016. We saw the [serial digital interface \(SDI\) push to 12 Gbps](#) in late 2015 and we know that more is coming in this area as well. The [High-Speed Networking Laboratory \(HSNL\)](#) at NYU Polytechnic School of Engineering is conducting research and providing education to the challenging problems facing high-speed networks today. 5G is a big focus and signal chains are an important area. Expect to see more from them in 2017. Their [Brooklyn 5G Summit](#) will take place on April 19-21, 2017, where you can hear about the latest developments in the signal chain and much, much more.
- **Emerging interface solutions:** Sometimes the interface solution is one of the least thought-about areas of a design. Maxim Integrated showed off their [IO-Link](#), an intelligent factory automation connection to the sensor world, and [high-voltage battery management data communications](#) in automobiles was highlighted by Linear Technology in mid-2016 (definitely expect to see much

more of this next year). And let's not forget about the [old standby RS-485](#), which is handling ultra-high speed nowadays and [fail-safe biasing](#), as Intersil joins the fray in this area, so watch for this to emerge further. And speaking of high-speed, Texas Instruments is innovating in this area with [high voltage isolation using their expertise in LVDS](#). Long traces need good noise immunity and the differential pair architecture of LVDS is second to none. [Analog Devices has also entered the LVDS isolation arena](#) for safety and harsh environments.

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