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## **DIGITAL-SIGNAL** **PROCESSING**

# **Optics circumvent bottleneck in A/D conversion**

*“Researchers at the University of California, Los Angeles (UCLA) have found an optical way to speed up the analog-to-digital (A/D) conversion process that currently limits the use of available digital-signal-processing capacity for high-performance communication and radar systems.”*

*“A wide range of defense and telecom applications stand to benefit from development of the UCLA method.”*

*“The fastest analog-to-digital converter that I can buy with 10-bit resolution is about 100 Mbit/s,” Jalali said. “If*

*you compare that to several giga operations per second of processing power, there is a huge gap. As a result, the A/D converter is the bottleneck in system performance.”*

## **New approach**

*“Because it didn't seem likely that A/D processing speeds would catch up with PCs anytime soon, Jalali's group took another approach. ‘We said, Instead of making the A/D converter faster, can we make the [analog] signal slower?’”*

*“‘If I use a very short [femtosecond-width] optical pulse, then I can obtain a bandwidth of several hundred terahertz, whereas the signal I am trying to stretch is, at most, several hundred gigahertz,’ Jalali said. ‘So by performing a chirp using ultrashort pulses, we can satisfy the condition [of a much higher chirp bandwidth]. That gives us a very simple system that we can implement using commercially available components.’”*