Photonic-Electronic, Real-Time, Signal Processing

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ABSTRACT

Researchers at the University of California, Davis have developed a method for ultra-wideband and highly precise, photonic-electronic, signal processing. This technology is capable of high-speed, real-time signal correlation/processing by exploiting RF-photonics, ultra-stable optical frequency combs and high precision electronics.

FULL DESCRIPTION

Signal processing is an important technology for both aeronautics and satellite communication. Unfortunately, current methods of signal processing are often sub-optimal or inadequate. Conventional signal processing techniques are limited by electronic signal bandwidth (< 40 GHz) and function poorly in applications requiring equivalent bit resolution at high speeds (<5 bit at 10 GHz). Furthermore, conventional signal processing techniques are unable currently to achieve signal correlation at high speeds. Given these limitations, there is a need for more effective signal processing methods.

Researchers at the University of California, Davis have developed a method for improved signal processing. It uses ultra-wideband, high precision, photonic-electronic technologies, resulting in high-speed, real-time, signal correlation and processing. This method of improved signal processing utilizes RF-photonics, ultra-stable optical frequency combs and high precision electronics. This method can scale its bandwidth up to THz and higher frequencies while still achieving high equivalent bit resolutions (ENOB as high as 10). It is also capable of optical correlation of high bandwidth signals (> 100 GHz). This improved signal processing technology allows for efficient analog-to-digital conversion, as well as real-time, photonic-electronic, processing.

APPLICATIONS

- Photonic analog-to-digital conversion
- Real-time, photonic-electronic, processing
- Capable of use with ultra-wide bandwidth frequencies

FEATURES/BENEFITS

- Delivers high-speed, real-time, signal correlation and processing

PATENT STATUS

Patent Pending

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OTHER INFORMATION

KEYWORDS

Signal processing, analog-to-digital conversion, photonic-electronic processing, optical correlation, high-speed, ultra-wide bandwidth, GHz, THz

CATEGORIZED AS

- **Optics and Photonics**
  - All Optics and Photonics
- **Communications**
  - Optical
- **Transportation**
  - Aerospace

RELATED CASES

2018-047-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Higher-Speed and More Energy-Efficient Signal Processing Platform for Neural Networks
- Crystal Orientation Optimized Optical Frequency Shifter
- Multi-Wavelength, Nanophotonic, Neural Computing System
- Athermal Nanophotonic Lasers
- Athermal Silicon Photonics With CMOS Compatibility

- Ultra-High Resolution Multi-Platform Heterodyne Optical Imaging
- Multi-Wavelength, Laser Array
- Optical Interposers for Embedded Photonics Integration
- Development of a CMOS-Compatible, Nano-photonic, Laser
- Energy Efficient and Scalable Reconfigurable All-to-All Switching Architecture
- Compressive High-Speed Optical Transceiver
- All-Optical Regenerators
- Silicon Based Chirped Grating Emitter for Uniform Power Emission
- Energy-Efficient All-Optical Nanophotonic Computing

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