Modulo-Based High Dynamic Range ADC

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Principal investigator

Yonina Eldar

Faculty of Mathematics and Computer Science
Department of Computer Science and Applied Mathematics

Overview

A novel analog-to-digital conversion pre-processor uses a modulo-based signal folding method to overcome the limited dynamic range of conventional ADCs. The folded signal is reconstructed using a dedicated unfolding algorithm, enabling precise signal recovery across a wide amplitude spectrum. This novel architecture enables accurate reconstruction of the original signal, ensuring accurate signal conversion across a wide amplitude range. This technology extends the effective dynamic range of ADCs, improving performance in demanding applications such as radar, ultrasound imaging, and hearing aids.

Applications

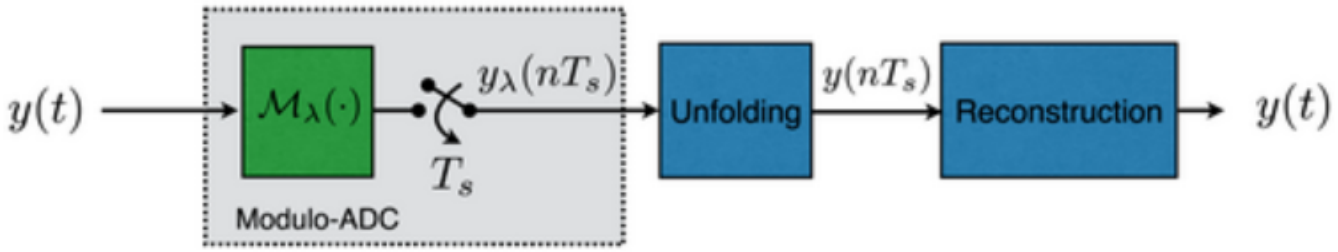
- Ultrasound imaging
- Radar systems
- Sonar technology
- High-dynamic range camera
- Hearing aids

Differentiation

- Extends dynamic range beyond ADC limits
- Accurate signal recovery
- Reduced power consumption

Development Stage

A hardware prototype and unfolding algorithm were developed, enabling sampling at 1/6 the Nyquist rate and supporting signals with 8Ã— greater dynamic range.



A schematic of modulo-sampling and reconstruction

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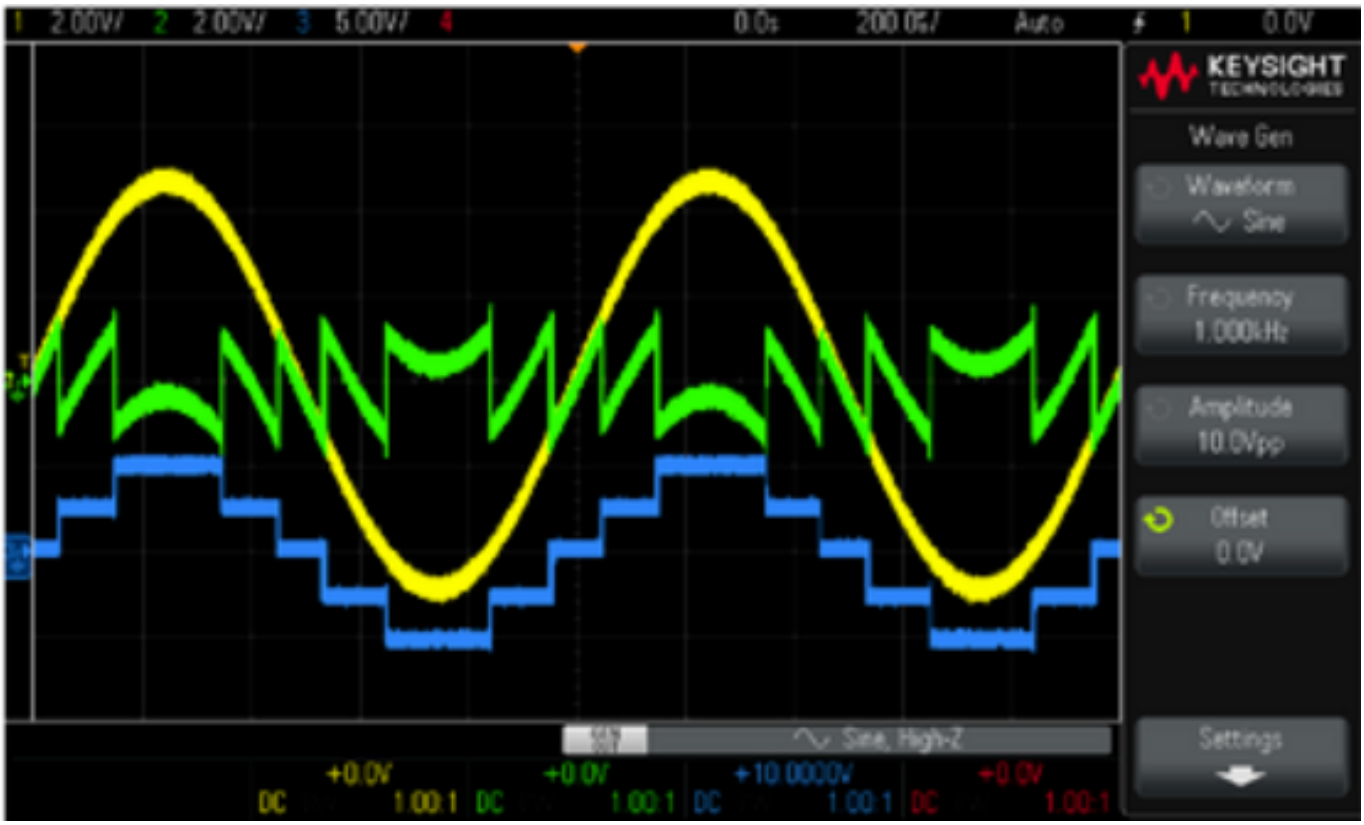

Oscilloscope screenshot showing 1â€¯kHz sinusoid (yellow), modulo-folded output (green), and DVG signal (blue) with peak amplitude of 4Î»