Method and Apparatus for Compressed Sensing Analog-to-Digital Conversion

The invention is methods, systems, and devices for compressed sensing analog to digital conversion. Common compressed-sensing techniques are limited by potential inaccuracy and imprecision, power inefficiency, long delays, and large circuit areas. This invention eliminates the issues and provides an efficient and accurate data compression method.

What is the Problem?

Common approaches to data compression involve sampling, digitizing, and then compressing a data signal. Such approaches often include Nyquist sampling of the data signal, whereby the data signal is sampled at least twice as fast as the data signal's maximum rate of change. However, for data signals that are characterized by a high degree of data redundancy (i.e., signals exhibiting a significant degree of difference between the rate of change of a relatively sparse signal and the rate of information in it), such common approaches to data compression may be inefficient or otherwise undesirable. Examples of data signals that may exhibit high degrees of data redundancy include bio-signals, industrial signals, computer-processing signals, audio-recording signals, and video-recording signals, among others.

What is the Solution?

The invention is methods, systems, and devices for compressed sensing analog to digital conversion. One source of such efficient compressed sensing in this invention is a column-by-column multiplication of the measurement matrix [Φ] by the input signal (vector [X]). This could be applicable to a wide-variety of signal-acquisition applications.

What is the Competitive Advantage?

There are a number of limitations to other approaches of compressed-sensing techniques. Such limitations include, for example, potential inaccuracy and imprecision, power inefficiency, long delays, and large circuit areas. This method eliminates those issues and provides an efficient and accurate method of compressed sensing analog-to-digital conversion.

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