Array-based Radio Frequency Sensing
Technology #17482

Applications

- Small size, efficient and wide-band radio frequency surveillance system
- Communication systems, radio frequency sensing and cognitive radios
- Internet of things

Problem Addressed

There is increasing demand for systems capable of identifying, locating and responding to electromagnetic emissions found anywhere in extremely wide bandwidths, including to determine whether a given frequency band is occupied or available to a cognitive radio. Currently, high sensitivity, narrowband receiver arrays capable of decoding signals and determining direction-of-arrival (DoA) must be tuned to a frequency of interest provided by prior knowledge of the spectrum or a less sensitive, wideband cueing receiver. These cueing receivers add size, weight, and power to the overall system. Without cueing, the spectral coverage is limited to the instantaneous bandwidth of the receiver, which is much less than the tuning bandwidth.

Technology

The technology is an Array-based Compressed sensing Receiver Architecture (ACRA) that eliminates the need for a cueing receiver by incorporating a wideband scanning mode in a sensitive digital receiver array. ACRA extends the functionality of a narrowband, tuned digital receiver array to also detect signals over very wide bandwidths by employing compressed sensing (CS) techniques. ACRA offers persistent surveillance of the entire tuning bandwidth increasing the likelihood of detecting short bursts of RF energy and reducing the delay in detecting persistent waveforms with little to no increase in power requirements, cost or system complexity.

Advantages

- Enables persistent surveillance of the entire bandwidth
- Extends the functionality of a narrowband, tuned digital receiver array to include signal detection
- Low power, weight and cost alternative to traditional IFM receiver technology

Categories For This Invention:

Electronics & Circuits
Lincoln Laboratory

Intellectual Property:

Methods and apparatus for array-based compressed sensing
PCT
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Methods and apparatus for array-based compressed sensing
US Patent Pending

Inventors:
James Vian
Andrew Bolstad
Jonathan Chisum

Publications:
An Array-based Compressed Sensing Receiver Architecture
IEEEExplore
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External Links:
Lincoln Laboratory
http://www.ll.mit.edu/

Image Gallery: