GIRD SYSTEMS, INC.

"Defining New Limits in Signal Processing"

Leadership Statement

GIRD's mission is to provide the latest digital signal processing algorithms, techniques and solutions that enable our customers to reduce development times and increase wireless communication systems' performance. Our solutions are implemented as either turn-key hardware implementations or reusable firmware IP blocks which are available in formats supporting a variety of hardware processing devices utilized by the industry. GIRD strives to become a leading developer of custom digital signal processing solutions for both the commercial and military markets.

Two core principles of GIRD are Integrity and Innovation. The Company's integrity is based on both ethics and professionalism principles consistent with the highest standards and values necessary to gain customer trust. Innovation is more than a principle; it is the Company's main driver. We develop clever implementations from the widest domain of innovative algorithms including those we have invented, allowing us to develop the best solution possible.

GIRD has always focused on delivering solutions on-schedule and on-budget while developing trustful relationships with its customers. Establishing a high level of trust with our customers and partners speeds the ability to make critical decisions in time, and enables more productive collaborations which often result in novel and significant improvements to the overall solutions.

Objective

GIRD seeks a supplier relationship with both military and commercial prime contractors to integrate its advanced signal processing solutions and/or firmware IP blocks into various systems such as communications, RADAR, Satellite systems and geo-location, and to collaborate and contribute in the development of new systems.

Core Competencies

For over ten years, GIRD Systems, Inc., with close ties to universities, has applied the latest digital signal processing algorithms to some of the toughest problems faced by the wireless communications industry including the USA military. GIRD has implemented solutions to: mitigate interference on wireless communications channels, increase wireless network security at the physical layer, allow simultaneous communication between friendly forces while jamming IED detonators, allow soldiers to determine their geo-location from their handheld radios in GPS-denied environments, determine the direction of enemy transmitters regardless of signal characteristics, extend the range of digital communication systems without redesigning radio hardware, process larger contiguous bandwidths than traditional systems, and many more. Our staff has over 100 years of combined R&D experience in communications providing the necessary tools to effectively assess the customer's needs and develop solutions based on those needs.

Our solutions are implemented as turn-key, stand-alone units and/or reusable firmware IP blocks that are licensed to end-equipment manufacturers. GIRD provides documentation, training, and engineering support to make integration as simple as possible. In many instances, our solutions make it feasible to improve existing products without the need for hardware modification, instantly achieving higher performance and greater customer satisfaction. Our implementations enable us to process signals on-channel at RF - in some cases into the tens of gigahertz range.

GIRD follows a proven project management discipline to execute its work with project managers who have passed Project Management Institute certification. The company is flexible and will adjust its process to accommodate any special needs of its customers in any part of the design cycle from requirements definition to production launch and follow-on support.


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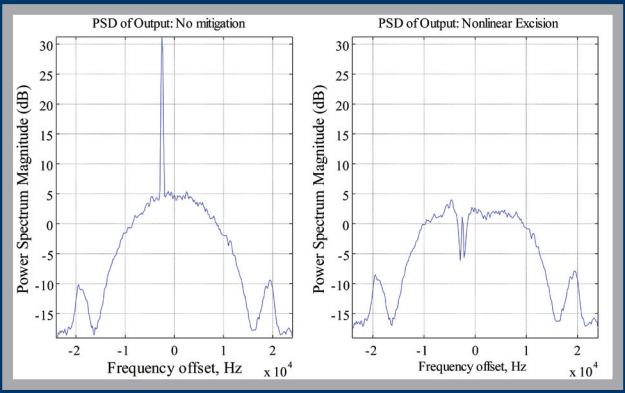
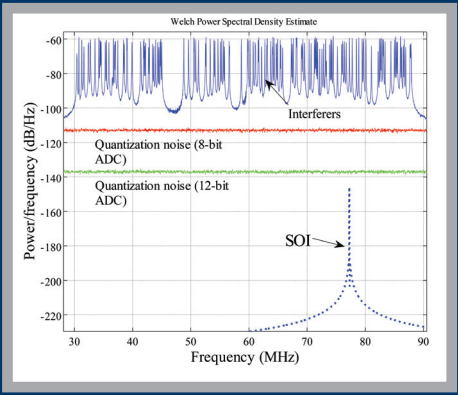
Technology Developments

Interference Mitigation

Interference mitigation in concurrent jamming and omnidirectional communications environments with blind excision of interference



Power spectrum of signal of interest with narrowband, in-band interference (left) and cancelled interference (right). Multiple interferers can be removed simultaneously.



Spectra of signal of interest and SOI in a high-dynamic range scenario. SOI is below the quantization noise level for digital interference cancellation. Right: Digital cancellation of a strong interferer without a reference signal (i.e., blind) for an ideal(red) and 8-bit quantized (green) scenario.

Secure Wireless Communications

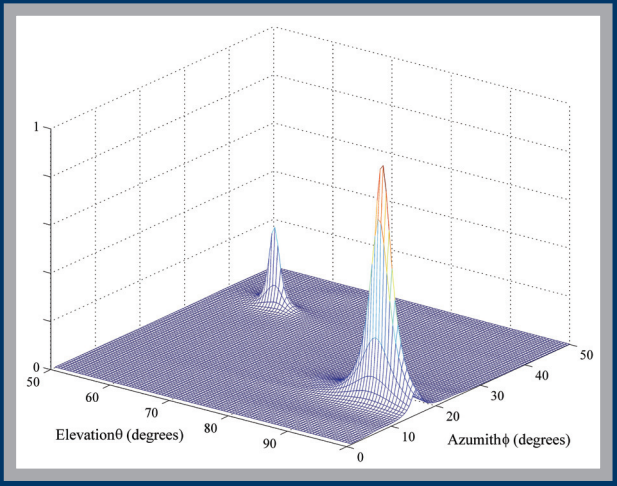
Secure wireless communications by modifying the physical layer with low latency, MIMO-based security in omnidirectional communications environments

Position tracking and Spatial processing in GPS-denied environments

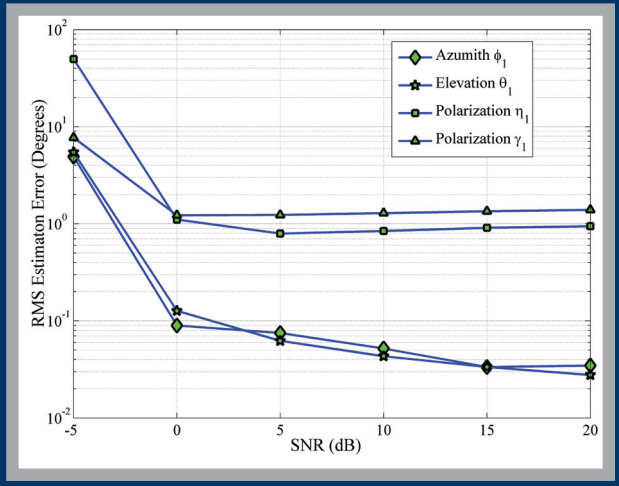
Position tracking and spatial processing in GPS-denied environments that adapts to dynamic geometries due to moving convoys/fleets/squads/troops

Direction Finding

Direction finding with signals of unknown bandwidth and unknown polarization and in low SNR and interference environments



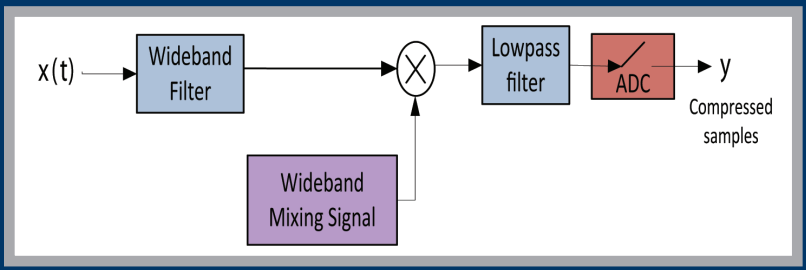
Spatial spectra for two equal-powered wideband (20 MHz) BPSK source signals with randomly selected circular polarization for each. The signals operate at the same carrier frequency and at 5 dB SNR. RMS error is less than 0.3 deg using a 9-element airborne array and short processing frame lengths.



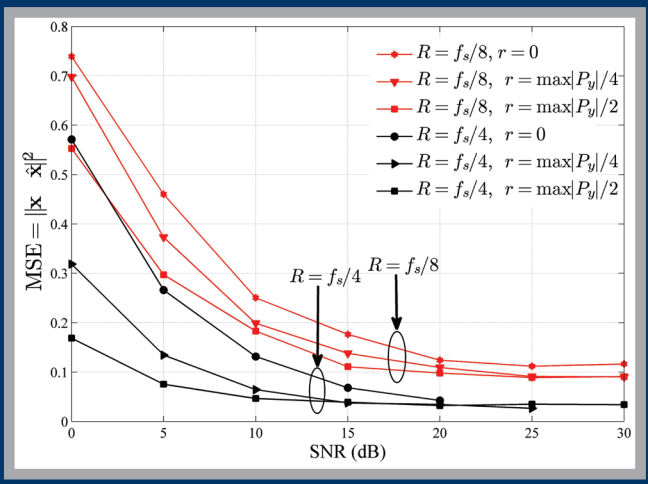
RMS errors for DOA and polarization estimation versus SNR. DOA performance at low SNRs improves significantly with longer processing frames, with DOA errors as low as 0.1 deg at -5 dB SNR.

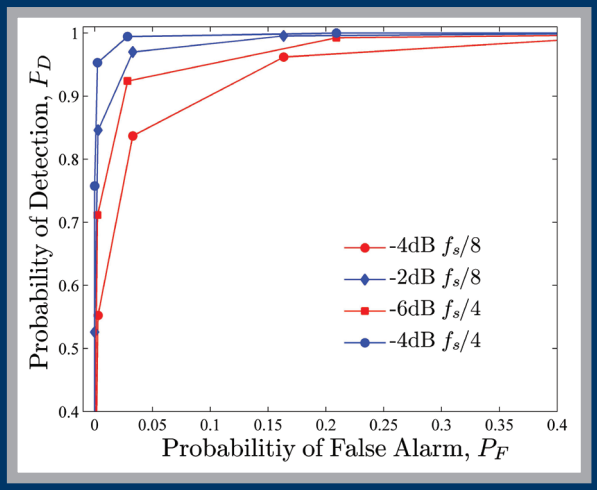
Compressive Sensing

Compressive sensing that enables sub-Nyquist rate devices to process very wide instantaneous BWs



Compressive sensing overcomes the ADC bottleneck by allowing the processing of wider bandwidths with current ADC limitations. GIRD's novel random mixing approach provides a properly randomized signal with only sub-Nyquist rate devices such that the compressed samples can be processed using GRID's custom dictionaries.





MSE of waveform reconstruction error vs. SNR for compressive sensing at two different sub-Nyquist sampling rates with different algorithm parameters. Right: Receiver operating characteristic (ROC) curves for pulse detection with different sub-Nyquist sampling rates at low SNRs.

Existing Relationships

Partners

- The State University of New York
- Southwest Research Institute
- L3 Communications
- Northrop Grumman Electronic Systems
- Pole/Zero Corporation
- University of Cincinnati
- University of the Pacific
- Thales Communications
- General Dynamics

Customers

- US Army Research, Development and Engineering Command
- US Navy:
  - NAVSEA
  - SPAWAR
  - NAVAIR
  - Office of Naval Research (ONR)
- US Air Force

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