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# Radar and Radio Signal Processing

**John E. Ball *,† and Nicolas H. Younan †**

Electrical and Computer Engineering, Mississippi State University, 406 Hardy Road, Mississippi State, MS 39762, USA; younan@ece.msstate.edu

* Correspondence: jeball@ece.msstate.edu; Tel.: +1-662-325-4169

† These authors contributed equally to this work.

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## 1. Introduction

Radar is a technology used in many aspects of modern life, with many diverse civilian and military applications. Although radars have been around since 1904 [1], much work is still spent today designing, building, testing, and implementing new radars and developing new and more powerful radar signal processing techniques. Radar signal processing is still a very active area of research.

## 2. The Special Issue

This special issue [2] has eight papers covering a diversity of categories in radar signal processing, including three papers on radar optimization and system design [3–5], one paper on parameter estimation [6], three papers in the area of synthetic aperture radar (SAR) and inverse SAR (ISAR) processing [7–9], and one paper on harmonic radar [10].

Two papers were selected as feature papers for the special issue: "Radar Angle of Arrival System Design Optimization Using a Genetic Algorithm" by Egger et al. [3] and "Knowledge-Aided Covariance Matrix Estimation in Spiky Radar Clutter Environments" by Bang et al. [6].

In the category of radar design and optimization, Egger et al. investigated genetic algorithms to aid in the radar design of a multi-beam angle of arrival estimation system [3]. By utilizing properties of Sodoku puzzles, Bufler et al. developed novel waveforms with desirable ambiguity functions and developed methods for antenna array interleaving, thinning, and random element spacing [4]. Pinchera et al. propose a modified generalized alternate projection algorithm which utilizes a simple convex programming implementation to design the element excitations and positions for a sparse array synthesis [5].

In the area of parameter estimation, Bang et al. examined knowledge-aided covariance matrix estimation in complex clutter environments [6].

In the area of SAR processing, Dabbiru et al. utilized textural and wavelet-based features from SAR imagery to detect slump slides in earthen levees [7]. Penner et al. developed a 2D ground-based SAR system and associated 3D time-domain backpropagation algorithm to generate 3D radar images of trees [8]. In ISAR processing, Khwaja et al. propose an orthogonal matching pursuit (OMP) reconstruction algorithm that requires a dictionary based only on first-order phase terms and estimates the second-order and third-order phase terms [9].

By utilizing harmonic radar, where the receive signal is a harmonic of the transmit frequency, Gallagher et al. develop a harmonic radar which has a high clutter rejection capability for moving target imaging and synthetic aperture imaging [10].

**Conflicts of Interest:** The authors declare no conflict of interest.

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