SCHOLARLY PUBLICATIONS
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Journal Name: IEEE Transactions on Power Delivery **IF: 4.4**

Title: Dynamic Phasor Estimation Using ℓ1-norm Constraint Maximum-Correntropy Criterion

Author: Sarita Nanda, Kuber Saxena and S.R Samantaray

Details: January 2024

Abstract: Two algorithms namely variable centre maximum correntropy based recursive Gauss Newton filter (VCMC-RGN) and variable centre maximum correntropy based ℓ1 -norm constraint (zero attracting) recursive Gauss Newton filter (VCMC-ZARGN) are proposed for dynamic phasor and frequency estimation suitable for Phasor Measurement Units. The correntropy term leads to better performance in estimating phasor and frequency under dynamic conditions of a power system both in Gaussian as well as impulsive noise environment. Additionally, some assumptions have been considered to compute the inverse Hessian matrix that optimizes memory resources and time consumption. In addition, the underlying sparse behaviour of the adaptive filter has been exploited through norm to significantly improve the accuracy and the convergence rate of the phasor estimation. Moreover, this work demonstrates the feasibility of implementing the new VCMC-ZARGN estimator in real time using the real-world measurement acquired from the Ecole Polytechnique Federale de Lausanne (EPFL) campus grid and also experimental setup based on the Field-Programmable Gate Arrays (FPGAs) with optimum device utilization that is authenticated using a PV-Wind hybrid system.

URL: https://ieeexplore.ieee.org/abstract/document/10416393

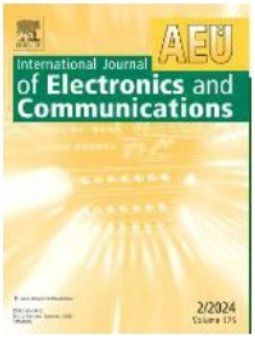
Journal Name: AEU - International Journal of Electronics and Communications **IF: 3.2**

Title: Wideband metasurface reflective linear-cross and linear-circular meander-line polarizer for WLAN and SatCom applications in S and C bands

Author: Niten Kumar Panda, Sudhakar Sahu and Sraddhanjali Mohapatra

Details: Volume 173, January 2024, 154988

Abstract:
The wideband multipurpose metasurface polarizer described in this article can convert linearly-polarized (LP) waves to cross-polarized (CLP) and circularly-polarized (CP) waves in S and C band applications. To achieve the desired polarization conversion, a meander-line with a non-uniform width unitcell is carved on a FR4-substrate. An airgap is then introduced between the dielectric and metal ground. Due to variations in the electrical length that the electromagnetic wave travels through the metasurface, this airgap is essential in determining whether the polarizer is a half- or quarter-waveplate. When the airgap was 9 mm, it was possible to record wideband LP-to-CLP at 2.87–7.12 GHz with a polarization conversion ratio (PCR) % and narrowband LP-CP at 2.45–2.69 GHz and 7.56–8.1 GHz with an axial-ratio (AR) dB. By reducing the gap to 4.2 mm, the above band exhibits a wideband LP-CP conversion within bands of 3.02–3.35 GHz and 3.82–7.42 GHz with an incidence angle variation up-to 40°. Also, 3.18–3.33, 5.28–6.70, and 7.72–7.96 GHz bands exhibit PCR % over 40°. Surface impedance, surface current, and the transfer matrix technique were all used in the investigation of the conversion process for both normal and oblique incidence. RCS reduction, one of the applications, was also demonstrated.



URL: https://www.sciencedirect.com/science/article/pii/S1434841123004624

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Journal Name: AEU - International Journal of Electronics and Communications **IF: 3.2**

Title: Analysis of RF energy harvesting assisted RF/FSO system with SSK modulation in smart city

Author: Shaik Mohammed Ali, Hemanta Kumar Sahu and Sudhansu Sekhar Singh

Details: Volume 176, March 2024, 155157

Abstract: In this paper, the performance of smart city network infrastructure is studied using space shift keying (SSK) modulation and radio-frequency (RF) based energy harvesting with cooperative amplify-and-forward (AF) and decode-and-forward (DF) relaying. Here, the Wireless-enabled sites can communicate data to the control unit via the access point (AP). The sites function by utilizing an energy-saving mechanism, which leads to a notable improvement in spectral efficiency. The Markov chain considers the number of active sites in the network dynamically. Moreover, energy harvesting-assisted AP helps overcome the rising demands of the city by providing an enhanced data rate, low latency, shorter coverage, widespread connectivity of the massive number of sites, and energy efficiency. The channel between sites to the AP is Nakagami-m distributed, whereas the AP is connected with the control unit through the free space optical (FSO) link. The FSO link is modelled with Gamma–Gamma distribution with pointing error impairments. The mathematical equations for average bit error probability (ABEP) are obtained for smart cities by considering mixed channels and utilizing the multi-user selection combination. The Monte Carlo simulation technique verifies the accuracy of the numerical results. According to the findings, using SSK modulation in combination with energy harvesting strategies can enhance the effectiveness of smart cities.

URL: https://www.sciencedirect.com/science/article/pii/S1434841124000426

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Journal Name: Wireless Networks **IF: 3.0**

Title: Multiuser hybrid precoder design using logarithmic hyperbolic filtering for millimeter wave communication systems

Author: Swetaleena Sahoo, Manidipa Sarkar, Harish Kumar Sahoo and Sarita Nanda

Details: Volume 30, January 2024, Pages 139–150

Abstract: Hybrid precoding is an emerging solution for millimeter wave massive MIMO system to achieve reduced complexity and enhanced spectral efficiency. Hybrid precoding fully exploits spatial information to achieve high channel gain which reduces excessive path loss. The research presented in this paper is aiming at the design of optimal precoder which is based on Logarithmic hyperbolic cosine cost function with ZA and RZA criterion and has the advantage of reduced RF Chains. The channel state information (CSI) is generated by using random values of angle of arrival (AoA) and angle of departure (AoD) information. This CSI information is crucial to generate the precoding matrices and the row wise elements of the digital precoding matrix are recursively updated by using hyperbolic cosine filtering algorithm. Proposed precoder achieves spectral efficiency of 13 bps/Hz with 20 dB SNR which is comparatively higher than the precoders designed using other state of art methods. The performance is tested by varying base station antennas, mobile station antennas and number of users. The achievable spectral efficiency with variation of antenna elements and users establish the superior performance of the precoder. Thus the design can be suitable for fifth and next generation wireless communication systems when higher data rate is the requirement in millimeter wave band.

URL: https://link.springer.com/article/10.1007/s11276-023-03465-8

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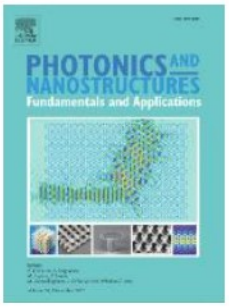
Journal Name: Photonics and Nanostructures - Fundamentals and Applications **IF: 2.7**

Title: Adjustable broadband absorber based on vanadium dioxide multiple coupled diagonally sliced square ring shaped structure for THz frequency

Author: Pankaj Binda, Sagnik Banerjee, Rajendra Mitharwal and Sarita Nanda

Details: Volume 58, February 2024, 101211

Abstract: A broadband absorber with multiple coupled diagonally sliced square rings at terahertz frequency using vanadium dioxide is proposed. The proposed structure exhibits more than 90 % absorption in the frequency range of 2.85–7.51 THz, with a relative bandwidth of 89.96 % and an absorption bandwidth of 4.66 THz. The absorptivity curve increases as vanadium dioxide conductivity rises from 200 S/m to 200,000 S/m, giving a wide range of tunability from 1.62 % to 100 % at 3.4 THz. Due to its geometrical symmetry, the proposed structure is independent of the polarization angle under normal incident plane waves. The proposed structure works for different incident angles for transverse electric (TE) mode and transverse magnetic (TM) mode with oblique incidence plane waves. The results demonstrate the broad bandwidth compared to the state-of-the-art designs within the same frequency band with potential applications in sensors, switches, tuning, and modulation in the terahertz range.



URL: https://www.sciencedirect.com/science/article/pii/S1569441023001050

Journal Name: Journal of Vibration Engineering & Technologies **IF: 2.7**

Title: Convex Combination of Nonlinear Filters using Improved Proportionate Least Mean Square/Fourth Algorithm for Sparse System Identification

Author: Patnaik, Ansuman; Nanda, Sarita

Details: Volume 12, 2024, Page 941-951

Abstract: Real-time systems are affected by nonlinearities which might be due to the use of passive devices. To model these nonlinearities, a combined split adaptive exponential functional link network (cSAEFLN) architecture is proposed which uses the AEFLN-based modeling that enhances the architecture's capability for nonlinear system identification. The cSAEFLN architecture consists of one linear adaptive filter and a convex combination of two nonlinear adaptive filters. To address the sparsity issue and deal with the nonlinearities resulting from the functional expansion of the input signal, a novel improved proportionate least mean square/fourth (IPLMS/F) algorithm is introduced for updating the nonlinear adaptive filter coefficients. Different experiments related to the system identification problem are examined to analyze the robustness of the proposed architecture. The testified outcome indicates the efficiency of the cSAEFLN architecture in terms of mean square error and convergence rate for different systems.

URL: https://link.springer.com/article/10.1007/s42417-023-00885-w

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Journal Name: Physical Communication **IF: 2.2**

Title: A novel piecewise nonlinear companding scaling scheme for FBMC PAPR reduction

Author: Ramavath S., Patra P.K., Samal U.C.

Details: Volume 63, April 2024, Article number 102316

Abstract: The performance of offset quadrature amplitude modulation filter bank multi carrier (OQAM-FBMC) has been noticed to be affected by a high peak-to-average power ratio (PAPR). High PAPR causes the transmit power amplifier to become saturated, improving the bit error rate (BER) and causing out of band (OOB) distortions. In this paper, the PAPR of FBMC systems can be reduced by using shifting and scaling the trigonometric companding technique associated with a reduced BER performance and the power spectral density (PSD) with low OOB distortions. The characteristics of low peak signals are not changed by this companding scheme, while the characteristics of high peak signals are transformed into scaling piecewise nonlinear trigonometric functions. By tuning the parameters the suggested technique maintains the average signal power level unchanged. The theoretical analysis of the proposed scheme is also studied and also compared with the simulation results. The performance of the trigonometric companding scheme is also analysed with the μ-law and A-law existing companding methods and the suggested method obtaining 3 dB and 3.2 dB PAPR improvement respectively. The proposed technique determined to be better in terms of BER performance and spectrum efficiency.

URL: https://www.sciencedirect.com/science/article/pii/S187449072400034X

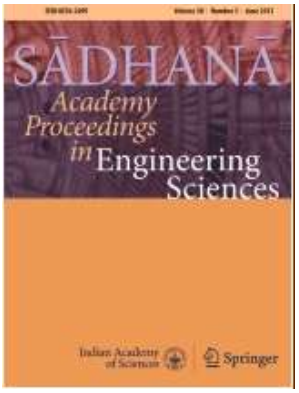
Journal Name: Sadhana - Academy Proceedings in Engineering Sciences **IF: 1.6**

Title: Analysis of improved fractional backstepping and lyapunov strategies for stabilization of inverted pendulum

Author: Mukherjee D., Raja G.L., Kundu P., Ghosh A.

Details: Volume 49, Issue 1, March 2024, Article number 48

Abstract: Controlling an inverted pendulum towards an upright position is a difficult task. Backstepping control is an emerging tool for assisting this extremely nonlinear system to stabilize. Since several studies demonstrated fractional modern strategies with Oustaloup approximation, this current work proposes a novel fractional backstepping rule with improved biquadratic equiripple approximation method to stabilize the system with superior accuracy. On the basis of study in the frequency domain, a suitable fractional order is established. Closed-loop performances and control efforts between proposed fractional and conventional backstepping controllers are illustrated based on time domain analysis from a real-time perspective. By abruptly changing the system's parameters, the effectiveness of the proposed controller is also verified. A further fractional Lyapunov improved architecture is proposed to investigate control efficacy with proposed fractional backstepping strategy. The selection of tuning parameters of all control strategies is addressed analytically in depth. It is explored that the suggested fractional backstepping control scheme outperforms the conventional backstepping and fractional Lyapunov stability rules by effectively tracking desired position. This enhanced performance is achieved with relatively smooth control action. On the basis of error measurements, quantitative performance analysis is also subjected to all control strategies.



URL: https://link.springer.com/article/10.1007/s12046-023-02415-6