

IEEE TRANSACTIONS ON
AEROSPACE AND ELECTRONIC SYSTEMS

DECEMBER 2024

VOLUME 60

NUMBER 6

IEARAX

(ISSN 0018-9251)

PAPERS

A Multialignment Task-Adaptive Method for MFR Mode Recognition on Few-Shot Open-Set Learning	Q. Zhai, J. Liu, Z. Zhang, Y. Li, and S. Wang	7559
Unequal Directivity Orders Between Two Figure-8 Sensors Perpendicularly Colocated With a Pressure Sensor – Their “Spatial Matched Filter” Beam Steering	J. S. Zheng, K. T. Wong, C. J. Nnonyelu, and Y. Song	7575
A Low-Cost Dual-Path Feature Fusion Network for Omnidirectional Human Motion Recognition Using Monostatic Radar	Y. Qiu, X. Li, Z. Deng, X. Huang, P. Pan, and X. Ma	7595
Distributed Collaborative Feedback Particle Filter: A Diffusion Map-Based Feedback Gain Approximation Approach ..	W. Xia, Z. Zhou, and W. Jiang	7611
Nonmyopic GOSPA-Driven Gaussian Bernoulli Sensor Management	G. Jones, Á. F. García-Fernández, and C. Blackman	7628
A Space–Time-Ambiguity Decomposition Method for DOA Estimation Enhancing Antispoofing via Rotating Dual Antennas	H. Wang, H. Li, M. Zhong, and M. Lu	7643
Reduced-Order Desensitized Optimal Control for Mars Entry Trajectory Optimization	Y. Xu, X. Liu, S. Li, M. Xin, and X. Huang	7663
Fast Adaptive Jamming Resource Allocation Against Frequency-Hopping Spread Spectrum in Wireless Sensor Networks via Meta-Deep-Reinforcement-Learning	N. Rao, H. Xu, Z. Qi, D. Wang, and Y. Zhang	7676
I Can Hear You Loud and Clear: GNSS-Less Aircraft Navigation With Terrestrial Cellular Signals of Opportunity	Z. M. Kassas, A. A. Abdallah, S. Shahcheraghi, J. J. Khalife, C. Lee, J. Jurado, S. Wachtel, J. Duede, Z. Hoeffner, T. Hulsey, R. Quirarte, and R. Tay	7694
Attention-Mechanism-Based Anti-Jamming Detector With Generative Adversarial Training	Y. Zhang, B. Jiu, Y. Zhao, H. Liu, J. Yan, and M. S. Greco	7711
Game-Theoretic Strategy Design of Multistatic MIMO Radar Network and Jammer	G. Zhang, J. Xie, and H. Zhang	7728
AnoMili: Spoofing Hardening and Explainable Anomaly Detection for the 1553 Military Avionic Bus	E. Levy, N. Maman, A. Shabtai, and Y. Elovici	7738
Range-Ambiguous Clutter Suppression With Cascaded FDA-MIMO STAP for Bistatic Space-Based Early Warning Radar	X. Yang, K. Duan, Z. Qiu, and Y. Wang	7754
Event-Triggered Nonlinear Model-Predictive Control for Optimal Ascent Guidance	T. Zhang, C. Gong, and L. Zhang	7771
ROSE: Covisibility Region Aware 3D-LiDAR SLAM Based on Generative Road Surface Model and Long-Term Association	S. Si, Y. Huang, Y. Nie, L. Xiao, B. Dai, and Y. Zhang	7785
Markov Chain Monte Carlo Multiscan Data Association for Sets of Trajectories	Y. Xia, Á. F. García-Fernández, and L. Svensson	7804
Square-Root Higher-Order Unscented Estimators for Robust Orbit Determination	Y. Yang	7820
Spacecraft Proximity Operations Under Motion and Input Constraints: A Learning-Based Robust Optimal Control Approach	Y. Tian, Y. Shi, X. Shao, Q. Hu, H. Yang, and Z. H. Zhu	7838
Refined Disturbance Observer-Based Maneuver Control for Flexible Spacecrafts With Guaranteed Strength-Saving Performance	Y. Zhu, K. Guo, J. Qiao, and W. Bao	7853

(Contents Continued on Page 7555)

A Closed-Form Method With Low Noise Sensitivity for Locating a Moving Source on Earth at a Known Altitude	7870
..... G. Bagherian, N. Mokari, B. A. Arand, K. C. Ho, and H. Yanikomeroglu	
A Predefined-Time Nonsingular Terminal Sliding Mode Control for Multispace Transport Robot System With Varying Power Reaching Law	7886
..... R. Tao, Y. Ding, X. Yue, and N. Wu	
A Game Theory-Based Flight Strategy to Energy Efficient UAV-Femtocell Geolocation Systems	7903
..... R. Avanzato, F. Beritelli, F. Raciti, and E. Spataro	
Q-Law Control With Sun-Angle Constraint for Solar Electric Propulsion	7917
..... G. R. Hecht and E. M. Botta	
Dynamic Event-Triggered Distributed MPC for Heterogeneous UAVs–UGVs Against DoS Attacks	7931
..... H. Tang and Y. Chen	
Bayesian Upper Bound on GNSS Posterior Integrity Risk	7945
..... S. Wang, X. Zhan, Y. Zhai, and H. Wang	
Class Hierarchy Aware Contrastive Feature Learning for Multigranularity SAR Target Recognition	7962
..... Z. Wen, Z. Wang, J. Zhang, Y. Lv, and Q. Wu	
CoSTAP: Clutter Suppression in Co-Pulsing FDA-STAP	7978
..... W. Lv and K. V. Mishra	
UAV-RIS Enabled NOMA Network for Disaster Management With Hardware Impairments	7995
..... S. Ghosh, A. Bhowmick, S. D. Roy, and S. Kundu	
Spatio-Temporal Dynamic Graph Attention Network-Based Detector for Sea-Surface Small Targets	8010
..... S. Xu and Q. He	
Sparse Learning Method With Feature Selection for Sensor Placement and Response Prediction	8022
..... M. Zhang, J. Ding, and B. Li	
Weather- and Space-Weather-Driven Variability of ADS-C Reports in New Zealand Airspace	8034
..... E. Schmöller and J. Berdermann	
Timeliness Analysis for Real-Time Updates Across Different Service Time	8054
..... L. Hu, D. Deng, F. Chen, P. Wu, and Z. Chen	
Image-Based Multispacecraft Feature Tracking Control Under Visibility Constraints With Observer	8069
..... Z. Lin and B. Wu	
Memetic Multiobjective Discrete Jaya Algorithm for Cooperative Scheduling of Multiple Agile Earth Observation Satellites	8086
..... B. Wang, Y. Feng, G. Zhang, L. Zhang, and Y. Yang	
Joint Optimization of Spectrum Recovery and Target Scattering Parameter Estimation in Microwave Photonic Radar	8100
..... Y. Hai, J. Wu, W. Pu, Z. Shao, P. Huang, Z. Li, A. Wang, D. Wang, Y. Huang, and J. Yang	
ISAR Imaging for Maneuvering Target Based on Suitable CPI Extraction and PC-MBSBL	8118
..... T. Yang, H. Shi, J. Guo, X. Wang, S. Yao, and W. Jiang	
Dynamic Caching in Space Over Heterogeneous Mega-Constellations: A DRL-Guided Approach	8136
..... Y. Zhang, M. A. Kishk, and M.-S. Alouini	
Direction Finding With Sparse Subarrays: Design, Algorithms, and Analysis	8149
..... W. S. Leite, R. C. de Lamare, Y. Zakharov, W. Liu, and M. Haardt	
Codesign for Spectral Coexistence Between RIS-Aided MIMO Radar and MIMO Communication Systems	8166
..... D. Li, B. Tang, X. Wang, W. Wu, and L. Xue	
Exploiting Base Station for Remote Sensing: Modeling, Joint Transceiver Design, and Experiment	8184
..... J. He, H. Li, Z. He, W. Wang, and Z. Cheng	
Enhancing Space-Based Situational Awareness: Real-Time Observation of Dynamic Targets With Meta-Cooperative-Scheduling Net	8198
..... D. Liu, Q. Zong, X. Zhang, W. Liu, L. Dou, and B. Tian	
Synthetic Aperture Radar Ship Detection Based on Efficient Multiscale Feature Enhancement Network	8212
..... H. Shan, W. Liu, X. Wang, Y. Hu, X. Duan, and Y. Zhang	
CV-SAR-Det: Target Detection for SAR Images via Deep Complex-Valued Network	8226
..... Z. Wang, R. Wang, H. Kang, F. Luo, and J. Ai	
Real-Time Pose Determination of Ultraclose Noncooperative Satellite Using Time-of-Flight Camera	8239
..... J. Hu, S. Li, and M. Xin	
Optimal Sensor Placement and Velocity Configuration for TDOA–FDOA Localization and Tracking of a Moving Source	8255
..... Y. Yang, J. Zheng, H. Liu, K.C. Ho, Z. Yang, and S. Gao	
Earth Observation Satellite Scheduling With Interval-Varying Profits	8273
..... J. Li, J. Zhu, D. Xu, J. Wang, Z. Li, and K. Zhang	
Continuous Human Action Recognition by Multiple-Object-Detection-Based FMCW Radar	8289
..... W. Yin, L. Shi, and Y. Shi	
Multichannel Signal Integration Approach for High-Speed Target Detection in Coherent MIMO Radar System	8298
..... M. Wang, X. Li, L. Gao, X. Li, Z. Sun, G. Cui, and T. S. Yeo	
Clutter Suppression Using Thresholded Reciprocal Filter in OFDM Radar	8316
..... A. Quirini, F. Colone, and P. Lombardo	
A High-Order Motion Parameter Estimation of Moving Target for Miniature Dechirped MMW Radar	8332
..... B. Xue, G. Zhang, F. Gini, M. S. Greco, and H. Leung	

Deep Learning Approach for GNSS Jamming Detection-Based PCA and Bayesian Optimization Feature Selection Algorithm	A. Reda, T. Mekkawy, T. A. Tsiftsis, and A. Mahran	8349
An Omnidirectional Compliant Docking Strategy for Non-Cooperative On-orbit Targets: Principle, Design, Modeling, and Experiment	M. Chu, S. Lin, S. Xu, G. Wang, J. Jia, and R. Chang	8364
Factor Graph Optimization-Based Smartphone IMU-Only Indoor SLAM With Multihypothesis Turning Behavior Loop Closures	S. Bai, W. Wen, L.-T. Hsu, and P. Yang	8380
Hermitian Toeplitz Covariance Tensor Completion With Missing Slices for Angle Estimation in Bistatic MIMO Radars	J. Chen, Y. Zhang, C. Yao, G. Tu, and J. Li	8401
A Covariance-Based View Planning Algorithm for Aerial Robots With Decoupled Vision System	Z. Hua, B. Xu, F. Quan, J. Sun, and H. Chen	8419
On the Secrecy Enhancement of an Integrated Ground–Aerial Network With a Hybrid FSO/THz Feeder Link	E. Illi and M. Qaraqe	8431
Robust Trajectory Tracking for Cooperative Aerial Load Transportation	P. Abeshtan and F. Saghaei	8448
Implementation of a Low-Earth Orbit Satellite Chirped Preamble Detector	M. Magnant, B. Le Gal, G. Ferré, and F. Collard	8458
Range-Ambiguous Clutter Suppression for Forward-Looking Airborne Radar Based on Frequency Coding and Phase Waveforms Modulation in Slow-Time	Z. Qiu, K. Duan, and Z. Liao	8470
Data-Driven Finite-Time Three-Dimensional Differential Game Guidance Law Against a Maneuvering Target With Input Constraints	H. Liu, M. Cheng, L. Wang, and Y. Jiang	8483
Meta-Heuristic Optimization and Variable Sparsity Combination of Two LMS Framework Based Charging Solutions for Electric Transportation	D. Jaraniya, S. Kumar, B. Singh, and G. Modi	8494
Dual TOA and Signal Type Prediction for Electronic Warfare Applications	B. Egolf, J. R. Pennington, and C.-H. Cheng	8504
Twistor-Based Global Hybrid Finite-Time Pose Tracking for 6-DOF Dual Spacecraft Formation	J. Chen, B. Zhang, and H. Huang	8512
Bistatic ISAR Imaging and Scaling Algorithm Based on the Estimation of Bistatic Factor and Effective Rotation Velocity	Y. Jiang, J. Wei, and Z. Liu	8522
Reentry Vehicle Filtering Using a Passive Angle-Only Sensor	M. Mallick, X. Tian, and L. Xu	8539
Reinforcement-Learning-Enhanced Adaption of Signal Power and Modulation for LPI Radar System	Y. Yuan, X. Liu, T. Zhang, G. Cui, and L. Kong	8555
Fuel-Optimal Control for Multiple Spacecraft Formation Flying With Relative Motion Constraints	W. Wang, D. Wu, and H. Baoyin	8569
Scenario Tracking for Airborne Bistatic Radar Systems	J. Klintberg, P. Dammert, and T. McKelvey	8583
User-Centric Satellite Handover for Multiple Traffic Profiles Using Deep Q-Learning	N. Badini, M. Jaber, M. Marchese, and F. Patrone	8591
Doppler Compensated Pseudorange Based Signal-of-Opportunity Positioning Using Iridium Satellite	H. Liang, H. Qin, and H. Li	8605
Toward Practical HARQ-Based RC-LDPC Design for Optical Satellite-Assisted Vehicular Networks	C. T. Nguyen, H. D. Le, C. T. Nguyen, and A. T. Pham	8619
Robust Iterative Sparse ML-Based Approaches for CES Data Model: Application to DOA Estimation	H. Abeida, G.-O. Glentis, M. Alsharef, and J. Li	8635
Multipursuer Interdiction Guidance Against Stationary Targets With Inter-Pursuer Collision Avoidance	Vivek A and S. Ghosh	8651
Multidestination Path Planning Based on Ant Colony Decision and Rolling Control	J. Ma, X. Ma, and S. Zang	8667
A Deep-Q-Learning-Based Base-Station-Connectivity-Aware Decentralized Pheromone Mobility Model for Autonomous UAV Networks	S. Devaraju, A. Ihler, and S. Kumar	8682
Automatic Modulation Recognition for Radio Frequency Proximity Sensor Signals Based on Masked Autoencoders and Transfer Learning	G. Yi, X. Hao, X. Yan, J. Wang, and J. Dai	8700
Discriminating Distributed Targets in Automotive Radar Using Fuzzy L-Shell Clustering Algorithm	Z. Ren, J. Tabrikian, I. Bilik, and W. Yi	8713
LoS Coverage Analysis for UAV-Based THz Communication Networks: Toward 3-D Visualization of Wireless Networks	M. T. Dabiri, M. Hasna, S. Althunibat, and K. Qaraqe	8726
Global Localization Technology of Lunar Rover by Horizon Line Matching	Z. Tian, H. Zhang, and Q. Hu	8744
Wi-Fi-Based Real-Time UAV Localization: A Comparative Analysis Between RSSI-Based and FTM-Based Approaches	E. Pagliari, L. Davoli, and G. Ferrari	8757

Multigranularity Batch Sequential Design Method for Component-Level Satellite Design Optimization	S. Xie, Z. Li, Y. Dong, and P. Chen	8779
A Polarization-Doppler Joint Feature-Based Detection Method for Small Targets in Sea Clutter	G. Wu, S. L. Wang, P. Wang, and Y. Li	8791
Fast Coherent Integration Based on Time-Frequency Reversal Decoupling Transform for Maneuvering Target Detection	Z. Xu, G. Wu, G. Li, and G. Zhou	8805
Conflict Detection and Resolution Strategy for eVTOLs in Low-Altitude Urban Environments Based on the Geodetic Coordinate System	J. Chen, Y. Liu, Y. Zhang, and X. Lin	8823
Using Fuzzy Clustering Technology to Implementing Multiple Unresolvable Group Object Tracking in a Clutter Environment	Y. Cheng, Y. Cao, T.-S. Yeo, Y. Wang, and J. Fu	8839
An On-Board Adaptive Modeling Approach Based on MIRLS-MA Extended Kalman Filter for Aeroengines	Z. Liu, X. Han, Y. Huang, L. Gou, and D. Fan	8855
Double Bulk Current Injection for Radiated Susceptibility of Nonlinear Avionics With Shielded Multicore Wire	J. Sun, X. Lu, G. Wei, H. Wan, X. Pan, and X. Lyu	8871
LPI Radar Signals Modulation Recognition in Complex Multipath Environment Based on Improved ResNeSt	B. Chen, X. Wang, D. Zhu, H. Yan, G. Xu, and Y. Wen	8887
Design of Orthogonal Polyphase Code Set Based on Multipulse Joint Processing	J. Bai, G. Wei, J. Shao, X. Wang, and Z. Fei	8901
Toward Optimal Placement of Free-Space Optical Terminal on the Spacecraft Body	J. A. Fraire, J. A. Ruiz-de-Azua, and E. Fernandez-Nino	8914
LSTM–Fuzzy Logic for Fault Forecasting and Mitigation in Propulsion System	B. Yu, Y. Peng, J. Huang, and F. Lu	8929
Frequency-Domain Modeling of Correlated Gaussian Noise in Kalman Filtering	S. Langel, O. G. Crespillo, and M. Joerger	8945
Block Sparse Recovery With Redundant Measurement Matrices and Its Application in Frequency Agile Radar	Y. Li, T. Huang, Y. Liu, X. Wang, and Y. C. Eldar	8960
Beamforming for Unmanned Aerial Vehicle Swarm-Based Distributed Radar Array: Theoretical Analysis and Engineering Demonstration	Z. Yang, J. Zheng, Y. Yang, T. Zhang, J. Yang, H. Liu, K. C. Ho, and Q. Gao	8976
Initial Orbit Determination of Periodic Orbits in the Earth–Moon System With Ground-Based Optical Observations	X. Liu, R. Armellin, L. Pirovano, and X. Hou	8992
Distributed Radar Multiframe Detection With Local Censored Observations	J. Lu, S. Zhou, X. Peng, and A. Wang	9006
Secrecy Capacity of SWIPT-Based Cognitive Satellite-Terrestrial Network With Artificial Noise and Noncolluding ERs	Y. Ma, G. Zhang, Z. Xu, X. Ding, L. Tian, A. Meng, and G. Pan	9029
Attitude Trajectory Planning for Spacecraft With Time-Varying Mass Using Sequential Conic Optimization	Y. Liu, Q. Hu, and H. Yang	9045
Reduced Space Sequential Convex Programming for Rapid Trajectory Optimization	Y. Ma, B. Pan, and J. Tang	9060
A Radar Compound Jamming Recognition Method Based on Blind Source Separation	H. Zhou, L. Wang, and Z. Guo	9073
Reinforcement Learning Driven Time-Sensitive Moving Target Tracking of Intelligent Agile Satellite	W. Lu, W. Gao, B. Liu, W. Niu, D. Wang, Y. Li, X. Peng, and Z. Yang	9085
Smooth and Stable Deployment Control of Tether Satellite System Using Nonlinear Model Predictive Control With Actuator Constraints	S. Wen, F. Zhang, G. Shen, and P. Huang	9102
Anti-Deception Jamming Resource Scheduling for Multitarget Tracking in Distributed Radar Networks	J. Sun, Y. Yuan, M. S. Greco, F. Gini, X. Yang, and W. Yi	9111
Feature Distribution Transfer Learning for Robust Few-Shot ISAR Space Target Recognition	R. Xue, X. Bai, M. Yang, B. Chen, and F. Zhou	9129
TF-GAN: Satellite Anomaly Detection via Generative Adversarial Networks and Time–Frequency Spectrum	J. Jiao, G. Li, J. Wang, Z. Zhao, J. Li, and H. Chen	9143
Tracking Multiple Underwater Targets Using Adaptive Gaussian Mixture Probability Hypothesis Density Filter With Unknown Clutter Rate	J. Kim	9154
Monocular Satellite Pose Estimation Based on Uncertainty Estimation and Self-Assessment	J. Wang, Y. Li, Z. Li, Z. Wang, and Q. Yu	9163
A Physics-Informed Indirect Method for Trajectory Optimization	K. Wang, F. Lu, Z. Chen, and J. Li	9179
Evaluation of Sun Position and Angular Rates Using the Photovoltaic Conversion System for On-Board Functions in an Artificial Satellite	R. Rocha, J. C. V. de Castro, and A. de C. Santana	9193
MIMO Radar Beampattern Design via Algorithm Unrolling	K. Metwaly, J. Kweon, K. Alhujaili, F. Gini, M. S. Greco, M. Rangaswamy, and V. Monga	9204

Preliminary Layout Design Method of Flush Airdata Sensing System	<i>F. Li, L. Song, J. Xie, B. Ji, and X. Lu</i>	9221
FATCNet : Feature Adaptive Transformer and CNN for Infrared Small Target Detection	<i>J. Yang, S. Deng, F. Zhang, A. Pan, and Y. Yang</i>	9231
Waveform Domain Adaptive Matched Filtering for Suppressing Interrupted Sampling Repeater Jamming	<i>H. Su, Q. Bao, J. Pan, F. Guo, and W. Hu</i>	9247
Adaptive Log-Euclidean Metric on HPD Manifold for Target Detection in Dynamically Changing Clutter Environments	<i>Z. Yang, Y. Cheng, H. Wu, Y. Yang, X. Li, and H. Wang</i>	9261
Improving Labeled Random Finite-Set-Based Filtering With Limited Fields of View	<i>B. L. Reifler and B. A. Jones</i>	9275
Weak Moving Target Detection in Distributed MIMO Radar With Hybrid Data	<i>X. Jing, H. Su, Z. Li, R. Yang, and Y. Zhu</i>	9291
Deinterleaving Method for Radar Signals With Dwell and Switch Pulse Repetition Intervals in a Prior Unknown Scenario	<i>M. Xie, C. Zhao, J. Huang, Y.-F. Sun, D.-X. Hu, and Z.-W. Wang</i>	9307
Micromotion Parameters Estimation for Helicopter Under Low-Pulse Repetition Frequency Condition	<i>X. Zhao, K. Li, Y. Luo, D. Zhao, and Q. Zhang</i>	9324
Reinforcement Learning-Based Integrated Decision-Making and Control for Morphing Flight Vehicles Under Aerodynamic Uncertainties	<i>Z. Guo, S. Cao, R. Yuan, J. Guo, Y. Zhang, J. Li, G. Hu, and Y. Han</i>	9342
Prior Information-Assisted Few-Shot HRRP Recognition Based on Task-Wise Shrinkage Quadratic Discriminant Analysis	<i>J. Li, W. Guo, F. Wei, T. Zhang, and W. Yu</i>	9354
Adaptive Sequential Convex Programming for Mars Ascent Vehicle Multiphase Trajectory Optimization	<i>K. Li, Y. Guo, G. Ran, and J. H. Park</i>	9369
<hr/>		
CORRESPONDENCE		
Performance Analysis of RIS-Aided Multibeam Satellite Communication Systems	<i>C. Kim, W. Saad, and M. Jung</i>	9383
LDM-Enhanced Computation and Communication Codesign in Unmanned Aerial Vehicle Networks	<i>B. Zhao, M. Lin, Z. Wang, J.-Y. Wang, and N. Al-Dhahir</i>	9394
Fast Clustering Satellite Selection Based on Doppler Positioning GDOP Lower Bound for LEO Constellation	<i>D. Wang, H. Qin, Y. Zhang, Y. Yang, and H. Lv</i>	9401
Unresolved Rayleigh Targets Detection for Monopulse Radar With Knowledge of One Target's DOA	<i>F. Cai</i>	9411
An ℓ_0 -Norm Optimization-Based Algorithm for Robust and Efficient MIMO Localization	<i>Z.-L. Shi, W. Xiong, X.-P. Li, W. Li, Y. Fu, and H. C. So</i>	9418
Retrodirective Cross-Eye Jammer Parameter Estimation Based on Complex Monopulse Ratio	<i>T. Lv, R. Zhang, W. Sheng, and X. Ma</i>	9426
Effects of Spatial Position on Mainlobe Interference Suppression Performance of FDA-MIMO Radar	<i>S. Shao, W.-Q. Wang, Y. Sun, and S. Zhang</i>	9437
<hr/>		
CORRECTIONS		
Corrections to “Sequential Switching Shunt Regulation Using DC Transformers for Solar Array Power Processing in High Voltage Satellites”	<i>C. Orts, A. Garrigós, D. Marroquí, and A. Franke</i>	9444
