IEEE TRANSACTIONS ON

# VEHICULAR TECHNOLOGY

A PUBLICATION OF THE IEEE VEHICULAR TECHNOLOGY SOCIETY

MARCH 2022 VOLUME 71 NUMBER 3 ITVTAB (ISSN 0018-9545)

EDITORIAL

Welcome Message From the New Editor-in-Chief ..... *A. Jamalipour* 2227

REGULAR PAPERS

*Channel Modeling*

Stochastic Fading Channel Models With Multiple Dominant Specular Components ..... *J. M. Romero-Jerez, F. J. Lopez-Martinez, J. P. Peña-Martín, and A. Abdi* 2229

Infrastructure-to-Vehicle Visible Light Communications: Channel Modelling and Performance Analysis ..... *H. B. Eldeeb, M. Elamassie, S. M. Sait, and M. Uysal* 2240

A 3D Geometry-Based THz Channel Model for 6G Ultra Massive MIMO Systems ..... *Y. Yuan, R. He, B. Ai, Z. Ma, Y. Miao, Y. Niu, J. Zhang, R. Chen, and Z. Zhong* 2251

*Communication Circuits & Systems*

Feasible Dispatch Limits of PV Generation With Uncertain Interconnection of EVs in the Unbalanced Distribution Network ..... *M. R. Feizi, M. E. Khodayar, and B. Chen* 2267

Few-Shot Learning for Fine-Grained Signal Modulation Recognition Based on Foreground Segmentation ..... *Z. Zhang, Y. Li, Q. Zhai, Y. Li, and M. Gao* 2281

Optimal Multi-Tier Clustering of Permissioned Blockchain Systems for IoT ..... *J. Mišić, V. B. Mišić, and X. Chang* 2293

Hybrid RFID Based Batteryless Seat Sensor With Discontinuous RF Transmission ..... *S. Mondal, Y. Chu, M. Cuddihy, A. Attaran, M. Y. Ghannam, and P. Chahal* 2305

*Connected Vehicles*

Safety of Automatic Emergency Braking in Platooning ..... *G. Sidorenko, J. Thunberg, K. Sjöberg, A. Fedorov, and A. Vinel* 2319

Reconfigurable Intelligent Surface Enabled Vehicular Communication: Joint User Scheduling and Passive Beamforming ..... *A. Al-Hilo, M. Samir, M. Elhattab, C. Assi, and S. Sharafeddine* 2333

*Transportation and Autonomous Vehicles*

Adaptive Equivalent Consumption Minimization Strategy for Off-Road Hydraulic Hybrid Vehicles: A Cycle-to-Cycle Optimization Approach ..... *Q. Wen, F. Wang, M. Cheng, B. Xu, and Z. Sun* 2346

Autonomous Pilot of Unmanned Surface Vehicles: Bridging Path Planning and Tracking ..... *N. Wang, Y. Zhang, C. K. Ahn, and Q. Xu* 2358

Fundamentals of Motion Planning for Mitigating Motion Sickness in Automated Vehicles ..... *Z. Htike, G. Papaioannou, E. Siampis, E. Velenis, and S. Longo* 2375

Homography-Based Visual Servoing for Underactuated VTOL UAVs Tracking a 6-DOF Moving Ship ..... *Y. Huang, M. Zhu, Z. Zheng, and K. H. Low* 2385

A Generative Adversarial Network Based Learning Approach to the Autonomous Decision Making of High-Speed Trains ..... *X. Wang, T. Xin, H. Wang, L. Zhu, and D. Cui* 2399

Voltage Regulation With Electric Taxi Based on Dynamic Game Strategy ..... *K. Ma, X. Hu, Z. Yue, Y. Wang, J. Yang, H. Zhao, and Z. Liu* 2413

Electric Taxi Charging Strategy Based on Stackelberg Game Considering Hotspot Information ..... *K. Ma, X. Hu, J. Yang, Z. Yue, B. Yang, Z. Liu, and X. Guan* 2427

*(Contents Continued on Page 2225)*

IEEE

*(Contents Continued from Front Cover)*

OpenMPD: An Open Multimodal Perception Dataset for Autonomous Driving . . . . . *X. Zhang, Z. Li, Y. Gong, D. Jin, J. Li, L. Wang, Y. Zhu, and H. Liu* 2437
Hybrid Swapped Battery Charging and Logistics Dispatch Model in Continuous Time Domain . . . . . *W. Jia, T. Ding, J. Bai, L. Bai, Y. Yang, and F. Blaabjerg* 2448
A Multi-Intersection Vehicular Cooperative Control Based on End-Edge-Cloud Computing . . . . . *M. Jiang, T. Wu, Z. Wang, Y. Gong, L. Zhang, and R. P. Liu* 2459
ES-DQN: A Learning Method for Vehicle Intelligent Speed Control Strategy Under Uncertain Cut-In Scenario . . . . . *Q. Chen, W. Zhao, L. Li, C. Wang, and F. Chen* 2472
Human-Tailored Data-Driven Control System of Autonomous Vehicles . . . . . *M. Rokonuzzaman, N. Mohajer, and S. Nahavandi* 2485
High-Accuracy and Adaptive Fault Diagnosis of High-Speed Train Bogie Using Dense-Squeeze Network . . . . . *Y. Zhang, N. Qin, D. Huang, B. Wu, and Z. Liu* 2501
Bio-Inspired Collision Avoidance in Swarm Systems via Deep Reinforcement Learning . . . . . *S. Na, H. Niu, B. Lennox, and F. Arvin* 2511
Event-Triggered Sensor Fault Estimation of Unreliable Networked Unmanned Surface Vehicle System With Correlated Noises . . . . . *K. Zhu and Y. Wang* 2527

*Vehicular Electronics*

Adaptive Equivalent Consumption Minimization Strategy (A-ECMS) for the HEVs With a Near-Optimal Equivalent Factor Considering Driving Conditions . . . . . *K. Choi, J. Byun, S. Lee, and I. G. Jang* 2538
Coordinated Attitude Control of Longitudinal, Lateral and Vertical Tyre Forces for Electric Vehicles Based on Model Predictive Control . . . . . *H. Zhao, X. Lu, H. Chen, Q. Liu, and B. Gao* 2550
Design and Optimization of Asymmetric and Reverse Series Coil Structure for Obtaining Quasi-Constant Mutual Inductance in Dynamic Wireless Charging System for Electric Vehicles . . . . . *Z. Li, J. Li, S. Li, Y. Yu, and J. Yi* 2560
A Coupling Thermal Management Strategy Based on Fuzzy Control for a Range Extended Electric Vehicle Power System . . . . . *K. Li, Q. Liu, Y. Hu, J. Gao, and H. Chen* 2573
A C-Band Fully Polarimetric Automotive Synthetic Aperture Radar . . . . . *J. M. Merlo and J. A. Nanzer* 2587
An Integrated Method of the Future Capacity and RUL Prediction for Lithium-Ion Battery Pack . . . . . *C. Zhang, S. Zhao, and Y. He* 2601
A Multi-Sensor Fusion Positioning Strategy for Intelligent Vehicles Using Global Pose Graph Optimization . . . . . *X. Tao, B. Zhu, S. Xuan, J. Zhao, H. Jiang, J. Du, and W. Deng* 2614
A General Polynomial Reverse Design of Step-Up Converters for EV Battery Applications . . . . . *G. Zhang, S. S. Yu, W. Chen, B. Zhang, and Y. Zhang* 2628
Integrated Velocity Prediction Method and Application in Vehicle-Environment Cooperative Control Based on Internet of Vehicles . . . . . *Y. Zhang, Z. Chen, G. Li, Y. Liu, Y. Huang, G. Cunningham, and J. Early* 2639
Bayesian Detection in Gaussian Clutter for FDA-MIMO Radar . . . . . *B. Huang, W.-Q. Wang, A. Basit, and R. Gui* 2655
MPC-Based Integrated Control of Trajectory Tracking and Handling Stability for Intelligent Driving Vehicle Driven by Four Hub Motor . . . . . *L. Zhai, C. Wang, Y. Hou, and C. Liu* 2668
Optimal Design of 9-Phase Permanent Magnet Synchronous Generator With Low Voltage Change Rate for Diesel Railway Vehicles . . . . . *L. Kang and Y. Chen* 2681
Design Methodology Based on Dual Control of a Resonant Dual Active Bridge Converter for Electric Vehicle Battery Charging . . . . . *A. V. Mirtchev and E. C. Tatakis* 2691
Shared Control for Intelligent Vehicle Based on Handling Inverse Dynamics and Driving Intention . . . . . *H. Deng, Y. Zhao, S. Feng, Q. Wang, and F. Lin* 2706
Multi-Actuation Controller for Performance Vehicles: Optimal Torque Allocation and Active Aerodynamic . . . . . *S. Mashrouteh, A. Khajepour, A. Kasaiezadeh, E. Esmailzadeh, S.-K. Chen, and B. Litkouhi* 2721
A Dynamic Rollover Prediction Index of Heavy-Duty Vehicles With a Real-Time Parameter Estimation Algorithm Using NLMS Method . . . . . *X. Yang, C. Wu, Y. He, X.-Y. Lu, and T. Chen* 2734

*Wireless Communications*

Broadcast Encryption Scheme for V2I Communication in VANETs . . . . . *H. Zhong, S. Zhang, J. Cui, L. Wei, and L. Liu* 2749
Intelligent Reflecting Surface Aided Secure Communications for NOMA Networks . . . . . *C. Gong, X. Yue, X. Wang, X. Dai, R. Zou, and M. Essaaidi* 2761
Leveraging Blockchain for Multi-Operator Access Sharing Management in Internet of Vehicles . . . . . *D. Hu, J. Chen, H. Zhou, K. Yu, B. Qian, and W. Xu* 2774
Wireless Network Reliability Analysis for Arbitrary Network Topologies . . . . . *S. T. Basaran, G. K. Kurt, and F. R. Kschischang* 2788

*(Contents Continued on Page 2226)*

*(Contents Continued from Page 2225)*

Transmit Antenna Number Identification for MIMO Cognitive Radio Systems in the Presence of Alpha-Stable Noise . . . *J. Zhang, N. Zhao, M. Liu, Y. Chen, F. Gong, Q. Yang, and F. R. Yu* 2798
Low-Band Information and Historical Data Aided Non-Uniform Millimeter Wave Beam Selection Algorithm in 5G-R High-Speed Railway Communication Scene . . . *T. Li, Y. Xu, H. Tong, and K. Pang* 2809
Efficient Joint Estimation of DOA, Range and Reflectivity in Near-Field by Using Mixed-Order Statistics and a Symmetric MIMO Array . . . *A. M. Molaei, P. del Hougne, V. Fusco, and O. Yurduseven* 2824
Online Control of Traffic Split and Distributed Cell Group State Decisions for Multi-Connectivity in 5G and Beyond . . . *S. H. Jung and S. Bahk* 2843
Impact of Primary User Activity Statistics in Cognitive Vehicular Networks . . . *D. K. Patel, S. Kavaiya, Z. Ding, Y. L. Guan, and S. Sun* 2859
Design of Improved Expanding-Window BATS Codes . . . *J. Yang, Z. Shi, and J. Ji* 2874
Temporal Correlation Enhanced Sparse Activity Detection in MIMO Enabled Grant-Free NOMA . . . *L. Wu, Z. Wang, P. Sun, and Y. Yang* 2887
Orientational Beamforming via a Modified RBF Neural Network for Orientational UWB Interference Rejection . . . *J. Han, B. P. Ng, and M. H. Er* 2900
Performance Analysis of the Hybrid Satellite-Terrestrial Relay Network With Opportunistic Scheduling Over Generalized Fading Channels . . . *Z. Zhao, G. Xu, N. Zhang, and Q. Zhang* 2914
Exploitation of Channel-Learning for Enhancing 5G Blind Beam Index Detection . . . *J. Y. Han, O. Jo, and J. Kim* 2925
An Adaptive Vehicle Clustering Algorithm Based on Power Minimization in Vehicular Ad-Hoc Networks . . . *H. Zhao, J. Tang, B. Adebisi, T. Ohtsuki, G. Gui, and H. Zhu* 2939
Precoder Design for Physical-Layer Security and Authentication in Massive MIMO UAV Communications . . . *S. J. Maeng, Y. Yapıcı, İ. Güvenç, A. Bhuyan, and H. Dai* 2949
Energy Efficient Resource Allocation for MSCA Enabled CoMP in HetNets . . . *J. Chen, Z. Ma, Y. Liu, J. Jia, and X. Wang* 2965
LIDAR and Position-Aided mmWave Beam Selection With Non-Local CNNs and Curriculum Training . . . *M. Zecchin, M. B. Mashhadi, M. Jankowski, D. Gündüz, M. Kountouris, and D. Gesbert* 2979
Complementary Coded CDMA With Multi-Layer Quadrature Modulation . . . *X. Wang, H.-H. Chen, X. Liu, and Q. Guo* 2991
Outage Probability and Ergodic Capacity of Distributed Transmit Beamforming With Imperfect CSI . . . *I. Ahmad, C. K. Sung, D. Kramarev, G. Lechner, H. Suzuki, and I. Grivell* 3008
3D-Trajectory and Phase-Shift Design for RIS-Assisted UAV Systems Using Deep Reinforcement Learning . . . *H. Mei, K. Yang, Q. Liu, and K. Wang* 3020
Performance Analysis of Opportunistic Beam Splitting NOMA in Millimeter Wave Networks . . . *Y. Zhou and S. Sun* 3030
FBMC Receiver Design and Analysis for Medium and Large Scale Antenna Systems . . . *H. Hosseiny, A. Farhang, and B. Farhang-Boroujeny* 3044
Maintaining the Status Quo: Simultaneous Estimation and Elimination for Multiple Interference in Transform Domain Vehicular Communication . . . *G. Wang, X. Han, Y. Wang, and S. Dong* 3058
Robust Sum-Rate Maximization for Underlay Device-to-Device Communications on Multiple Channels . . . *M. Elnourani, S. Deshmukh, B. Beferull-Lozano, and D. Romero* 3075

*Wireless Networks*

Cooperative Localization Based Multi-AUV Trajectory Planning for Target Approaching in Anchor-Free Environments . . . *Y. Li, B. Li, W. Yu, S. Zhu, and X. Guan* 3092
A Blockchain Based User Subscription Data Management and Access Control Scheme in Mobile Communication Networks . . . *K. Xue, X. Luo, H. Tian, J. Hong, D. S.L. Wei, and J. Li* 3108
A QoE-Driven Pricing Scheme for Inter-Vehicular Communications With Four-Stage Stackelberg Game . . . *K. M. K. Ramamoorthy and W. Wang* 3121
Joint Cache Placement and Cooperative Multicast Beamforming in Integrated Satellite-Terrestrial Networks . . . *D. Han, W. Liao, H. Peng, H. Wu, W. Wu, and X. Shen* 3131
Combined Communication and Computing Resource Scheduling in Sliced 5G Multi-Access Edge Computing Systems . . . *W. K.G. Seah, C.-H. Lee, Y.-D. Lin, and Y.-C. Lai* 3144
Optimal Energy Efficiency for Relay Selection via Power Allocation in L2 Halo-Orbital Cislunar Communication Network . . . *A. Yuan, Y. Xu, Q. Zhang, R. Wang, and Z. Yang* 3155
Coverage Analysis for UAV-Assisted mmWave Cellular Networks Using Poisson Hole Process . . . *X. Guo, C. Zhang, F. Yu, and H. Chen* 3171
A Collaborative Caching-Transmission Method for Heterogeneous Video Services in Cache-Enabled Terahertz Heterogeneous Networks . . . *Q. Li, A. Nayak, X. Wang, D. Wang, and F. R. Yu* 3187

*(Contents Continued on Back Cover)*

*(Contents Continued from Page 2226)*

Content Distribution Based on Joint V2I and V2V Scheduling in mmWave Vehicular Networks ..... *L. Su, Y. Niu, Z. Han, B. Ai, R. He, Y. Wang, N. Wang, and X. Su* 3201
User-Number Threshold-Based Base Station On/Off Control for Maximizing Coverage Probability ..... *J.-H. Noh, B. Lee, and S.-J. Oh* 3214
Learning Algorithms for Complete Targets Coverage in RF-Energy Harvesting Networks ..... *C. Li, K.-W. Chin, and C. Yang* 3229
The Role of Communication Time in the Convergence of Federated Edge Learning ..... *Y. Zhou, Y. Fu, Z. Luo, M. Hu, D. Wu, Q. Z. Sheng, and S. Yu* 3241
Quantum-Defended Blockchain-Assisted Data Authentication Protocol for Internet of Vehicles ..... *D. S. Gupta, A. Karati, W. Saad, and D. B. da Costa* 3255
UAV-Assisted Edge Computing and Streaming for Wireless Virtual Reality: Analysis, Algorithm Design, and Performance Guarantees ..... *L. Zhang and J. Chakareski* 3267

CORRESPONDENCE

*Channel Modeling*

Bivariate Complex $\alpha$-$\mu$ Statistics ..... *T. A. M. de Bairros, P. M. R. Pereira, R. A. A. de Souza, and M. D. Yacoub* 3276

*Wireless Communications*

RIS-Aided Hybrid Massive MIMO Systems Relying on Adaptive-Resolution ADCs: Robust Beamforming Design and Resource Allocation ..... *Y. Wang, X. Chen, Y. Cai, and L. Hanzo* 3281
Machine-Learning-Aided Link-Performance Prediction for Coded MIMO Systems ..... *T. Van Le and K. Lee* 3287
A Revisit to Chiani's Framework and Identity With Applications to Hoyt Faded MIMO and Beyond ..... *Y. Feng and H. Zhang* 3293
HARQ Under Outdated CSI, Finite-Blocklength Regimes and Generalised-Rician Fading ..... *K. N. Le* 3298
Energy Efficiency Optimization for Compact Massive MIMO Wireless Systems ..... *Y. Zhang, J. Tang, L. Pang, Y. Guo, Y. Chen, and J. Li* 3303
Generalized Approximate Message Passing Equalization for Multi-Carrier Faster-Than-Nyquist Signaling ..... *Y. Ma, N. Wu, J. A. Zhang, B. Li, and L. Hanzo* 3309
Fusion Test Statistics Based Mixture Detector for Spectrum Sensing ..... *X. Luo, W. Zhao, H. Li, M. Jin, and G. Cui* 3315
Sum-Rate Maximization for Intelligent Reflecting Surface Assisted Terahertz Communications ..... *Y. Pan, K. Wang, C. Pan, H. Zhu, and J. Wang* 3320
On the Performance of Distributed Antenna Array Systems With Quasi-Orthogonal Pilots ..... *A. Chowdhury, P. Sasmal, C. R. Murthy, and R. Chopra* 3326
On Some Capacity-Achieving Fractional Repetition Codes ..... *B. Zhu, W. Wang, and J. Wang* 3332
Link-Level Wideband Signal Shaping for Downlink Wireless Information and Energy Provision ..... *Z. Wang, J. Hu, K. Yang, and J. Shen* 3338
Resource Allocation for URLLC-Oriented Two-Way UAV Relaying ..... *Y. Cai, X. Jiang, M. Liu, N. Zhao, Y. Chen, and X. Wang* 3344
Noncoherent Two-Way Relaying With Decode and Forward: Two Versus Three Phases ..... *R.-Y. Wei, W.-Y. Chin, and T.-Y. Feng* 3350
Outage Probability for OTFS Based Downlink LEO Satellite Communication ..... *J. Shi, J. Hu, Y. Yue, X. Xue, W. Liang, and Z. Li* 3355
An ARMA-Filter Based SAGE Algorithm for Ranging in Diffuse Scattering Environment ..... *S. Jiang, W. Wang, T. Jost, P. Peng, and Y. Sun* 3361

*Wireless Networks*

Adaptive Deadline Determination for Mobile Device Selection in Federated Learning ..... *J. Lee, H. Ko, and S. Pack* 3367
Optimal False Data Injection Attacks on MTC ..... *Y. Du, J. Liu, N. Li, and Y. Zhang* 3372
Spectral-Energy Efficiency Trade-Off Based Design for Hybrid TDMA-NOMA System ..... *X. Wei, H. Al-Obiedollah, K. Cumanan, W. Wang, Z. Ding, and O. A. Dobre* 3377
Joint Offloading and Resource Allocation for Multi-User Multi-Edge Collaborative Computing System ..... *Z. Gao, W. Hao, and S. Yang* 3383
Deep Reinforcement Learning Approach for Joint Trajectory Design in Multi-UAV IoT Networks ..... *S. Xu, X. Zhang, C. Li, D. Wang, and L. Yang* 3389