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SPECIAL ISSUE

Internet of Vehicles

Point of View: A Grid of Microgrids: Is It the Right Answer?

Point of View: Sustainable and Resilient Distribution Systems With Networked Microgrids

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246 Mobile Edge Intelligence and Computing for the Internet of Vehicles
By J. Zhang and K. B. Letaief
|INVITED PAPER| This article overviews the edge information system (EIS), including edge caching, edge computing, and edge AI, which will enable a plethora of new exciting intelligent IoV applications.

262 Learning Driving Models From Parallel End-To-End Driving Data Set
By L. Chen, Q. Wang, X. Lu, D. Cao, and F.-Y. Wang
|INVITED PAPER| This article concerns how simulated-world data and real-world data can be efficiently used to improve the performance of parallel end-to-end autonomous driving. It introduces a parallel end-to-end driving data set (PED), containing real-world images, corresponding simulated-world images, and vehicle information.

274 SDN/NFV-Empowered Future IoV With Enhanced Communication, Computing, and Caching
By W. Zhuang, Q. Ye, F. Lyu, N. Cheng, and J. Ren
|INVITED PAPER| This article presents an overview of SDN/NFV-enabled IoV, a new network architecture for IoV. Here, SDN/NFV technologies are leveraged to enhance the performance of IoV and enable diverse IoV scenarios and applications.

292 Future Intelligent and Secure Vehicular Network Toward 6G: Machine-Learning Approaches
By F. Tang, Y. Kawamoto, N. Kato, and J. Liu
|INVITED PAPER| This article reveals the potential to apply advanced machine learning into vehicular communications and networking. It provides a survey on various machine learning techniques applied to communication, networking, and security parts in vehicular networks, and envisions the ways of enabling AI toward future 6G vehicular networks.

308 Evolutionary V2X Technologies Toward the Internet of Vehicles: Challenges and Opportunities
By H. Zhou, W. Xu, J. Chen, and W. Wang
|INVITED PAPER| This article surveys the historical process and status quo of V2X technologies, while listing the major V2X communication technology standards in North America, Europe, and Asia.

324 Toward Reliable and Scalable Internet of Vehicles: Performance Analysis and Resource Management
By Y. Ni, L. Cai, J. He, A. Vinel, Y. Li, H. Mosavat-Jahromi, and J. Pan
|INVITED PAPER| This article concerns how to ensure reliable and scalable wireless transmissions for IoV based on performance modeling and analysis.

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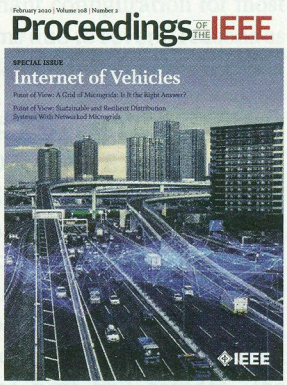

On the Cover:
Our cover image this month highlights the "Internet of Vehicles" where each vehicle is envisioned as an intelligent object and is connected to different entities (other vehicles, charging/gas stations, cloud, and more) via vehicle-to-everything (V2X) communications.

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341 Deep-Learning-Based Wireless Resource Allocation With Application to Vehicular Networks
By L. Liang, H. Ye, G. Yu, and G. Y. Li
|INVITED PAPER| This article discusses the key motivations and roadblocks of using deep learning for wireless resource allocation with applications to vehicular networks.

357 The Security of Autonomous Driving: Threats, Defenses, and Future Directions
By K. Ren, Q. Wang, C. Wang, Z. Qin, and X. Lin
|INVITED PAPER| This article gives a systematic study on the security threats surrounding autonomous driving, from the angles of perception, navigation, and control.

373 5G Vehicle-to-Everything Services: Gearing Up for Security and Privacy
By R. Lu, L. Zhang, J. Ni, and Y. Fang
|INVITED PAPER| This article reviews the architecture and the use cases of 5G V2X; studies a series of trust, security, and privacy issues in 5G V2X services; and discusses the potential attacks on trust, security, and privacy in 5G V2X.

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