

**SPECIAL ISSUE**

**INTERNET OF VEHICLES**

*Edited by X. (Sherman) Shen, R. Fantacci, and S. Chen*

**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.

**DEPARTMENTS**

**231 POINT OF VIEW**

A Grid of Microgrids: Is It the Right Answer?

*By N. Martins, A. L. Diniz, and J. G. C. Barros*

**238 POINT OF VIEW**

Sustainable and Resilient Distribution Systems

With Networked Microgrids

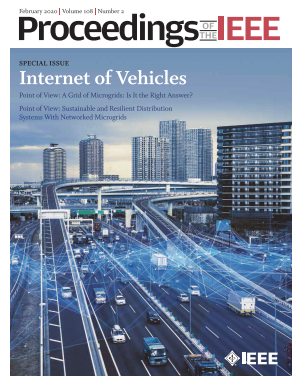
*By J. Wang and X. Lu*

**242 SCANNING THE ISSUE**

Internet of Vehicles

*By X. (Sherman) Shen, R. Fantacci, and S. Chen*

**390 FUTURE SPECIAL ISSUE/SPECIAL SECTIONS**



**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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