Guest Editorial Introduction to the Special Section on Blockchain for Vehicles and Intelligent Communications

The proliferation of vehicles and intelligent communications is generating enormous amount of data for enabling autonomous driving and innovative communications applications. The data may raise efficiency and security concerns to users, e.g., offering real-time services for smart phones/devices/vehicles and exposing sensitive driving information to the untrusted 3rd party.

Blockchain, which is featured with decentralization recording and tamper-proofing, has been emerged as a promising approach for mitigating data security risks of vehicles and intelligent communications. In addition, incorporating with smart contracts and other techniques, users connected through blockchain can share the data information in an efficient, private and secure manner, thereby reducing the management cost of service provision, improving the security of intelligent communications, and protecting the privacy of vehicles and mobile users. Further, highly dynamic communication topology caused by driving vehicles may undermine the establishment of consensus protocols. Thus, efficiency will become a critical challenge in leveraging blockchain for delay sensitive services in vehicular and intelligent communications.

This special section is aimed at seeking high-quality papers focusing on the use of blockchain for vehicles and intelligent communications, and bringing together researchers and experts from both academia and industry to provide their innovative insights into blockchain for vehicles and intelligent communications. In this special section, we received a total of 27 submissions, and each submission underwent at least 2 rounds of peer review by no less than 3 reviewers. In the end, we accepted 4 excellent submissions, with an acceptance rate of 14.8%. Each of the accepted papers will be introduced in detail below.

The first paper, entitled "A Blockchain Approach for Decentralized V2X (D-V2X)", by Isaac Agudo, Manuel Montenegro-Gomez, and Javier Lopez, proposes an approach for Decentralized V2X (D-V2X) that does not require any trusted authority and can be implemented on top of any communication protocol. Moreover, the authors define a proof-of-concept technical architecture to materialize all D-V2X concepts and evaluate some hardware components that could be used to implement it.

The second paper "ATM: An Active-Detection Trust Mechanism for VANETs Based on Blockchain", written by Fuliang Li, Zhenbei Guo, Changsheng Zhang, Weichao Li, and Yi Wang, proposes a novel local trust management mechanism by employing active detection and blockchain techniques, to solve the problems of trust inconsistency in different regions and fake trust values generated by a set of cooperating malicious nodes. The authors conduct extensive experiments and numerical analysis to assess the performance of ATM by comparing it with three trust mechanisms. The experimental results show that ATM can effectively identify malicious behaviors in terms of 95% detection accuracy and 90% deliver ratio.

The third paper "A Secure and Scalable Framework for Blockchain based Edge Computation Offloading in Social Internet of Vehicles", by Uzair Javaid and Biplab Sikdar, proposes a two dimensional framework which employs a dynamic proof-of-work consensus coupled with a block checkpoint mechanism and a resource assignment policy with edge modules. The authors present security and performance analyses to study the feasibility and scalability of the framework. The analyses indicate that the framework can scale and offer enhanced security fidelity with a minimal increase in computation overhead. Further, the authors present a case study to evaluate the network dynamics of the framework under a real-life vehicular network simulation.

The fourth paper named "PriParkRec: Privacy-Preserving Decentralized Parking Recommendation Service", written by Zengpeng Li, Mamoun Alazab, Sahil Garg, and M. Shamim Hossain, presents an efficient and privacy-preserving carparking recommendation service platform, called PriParkRec, along with the proof-of-concept solution to protect the requester's privacy in PriParkRec while maintaining most of the benefits of current parking-slot-sharing service. PriParkRec addresses the challenges in most of existing car-parking platforms and increases the efficiency of the distributed and decentralized blockchain-enabled car-parking system by integration of Internet-of-Things (IoTs), private blockchain and cryptographic technology.

In a nutshell, we hope that the above accepted high-quality papers will promote the application of blockchain technologies in the field of vehicles and intelligent communication in academia and industry.

ACKNOWLEDGMENT

The guest editors would like to thank all authors who submitted manuscripts to this special section for their supports. Then, they appreciate all reviewers for providing high-quality and insightful review comments, which are very useful to help authors improve the quality of their manuscripts. Finally, they are grateful to the Editor-in-Chief of IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY, Prof. Nei Kato, and his team for their supports in the processing and publication of the papers.

Digital Object Identifier 10.1109/TVT.2021.3075042

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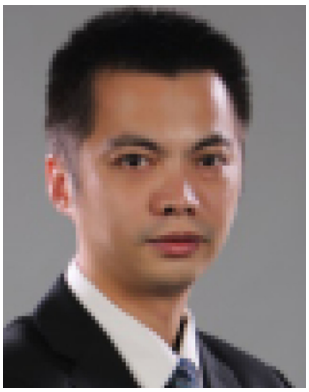

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