Editorial

Special Issue of Ad Hoc Networks on Recent Advances in Vehicular Communications and Networking

Vehicular communication and networking for Intelligent Transportation Systems (ITS) is an emerging concept that allows the forwarding of upcoming traffic information and entertainment messages to traveling vehicles. Road traffic crashes are one of the largest problems being faced not only in the United States but also all over the world. A report published by National Highway Traffic Safety Administration (NHTSA) in 2012 estimates that one person dies in motor vehicle crashes every 15 minutes in the United States (US). Furthermore, the US Department of Transportation (US-DOT) notes that traffic congestion and crashes cause a waste of $75 billion equivalent work hours and $8.4 billion gallons of fuel every year. Vehicular communications can play an increasingly important role in people's lives since it provides safety as well as comfort for passengers. It also enables efficient travel by providing timely information to drivers and concerned authorities using vehicle-to-vehicle (V2V), through Vehicular Ad hoc Networks (VANETs), and vehicle-to-roadside (V2R) communications.

This Special Issue of *Ad hoc Networks* on "Recent Advances in Vehicular Communications and Networking" focuses on the latest achievements that present current groundbreaking research, projects, and standardization efforts performed in the area of vehicular communications and networking. The Call for Papers attracted 32 submissions worldwide. After a rigorous review process, 11 manuscripts have been selected for publication. The selection provides a glimpse of the state-of-the-art research in the field. An outline of the selected papers is presented as follows.

In the paper "On-road Video Delivery with Integrated Heterogeneous Wireless Networks", Ke He et al. consider On-road Video Delivery (OVD) in heterogeneous wireless networks to improve the experience of mobile users (passengers). The optimization for the OVD problem maximizes the system-wide User Experience Index (UEI) for on-road video services.

The paper "Fast Randomized Algorithm for 2-Hops Clustering in Vehicular Ad-Hoc Networks" presents a Hierarchical Clustering Algorithm (HCA) to forward time critical messages with minimum delay in VANETs. The

proposed channel access scheme enables delay bounded reliable communication and does not require the knowledge of the vehicles' locations.

In the paper "Cognitive Multicast with Partially Overlapped Channels in Vehicular Ad hoc Networks", Wooseong Kim and Mario Gerla present a multicast method in VANETs using a cognitive multi-channel, multi-radio protocol, borrowing a concept of recently developed cognitive radio techniques which help overcome interference and channel assignment issues. As the number of orthogonal channels are limited in the ISM band to avoid interference in the urban Wi-Fi cloud, parallel frame transmission over OFDM sub-channels and network coding for the sub-channel frames are used.

The paper "Complete Architecture and Demonstration Design for a New Combined WiMAX/DSRC System with Improved Vehicular Networking Efficiency" provides an architecture for a new joint Worldwide Interoperability for Microwave Access (WiMAX) and Dedicated Short Range Communications (DSRC) network layer for providing Internet access to vehicles. The integrated WiMAX-DSRC Internet access architecture delivers improvement in overall system efficiency.

In the paper "Context Awareness Beacon Scheduling Scheme for Congestion Control in Vehicle to Vehicle Safety Communication", Songnan Bai et al. present a context awareness beacon scheduling (CABS) algorithm that improves VANET performance in terms of packet delivery ratio and channel access time.

The paper "A low latency path diversity mechanism for sender-oriented broadcast protocols in VANETs" presents a scheme that uses the path diversity for low latency and high reliability. Analytical and numerical results show the effectiveness of the proposed schemes in VANETs.

In the paper "Design and Performance evaluation of a PMIPv6 solution for geo-networking-based VANETs", Victor Sandonisa et al. deal with the problem of providing Internet access from VANETs combining the Proxy Mobile IPv6 (PMIPv6) with the ETSI TC ITS Geo Networking (GN) protocols. They have adapted PMIPv6 to the multi-hop ETSI TC ITS architecture that improves the overall performance of VANETs.

The paper "Data Fusion with Flexible Message Composition In Driver-in-the-Loop Vehicular CPS" deals with a Driver-in-the-Loop Data Fusion Problem (DDFP) in Vehicular Cyber-Physical Systems (VCPS) in which authors have considered human factors for message fusion. The proposed scheme helps save limited transmission resources in VANETs.

In the paper "Trust Prediction and Trust-based Source Routing in Mobile Ad Hoc Networks", Hui Xia et al. present a dynamic trust prediction model to evaluate the trustworthiness of nodes, which is based on the nodes' historical behaviors, as well as the future behaviors via extended fuzzy logic rule prediction.

Hyeong-Jun Chang et al. in "A study on traffic signal control at signalized intersections in Vehicular Ad Hoc Networks" present a new traffic signal control algorithm that enables smooth traffic flow at intersections using VANETs for ITS. The proposed algorithm does not require the installation of additional devices such as cameras, sensors or image processing units.

The paper "GeoSVR: A Map-based Stateless VANET Routing" proposes the geographic stateless routing (GeoSVR) algorithm that uses node location and digital map. The proposed GeoSVR scheme is also suitable for mitigating the sparse connectivity problem and unreliable wireless channels.

It has been a great pleasure to run this special issue, which reveals important and state of the art research results in the field of vehicular communications and networking from many distinguished authors and organizations all over the world. We thank the authors who have submitted their papers for consideration for this issue. We also thank the reviewers for their time and diligent work in evaluating these manuscripts. Their comments greatly helped us select the best papers for this special issue. Special thanks go to the Editor-in-Chief of *Ad hoc Networks*, Professor Ian Akyildiz, and staff in the Editorial Office for offering us the opportunity to edit this special issue.

Editors

Danda B. Rawat
Georgia Southern University, USA
E-mail address: db.rawat@ieee.org

Geert Heijenk
University of Twente, The Netherland
E-mail address: geert.heijenk@utwente.nl

Michele C. Weigle
Old Dominion University, USA
E-mail address: mweigle@cs.odu.edu

Bhed Bahadur Bista
Iwate Prefectural University, Japan
E-mail address: bbb@iwate-pu.ac.jp

Yuh-Shyan Chen
National Taipei University, Taiwan
E-mail address: yschen@mail.ntpu.edu.tw

Danda B. Rawat is currently an Assistant Professor in the Department of Electrical Engineering at Georgia Southern University, USA. He received his Ph.D. in Electrical and Computer Engineering from Old Dominion University, USA in 2010. His research focuses on wireless communication systems and networks. His current research interests include design, analysis, and evaluation of cognitive radio networks, vehicular ad hoc networks, wireless sensor networks, network security, and cyber physical systems. He has served as a Guest Editor, Editor and Editorial Board Member for numerous international journals and books, served as a workshop chair and session chair for numerous international workshops and conferences, and served as a technical program committee member for several international conferences including IEEE GLOBECOM, CCNC, GreenCom, WCNC and VTC conferences. He has previously held an academic position at Eastern Kentucky University, Old Dominion University and Tribhuvan University. He is a senior member of IEEE and a member of ACM.

Geert Heijenk is an associate professor at the University of Twente, the Netherlands. Between 1995, when he obtained his Ph.D., and 2003, he was working for Ericsson EuroLab, Netherlands, leading a networking research group. He is steering committee member of WWIC and IEEE VNC, and vice-chair of the European COST action "Wireless Networking for Moving Objects". He has been a visiting researcher at the University of Pennsylvania, Philadelphia, and a visiting professor at the University of California, Irvine, and INRIA, Rocquencourt. His area of research is wireless networking. He is particularly interested in architectures, algorithms, and protocols for cellular, ad hoc, sensor, and vehicular networks.

Michele C. Weigle is an Associate Professor of Computer Science at Old Dominion University. She received her Ph.D. from the University of North Carolina at Chapel Hill in 2003. Her research interests include vehicular networks, wireless and mobile networks, network protocol evaluation, network simulation and modeling, and web science. She and her collaborators have received over $2 million in funding from the National Science Foundation for research in wireless networks, sensor networks, and Internet traffic modeling and simulation. She leads the Intelligent Networking and Systems (iNetS) research group

in the Department of Computer Science and has produced over 30 publications in respected journals and conferences related to wireless and vehicular networking. She is also the author of 2 book chapters and the co-editor of one of the first books on vehicular networks, Vehicular Networks: From Theory to Practice, published by CRC Press in 2009. She is a co-chair of the IEEE ITS Society Technical Committee on Mobile Communication Networks. She also has participated on the technical program committees (TPC) for several international conferences and serves on the steering committee for the International Workshop on Intelligent Vehicular Networks and as TPC Vice-Chair for the IEEE Workshop on Networking for Intelligent Vehicles and Infrastructures (NiVi) and the IEEE Vehicular Networks and Applications Workshop (Vehi-Mobi). She is a member of ACM, ACM SIGCOMM, ACM SIGMOBILE, IEEE, and IEEE ComSoc.

Bhed Bahadur Bista received the B.Eng. degree in Electronics from the University of York, England and the M.S. and Ph.D. degrees in Information Science from Tohoku University, Japan. After his Ph.D., he worked at the Miyagi University, Japan, for one year as a Research Associate and moved to the Iwate Prefectural University, also in Japan in 1998 as an Assistant Professor. Currently, he is an Associate Professor with the Department of Software and Information Science at the same university. His research interests include computer networks, vehicular networks, sensor networks, ad hoc and cognitive radio networks. He has organized International Workshops and has actively taken part as an area chair and a program committee member in international conferences.

Yuh-Shyan Chen received the B.S. degree in Computer Science from Tamkang University, Taiwan, ROC, in June 1988 and the M.S. and Ph.D. degrees in Computer Science and Information Engineering from the National Central University, Taiwan, ROC, in June 1991 and January 1996, respectively. Since 2006, he has been a Professor at the Department of Computer Science and Information Engineering, National Taipei University, Taiwan, ROC. He is now serving as chair of Institute of Communication Engineering, National Taipei University, Taiwan, ROC. He served as Editor-in-Chief of International Journal of Ad Hoc and Ubiquitous Computing (indexed by SCIE and EI), Regional Editor (Asia and Pacific) of IET Communications, Editorial Board of Telecommunication System Journal, EURASIP Journal on Wireless Communications and Networking, International Journal of Communication Systems, Mobile Information Systems, Journal of Internet Technology, and IET Networks. His paper wins the 2001 IEEE 15th ICOIN-15 Best Paper Award. He was a recipient of the 2005 Young Scholar Research Award, National Chung Cheng University, ROC. His recent research topics include wireless communications, mobile computing, and next-generation personal communication system. He is a senior member of the IEEE Communication Society.