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Editorial

Data Disseminations in Vehicular Environments 2014

Dongkyun Kim,[1] Juan-Carlos Cano,[2] Wei Wang,[3] Floriano De Rango,[4] and Kun Hua[5]

[1]*School of Computer Science & Engineering, Kyungpook National University, Daegu 702-701, Republic of Korea*
[2]*Universidad Politécnica de Valencia, Camino de Vera, S/N, 46022 Valencia, Spain*
[3]*Department of Computer Science, San Diego State University, Campanile Drive, San Diego, CA 92115, USA*
[4]*Department of Informatics, Electronic and Sistemistic, University of Calabria, Italy*
[5]*Department of Electrical and Computer Engineering, Lawrence Technological University, Southfield, MI 48075, USA*

Correspondence should be addressed to Dongkyun Kim; dongkyun@knu.ac.kr

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Vehicular ad hoc networks (VANETs) have been attracting a significant number of researchers worldwide. Until now, VANETs have been considered novel wireless networks for the Internet access and data transfer during users' driving along with a wide range of safety and nonsafety applications. Currently, the researchers focus on vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications while providing different applications including safety and environmental awareness. The main contributions have focused on different communication protocols from physical to application layers. This new paradigm can be used to face complex problems with high requirements such as end-to-end connection, self-configuration, and self-repairing through network while providing services.

This special issue provides recent routing and data dissemination schemes in vehicular environments, thus featuring current and future research waypoints in the field of VANETs.

T. Nguyen et al. in the paper entitled "Asynchronous Scheme for Optical Camera Communication Based Infrastructure-to-Vehicle Communication" introduced a few scenarios and services to cancel the effect of the exposure time and mitigate the variation in the frame rate of a camera during a sampling operation. The simulations were carried out to check the feasibility of asynchronous OCC-based I2V communication in a vehicular environment. After simulations, the authors found that their first scheme removed the exposure effect but still generated errors when the frame rate of the camera continuously changed during a data transmission. On the other hand, the second scheme mitigated the effect of this variation but was more complex in terms of its implementation. The authors concluded that the less complex scheme with FEC will be better choice.

In the paper entitled "Reliable and Swift Message Broadcast Method in Vehicular Ad Hoc Networks" by J. Park and Y. lim, a reliable and swift message broadcasting (RSMB) method was proposed for safety applications in VANETs. RSMB is designed based on the successful message reception probability. To expedite a message delivery, the next relay of a message is selected in a way that could make the farthest progress to the message. The received message is broadcasted by the selected relay multiple times to increase the probability that the vehicles located between the previous relay and itself successfully receive the message at least once. Through performance analysis, it is observed that the message delivery ratio of RSMB outperforms the existing solutions by almost 93% rate.

In "PAMTree: Partitioned Multicast Tree Protocol for Efficient Data Dissemination in a VANET Environment" proposed by A. F. Santamaria et al., a novel multicast protocol for VANET network was proposed, named as PAMTree, and it takes the advantages from distributed management of the multicast trees. The simulation results show that the PAMTree protocol reduces the waiting time for joining the multicast tree as well as increasing the average number of users that belong to specific sessions.

S. H. Bouk et al., in the paper entitled "Hybrid Adaptive Beaconing in Vehicular Ad Hoc Networks: A Survey,"

performed a comprehensive study of state of the art of hybrid adaptive beaconing schemes proposed for VANETs. The parameters, on which these schemes optimize the combination of beacon power, rate, and/or CW, along with their working principles, were provided in detail. In the end of this tutorial paper, the evaluation and simulation parameters were summarized in detail to easily insight the contrast between all schemes in the literature. In addition, a list of open challenges and future directions were provided, where the authors aimed to motivate further research interest for existing beaconing constraints in VANETs.

H. Oh and S. Ahn proposed a full-duplex relay based hybrid transmission mechanism in MIMO-capable C-ITS in the paper entitled "A Full-Duplex Relay Based Hybrid Transmission Mechanism for the MIMO-Capable Cooperative Intelligent Transport System." It was found that, due to the low overhead of using a single detour path and the opportunistic MIMO mode change, the proposed mechanism offered the proper solution for seamless video streaming. After simulations, the authors showed that the proposed mechanism improved a network performance when compared to mDSR and the MIMO policy-only scheme. For the future work, the authors intended to figure out the optimal vehicle queue thresholds for opportunistic MIMO mode changes.

Recently, many researchers found that IPv6 could be considered as a main communication protocol for accessing the Internet during driving, location privacy. Therefore, the IPv6 layer is becoming an important issue in cooperative ITS. Similarly, J.-H. Lee et al., in their work entitled "Pseudonyms in IPv6 ITS Communications: Use of Pseudonyms, Performance Degradation, and Optimal Pseudonym Change," presented an IPv6 address configuration with pseudonyms and then studied a performance degradation issue due to the pseudonym change at the IPv6 layer. In addition, the authors also proposed the optimal pseudonym change algorithm that adaptively finds an optimal pseudonym change interval with given parameters.

In "Selective Random CDD Enhanced Joint Cooperative Relay and HARQ for Delay-Tolerant Vehicular Communications," G. Wu et al. introduced a selective random CDD based joint cooperative relay and HARQ scheme for delay-tolerant services in vehicular communications. Their design took the advantage of frequency selectivity created by applying CDD techniques. In the meantime, the selective random CDD also reduced the overhead as well as the dependency on different network parameters as compared to the conventional cooperative beam forming scheme. Through simulations, the proposed scheme exhibited performance superiority over the conventional cooperative beam forming scheme in terms of throughput and transmission failure probability.

In the paper entitled "QoS Aware Service Scheduling Scheme for VANETs" by A. Guleria et al., a new data scheduling scheme was proposed for vehicular ad hoc networks. The authors in their scheme first categorized data items into two classes, that is, high update priority data and low update priority data. Different weights were assigned to these two classes such that more weightage was given to data items of class high update priority data. Priority assigning algorithm assigned priorities to the upload requests by depending upon whether download requests exist for same data item or not. In the proposed scheme, an RSU also scheduled these requests according to their priorities. Simulation result showed that the proposed algorithm provides better service ratio and data quality than earlier algorithms.

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Dongkyun Kim
Juan-Carlos Cano
Wei Wang
Floriano De Rango
Kun Hua