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Editorial for Special Issue on "Advances on Vehicular Communication Systems"

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Editorial:

The joint efforts of academia and industry in the past years have led to the introduction of new on board applications and services. In addition, governments and standardization organizations have agreed upon a common set of standards (DSRC) specific to vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications. Combined with the cellular network infrastructure, they pave the way for a plethora of solutions empowered by vehicular communications. Among these solutions, we have emergency alerts, autonomous vehicles, infotainment, comfort services, cooperative road sensing and collaborative applications. Also, the integration between smartphones and vehicles has been addressed by many researchers, and a wide range of applications are already available, many more being expected.

In terms of communication systems, mobility effects and channel conditions heavily affect the signal quality, introducing path-loss, fading, and received power fluctuations. Under such conditions, several issues remain open including message dissemination in congested environments, Quality of Service (QoS), efficient and adaptive routing, MAC layer enhancements, mobility prediction, efficient handovers, etc.

For this special issue we have selected 6 high-quality papers among a total of 26 submissions.

The first article, entitled "Implementation and Performance Evaluation of Distributed Autonomous Multi-Hop Vehicle-to-Vehicle Communications over TV White Space" by K. Tsukamoto et al., presents a two-layer control channel model able to establish the multi-hop network. In their proposal, the vehicles construct a swarm using location and direction information, while sharing route and channel information. The vehicles use GPS-driven oscillators for coarse synchronization, introducing a time margin to accommodate for the remaining drift. Simulation results show that the proposed idea is suitable for vehicular environments, providing efficient and stable V2V communication.

The second article, entitled "Safety enhancement and Carbon Dioxide (CO2) reduction in VANETs" by A.F. Santamaria et al., discusses new approaches for road safety. In particular, the authors illustrate a novel cooperative architecture supporting both V2V and V2I connectivity. The idea, called SeAWave, takes advantage of the IEEE802.11p standard, enhancing it by adding useful messages to improve the vehicles' active and passive safety systems based on information about the environment and road conditions. Simulations show good results for the proposed smart traffic management system.

The third article, entitled "Target RSU Selection with Low Scanning Latency in WiMAX-enabled VANETs" by S.H. Ahmed et al., addresses the problem of handover management in VANETs, exploiting the potentialities of WiMAX services when users switch between

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RSUs. In the proposed scheme a serving RSU is able to calculate the amount of time during which a mobile host can receive services from a forthcoming Target RSU based on its velocity and coverage area of the target RSU. The proposed scheme was evaluated using the NS-2 simulator, comparing it against some existing solutions. It has been shown that the new idea is able to increase the throughput, as well as to reduce the network overhead.

The fourth article, entitled "Replication-Aware Data Dissemination for Vehicular Ad Hoc Networks using Location Determination" by N. Kumar et al., presents a novel Data Dissemination scheme for VANETs based on the estimation of the location of mobile nodes. The authors propose algorithms for position estimation, accessing the message from the remote vehicles and routing the packets to the destination in an integrated manner, avoiding the need for RSU deployment while also reducing message dissemination complexity. The scheme is compared against existing state-of-the-art solutions, and simulation results show that it outperforms the existing schemes in terms of reliability, replication cost and packet delivery ratio.

The fifth article, entitled "An Intersection-based Routing with QoS Support in Vehicular Ad Hoc Networks" by G. Li et al., discusses several problems related to routing in vehicular environments. In particular, authors propose a new protocol, IRQV, that follows an Ant Colony Optimization approach. IRQV is based on three main processes: terminal intersection selection process, network exploration and optimal routing path selection. The new protocol is based on a greedy carry-and-forward mechanism to forward data between two adjacent intersections. In addition, the authors propose some mathematical models for a 2-lane road segment scenario to estimate local QoS. The performance of IRQV was evaluated through simulation analysis, showing its effectiveness in terms of overhead, delay and packet delivery ratio.

Finally, the last article in this special issue is "Smart Traffic Light for Low Traffic Conditions: A Solution for Improving Safety of Drivers" by C.M. Silva et al. The paper presents a novel smart traffic light designed specifically to manage low-traffic intersections. The new module, called LaNPro, is triggered by the traffic light infrastructure when detecting low traffic levels. When LaNPro detects a traffic level increase, it resumes standard traffic light operation. The module is able to manage vehicles to safely cross the intersection without stopping. This way the vehicles' flow is maintained under very low traffic conditions, typical of small cities and also of early morning hours in urban metropolis. The obtained results show that LaNPro can ensure the non-stop crossing of intersections, generating a very low network traffic volume.

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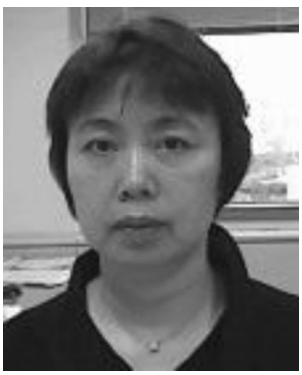

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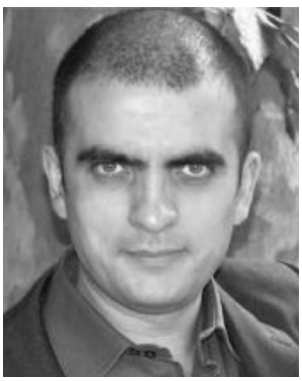

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