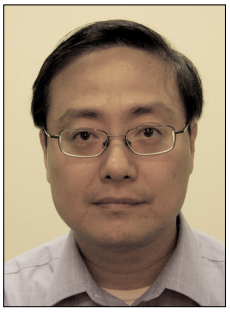
AUTOMOTIVE NETWORKING AND APPLICATIONS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In this 16th issue of the Automotive Networking and Applications Series, we are pleased to present two articles that address information-centric networking for connected vehicles and network engineering for real-time automotive networks.

In the connected vehicle ecosystem, a large amount of information and safety-critical data will be exchanged among vehicles, roadway infrastructures, and pedestrians in a highly dynamic environment characterized by fluctuating wireless links and vehicle mobility. The host-centric IP-address-based model of networking, designed with the end-to-end connectivity principle in mind, is challenged to work in this dynamic roadway environment and is not well suited for the localized nature of many cases of vehicular communications, where the focus is on specific road segments (e.g., the vicinity of a hazard, a point of interest) regardless of the identity or the IP address of any specific vehicle passing by. The first article, "Information-Centric Networking for Connected Vehicles: A Survey and Future Perspectives" by M. Amadeo *et al.*, discusses the applicability of the information-centric networking (ICN) paradigm as a networking solution for connected vehicles. The authors first review core functionalities of ICN and survey related research results on the adaptations and customizations of the baseline ICN architecture to better match dynamic vehicular environments. Through their analysis, the authors show that the native design principles of ICN are well suited for the main features of vehicular ad hoc networks and their applications. The authors conclude with a discussion of the open challenges related to large-scale deployment of ICN and coexistence with other vehicular networking technologies, among others.

With the advances in x-by-wire applications that have strict latency and reliability requirements, formal verification of end-to-end timing constraints on networks has become an important part in the design process of vehicles. The second article, "Network Engineering for Real-Time Networks: Comparison of Automotive and Aeronautic Industrial Approaches" by F. Geyer and G. Carle, first reviews the prevailing network architectures and technologies used by the automotive and aeronautic industries for x-by-wire applications. The authors then present and compare two representative mathematical frameworks, schedulability analysis and network calculus, that are used by each industry to formally verify the end-to-end latency behavior of a network. Based on empirical evaluation results of two use cases, the authors highlight the trade-offs between the two frameworks and provide guidelines on a suitable framework to use depending on the types of network deployed.

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BIOGRAPHIES

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LUCA DELGROSSI is manager of the Vehicle-Centric Communications Group at Mercedes-Benz Research & Development North America Inc., Palo Alto, California. He started as a researcher at the International Computer Science Institute of the University of California at Berkeley and received his Ph.D. in computer science from the Technical University of Berlin, Germany. He served for many years as a professor and associate director of the Centre for Research on the Applications of Telematics to Organizations and Society of the Catholic University at Milan, Italy, where he helped create and manage the Master's in Network Economy (MiNE) program. In the area of vehicle safety communications, he coordinated the Dedicated Short Range Communications (DSRC) Radio and On-Board Equipment work orders to produce the DSRC specifications and build the first prototype DSRC equipment as part of the Vehicle Infrastructure Integration (VII) initiative of the U.S. Department of Transportation.

TIMO KOSCH works as a team manager for BMW Group Research and Technology where he is responsible for projects on distributed information systems, including such topics as cooperative systems for active safety and automotive IT security. He has been active in a number of national and international research programs, and serves as coordinator for the European project COMeSafety, co-financed by the European Commission. He is also currently heading the system development for a large German Car2X field test. For more than three years, he chaired the Architecture working group and was a member of the Technical Committee of the Car-to-Car Communication Consortium. He studied computer science and economics at Darmstadt University of Technology and the University of British Columbia in Vancouver with scholarships from the German National Merit Foundation and the German Academic Exchange Service. He received his Ph.D. from the Computer Science Faculty of the Munich University of Technology.

TADAO SAITO [LF] received a Ph. D degree in electronics from the University of Tokyo in 1968. Since then he has been a lecturer, an associate professor, and a professor at the University of Tokyo, where he is now a professor emeritus. Since April 2001 he has been chief scientist and CTO of Toyota InfoTechnology Center, where he studies future ubiquitous information services around automobiles. He has worked in a variety of subjects related to digital communication and computer networks. His research includes a variety of communication networks and their social applications such as ITS. Included in his past study, in the 1970s he was a member of the design group of the Tokyo Metropolitan Area Traffic Signal Control System designed to control 7000 intersections under the Tokyo Police Authority. Now he is Chairman of the Ubiquitous Networking Forum of Japan working on a future vision of the information society. He is also Chairman of the Next Generation IP Network Promotion Forum of Japan. From 1998 to 2002 he was Chairman of the Telecommunication Business Committee of the Telecommunication Council of the Japanese government and contributed to regulatory policy of telecommunication business for broadband network deployment in Japan. He is also the Japanese representative to the International Federation of Information Processing General Assembly and Technical Committee 6 (Communication System). He is an honorary member and fellow of IEICE of Japan.