Dept. of Electrical and Computer Engineering

Colloquium

Sponsored by the IEEE Columbus Chapter of the Signal Processing Society

Adaptive Inter-Vehicular Communication Protocols and Realistic Simulations Models

Falko Dressler

University of Erlangen

Friday October 2, at 1:30pm, 260 Dreese Laboratory

We discuss the need for more sophisticated simulation techniques for evaluating Vehicular Ad Hoc Networks (VANETs) in a simulation framework. In the last decade, much progress can be observed in the domain of protocol engineering for Inter-Vehicle Communication (IVC). Usually, simulation models are used to evaluate the developed protocols. This approach has two major prerequisites: First, detailed network simulation of all layers of communication protocols is necessary as provided by a wide variety of tools by the networking community. Secondly, realistic simulation of vehicles' mobility, i.e. an exact modeling of road traffic, is needed to estimate positions and movements of involved components. In this talk, we briefly discuss the evolution of mobility modeling in VANET simulations. Furthermore, based on a case study using the simulation framework Veins, we investigate how recent advances in bidirectional coupling of road traffic microsimulation and network simulation lead to more realistic results at comparably low computational cost. In the second part of the talk, a new IVC protocol is presented, Adaptive Traffic Beacon (ATB), which supports the exchange of delay-sensitive traffic information in a wide range of scenarios by flexibly adapting to the availability of infrastructure elements as well as to the network load. From previous work, we see that centralized solutions and flooding based approaches each show benefits and drawbacks depending on traffic density, penetration, network utilization, and other parameters. This observation is in line with findings about intelligent transportation systems that have been developed for specific settings. In order to overcome this limitation, we designed ATB to be adaptive in two dimensions: First, the beacon interval is adapted dynamically and, secondly, the protocol can dynamically make use of available infrastructure elements.

Falko Dressler is an assistant professor leading the Autonomic Networking Group at the Department of Computer Sciences, University of Erlangen. He teaches on self-organizing sensor and actor networks, network security, and communication systems. Dr. Dressler received his M.Sc. and Ph.D. degree from the Dept. of Computer Sciences, University of Erlangen in 1998 and 2003, respectively. Dr. Dressler is an Editor for the Elsevier Ad Hoc Networks journal, the ACM/Springer Wireless Networks (WINET) journal, and the Journal of Autonomic and Trusted Computing (JoATC). He was guest editor of special issues on self-organization, autonomic networking, and bio-inspired computing and communication for IEEE Journal on Selected Areas in Communications (JSAC), Elsevier Ad Hoc Networks, and Springer Transactions on Computational Systems Biology (TCSB). His research activities are focused on (but not limited to) Autonomic Networking addressing issues in Wireless Ad Hoc and Sensor Networks, Vehicular Communication, Self-Organization, Bio-inspired Mechanisms, and Adaptive Network Monitoring and Security Techniques.

Host: Eylem Ekici