Success Story
COMET

FFG

ftw Creating Communication Technologies

FTW
Forschungszentrum Telekommunkation Wien
Programme: COMET – Competence Centers for Excellent Technologies
Programme line: K1-Centres

Creating connectivity in Intelligent Transportation Systems

The “connected vehicle” is one of the major trends in Intelligent Transportation Systems that has become reality: vehicles are able to exchange information with their environment in order to provide drivers, passengers and traffic operators with real-time information about road conditions, traffic jams, train delays, etc. This information helps to increase road safety and traffic efficiency. FTW conducted several research projects and contributed to the vision of the connected vehicle with new algorithms, protocols and interfaces for efficient and robust communication from the transceiver chip to the user interface.

The Connected Vehicle

The “connected vehicle” is not only a vision anymore, which is a result of research and development efforts on a global scale in the recent years. One of the key technologies is Car-to-X communication, which began as an extension of the Wireless LAN (Wi-Fi) standard. FTW started research on Car-to-X communication with the aim to characterize the basic properties of vehicular communication, which takes place under completely different conditions than indoor Wireless LANs. Having this knowledge, new transceiver algorithms and protocols were designed to make communication more robust, more efficient and scalable, or simply to make it work among hundreds of dynamically moving cars. The results were validated in several studies, simulations and field trials.

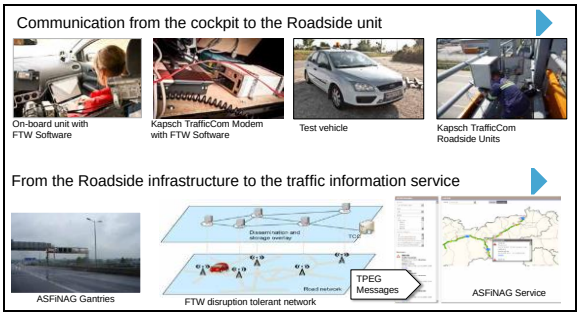

Fig. 1: Prototyping and testing of Car-to-X communication systems and services.

User-centred design

FTW’s research spans not only technical aspects, but also involves the users of systems and services. In intelligent transportation systems, user aspects were considered from a driver’s and a traffic operator’s perspective. Innovative services and new human interaction techniques for mobile in-vehicle apps (e.g. gestures, speech commands and speech synthesis) were prototypically designed and test-

bmwfw Federal Ministry of Science, Research and Economy

bmvit Austrian Ministry for Transport, Innovation and Technology

ed. The user studies showed that the aspect of driver distraction is often overlooked and needs to be considered in the beginning of the design process.

Fig. 2: Design and test of automotive user-interfaces.

Mobility analysis

Connected vehicles and connected devices, such as mobile phones, provide information to their users, but they also help to collect information which is relevant. Cellular networks and Wi-Fi access networks are able to record handover events between the coverage areas of wireless access networks. FTW analysed such data and provided methods for traffic congestion detection and travel time estimation. Last but not least, also the aspect of privacy was considered, which is important when location data is collected: FTW could demonstrate that mobility analyses are also possible if identifiers are made ambiguous so that users gain anonymity.

Impact and effects

The work of FTW had the following impact on its scientific and industrial environment:

- FTW released basic and applied research results in over 150 publications in the field of Intelligent Transportation Systems
- FTW provided Austrian partners with knowhow in order to take a leading role in standardization and specification for the deployment of cooperative systems.
- FTW created the first software-radio implementation of the Car-to-X communication standard IEEE 802.11p.
- FTW helped Austrian partners to create innovative demonstrations in major international events such as the ITS World Congress.

FTW and its partners could demonstrate scientific excellence and further strengthen Austria's position as a leading country for innovations in the field of intelligent transportation systems.

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Selected related FTW Projects:
Future ITS, CAMINO, CarLo, ITS Evolution, Roadsafe, Realsafe, Vermobil, NFN SISE