

BOOK *of* ABSTRACTS

***Driver-Car Interaction
and Safety Conference
2021***



FACULTY OF
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Psychosocial Aspects of the Use and Provision of Carsharing Services in the Czech Republic

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The concept of shared mobility involves a type of transportation based on advanced digital technologies which make it possible to approach mobility as a service. This concept seeks to reduce the need for individual ownership of means of transport and enhance the effectiveness of their use. Our paper focuses on carsharing as a specific service. In the Czech Republic we do not have enough empirical data about attitudes towards this emerging type of transportation. The objectives of the paper are (1) to analyse the current situation in terms of the offer of carsharing services in the Czech Republic, (2) to identify psychosocial factors associated with the use of the carsharing service among Czech users, and (3) to assess the barriers to, and benefits of, carsharing services from their providers' perspective. A qualitative research design was selected in view of the objectives of the paper. Semi-structured interviews with both users and providers of carsharing services were the main data collection method. The collection and analysis of the data took place from March to August 2021. Participants were recruited using non-probabilistic sampling methods: simple purposive sampling, self-selection, and snowball sampling. Interpretative phenomenological analysis was chosen to process the data. The study is expected to provide an overview of the offer of carsharing services, describe the psychosocial aspects of the use of carsharing, and report experience with the provision of such services in the Czech Republic. The benefits of this paper are that it considers the experience of both parties – the providers and users of carsharing – and that it is the first study of its kind to be carried out in the Czech Republic. This deliverable was co-financed by the grant projects IGA_FF_2021_001 and IGA_FF_2021_018 (UPOL).

Usage of Multi-Image Photogrammetry in Interactive Simulations

Hinková Natálie

This paper is focused on the possible usage of multi-image photogrammetry in interactive simulators. Virtual scene in simulators often does not correspond with the real urbanistic rules and everything is often very clean and regular. Usage of photogrammetry can help to get more realistic look of the virtual scene in simulators which will help participants of experiments in simulators to achieve realistic impression of driving a real car. This will help with better results of experiments. Problem of usage of multi-image photogrammetry is the output model. This model is very complex and it consists of vertices which can be in order of millions. Model like that cannot be used in interactive simulators. The model has to be simplified so it corresponds with the rules of usage in interactive simulations. Also it has to keep its details so it will help with more realistic look of the virtual scene. This paper introduces method of simplification of this model. The optimal method was chosen on the basis of comparison of available methods of simplifications of models. Simplified model can be edited further and can be used in interactive simulations. With these edited models was designed a new method of creating scenarios in vehicle simulators.

The Interaction Between a Driver and Intelligent Transport Systems

Kalašová Alica, Skřivánek-Kubíková Simona, Čulík Kristián

Road traffic system is a complex system which contains the comprehensive factors such as a human, a vehicle, a road and natural environment.

Road safety in Slovakia is based on the strategy of the government, as well as on European policies. It is important to implement complex strategic measures in fields of traffic accidents, emergency services, and definitions of classifying injuries and deaths to decrease the number of injuries. The National plan's measures must be included in strategic documents which discuss road safety. It is necessary to combine several strategic goals in the transport process, to provide transport services according to the users' needs. Increasing of safety on the roads is a process which tries to mitigate the negative impacts of traffic accidents.

In recent years, Intelligent Transport Systems (ITS) have had a significant impact on the decrease a number of road traffic fatalities, particularly amongst passenger car occupants' deaths. Various types of intelligent transport systems (ITS) are currently implemented in passenger cars and provide higher level of road safety. However, there is a need to assess the effects of these systems on traffic safety.

The technologies must be perceived by drivers as useful, effective, easy to use, affordable and socially acceptable. There is also a need of driver's willingness to accept using of ITS. This paper discusses the benefits of using intelligent transport systems (ITS) in urban conditions which enable safety of road traffic, reducing the number of road traffic accidents and mortality on the road network.

The drivers' acceptability of individual ITS elements, we have been verifying in the form of a questionnaire. We have gather 519 responds which were processed and evaluated. The results are presented in the paper.

Dynamic Tests of the Culvert Face

Kohout Tomáš, Nouzovský Luboš

Severity of a vehicle impact into solid obstacles alongside of the road can be annually illustrated by means of accident statistics. One example of such solid obstacles is drainage ditch culvert faces. Within the research at the Faculty of Transportation Sciences of the Czech Technical University new equipment has been designed in a form of a modular system of the drainage ditch culvert faces construction. Qualities of this equipment have been tested by means of crash tests with a personal vehicle Škoda Fabia making use of criteria of biomechanical endurance of the vehicle passengers. The results have been compared with the test carried out by means of a vehicle crash into concrete culvert faces.

Developing a Low-Cost Semi-Autonomous Platform for Urban Mobility

Křivda Tomáš

This presentation will introduce you to a low-cost open-source autonomous driving solution that is now entering the practical testing phase.

We will take you through a short history, the current process and an outlook on near real deployment. In detail, the problem of vehicle localization in space and the fusion of outputs from different types of sensors to achieve adequate real-time awareness of the vehicle's immediate surroundings.

Brain Data and Driver's Attention during Simulated Drive

Mouček Roman

Attention of drivers is a serious issue and one of the critical factors of road safety. The question is whether the electrical activity of the human brain can be correctly measured/collected and utilized to monitor and interpret the driver's attention during simulated driving. This article introduces some experiments that have been designed, performed, and evaluated in the neuroinformatics laboratory at the University of West Bohemia. Simulated driving under various conditions in a car simulator was organized, and electrophysiology, mainly electroencephalography, data were collected from participants/drivers. The results include experience with the design of such experiments and the suitability of methods based on the collection and interpretation of electroencephalography data for driver attention detection.

On Applications of Brain-Computer Interface

Mouček Roman

Brain-computer interface applications are considered to implement a direct communication path between the brain and the computer appropriate in special cases. The article deals with the experiences of the neuroinformatics team with the design and implementation of various brain-computer interface applications. Their advantages, drawbacks and suitability are discussed in multiple contexts.

Eyetracking Technology in Automotive Industry

Novotný Jan

The subject of the research paper „EYETRACKING TECHNOLOGY IN AUTOMOTIVE INDUSTRY“ is to implement eyetracking technology into development of new vehicles and decision making process. This objective technology tracks eye movement of a participant, detects where the subject is looking during an interval of an experiment, and thus offers wide range of applications. It can be used to detect distraction while driving on simulator under a certain workload or to record objective data during otherwise subjective customer oriented clinic. In this topic, we evaluate areas of the vehicle which are the most interesting for customers and therefore, provide support and recommendations for new vehicle designs.

Development of Realistic Visualization for Vehicle Simulator

Piksa Ondřej

During the presentation you will be introduced to the current state of the functional sample of the vehicle simulator at the CTU in Decin, which is currently entering into real use. For an immersive simulation experience, one of the essential factors is the sufficient quality of the visualization of the projected virtual environment. More specifically, it will be described the development of the virtual reality using photogrammetric tools and game engines.

Improved Tools for Police in Traffic Collision Investigations and the Resulting Benefits for Traffic Accident Research

Ritter Jan, Drbohlav Pavel

Collisions with pedestrians are among the most complex tasks in accident reconstruction. In the Czech Republic, the total number of pedestrian accidents is steadily decreasing, although relatively slowly. On the other hand, accidents in cities are still increasing. In such cases, accident reconstruction can be problematic on the basis of the available documentation, and the specific measures to reduce the risk or consequences may differ from case to case due to, among other things, cultural differences in different countries or even different regions.

The aim of this project is to assist the Czech Police in the investigation of accidents and also to provide more detailed data for subsequent research. The new methods make use of the increasingly available video footage from static or on-board cameras, which are valuable objective sources of information about the accident process. Combined with accurate 3D measurements of the accident scene, the new methods allow the application of the outputs for the development of advanced assistance systems to further improve road safety, HMI improvements, as well as prevention using virtual reality and traffic simulations.

Bus Traffic Optimization System for Smart Cities

Scháno Martin

In this presentation, you will learn how a system for automatic analysis of public bus delays is being created in the Ústí nad Labem Region and what goals this system is trying to fulfill. The individual factors influencing the delay will be presented together with the methods of their measurement and processing. Furthermore, the issue of data quality and general experience with building the Smart City concept in a small town will be discussed.

Validation of Longitudinal Motorcycle Riding Dynamic Model for Powered Two Wheeler Interactive Simulator

Svoboda Josef, Toman Přemysl, Orlický Adam

During the presentation you will be introduced to the current state of the functional sample of the vehicle simulator at the CTU in Decin, which is currently entering into real use. For an immersive simulation experience, one of the essential factors is the sufficient quality of the visualization of the projected virtual environment. More specifically, it will be described the development of the virtual reality using photogrammetric tools and game engines.

Increasing the Quality of Driver School Education Using Modern Advances Driving Simulators

Topol Libor

This article is dealing with the proposal to use Advanced Driving Simulators (ADS) in driving schools as a legal substitution for some portion of real driving lessons, with a practical lessons in control virtually environment. It describes the history of the ADS development and application, following with the description of current legal requirements and restrictions, and proposes measures and improvements needed for the existing ADS to increase the hours students can practice on the ADS and describes advantages of this approach. It provides an overall description of changes needed to be performed for hardware and software layers of ADS, including description of possible scenarios to increase student level of preparation.