

Transport systems development Centre RODOS

Strategic Research Agenda

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Abstract

The mobility of people and goods is one of the basic prejudices for good functioning of contemporary economies and represents a key element for quality of life development in modern society. However increasing volume of transport is a significant burden on environment and is demanding for energy sources. Looking for balance between benefits and negative impacts of mobility and systematic implementation of intelligent transport system is a major goal of the Centre RODOS.

In the project period (2012 – 2018) new concepts of control, influence, support and finance of mobility are to be developed. Within SRA goals the tasks related to effective planning of transport infrastructure development, regulation of demand by price mechanisms and by tools influencing the decisions of people and systems of end users education.

Keywords: Intelligent transport systems, telematics, data collection, modeling, analysis of traffic data, traffic simulation, traffic management, intelligent transport systems, mobility monitoring, mobility management, statistical calculations, transport economics

1. INTRODUCTION

Transport systems development Centre (Centrum pro ROzvoj DOpravních Systémů (RODOS)) is based on the long-term partnership between research and private companies determining the direction of intelligent mobility development in the Czech Republic. RODOS presents platform that enables systematic view of traffic as interconnected, communicating and cooperating system.

Participating partners collaborate on common research agenda that responds to recent state of research and development, mid-term needs and new opportunities in the fields of data collection and analysis as well as simulation and optimization of passenger and goods mobility.

The Centre connects top experts from the fields of intelligent traffic systems, IT, economy, sociology and social geography, environmental and safety engineering (more than 100 researchers involved).

2. STRATEGIC RESEARCH AGENDA OF THE CENTRE RODOS

Strategic Research Agenda (SRA) builds on existing state of art of the research and development, a middle-term need and new occasions in the area of collection and analysis of data, simulation and optimization of people and goods mobility. The research has been very fragmented and limited to particular problems. A complex solution has been missed. The reason for that is a total lack of real data characterizing all the things related to mobility in a complex way. In the transport area, except air transport and partially public transport, there is a lack of data and existing data provides just limited knowledge of real traffic development. In other words it is not known what the start and end destination of people journeys is like, the time the journey takes, why they travel and why they choose a particular mode of transport, particular journey trajectory and the time. Even the dynamics of traffic flows is not monitored in comprehensive manner and so, in consequence, there is a low efficiency of control systems on highways and in urban and suburban areas as well. Missing real data and information is partially replaced by modeling. It should be noted that the modeling is often very imprecise due to the complexity and changeability of traffic system.

SRA goals of the Centre RODOS take these problems into account and basically claim to achieve the implementation of new methods for transport and mobility monitoring, their integration with existing monitoring

mobility methods, i.e. creation of complex information umbrella above the transport followed by implementation of new interactive systems of transport control and support, their testing and continuous improvement.

One of the significant issues of the Centre RODOS to achieve the goals is the use of so called time and space independent sample methods for data collection in the model computation of actual state of transport and mobility of people in a space. To the existing profile measurements and selected examinations the time-continuous and whole-area available data from sample technologies are to be added, even they work with GPS data or signaling data from GSM network. Thanks to the fusion of new and existing sources of data far more precise dynamic models are to be gained; some “rough statistics estimations” made with minimum data. The above described way enables an optimum design and implementation of innovative traffic control systems, combined toll systems, information and support systems and other advanced applications.

SRA goals of the Centre react on dynamic development of terrestrial and satellite navigation and localization services (LBS) – especially on the transfer from simple navigation to intelligent navigation services of interactive ability with actual status of the traffic flow. The Centre within its agenda also reflects fast development of electronic communication, especially mobile internet enabling personalised interaction of people moving in space and time with the systems of “central intelligence”.

Besides the long-term strategy vision represented by creation of the system of cooperating subjects having the ability to adapt existing transport system to future needs and production of new technologies and methods with the aim to fulfil step by step the vision of intelligent mobility, the Centre RODOS is to reach following specific goals:

The goal (G) 1: New methodology for measuring the performance characteristics and monitoring of phenomena related to people mobility in the Czech Republic based on the combination of effective use of existing data sources with data sources of “new generation” is to be developed. The output is a certified, in-praxis-verified methodology for performance characteristics measurement and monitoring of phenomena related to mobility in the Czech Republic.

G2: Design of the architecture and creation of physical database to transform input data characterizing mobility in the Czech Republic is to be developed. The output is a pilot plant of comprehensive database of people mobility in the Czech Republic.

G3: Sophisticated model (dynamic model of mobility, DMM) is to be developed; its analytical and prediction functions are to ensure the necessary inputs for relevant applications, control and information systems. DMM is to integrate transport, emissions and energy models in one platform. The significant contribution of the DMM is the provision of a support for crisis situation management. The output is a pilot plant of dynamic model of mobility, DMM, including created interfaces for relevant applications and special maps.

G4: Existing control systems of traffic flow on highways are to be adapted to new types of inputs from DMM, including the integration of new inputs from DMM and new methods of control systems of traffic flow on highways (innovative static and mobile systems of traffic flow control). The output is a pilot plant of innovative static system for control of traffic flow on highways and a pilot plant of mobile system for control of traffic flow on highways (to be used for traffic closures). In principle the systems of traffic flow control in urban and suburban areas are to be adapted in similar way. The emphasis is especially laid on the transfer from isolated solution of road crossing control via traffic flow control within single carriageways to the ultimate aim – overall control of crossing nodes with alignment to control systems of related roads outside of urban areas. New methods of control are to come again from the outputs of DMM. The output is a pilot plant of innovative system for control of traffic flow in urban and suburban areas.

G5: The next aim is the creation of new methods for road infrastructure financing. The economic indicators of transport are to be examined and their mutual relations searched. The output is the certified, in-praxis-verified methodology for collection of data and information characterizing economic indicators of transport, pilot test system of passenger cars charging on the currently tolled road network and proposal for legislation for different types of charging in cities, regions and specific zones, etc.

G6: The goal of the project is also a design and creation of micro simulating transport-planning model using agent technologies and derivation of transport demand by people activity; design and pilot test of proposals for systematic, data-oriented provisions for mobility control.

3. CONCLUSION AND FUTURE WORK

At the present time, nothing is developing more quickly than information and communication technologies. This major modern revolution has ushered in a mass expansion of mobile internet connectivity and a growing number of devices connected to the World Wide Web. Such devices are increasingly installed directly into cars themselves, but we can also make use of regular cell phones. The RODOS Center is reacting to this trend and would like to use this potential to improve the mobility of persons.

The project proves its merits by continuous implementation of the developed technologies and system into the real-world operation and subsequent quantification of direct and indirect benefits resulting from their everyday use.

Acknowledgements

This work was supported by the Technology Agency of the Czech Republic, program “Competence Centres” (Project TE01010155).