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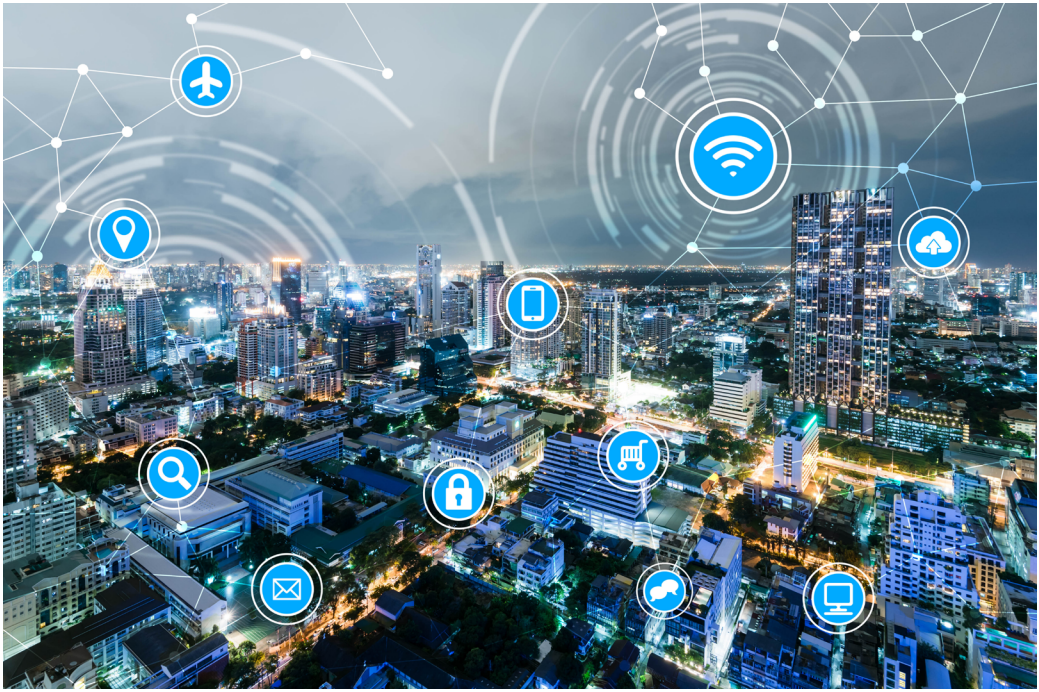

PROCEEDINGS OF ABSTRACTS

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Foreword

The Smart Cities Symposium Prague 2018 (the fourth annual conference) aims on exchange of ideas and best practices in the field of Smart cities. It covers whole range of topics, from the system point of view, through data mining and data processing, smart grids, up to multi-agent systems and other soft computing approaches. The objective of this conference is to define the future applications for the field of smart cities. The results should be based on the theoretical backgrounds, but aim on usage of best practices for real world applications.

The Smart Cities Symposium Prague 2018 covers the following key areas:

- System approach to Smart Cities transformation
- Information and data processing, algorithms, agents, simulation and prediction
- Technologies for Smart Cities
- Human Factors in Smart Technologies
- Social aspects of Smart Cities
- Energy efficient buildings
- Best practices for Smart Cities transformation
- All accepted papers are expected to be included in IEEE Xplore and will be indexed by EI.

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Electronic, full-text conference proceedings will be published within 30 days after symposium.

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kapsch challenging limits

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Accurate Road Safety Level Assessment for Effective Road Safety Inspection

Josef Kocourek, Tomas Padelek

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road safety inspection, safety assessment, traffic conflict, traffic safety

The article presents a new approach in assessment of safety level by conducting of road safety inspections. The current methodology for safety level assessment by conducting of road safety inspections is insufficient because it uses an inaccurate safety level indicator which does not allow accurate comparison of localities according to the safety level. A "new" methodology, developed on Czech Technical University, Faculty of Transportation Sciences, uses an improved description of safety level using the combined safety level indicator that contains indicator of traffic environment risk level and indicator of road users' behavior. The new methodology determines procedures for accurate comparison of localities according to the safety level, for estimating of safety level in postremediation state and for assessing the efficiency of proposed remedial measures to facilitate the selection of localities for remediation.

Aided Decision Making for Hybrid Energy Systems Planning in Micro-Grids

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hybrid energy system, micro-grid, decision making methodology

This paper presents a decision making methodology based on a cost-effectively analysis for the optimal planning of a hybrid energy system (HES), in micro-grids, using HOMER software tool. The proposed methodology consists in analyzing the HES impact that takes into account different types of renewable energy sources (wind, solar and hydro sources) aiming to determine the optimal solution corresponding to a minimum annualized capital cost of HES (ACHES) and a maximum injection degree from the renewable resources.

An International Interdisciplinary Study Abroad Program on Smart Cities

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smart cities, study abroad, collaborative, international, interdisciplinary

Preparing the next generation of engineers, scientists and decision makers requires the development of new teaching strategies that follow smart cities philosophy: collaborative, inclusive and focused on specific needs of the region. The University of Texas at El Paso (UTEP), USA and University of Guadalajara (UdeG), Mexico, addressed the challenge of creating a new international course on smart cities study abroad program that leverages the long-term relationship of UTEP with Czech Technical University (CTU), Czech Republic, and industry partners in El Paso and Guadalajara, especially IBM Mexico. This program is highly interdisciplinary, involving four departments in the College of Engineering at UTEP and the Department of Information Systems, Centro Universitario de Ciencias Economico Administrativas at UdeG. Input from city officials in Guadalajara and El Paso along with industry partners was key in designing this novel program. Thirty-two students from UTEP and 32 from UdeG have successfully completed this program which will launch again on its third edition this year. The program included problem-based learning strategies as well as cultural, industry-led activities, culminating in a Smart Cities Hackathon competition. This articles reports on the planning, development and results of this study abroad program, challenges and lessons learned.

Analysis of red light violation - a case study in Bialystok

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Magdalena Anszczak - Pycz, Zbigniew Dziejma

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red light cameras, violations, intersections, traffic volume

Red light running is a frequent cause of crashes and injuries worldwide. Traditionally, the enforcement of this violation involves police observations but recently this precaution is being automated through the use of red light camera systems that detect offending motorist. This paper presents results and an analysis of red light violations records collected from five intersections in the City of Bialystok, Poland. The data were gathered by red light photo enforcement cameras between June 2015 and October 2017. Statistical analysis were carried out to find the correlation between red light violations and intersection geometry and traffic related factors (traffic intensity, number of driving lanes, land width). Another consideration was given to evaluate the influence of changes in law regulations in scope of red light camera surveillance on the number of violations.

Data Analysis with Empirical Probability Functions as a Data Mining Method: Employing CF-Miner and Pattern Difference Quantifiers

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CF-Miner, conditional empirical probability functions, data analysis, data mining, difference histogram, GUHA, histogram analysis, LISp-Miner, pattern difference

In this paper we perceive data analysis with empirical probability functions as a data mining method. We propose a way to carry out this type of analysis by employing the LISp-Miner system, namely the CF-Miner procedure and pattern difference quantifiers. In order to confirm that LISp-Miner is a suitable tool for this purpose, we briefly present both methods and then show their equivalence. We do this by providing theoretical description which we then support by analysing a small set of data concerning traffic accidents with methods and comparing results. Afterwards we provide an example of analysis of a full data set concerning rail tickets sold at selected stations in 2014. We show that by considering "difference histograms" it is possible to identify remarkable dissimilarities in histograms of time of ticket sale that would not be found otherwise. Both analyses confirms that the method we propose can provide new and interesting results even if the data has been already analysed.

Data-driven Management of Dynamic Public Transport

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public transport, smart city, dynamic service, big data

The theme of the Fourth Industrial Revolution and Smart City appears increasingly also in transport. The aim of this paper is to provide an approach for evaluation of smart solution in public transport. A solution using combination of dynamic service and the Big Data is described in more detail. This dynamic service is influenced by many parameters and one of them can be the movement of the population. The movement of the population can be monitored through the Big Data.

Economic aspects of micro-cogeneration systems – insight into investors' approaches

Jakub Mascuch, Vaclav Novotny, Michal Tobias
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decentralized energy systems, cogeneration, economic evaluation

This work shows aspects of integrating decentralized electricity production systems based on small scale heat and power cogeneration (CHP) systems. On a case study of replacement of old brown-coal heating system is shown important fact that these technologies can't be considered as standard investment but as a necessity to secure heating requirements for manufacturing processes, administrative or residential buildings. Impact is on investor's decision making, which may be significantly different from only techno-economic optimization. It is shown, that typical comparison based on discounted cash flow is not a straight forward indication. When risks are included the decision making process is more complicated. When the projects have same discounted expenses over the period of comparison then the option with lowest CAPEX is selected. The work analyses several illustrative options of risk and benchmark option for the comparison.

Energy sufficiency of an administrative building based on real data from one year of operation

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Czech Republic

battery energy storage system, building energy demand, control strategies, hybrid photovoltaic system, PV potential

This article describes a method to optimize the utilization of a BIPV system with battery energy storage at an administrative office building in Jeseník, Czech Republic. Solar analysis is taking into account constraints from the architecture and surrounding of the building in order to identify suitable surfaces and propose BIPV solutions. A validated PV model is used for the estimation of the annual energy output depending on the PV configuration (technology, capacity etc.). Based on real data from one year of operation, an emphasis is also be given on the optimal control strategy for the operation of the system with the aim to increase the self-sufficiency of the building. To this end, optimal solution is proposed indicating the optimal strategy in terms of increasing the sustainability of the building with the minimum required cost.

How are smart cities perceived by project leaders and participants in an ongoing project: the challenge of evaluating smart cities

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smart cities, evaluations, perceptions, knowledge sharing.

This study is part of an evaluation within an ongoing smart city project in Greater Copenhagen, called Ready for Smart Growth. The focus is on how smart cities are perceived among participants from four different courses in the project. Further, some of the challenges of evaluating smart city projects are described within. A questionnaire in paper format was distributed to all participants just after their participation in the four courses (n=71). The participants were employed within 22 different municipalities, and were project leaders, planners, coordinators, IT-experts or consultants. The participants' main perception of a smart city was within the smart economy, which incorporates technology and innovation to strengthen business development, employment and urban growth. The participants also perceived some individual positive effects within the smart city project. The 22 involved municipalities were very different in terms of size, populations, economies, and organizations, as well as the technical and contextual support of smart city solutions. Therefore, there seems to be room for improved knowledge sharing among the municipalities in the project. The huge differences also put an emphasis on the challenges of evaluating smart city projects, and there is a need for more in-depth qualitative approaches for understanding the more individual needs (goals, aims) and the contextual background of the municipalities.

How to support planning and implementation of climate adaptation measures in urban areas? Case study of Brno-Nový Lískovec

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urban adaptation, smart approach, demography, cost-benefit analysis, ecosystems services, economic valuation

Adaptation to climate change of cities is becoming one of the key points in the planning processes. Adaptation contributes to preservation/improvement of the quality of life and human well-being. It should be an integral part of SMART Cities. Implementation of adaptation measures frequently faces numerous problems, including insufficient awareness of manifestations of climate change or importance of different measures. On an example of the urban district Brno-Nový Lískovec, the paper demonstrates possible approaches that play a supporting role in planning and implementation of adaptation measures. To promote further development of nature-based measures, the paper presents an economic assessment of existing measures, including an assessment of their benefits. The results indicate that the implementation of a park with a wetland in the densely built-up area has brought high social benefits greatly exceeding the costs.

Hydrometeorological measurements to assess the effect of vegetation on urban microclimate

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data analysis, statistical analysis, land surface temperature, remote monitoring, thermal variables measurement, humidity measurement, solar heating, vegetation, urban heat island

This paper deals with the empirical analysis of the effect of the green vegetation to the hydrometeorological parameters of the urban environment and its subsequent analysis for comparison with UHI (Urban heat island). UHI is the issue of large cities with excessive temperature during the summer months. For the comparison were chosen two places in Dejvice Capmups in Prague, where measurements take placed. One place represents artificial surface, the second one the nature surface. Basic statistical analysis and biological description of both localities were done.

Impacts of lacks in design of control systems in rail transportation

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impacts of lacks in design of control systems in rail transportation

Smart Cities are built on advanced technologies and their interconnections with other systems of different natures. In dependence on kinds of interconnection, we talk about the cyber-physical, socio-technical systems, which are so complex as their number of connections is. Higher complexity magnifies the probability of emergent phenomena occurrence, which have acceptable or unacceptable impacts on system alone and its vicinity. Occurrence of such phenomena is often sudden and unpredictable. In other words, the complexity influences the safety of concerned systems, and hereby, also the human security in the smart cities, i.e. it increases the risks related to system safety towards the human security. Because new technologies introduced in the concept of smart cities are not predictable in term of how they can influence the human system, we need to introduce the proper and sufficient control system that of course brings another complexity and risks. For coping with risks in this new area, we need to learn from lessons obtained in past and to know lacks in the control systems. The work is focused on controls systems in railway domain and on their lacks in design, which caused severe accidents. It provides four examples of severe rail derailments, and outcomes of their analysis, which show the lacks in design of control systems.

Implementing large scale electromobility infrastructure as a profitable virtual electricity storage plant: a case study, system ALISE

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smart grid, virtual power plant, EV, storage, case study

Virtual power plants using spare capacity of standing plugged-in electric vehicles (EV) is an innovative system which will be able to cope with power grid instabilities brought by intermittent renewables. Bottleneck for its application is however the widespread of EV, being stuck at the chicken or the egg causality dilemma of charging infrastructure presence and larger customers' demand for EVs. This paper shows a concept and case study for a district – to city – scale integrated system bringing infrastructure in large scale with low visual impact even into densely populated areas and in a way economically feasible for larger investors.

Increasing efficiency of ground stations scheduling to sustainably provide satellite based services for smart cities

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satellite range scheduling, smart cities, ground station, communication session, emergency situation

Satellite technologies are widely used in many areas of modern society in general and in smart cities in particular. Today, smart cities cannot be imagined without using satellite systems for communication, navigation or Earth observing systems. Improved traffic management, air quality monitoring, emergency management, geospatial distribution, management of critical energy infrastructure are examples of the tasks where using satellite technologies can give significant contribution to sustainability and safety. Proper operation of satellite systems is needed to achieve that. This requires solving a number of tasks, one of which is scheduling tracking, telemetry and command (TT&C) ground stations to carry out communication sessions with satellites. Service actions and transmitting a plan for payload operation such as Earth observation or radio broadcasting are performing during that sessions.
In this paper, the authors discuss mathematical formulation of TT&C ground stations scheduling problem in order to analyse possibilities to increase the quality of schedule and efficiency of its adaptations. Possible approaches to achieve the goal, and factors influenced on parrying emergency situations are demonstrated. Approaches for monitoring the current situation and preparing data about it are proposed. Possible ways of its improvement are discussed, basic idea of decision support system to determine state of ground stations is proposed. Evaluating the efficiency of changing schedule of TT&C ground stations using proposed approaches and tools is given. The proposed approaches can help to ensure performing both planned and emergency tasks of satellite systems in order to ensure normal work of many services in smart cities.

International Dual Master Degrees Program in Smart Cities

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smart cities, international collaboration, living laboratory, education, quality of life

In January 2018, Czech Technical University in Prague (CTU) and The University of Texas at El Paso (UTEP), signed a Memorandum of Understanding (MOU) to jointly develop and implement a Dual Master Degrees program in Smart Cities. Since then, the program structure has been decided, and the management team hopes to start the program with the first cohort of students in August 2018. In this paper, the authors, who are the key leaders in the development of this program, share the history, program structure, enabling teaching facilities, and challenges with the readers.

Macroscopic simulation model of a multi-stage, dynamic cargo bike-based logistics system in the supply of shopping malls in Budapest

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logistics, city logistics, modelling, shopping mall, simulation, simulation modelling, cargo bike, smart city

Nowadays, it is a big challenge to handle urban freight problems. To handle these problems is a significant task worldwide, because it is important to reduce environmental pollution and the overload of the city roads to make to cities more liveable. Within the urban freight transport problems, the so-called concentrated delivery points must be highlighted, because in these places there are several shops in a relatively small area. Deliveries of this kind of points mean a heavy load for the urban roads. Shopping malls, markets or dedicated shopping areas are concentrated delivery points. In 2015 we started to examine the logistics system of the shopping malls in Budapest, with the city logistics research group of the Department of Material Handling and Logistics Systems of the Budapest University of Technology and Economics. In our research, we developed a mesoscopic simulation model, which was presented at the Smart Cities Symposium in 2017. This model made it possible to simulate the deliveries of the shopping malls between the city border and the logistics area of the mall, in the current logistics system and in a new, innovative system also, where we place a consolidation center between the suppliers and the delivery points. In our paper, we would like to present a macroscopic simulation model, which was developed from our other, mesoscopic model. This new model makes it possible to examine a special logistics system, which can provide services for nearly 2000 shops of 18 shopping mall. This system uses green vehicles, such as cargo bikes and electric trucks and the structure of the system is based on the geometric model of the supply system of shopping malls in Budapest.

Making Innovation in Elderly Care Possible Using Participatory Design: The Smart Home-care Project in Prague

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participation, elderly care, smart home-care, stakeholder management, participatory design

Population ageing presents big challenge for cities, which will have to support increasing number of elderly citizens with special social and health needs. New services based on integrated care, community approach and modern technologies can help to face this challenge. Use of ICT-based solutions can enable new ways of indicating, delivering and managing care and help increasing senior citizens' quality of life. Therefore, innovation in elderly care should be part of Smart city agenda. But out of all topics linked to Smart cities, elderly care is maybe the most resistant when it comes to implementing new technology. The article discusses the obstacles in innovation in integrated elderly care and presents participative design methods as possible catalysator of change. The case study from the City of Prague demonstrates use of participatory design in designing complex ICT based solution for integrated elderly home care in major European city. The article summarizes what stakeholders were involved in the project, what methods were used and how participatory design contributed to the final solutions and their acceptance.

Methodology for Selection of Telecommunication Technology in Smart Applications and Networks

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communication network, communication technology, smart applications, smart cities, smart grid

Smart Networks and Smart Applications become an integral part of modern society. They offer new possibilities with efficiently provided services to end customers and by it further conceptual development of the entire population. Successful operation of Smart Network is closely related to the telecommunication infrastructure. Today, many technologies for telecommunications infrastructure are available. Implementation of objective methodology for the evaluation of individual telecommunication technology is therefore necessary. When evaluating technologies, it is possible to use the principles of conventional telecommunication infrastructures. However, it is needed to adjust qualitative criteria while considering the different requirements of Smart Networks and their Smart Applications. The proposal of the methodology, including the design and analysis of suitable qualitative criteria, the selection, and evaluation of individual communication technologies is the scope of this article.

Methods of traffic surveys in cities for comparison of traffic control systems – a case study

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traffic survey, traffic control, light-controlled traffic, smart city

Traffic overload is a pressing problem for many cities nowadays and they are trying to find smart solutions. Therefore cities are introducing traffic control systems that facilitate a more dynamic transit through the city for transit traffic while optimizing the control of individual junctions equipped with light signalling. Evaluation of traffic control parameters is usually based on processing of data from traffic surveys. This article describes the design, implementation and verification of alternative methods of traffic surveys for the comparison of traffic control systems in a case study of Uherske Hradiste. In this city, an extensive pilot project took place in summer and autumn 2017 to test the new algorithm for adaptive traffic control at selected light-controlled junctions of the city. The aim of the proposed traffic surveys was to evaluate the parameters of the newly installed traffic control systems and to compare them with the control parameters of the original system.

Optimal coverage of rDSLAM devices in the electronic communication network

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switchboards, rDSLAMs, electronic communication network, depot, optimization, set-covering

This article deals with optimizing the location of remote DSLAMs in the electronic communication network within the existing infrastructure. Based on selecting the most appropriate location for one or more rDSLAMs and the assigned attraction zone, the number of participants was maximized for the specified distance in order to achieve the highest possible transmission speed. Three set-covering models of the location analysis were used for two selected small villages. The article provides an example of the coverage of one of the villages while taking into consideration the aspect of the financial costs of its implementation. The proposed solution can be used for territorial units, small villages and towns with a population of up to 3,000 inhabitants. In practice, in the Czech Republic it could be used for about 200 towns and 5,800 villages. In larger towns with brick or concrete high-rise blocks of flats, there is a high probability of connecting directly to the optical network FTTH (FTTB) where there is already a number of different providers and types of internet connection.

Personal emergency system for elderly and disabled people in metropolitan network

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electronic healthcare, emergency services, information and communication technology

Project focuses on the implementation of ICT solution to health and social services. This paper introduces innovation into senior care system on the city district level. Special attention is given to the use of modern technologies, particularly in the field of senior care in their home environment. Within this framework, the technologies are perceived as complementary to health care, not aiming for their full replacement. New measures must react on the requirements of recipients and providers of care. Teamwork contains an analysis of these requirements, attitudes and capacities of the main stakeholders in the system of senior care. The work also deals with financial and legislative issues related to the introduction of innovation in the way of ensuring the feasibility of the proposed solution. Results of this work are transferable to other city districts in Prague and to other cities in the Czech Republic as well.

Planning principles of mobility service based on autonomous vehicles

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autonomous vehicles, service planning, questionnaire survey, user expectation, stated preference

Autonomous vehicles (AVs) facilitate alteration in passenger transportation. Shared, demand-driven mobility services based on small-capacity AVs emerge in urban areas. In order to provide highly personalized services, the user expectations are to be revealed. So, the acceptance of AVs can be also enhanced. The research question is what kind of information is needed to plan various service types with consideration of user expectations and operational constraints. Accordingly, the planning functions, as well as their input and output data have been identified. Then, the connections between the functions have been revealed. In order to provide input data for planning functions, we have elaborated a data collection method based on questionnaire survey applying stated preferences. Based on the survey data correspondences will have been revealed between personal attributes or mobility habits and expected mobility service attributes. The results can be used as planning principles for mobility services based on AVs.

Probabilistic Analysis of Sky Clearness Index for Solar Energy Systems Planning

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clearness index, solar radiation, probability density function, cumulative distribution function

Proper planning of solar energy systems require accurate knowledge concerning the effective values of irradiation incident on solar system. One of the important parameters that provide information concerning the effective value of irradiation at the ground level is the clearness index, this index being directly related to the attenuation effect of the earth's atmosphere and the clouds. In this paper, a solar radiation database recorder in Iasi, Romania has been involved in a statistical analysis in order to evaluate the probabilistic behavior of the clearness index values.

Real-Time Driver Advisory System for improving energy economy based on Advance Driver Assistant Systems Interface

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ADAS, ADASISv2 protocol, advisory curve speed, electronic horizon, electric vehicle, hybrid vehicle, Modelica, road geometry, road map data

The aim of this work is to present Real-Time Driver Advisory System (RTDAS) for improving energy economy of Electric Vehicles (EV) and Hybrid Electric Vehicles (HEV). System relies on a road map data provided in accordance with the second version of Advance Driver Assistant Systems Interface Specification (ADASIS v2) Protocol. Road map data is then transformed into Electronic Horizon (EH). The Electronic Horizon provides a preview of the road characteristics ahead of the vehicle, which is used for development of a predictive energy economy algorithms. The system is focused on static characteristics of the road ahead such as road slope, curvature, superelevation, speed limits and the traffic signs. Based on this data and vehicle parameters, the system is using algorithms to define if and when to send a message to the driver to release the gas pedal and to achieve higher energy economy, comfort and safety of driving. The releasing of gas pedal triggers an algorithm to adjust the speed using controlled regenerative braking without using mechanical brakes that leads to optimization of vehicle kinetic energy recuperation.

Regular Translation within Alliances

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boundary, finite deterministic automaton, functionality, input/output languages, interface, regular grammar, soft – systems, system alliance, uncertainty

Communication of a system alliance with surroundings can be modelled as a translation of specific languages. Incoming messages into alliance create an input language LI, outgoing messages from alliance create an output language LA. Elements on the boundaries serve as conversion units between external input languages and internal languages, or they serve as plain acceptors of input sentences, telling only the input sentence is valid/non-valid. Very important case is man – machine communication. In this case, the respective languages have to be regular. The example of two alliance interfaces and/or respective correction processes is discussed in detail. The process of the acceptance of a new (unknown) word within the adaptive acceptor is carried-out in the following part. These analyses are of high value for both the control and design of complex uncertain wholes, as well as for increasing their functionality and reliability.

Regulation of the Tourist Buses in Highly Urbanized Areas

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authorization system, autonomous charging system, continuous traffic flow, intelligent transportation systems, physical barriers

Special traffic regulation of the tourist buses is a measure for development of highly urbanized areas in accordance with the Smart City concept. Tourist destinations are often highly urbanized areas with low capacity traffic network. Tourist buses are biggest creators of the traffic jam resulting with increased air pollution and generally bad impact on the environment. Adequate regulation of the tourist buses can contribute to pollution reduction and nature conservation. With that aim the study has been made and the result was the concept design creation with proposal of the technological and technical solutions.

Reliability Data for Smart Grids: Where the Real Data Can be Found

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smart grids, power systems reliability, data analysis

Smart Grids play an important role in modern society and the sustainability of its wellbeing. However, the undoubted advantages come at the cost of higher complexity, especially on the level of information and communication technologies enhancing the physical grid infrastructure. As such, software quality requirements, such as reliability, resilience, safety, security, privacy, and performance, assume a more functional facet. In this paper, we focus on software reliability as one of the key qualities of a Smart Grid infrastructure, which is however not yet well defined and understood. We formulate relevant definitions of software reliability in the Smart Grid context, categorize information necessary to quantify the identified reliability views, and explore existing literature and online resources to assess what datasets necessary for reliability quantification are available to make the reliability assessment possible.

Routing pedestrians in smart city networks

Leon Rothkrantz

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ant based control, dynamic routing, WIFI ad-hoc networks.

Most routing devices can be used by pedestrians to find the shortest path to their destination. But in many cases not the shortest path but the fastest path is required. In this paper we discuss a variant of a dynamic routing algorithm based on AntBasedControl algorithm. The algorithm has been deployed in a centralized and decentralized routing system. People on their route use their smart phone to exchange traveling information with the central routing system or with other pedestrians via WIFI ad hoc networks (MANOC). Both systems can be used to route pedestrians from source to destination or to find the exit in shopping malls but also to route pedestrians to shelters and safe areas in case of a crisis. The algorithm and test experiments will be presented in the paper.

Smart Cities and Critical Infrastructure

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critical infrastructure, system of systems, safety, risk, cyber infrastructures, failure

The paper gives results of study between smart city performance and critical infrastructure safety. It concentrates to cyber infrastructure problems and especially to the I&C system role. On the basis of analyses of I&C system failures, it shows their impacts on public assets in human communities. At the end, the possible countermeasures for smart cities safe operation are discussed.

Smart parking in the Smart City application

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intelligent parking, smart city, occupancy monitoring, parking management, navigation to free parking spaces, occupancy, turnover

Insufficient parking capacities trouble almost every city today. The demand for parking space is considerably higher than the supply and since creating new parking facilities is economically very challenging, it is important to look for ways to make the most of the existing parking space, especially as on-street parking is regarded. The aim is therefore to apply systems for efficient use of existing parking space, focusing in particular on monitoring the occupancy of parking space and providing the information to drivers. A large-scale pilot project was implemented in Uherské Hradiště in the second half of the year 2017. It involved testing of features and subsystems for parking management as well as monitoring the turnover and occupancy of parking spaces in the city. This article describes the course of the pilot project, the mployed detection and action elements of the system and also deals with the evaluation and the outcomes of the pilot testing.

Smart Planning for Transportation Energy Efficient Region

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energy efficiency, Karlovy Vary region, spatial planning, transport modelling

Spatial planning on the regional scale delimits among other tasks development areas and urban centres. We suggest concentration of growth into these areas and centres can help decrease commuting-related transport energy consumption. We propose three scenarios – trend scenario and two scenarios with active regional policy, where the development is capped outside the development areas and outside the urban centres. We evaluate these scenarios using a doubly constrained transport model with modal choice and compare the energy consumption and its spatial patterns. The results reveal the importance of spatial planning for increasing transport energy efficiency with both scenarios with planning interventions outperforming the trend scenario. All planning proposals must be carefully evaluated to prevent increasing spatial disparities and energy vulnerability of sensitive areas – a problem affecting parts of specific areas in both scenarios with active planning policy.

Smart Urban Transport

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bus transport, public transport, tender for carriers, timetable designing, transport efficiency, transport planning, transport technology, urban transport, vehicle circulation

The Smart-city phenomenon in transport includes not only telematics for individual transport, clever and dynamic traffic flow management on roads and parking management, but also a strategy for public transport. As part of the smart-city strategies, the overall division of transport work and the urban transport system must be managed as long-term sustainable. In public transport, it is necessary to achieve such a state, where this system will be attractive for passengers. It is necessary to describe and to model traffic flows in the city, and to respond to them through the structural arrangement of the urban public transport system. In this respect, there are considerable differences between smaller towns and larger cities, depending on their size and population. The smaller is the city, the passanger flows are shattered, weaker and less graspable. However, in such a situation, it is necessary to look for tools to create a clever operational concept of urban transport. The article describes possible approaches to optimizing urban bus transport in terms of identifying demand for transport and consequently the principles of creating operational concepts.

Student Perception of Smart Campus: A case study of Czech Republic and Thailand

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smart cities, smart campus, survey

The topic of Smart Cities is nowadays very broadly discussed. In order to be able to move beyond theory and make some practical progress, the concept of building blocks shall be adopted. In this paper, we address one particular building block – Smart Campus – and try to understand its key features. University is typically a part of most big cities and forms a unique environment. Smart city theory clearly states that improving the quality of life of particular citizens shall be the main objective. Even though a university has also different stakeholders, students form a homogenous group with often common objectives. The objective of this paper is to propose a method to learn about student preferences and perception of different smart cities with respect to university campuses. For this reason, design of a survey which can be used by different universities to learn about the expectations of the end users – students – with respect to the smart concept is presented and discussed. Additionally, results of two pilot evaluations are presented. On purpose, two universities with rather different background and different cultural background were selected: Czech Technical University in Prague (Czech Republic) and Thammasat University in Thailand. A pilot survey was executed and the analysis of the results using basic econometric methods, inferential statistics and logistic regression is provided.

The e-mobility Analysis with Respect to the Transmission and Distribution Grid and its Effects on Stability of Power Delivery

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e-mobility, transportation, electrical grid, predictions, smart grid, distribution network, power stability, island operation

The electro-mobility has become one of the most regarded topics in the beginning of the new millennium. The massive emerge of the phenomenon is an effects of multiple efforts of utilization of energy with higher efficiency, sustainable growth of transportation capacities and lowering the environmental impacts of the mobility sector. Usage of electrical energy as the primary source of transportation has been there for many decades in public transportation in urban areas and over long distances, but with the massive spread of personal mobility, new key players in the automotive and economic sector, it is negotiated about electricity for the personal motor vehicles. This article introduces the multiple scenarios of the e-mobility evolution and introduces the related mechanisms in transmission and distribution grid, especially aimed at increase of power generation and distribution capacities. Paper discusses the impacts of these scenarios on the power system operation, ecology and economics. Paper also introduces the e-mobility as the key player in the urban distribution network of the future and defines the critical ties with the stability and reliability of power delivery.

Traffic Signal Control Without Stationary Detectors Under Different Penetration Rates of Connected Vehicles

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connected vehicles, intelligent transport systems, smart cities, traffic signal control, V2I

Smart cities require high level of cooperation among interdisciplinary fields and a contribution of the latest technologies in order to achieve the best results in city's key areas. One trend in modern vehicle technologies is that vehicles will communicate to the traffic infrastructure, the so called V2I (Vehicle-to-Infrastructure), which could enable innovative algorithms for traffic signal control that are more infrastructure/resources efficient at the same time it improve people's quality of life. This paper analyses three possibilities for traffic control using such CV (Connected Vehicles): (i) a Dynamic Maximum Gap (DMG) between arrivals at stop line (specific for each vehicle); the relation between intersection throughput and delay or stopped time, named as (ii) Throughput Adjusted Delay (TAD) and (iii) Throughput Adjusted Stopped Time (TAST), respectively. We show that our DMG algorithm, at non-peak flows and compared to traditional actuated control, reduces the travel time up to 15%, time stopped by almost 80%, and delay 50%. While the TAD and TAST strategies maintain good performance even at 10% penetration rate of CV. Future research could contribute to the assessment of the environmental and economical benefits of traffic signal control using CV's, as well as explore the use of even more enriched data, information being sent from the infrastructure to the vehicles, in addition to the extension of the control to more intersections.

MAVEN (Managing Automated Vehicles Enhances Network) was launched on 01-09-2016. This 3- year project, under the Horizon 2020 Research and Innovation Framework Programme of the European Commission (Grant Agreement No. 690727), has nine partners with a total budget of EUR 3,149,661.25.

The project aims to provide solutions for managing automated vehicles in an urban environment (with signalized intersections and mixed traffic). It will develop algorithms for organizing the flow of infrastructure-assisted automated vehicles, and structuring the negotiation processes between vehicles and the infrastructure. Platooning is an evident example of a technology in this domain. The MAVEN approach will substantially contribute to increasing traffic efficiency, improving utilization of infrastructure capacity, and reducing emission. The MAVEN project will build a prototype system that will be used both for field tests and for extensive modelling for impact assessment. Furthermore, the project will contribute to the development of enabling technologies, such as telecommunication standards and high-precision maps.

CONSORTIUM PARTNERS:

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More on: http://akce.fd.cvut.cz/en/scsp2018

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