

Communications in Computer and Information Science

531

Commenced Publication in 2007

Founding and Former Series Editors:

Alfredo Cuzzocrea, Dominik Ślęzak, and Xiaokang Yang

Editorial Board

Simone Diniz Junqueira Barbosa

*Pontifical Catholic University of Rio de Janeiro (PUC-Rio),
Rio de Janeiro, Brazil*

Phoebe Chen

La Trobe University, Melbourne, Australia

Xiaoyong Du

Renmin University of China, Beijing, China

Joaquim Filipe

Polytechnic Institute of Setúbal, Setúbal, Portugal

Orhun Kara

TÜBİTAK BİLGEM and Middle East Technical University, Ankara, Turkey

Igor Kotenko

*St. Petersburg Institute for Informatics and Automation of the Russian
Academy of Sciences, St. Petersburg, Russia*

Ting Liu

Harbin Institute of Technology (HIT), Harbin, China

Krishna M. Sivalingam

Indian Institute of Technology Madras, Chennai, India

Takashi Washio

Osaka University, Osaka, Japan

More information about this series at <http://www.springer.com/series/7899>

Jerzy Mikulski (Ed.)

Tools of Transport Telematics

15th International Conference
on Transport Systems Telematics, TST 2015
Wrocław, Poland, April 15–17, 2015
Selected Papers

Editor
Jerzy Mikulski
Polish Association of Transport Telematics
Katowice
Poland

ISSN 1865-0929 ISSN 1865-0937 (electronic)
Communications in Computer and Information Science
ISBN 978-3-319-24576-8 ISBN 978-3-319-24577-5 (eBook)
DOI 10.1007/978-3-319-24577-5

Library of Congress Control Number: 2015949407

Springer Cham Heidelberg New York Dordrecht London
© Springer International Publishing Switzerland 2015

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

Springer International Publishing AG Switzerland is part of Springer Science+Business Media
(www.springer.com)

Preface

It is a pleasure to welcome you to the selected papers of the 15th International Conference on Transport Systems Telematics. The 15th event in the series was held at the Wroclaw University of Technology Congress Center, during which the latest achievements and applications of telematics systems in practice were presented. The conference was organized by the Polish Association of Transport Telematics, together with the Polish Chamber of Commerce for High Technology.

Intelligent cities are becoming a reality in Europe today. Advanced technologies are transforming towns into smart cities. We can observe a dynamic increase in the importance of ITS applications. During the previous 14 editions of our meetings, we had the opportunity to observe and participate in the development of these solutions. The range of topics and the number of participants have grown significantly since then. To keep up with the pace of development in telematics applications, in the TST 2015 conference the topics of road, rail, air and ship transport were extended to include city telematics.

Not by accident, the first conference in a new form was held in Wroclaw. In recent years, the city has become a training ground for development and implementation of modern intelligent transport systems. We had the possibility to gain understanding of this type of system covering 150 road intersections of the fourth largest city in Poland, through which important European, national, and provincial roads pass.

The aim of the conference was to present the newest trends in transport improvement, arising in connection with the present worldwide telematics achievements and to share experience and exchange opinions between transport-related practitioners and scientists. Participation in the conference was an excellent opportunity to present current achievements and outline the direction of developments in transport telematics.

This year the conference was a part of the forum “Mobile City – Challenge of the Future.” The forum was held under the patronage of the Union of Polish Metropolises, the Association of Polish Cities, and the Ministry of Infrastructure and Development. The key topic of the forum were conditions of development and modernizing of urban transport systems, including the functioning of support instruments of the projects undertaken in this respect. Urban mobility is on the most important factors impacting the quality of life of a city’s inhabitants and its economic efficiency, and it is also one of the most difficult problems that Polish and European cities face today. During the sessions and exhibitions accompanying the forum, the most advanced technological solutions improving urban mobility and facilitating traffic management were presented. Therefore, the event was a perfect opportunity to share experience and discuss improvements in urban transport systems and mobility. The papers published in this volume were reviewed (double-blind review) by independent reviewers in accordance with the Scientific Committee’s criteria for high quality.

Scientific Program Committee

J. Mikulski	Polish Association of Transport Telematics, Poland
A. Bujak	WSB Schools of Banking in Wrocław, Poland
M. Bukljaš-Skočibušić	University of Zagreb, Croatia
W. Choromański	Warsaw University of Technology, Poland
T. Čorejová	University of Zilina, Republic of Slovakia
A. Dewalska-Opitek	Silesian School of Management, Poland
M. Franeková	University of Zilina, Republic of Slovakia
J. Gnap	University of Zilina, Republic of Slovakia
S. Iwan	Maritime University of Szczecin, Poland
M. Jacyna	Warsaw University of Technology, Poland
A. Janota	University of Zilina, Republic of Slovakia
J. Januszewski	Gdynia Maritime University, Poland
A. Kalašová	University of Zilina, Republic of Slovakia
J. Klamka	Polish Academy of Sciences, Poland
B. Kos	University of Economics in Katowice, Poland
A. Križanová	University of Zilina, Republic of Slovakia
M. Luft	University of Technology and Humanities in Radom, Poland
B. Łazarz	Politechnika Śląska, Poland
Z. Łukasik	University of Technology and Humanities in Radom, Poland
A. Maczyński	University of Bielsko-Biala, Poland
M. Michałowska	University of Economics in Katowice, Poland
G. Nowacki	Military University of Technology, Poland
T. Nowakowski	Wrocław University of Technology, Poland
D. Peraković	University of Zagreb, Croatia
Z. Pietrzykowski	Maritime University of Szczecin, Poland
K. Rástočný	University of Zilina, Republic of Slovakia
M. Siergiejczyk	Warsaw University of Technology, Poland
J. Skorupski	Warsaw University of Technology, Poland
E. Szychta	University of Technology and Humanities in Radom, Poland
A. Szydło	Wrocław University of Technology, Poland
R. Tomanek	University of Economics in Katowice, Poland
R. Wawruch	Gdynia Maritime University, Poland
W. Wawrzyński	Warsaw University of Technology, Poland
A. Weinrit	Gdynia Maritime University, Poland
M. Wierzbik-Strońska	Katowice School of Technology, Poland
E. Załoga	University of Szczecin, Poland

Contents

Data Flows in Urban Freight Transport Management System	1
<i>Stanisław Iwan and Krzysztof Małecki</i>	
Multicriteria Decision Support in Designing Transport Systems.	11
<i>Marianna Jacyna and Mariusz Wasiak</i>	
Impact of Road Conditions on the Normal Reaction Forces on the Wheels of a Motor Vehicle Performing a Straightforward Braking Maneuver.	24
<i>Jarosław Zalewski</i>	
Video Processing for Detection and Tracking of Pedestrians and Vehicles at Zebra Crossings	34
<i>Witold Czajewski, Paweł Mrówka, and Piotr Olszewski</i>	
Control of Coordinated Systems Traffic Lights. Cloud Computing Technology	45
<i>Elzbieta Grzejszczyk</i>	
Utility of Information from Road Weather Stations in Intelligent Transport Systems Application	57
<i>Artur Rygula, Krzysztof Brzozowski, and Aleksander Konior</i>	
Computer Aided Implementation of Logistics Processes – Selected Aspects . . .	67
<i>Ilona Jacyna-Golda, Konrad Lewczuk, Emilian Szczepański, and Jakub Murawski</i>	
Algorithm for Analysis of Road Surface Degradation	81
<i>Marián Hruboš, Aleš Janota, and Igor Miklůšik</i>	
Safety Analysis of Accidents Call System Especially Related to In-Land Water Transport Based on New Telematic Solutions	90
<i>Tomasz Perzyński, Andrzej Lewiński, and Zbigniew Łukasik</i>	
Modeling of Process of Maintenance of Transport Systems Telematics with Regard to Electromagnetic Interferences	99
<i>Mirosław Siergiejczyk, Jacek Pas, and Adam Rosinski</i>	
Model of the Hierarchical Process of Managing the Approaching Air Traffic in the Terminal Area	108
<i>Jacek Skorupski</i>	
Innovative Control System for High Efficiency Electric Urban Vehicle	121
<i>Karol Cichoński and Wojciech Skarka</i>	

Information System for Drivers Within the Integrated Traffic Management System - TRISTAR	131
<i>Jacek Oskarbski, Marcin Zawisza, and Michał Miszewski</i>	
Software Quality Assurance in e-Navigation	141
<i>Adam Weintrit</i>	
Software Simulation of an Energy Consumption and GHG Production in Transport	151
<i>Tomas Skrucany, Martin Kendra, Branislav Sarkan, and Jozef Gnap</i>	
Traffic Processes Models in Traffic Water Engineering Systems	161
<i>Piotr Majzner</i>	
Motor Vehicle Safety Technologies in Relation to the Accident Rates	172
<i>Ján Kapusta and Alica Kalašová</i>	
Concept of a Telematics System Model in Crisis Management	180
<i>Andrzej Bujak and Mariusz Topolski</i>	
Proposal of on-Line Key Management System Solutions for Railway Applications Based on Asymmetric Cryptography	188
<i>Mária Franeková, Peter Lüleý, Karol Rástočný, and Juraj Ždánsky</i>	
Transformations in the Ticket Distribution Network for Public Urban Transport in the Processes of Implementation of Electronic Fare Collection Systems	198
<i>Grzegorz Dydkowski</i>	
Safety Management System in the Railway Board Activity - An Outline of Issues	210
<i>Jerzy Mikulski, Beata Grabowska-Bujna, and Sonia Wieczorek</i>	
Performance Analysis of Authentication Protocols Used Within Cooperative - Intelligent Transportation Systems with Focus on Security	220
<i>Ján Ďurech, Mária Franeková, Peter Holečko, and Emília Bubeníková</i>	
Improvement of Public Transportation as an Instrument of Transport Policy in Cities of Agglomeration	230
<i>Ryszard Janecki</i>	
Comparison of Efficiency of Vehicle Detection and Classification System on Multilane Road	244
<i>Artur Rygula, Andrzej Maczyński, and Paweł Piwowarczyk</i>	
Analysis of the Problem of Interference of the Public Network Operators to GSM-R	253
<i>Marek Sumiła and Andrzej Miszkiewicz</i>	

Rail Traffic Remote Control Systems Within the Areas Affected by the Occurrence of Mining Damage and Railway Safety	264
<i>Beata Grabowska–Bujna, Sonia Wieczorek, and Jerzy Mikulski</i>	
Problems of Maritime Radio Systems Integration with E-navigation	274
<i>Karol Korcz</i>	
Hazardous Failure Rate of the Safety Function	284
<i>Karol Rástočný and Juraj Ždánsky</i>	
Telematics Applications, an Important Basis for Improving the Road Safety . . .	292
<i>Alica Kalašová, Peter Faith, and Jerzy Mikulski</i>	
Relation of Social Legislation in Road Transport on Driver’s Work Quality . . .	300
<i>Miloš Poliak and Adela Poliaková</i>	
Key Challenges and Problems in Conducting Independent Evaluations of the Adequacy of the Risk Management Process in Rail Transport	311
<i>Adam Jabłoński and Marek Jabłoński</i>	
Pricing Policy After the Implementation of Electronic Ticketing Technology in Public Urban Transport: An Exploratory Study in Poland	322
<i>Anna Urbanek</i>	
Navigational Information Exchange and Negotiation System.	333
<i>Zbigniew Pietrzykowski and Jacek Skorupski</i>	
Electric Taxis in Berlin – Analysis of the Feasibility of a Large-Scale Transition.	343
<i>Joschka Bischoff and Michal Maciejewski</i>	
Development of Electronic Payments in Poland Using the Example of Local and Regional Collective Transport	352
<i>Barbara Kos</i>	
Dependencies Between Development of Information and Communications Technologies and Transport	362
<i>Joanna Kos-Łabędowicz</i>	
Transport Telematics Development in the New European Cohesion Policy . . .	371
<i>Kinga Okrzesik-Faruga and Robert Tomanek</i>	
Author Index	379