

Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering

310

Editorial Board Members

Ozgur Akan

Middle East Technical University, Ankara, Turkey

Paolo Bellavista

University of Bologna, Bologna, Italy

Jiannong Cao

Hong Kong Polytechnic University, Hong Kong, China

Geoffrey Coulson

Lancaster University, Lancaster, UK

Falko Dressler

University of Erlangen, Erlangen, Germany

Domenico Ferrari

Università Cattolica Piacenza, Piacenza, Italy

Mario Gerla

UCLA, Los Angeles, USA

Hisashi Kobayashi

Princeton University, Princeton, USA

Sergio Palazzo

University of Catania, Catania, Italy

Sartaj Sahni

University of Florida, Gainesville, USA

Xuemin (Sherman) Shen

University of Waterloo, Waterloo, Canada

Mircea Stan

University of Virginia, Charlottesville, USA

Xiaohua Jia

City University of Hong Kong, Kowloon, Hong Kong

Albert Y. Zomaya

University of Sydney, Sydney, Australia

More information about this series at <http://www.springer.com/series/8197>

Ana Lúcia Martins · Joao Carlos Ferreira ·
Alexander Kocian (Eds.)

Intelligent Transport Systems

From Research and Development
to the Market Uptake

Third EAI International Conference, INTSYS 2019
Braga, Portugal, December 4–6, 2019

Editors

Ana Lúcia Martins 
ISCTE-IUL
Lisbon, Portugal

Joao Carlos Ferreira 
ISCTE-IUL
Lisbon, Portugal

Alexander Kocian 
University of Pisa
Pisa, Italy

ISSN 1867-8211 ISSN 1867-822X (electronic)
Lecture Notes of the Institute for Computer Sciences, Social Informatics
and Telecommunications Engineering
ISBN 978-3-030-38821-8 ISBN 978-3-030-38822-5 (eBook)
<https://doi.org/10.1007/978-3-030-38822-5>

© ICST Institute for Computer Sciences, Social Informatics and Telecommunications Engineering 2020
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, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

We are delighted to introduce the proceedings of the second edition of the International Conference on Intelligent Transport Systems (INTSYS 2019) from the European Alliance for Innovation (EAI). This conference brought together researchers, developers, and practitioners from around the world who are leveraging and developing Intelligent Transportation Systems (ITS) to increase efficiency, safety, mobility, and tackle Europe's growing emission and congestion problems. The theme of INTSYS 2019 was "Intelligent Transport Systems (ITS) has the Edge on Innovation."

The technical program of INTSYS 2019 consisted of 20 full papers, presented in oral sessions at the main conference tracks, and selected out of 35 submission received. All of the accepted papers were subjected to a blind peer-review process with a minimum of four reviews for each paper. Concerning the committees, it was a great pleasure to work with the excellent organizing team of the EAI, which was absolutely essential for the success of the INTSYS 2019 conference. In particular, we would like to express our gratitude to Kristina Lappyova and Marek Kaleta for all the support they provided in all subjects. We would like also to express our gratitude to all the members of the Technical Program Committee, who have helped in the peer-review process of the technical papers, as well as ensured a high-quality technical program. We would like to thank the extensive list of external reviewers from several areas of expertise and from numerous countries around the world.

A special acknowledgement has to be addressed to all the authors for their effort producing such good quality papers and also for the extremely rich and positive feedback shared at the conference.

We strongly believe that the INTSYS conference provides a good forum for all researcher, developers, and practitioners to discuss all science and technology aspects that are relevant to ITS. We also expect that the future INTSYS conferences will be as successful and stimulating, as indicated by the contributions presented in this volume.

January 2020

Ana Lúcia Martins
Joao Carlos Ferreira
Alexander Kocian

Organization

Steering Committee

Imrich Chlamtac Bruno Kessler Professor, University of Trento, Italy

Organizing Committee

General Chairs

Ana Lúcia Martins Instituto Universitário de Lisboa (ISCTE-IUL), Portugal
Joao Ferreira Instituto Universitário de Lisboa, Portugal

TPC Chair and Co-chair

Alexander Kocian Pisa University, Italy

Sponsorship and Exhibit Chair

José Crespo de Instituto Universitário de Lisboa, Portugal
Carvalho

Local Chair

Vitor Monteiro University of Minho, Portugal

Workshops Chair

Elsa Cardoso Instituto Universitário de Lisboa, Portugal

Publicity and Social Media Chair

Carlos M. P. Sousa Molde University College, Norway

Publications Chair

Vera Costa Universidade do Porto, Portugal

Web Chairs

Marcia Baptista INOV – Inesc Inovação, Portugal
Rui Maia INOV – Inesc Inovação, Portugal

Posters and PhD Track Chair

Rossella Arcucci Imperial College London, UK

Panels Chair

Rubén Pereira Instituto Universitário de Lisboa, Portugal

Demos Chair

Frederica Gonçalves University of Madeira, Portugal

Tutorials Chairs

Alberto Silva Instituto Superior Técnico, Portugal

Conference Manager

Karolina Marcinova EAI - European Alliance for Innovation, n.o., Belgium

Technical Program Committee

Ana Lúcia Martins	ISCTE-IUL, Portugal
Dagmar Caganova	Slovak University of Technology in Bratislava, Slovakia
Ghadir Pourhashem	Slovak University of Technology in Bratislava, Slovakia
Giuseppe Lugano	University of Žilina, Slovakia
Joao C. Ferreira	ISCTE-IUL, Portugal
Lorna Uden	Staffordshire University, UK
Lubos Buzna	University of Žilina, Slovakia
Marek Kvet	University of Žilina, Slovakia
Michal Kohani	University of Žilina, Slovakia
Michal Kvet	University of Žilina, Slovakia
Miroslav Svitek	Czech Technical University in Prague, Czech Republic
Peter Brida	University of Žilina, Slovakia
Peter Holečko	University of Žilina, Slovakia
Peter Jankovic	University of Zilina, Slovakia
Peter Pocta	University of Zilina, Slovakia
Porfirio Filipe	ISEL, Portugal
Teresa Grilo	ISCTE-IUL, Portugal
Sofia Kalakou	ISCTE-IUL, Portugal
Tatiana Kováčiková	University of Žilina, Slovakia
Veronika Sramova	University of Žilina, Slovakia
Vitor Monteiro	University of Minho, Portugal

Contents

Modelling

Design of a Route-Planner for Urban Public Transport, Promoting Social Inclusion	3
<i>Rafael Dias, Tânia Fontes, and Teresa Galvão</i>	
Simulating a Three-Lane Roundabout Using SUMO	18
<i>Bernardo Leite, Pedro Azevedo, Rui Leixo, and Rosaldo J. F. Rossetti</i>	
Directional Grid-Based Search for Simulation Metamodeling Using Active Learning.	32
<i>Francisco Antunes, Francisco Pereira, and Bernardete Ribeiro</i>	
A Generic Predictive Model for On-Street Parking Availability.	47
<i>Eren Unlu, Jean-Baptiste Delfau, Bich Nguyen, Eric Chau, and Mehdi Chouiten</i>	

Optimization

Identifying Relevant Transfer-Connections from Entry-Only Automatic Fare Collection Data: The Case Study of Porto.	63
<i>Joana Hora, Teresa Galvão, and Ana Camanho</i>	
Optimising Supply Chain Logistics System Using Data Analytics Techniques.	77
<i>Eleni Mangina, Pranav Kashyap Narasimhan, Mohammad Saffari, and Ilias Vlachos</i>	
Analyzing a Fleet Solution Using Scenarios	92
<i>Ana Lúcia Martins, Ana Catarina Nunes, and Bernardo Carvalho</i>	
Optimize Capacity for a Uniform Waste Transportation Collection	108
<i>José Tiago Silva, André Filipe Oliveira, Ana Lúcia Martins, and João Carlos Ferreira</i>	

Tracking and Prediction

Automatic Generation of Spider Maps for Providing Public Transports Information.	131
<i>Sara Santos, Teresa Galvão Dias, and Thiago Sobral</i>	

Public Transportation Prediction with Convolutional Neural Networks	150
<i>Dancho Panovski and Titus Zaharia</i>	
Tourism Guidance Tracking and Safety Platform.	162
<i>Frederica Gonçalves, Ana Lúcia Martins, João Carlos Ferreira, Eduardo Marques, Magno Andrade, and Luís Mota</i>	
App Guidance for Parking Occupation Prediction	172
<i>Gonçalo Alfaced, Joao C. Ferreira, and Ruben Pereira</i>	
Visualization	
Evaluation of SIMMARC: An Audiovisual System for the Detection of Near-Miss Accidents	195
<i>Florian Krebs, Georg Thallinger, Helmut Neuschmied, Franz Graf, Georg Huber, Kurt Fallast, Peter Vertal, and Eduard Kolla</i>	
Assessing the YOLO Series Through Empirical Analysis on the KITTI Dataset for Autonomous Driving.	203
<i>Filipa Ramos, Alexandre Correia, and Rosaldo J. F. Rossetti</i>	
Evaluation of Broadcast Storm Mitigation Techniques on Vehicular Networks Enabled by WAVE or NDN.	219
<i>Oscar Gama, Alexandre Santos, Antonio Costa, Bruno Dias, Joaquim Macedo, Maria Joao Nicolau, Bruno Ribeiro, and Fabio Goncalves</i>	
Non-destructive Diagnostic Methods for Smart Road Infrastructure Evaluation	237
<i>Lenka Mičechová, Anna Krišková, Jozef Jandačka, Ján Mikolaj, and Michal Veselovský</i>	
Sensing	
Towards Dynamic Monocular Visual Odometry Based on an Event Camera and IMU Sensor	249
<i>Sherif A. S. Mohamed, Mohammad-Hashem Hagbayan, Mohammed Rabah, Jukka Heikkonen, Hannu Tenhunen, and Juha Plosila</i>	
Tracking and Classification of Aerial Objects	264
<i>Marcia Baptista, Luis Fernandes, and Paulo Chaves</i>	
LiDAR SLAM Positioning Quality Evaluation in Urban Road Traffic	277
<i>Franz Andert and Henning Mosebach</i>	

DORA: An Experimental Platform for Smart Cities. 292
Vivek Prakash Nigam, Antero Kutvonen, Benjamin Molina,
Patricia Bellver Muñoz, and Jan-Niklas Willing

Author Index 303