Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering 426

More information about this series at https://link.springer.com/bookseries/8197

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

Intelligent Transport Systems

5th EAI International Conference, INTSYS 2021
Virtual Event, November 24–26, 2021
Proceedings

Springer

Editors
Ana Lúcia Martins
Lisbon University Institute
Lisbon, Portugal

Joao C Ferreira
Lisbon University Institute
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 978-3-030-97602-6 ISBN 978-3-030-97603-3 (eBook)
https://doi.org/10.1007/978-3-030-97603-3

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 fifth edition of the International Conference on Intelligent Transport Systems (INTSYS 2021) 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, and mobility, and tackle Europe's growing emission and congestion problems.

INTSYS 2021 covered the following topics: disruptive technology for intelligent transportation systems; intelligent transportation systems in epidemic areas; data science for cooperative intelligent transportation systems; AI innovation in intelligent transportation systems; diversity in transportation systems for people and goods; public transit planning and operation in the era of automation, electrification, and personalization; edge intelligence for the Internet of Vehicles; blockchain and big data-enabled intelligent vehicular communication; and intent-based networking for 5G-envisioned Internet of Connected Vehicles. This edition received 31 submissions from which the technical program of INTSYS 2021 was developed, consisting of 15 full papers. All papers were subjected to a double-blind peer-review process with a minimum of three reviews per paper.

Concerning the committees, it was a great pleasure to work with the excellent organizing team of the EAI, which was essential for the success of the INTSYS 2021 conference. In particular, we would like to express our gratitude to Conference Manager Elena Davydova for all the support she provided in all areas. We would like also to express our gratitude to all the members of the Technical Program Committee, who helped in the peer-review process for the technical papers, and thus 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 must 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 researchers, developers, and practitioners to discuss all science and technology aspects that are relevant to ITS. It is becoming a privileged space for knowledge sharing and networking. We also expect that the future INTSYS conferences will be as successful and stimulating as this year's, as indicated by the contributions presented in this volume.

December 2021

Ana Lúcia Martins
Joao C Ferreira
Alexander Kocian

Organization

Steering Committee

Imrich Chlamtac	University of Trento, Italy
Oscar Mayora	Fondazione Bruno Kessler, Italy
Venet Osmani	Fondazione Bruno Kessler, Italy

Organizing Committee

General Chairs

Joao C Ferreira	Iscte-Instituto Universitário de Lisboa, Portugal
Ana Lúcia Martins	Iscte-Instituto Universitário de Lisboa, Portugal

Technical Program Committee Chair

Alexander Kocian	University of Pisa, Italy

Sponsorship and Exhibit Chair

Helgheim Berit Irene	Molde University, Norway

Local Chair

Teresa Galvão	FEUP and INESCTEC, Portugal

Workshops Chair

Ulpan Tokkozhina	Iscte-Instituto Universitário de Lisboa, Portugal

Publicity and Social Media Chair

Maria C. Pereira	Iscte-Instituto Universitário de Lisboa, Portugal

Publications Chair

Vera Costa	FEUP, Portugal

Web Chair

Bruno Mataloto	Iscte-Instituto Universitário de Lisboa, Portugal

Posters and PhD Track Chair

Rosaldo Rosseti	FEUP, Portugal

Panels Chair

Luis Elvas	Inov and Iscte-Instituto Universitário de Lisboa, Portugal

Demos Chair

Frederica Gonçalves	University of Madeira and ITI/LARSyS, Portugal

Tutorials Chair

Ana Madureira	ISEP, Portugal

Technical Program Committee

Adreano Lino	Federal University of Western of Pará, Brazil
Ana Lucia Martins	Iscte-Instituto Universitário de Lisboa, Portugal
Ana Madureira	ISEP, Portugal
Atilla Altintas	Chalmers University of Technology, Sweden
Bruno Mataloto	Iscte-Instituto Universitário de Lisboa, Portugal
Carlos M. P. Sousa	Molde University College, Norway
Cheng Yin	Queen's University Belfast, UK
Dagmar Caganova	Slovak University of Technology in Bratislava, Slovakia
Diana Mendes	Iscte-Instituto Universitário de Lisboa, Portugal
Federico Costantini	Università degli Studi di Udine, Italy
Frederica Gonçalves	University of Madeira, Portugal
Gabriel Pestana	Inov, Portugal
Ghadir Pourhashem	Slovak University of Technology in Bratislava, Slovakia
Giuseppe Lugano	University of Žilina, Slovakia
Isabel Almeida	Iscte-Instituto Universitário de Lisboa, Portugal
Isabell Storsjö	Hanken School of Economics, Finland
Joao C Ferreira	Iscte-Instituto Universitário de Lisboa, Portugal
Lia Oliveira	Universidade de Aveiro and ESCE, Portugal
Lorna Uden	Staffordshire University, UK
Lubos Buzna	University of Žilina, Slovakia
Luis Elvas	Inov, Portugal
Marek Kvet	University of Žilina, Slovakia
Maria C. Pereira	Iscte-Instituto Universitário de Lisboa, Portugal
Michal Kohani	University of Žilina, Slovakia

Michal Kvet	University of Žilina, Slovakia
Miroslav Svitek	Czech Technical University in Prague, Czech Republic
Ossama Nazih	Université Ibn Tofail, Morocco
Pavan Kumar Mishra	National Institute of Technology, Raipur, India
Bruno Mataloto	Iscte-Instituto Universitário de Lisboa, Portugal
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
Rahul Sharma	TECMIC, Portugal
Rosaldo Rosseti	FEUP, Portugal
Tatiana Kováčiková	University of Žilina, Slovakia
Tomas Brandão	Iscte-Instituto Universitário de Lisboa, Portugal
Ulpan Tokkozhina	Iscte-Instituto Universitário de Lisboa, Portugal
Veronika Sramova	University of Žilina, Slovakia
Vincent Cicirello	Stockton University, USA
Vitor Monteiro	University of Minho, Portugal
Vitoria Albuquerque	Universidade Nova de Lisboa, Portugal
Yusuf Özçevik	Manisa Celal Bayar Üniversitesi, Turkey

Contents

Data Analytics