

*Commenced Publication in 1973*

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

## Editorial Board

David Hutchison

*Lancaster University, Lancaster, UK*

Takeo Kanade

*Carnegie Mellon University, Pittsburgh, PA, USA*

Josef Kittler

*University of Surrey, Guildford, UK*

Jon M. Kleinberg

*Cornell University, Ithaca, NY, USA*

Friedemann Mattern

*ETH Zurich, Zurich, Switzerland*

John C. Mitchell

*Stanford University, Stanford, CA, USA*

Moni Naor

*Weizmann Institute of Science, Rehovot, Israel*

C. Pandu Rangan

*Indian Institute of Technology, Madras, India*

Bernhard Steffen

*TU Dortmund University, Dortmund, Germany*

Demetri Terzopoulos

*University of California, Los Angeles, CA, USA*

Doug Tygar

*University of California, Berkeley, CA, USA*

Gerhard Weikum

*Max Planck Institute for Informatics, Saarbrücken, Germany*

More information about this series at <http://www.springer.com/series/7409>

Sheng-Lung Peng · Guan-Ling Lee  
Reinhard Klette · Ching-Hsien Hsu (Eds.)

# Internet of Vehicles

## Technologies and Services for Smart Cities


4th International Conference, IOV 2017  
Kanazawa, Japan, November 22–25, 2017  
Proceedings

*Editors*

Sheng-Lung Peng  
National Dong Hwa University  
Hualien  
Taiwan

Guan-Ling Lee  
National Dong Hwa University  
Hualien  
Taiwan

Reinhard Klette  
Auckland University of Technology  
Auckland, Auckland  
New Zealand

Ching-Hsien Hsu   
Chung Hua University  
Hsinchu  
Taiwan

ISSN 0302-9743                      ISSN 1611-3349 (electronic)  
Lecture Notes in Computer Science  
ISBN 978-3-319-72328-0              ISBN 978-3-319-72329-7 (eBook)  
<https://doi.org/10.1007/978-3-319-72329-7>

Library of Congress Control Number: 2017960874

LNCS Sublibrary: SL3 – Information Systems and Applications, incl. Internet/Web, and HCI

© Springer International Publishing AG 2017

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. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Printed on acid-free paper

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

# Preface

In the coming era of the Internet of Things, the Internet of Vehicles (IOV) plays an important role for constructing a smart city. It is a complex integrated network system, which connects different people within automotives, different automotives, and different environment entries in cities. IOV is different from telematics, vehicle ad hoc networks, and intelligent transportation, in which vehicles like phones can run within the whole network, and obtain various services by swarm intelligent computing with people, vehicles, and environments.

This volume contains the proceedings of the 4th International Conference on Internet of Vehicles (IOV 2017), which was held in Kanazawa, Japan, during November 22–25, 2017. We accepted a total of 19 high-quality papers from 40 submissions. IOV 2017 intended to play an important role for researchers and industry practitioners to exchange information regarding advancements in the state of art and practice of IOV architectures, protocols, services, and applications, as well as to identify emerging research topics and define the future directions of IOV. We believe that this volume not only presents novel and interesting ideas but will also stimulate interesting discussions from the participants and inspire new ideas.

The organization of conferences is hard work. It would not have been possible without the exceptional commitment of many expert volunteers. We would like to take this opportunity to extend our sincere thanks to all the authors, keynote speakers, TPC members, and reviewers. Special thanks go to the entire Local Arrangements Committee for their help in making the conference a success. We would also like to express our gratitude to all the organizations that supported our efforts to bring the conference to fruition. We are grateful to Springer for publishing the proceedings.

Last but not least, we hope that the participants not only enjoyed the technical program during this prestigious conference but also discovered many historical attractions in Kanazawa, in particular Kenrokuen Garden, one of Japan's "three best landscape gardens" to make their stay unforgettable. We wish you fruitful and enjoyable reading!

November 2017

Sheng-Lung Peng  
Reinhard Klette  
Ching-Hsien Hsu  
Guanling Lee

# Organization

## 2017 International Conference on Internet of Vehicles (IOV 2017)

### General Chairs

Mohammed Atiquzzaman	University of Oklahoma, USA
Jiannong Cao	The Hong Kong Polytechnic University, Hong Kong, SAR China
Chu-sing Yang	National Cheng Kung University, Taiwan

### General Executive Chairs

Tokuro Matsuo	Advanced Institute of Industrial Technology, Japan
Ching-Hsien Hsu	Chung Hua University, Taiwan

### Program Chairs

Reinhard Klette	Auckland University of Technology, New Zealand
Daxin Tian	Beihang University, China
Sheng-Lung Peng	National Dong Hua University, Taiwan

### International Liaison and Publicity Chairs

Andrzej M. J. Skulimowski	AGH University of Science and Technology, Poland
Jiong Jin	Swinburne University of Technology, Australia
Akihiko Tozawa	IBM Tokyo Research Laboratory, Japan
Atilla Elci	Aksaray University, Turkey
I-Chen Wu	National Chiao Tung University, Taiwan
Cong Wang	City University of Hong Kong, Hong Kong, SAR China
Domenico Ciuonzo	Network Measurement and Monitoring (NM2), Naples, Italy

### Advisory Committee

Hsiao-Hwa Chen	National Cheng Kung University, Taiwan
Sajal Das	Missouri University of Science and Technology, USA
Sumi Helal	University of Florida, USA

Chung-Ming Huang National Cheng Kung University, Taiwan

## **Workshop Chair**

Tzung-Shi Chen National University of Tainan, Taiwan

## **Special Session Chair**

Yao-Chung Chang National Taitung University, Taiwan

## **Award Chair**

Ruay-Shiung Chang National Taipei University of Business, Taiwan

## **Publication Chair**

Guanling Lee National Dong Hua University, Taiwan

## **Steering Committee**

Robert Hsu	Chung Hua University, Taiwan (Chair)
Shangguang Wang	BUPT, China
Victor C. M. Leung	The University of British Columbia, Canada
Mohammed Atiquzzaman	University of Oklahoma, USA

## **Technical Program Committee**

Carlos Calafate	Universidad Politecnica de Valencia, Spain
Mehmet Celenk	Ohio University, USA
Jyh-Biau Chang	University of Kang Ning, Taiwan
Yao-Chung Chang	National Taitung University, Taiwan
Yuan-Jen Chang	Central Taiwan University of Science and Technology, Taiwan
Min-Xiou Chen	National Dong Hwa University, Taiwan
Mu-Song Chen	Dayeh University, Taiwan
Thomas Chen	City University London, UK
Tzung-Shi Chen	National University of Tainan, Taiwan
Zhe Chen	Northeastern University, China
Woong Cho	Jungwon University, Korea
Domenico Ciuonzo	University of Naples Federico II, Italy
Massimiliano Comisso	University of Trieste, Italy
François-Xavier Coudoux	IEMN DOAE UVHC, France
Der-Jiunn Deng	National Changhua University of Education, Taiwan
Jana Dittmann	University of Magdeburg, Germany
Oscar Esparza	Universitat Politècnica de Catalunya, Spain
Esa Hytiä	Helsinki University of Technology, Finland

Han-Shin Jo	Hanbat National University, South Korea
Sokratis Katsikas	University of Piraeus, Greece
Georgios Kambourakis	University of the Aegean, Greece
Donghyun Kim	North Carolina Central University, USA
Constantine Kotropoulos	Aristotle University of Thessaloniki, Greece
Dimitrios Koukopoulos	University of Western Greece, Greece
Shujun Li	University of Surrey, UK
Chuan-Ming Liu	National Taipei University of Technology, Taiwan
Anthony Lo	Delft University of Technology, The Netherlands
Shou-Chih Lo	National Dong Hwa University, Taiwan
Miguel López-Benítez	University of Liverpool, UK
Xavier Masip	UPC, China
Natarajan Meghanathan	Jackson State University, USA
Enzo Mingozzi	University of Pisa, Italy
Nikolaos Papandreou	IBM Research - Zurich, Switzerland
Benoît Parrein	University of Nantes, French
Vincenzo Piuri	University of Milan, Italy
Christian Prehofer	Technical University of Munich, Germany
Luca Reggiani	Politecnico di Milano, Italy
Winston Seah	Victoria University of Wellington, New Zealand
Adão Silva	University of Aveiro/Instituto de Telecomunicações, Portugal
Ignacio Soto	UC3M, Spain
Razvan Stanica	INSA Lyon, France
Hung-Min Sun	National Tsing Hua University, Taiwan
Momin Uppal	LUMS School of Science and Engineering, Pakistan
Giacomo Verticale	Politecnico di Milano, Italy
Hao Wang	Norwegian University of Science and Technology, Norway
You-Chiun Wang	National Sun Yat-sen University, Taiwan
Jenq-Haur Wang	National Taipei University of Technology, Taiwan
Hung-Yu Wei	National Taiwan University, Taiwan
Bernd Wolfinger	Universität Hamburg, Germany



# Contents

Vehicular Communications: Standards and Challenges . . . . .	1
<i>Nian Xia and Chu-Sing Yang</i>	
Helmet-Mounted Display System of Motorcyclist with Collision Detecting and Navigation . . . . .	13
<i>Wen-Ching Chiu, Ping-Hsiao Hsieh, Wan-Lin Wu, and Chih-Lung Lin</i>	
Metaheuristic Algorithm of Multi-passengers Routing Path for Ride-Sharing Vehicle . . . . .	19
<i>Wei-Che Chien, Hsin-Hung Cho, Yao-Chung Chang, Chin-Feng Lai, and Han-Chieh Chao</i>	
A Rush-Hour Vehicles Scheduling Strategy in Online Car-Sharing System Based on Urban Trajectory Data Analysis . . . . .	31
<i>Xintong Wang, Zhihan Liu, and Yi Jia</i>	
Accurate Traffic Flow Estimation in Urban Roads with Considering the Traffic Signals . . . . .	41
<i>Yuan-Cheng Lai and Shun-Yi Huang</i>	
Performance Analysis and Modeling of Central Navigation Cloud . . . . .	53
<i>Zhiqiang Li, Yanheng Liu, Jian Wang, and Peng Zhou</i>	
Optimal Power Allocation for Multi-group Multicast Under Sensing-Based Spectrum Sharing Cognitive Radio Networks . . . . .	68
<i>Xiaoyu Li, Shouyi Yang, Xiaojuan Zhao, and Qing Cheng</i>	
A New Routing Protocol Based on OLSR Designed for UANET Maritime Search and Rescue . . . . .	79
<i>Yi Wu, Lei Xu, Xiao Lin, and Jie Fang</i>	
Multi-Task Oriented Participant Recruitment for Vehicular Crowdsensing . . . . .	92
<i>Wenlong Zong, Zhihan Liu, Shu Yang, Quan Yuan, and Fangchun Yang</i>	
Driving Fatigue Detecting Method Based on Temperature Insensitive ECG Parameters . . . . .	105
<i>Min Chen, Fengxi Li, Jianmei Lei, Zi Zeng, Qingwen Han, and Qian Chen</i>	

Communication Quality in Anticipatory Vehicle Swarms: A Simulation-Based Model . . . . .	119
<i>Andrzej M. J. Skulimowski and Arkadiusz Ćwik</i>	
A Cyber-Physical Systems Approach to Optimizing Internet of Vehicles Architecture with Rapidly Evolving Technology . . . . .	135
<i>David M. Curry and Cihan H. Dagli</i>	
Research on Finding Base Stations Related to a Specific Region. . . . .	144
<i>Hangman Wang, Xiaoqi Zhao, Zijie Xiong, and Yulong Wang</i>	
Intelligent Computing for Vehicle Form Design: A Case Study of Sand Making Machine. . . . .	154
<i>Feng Zheng, Chun-Chun Wei, Yang-Cheng Lin, Juan Du, and Jiacheng Yao</i>	
An Ad-Hoc Mesh Network for Flight-Deck Interval Management of Airplanes . . . . .	162
<i>Ichi Kanaya and Eri Itoh</i>	
TLS for Cooperative ITS Services. . . . .	176
<i>Mounira Msahli, Ahmed Serhrouchni, Houda Labiod, Arnaud Kaiser, and Brigitte Lonc</i>	
Distributed Simulation Platform for Autonomous Driving. . . . .	190
<i>Jie Tang, Shaoshan Liu, Chao Wang, and Chen Liu</i>	
Toward Fog-Based Event-Driven Services for Internet of Vehicles: Design and Evaluation. . . . .	201
<i>Yung-Li Hu, Chu-Yu Wang, Ching-Kai Kao, Shao-Yu Chang, David S. L. Wei, Yennun Huang, Ing-Yi Chen, and Sy-Yen Kuo</i>	
Theoretical Proving of Optimal Communication Radius Against Traffic Congestion in Simplified . . . . .	213
<i>Meng Jin, Yanheng Liu, Jian Wang, Zhao Liu, and Shaoqing Xu</i>	
<b>Author Index . . . . .</b>	<b>225</b>