Communications in Computer and Information Science

1101

Commenced Publication in 2007
Founding and Former Series Editors:
Phoebe Chen, Alfredo Cuzzocrea, Xiaoyong Du, Orhun Kara, Ting Liu,
Krishna M. Sivalingam, Dominik Ślęzak, Takashi Washio, Xiaokang Yang,
and Junsong Yuan

Editorial Board Members

Simone Diniz Junqueira Barbosa [0]

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

Rio de Janeiro, Brazil

Joaquim Filipe 10

Polytechnic Institute of Setúbal, Setúbal, Portugal

Ashish Ghosh

Indian Statistical Institute, Kolkata, India

Igor Kotenko

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

Lizhu Zhou

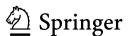
Tsinghua University, Beijing, China

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

Songtao Guo · Kai Liu · Chao Chen · Hongyu Huang (Eds.)

Wireless Sensor Networks

13th China Conference, CWSN 2019 Chongqing, China, October 12–14, 2019 Revised Selected Papers



Editors
Songtao Guo
Chongqing University
Chongqing, China

Chao Chen Chongqing University Chongqing, China Kai Liu

Chongqing University Chongqing, China

Hongyu Huang Chongqing University Chongqing, China

ISSN 1865-0929 ISSN 1865-0937 (electronic)
Communications in Computer and Information Science
ISBN 978-981-15-1784-6 ISBN 978-981-15-1785-3 (eBook)
https://doi.org/10.1007/978-981-15-1785-3

© Springer Nature Singapore Pte Ltd. 2019

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 Singapore Pte Ltd. The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Preface

The China Conference on Wireless Sensor Networks (CWSN) is the annual conference of CCF on Internet of Things (IoT). As a leading conference in the field of IoT, CWSN is the premier forum for IoT researchers and practitioners from academia, industry, and government in China to share their ideas, research results, and experiences, which highly promotes research and technical innovation in these fields domestically and internationally.

CWSN 2019 provided an academic exchange, research, and development forum for IoT researchers, developers, enterprises, and users to exchange ideas and experiences in IoT research and application. The conference also explored key challenges facing IoT research and application and research hotspots. As a high-level forum for the design, implementation, and application of IoT, CWSN 2019 aimed to promote the exchange and application of IoT theory and technology. Top experts at home and abroad presented special reports, and IoT-related companies showcased their latest technologies.

This year, CWSN received 158 submissions. After a thorough reviewing process, 31 English papers and 65 Chinese papers were selected for presentation as full papers. The high-quality program would not have been possible without the authors who chose CWSN 2019 as a venue for their publications. We are also very grateful to the members of the Program Committee and Organizing Committee, who put a tremendous amount of effort into soliciting and selecting research papers with a balance of high quality, new ideas, and new applications.

We hope that you enjoy reading and benefit from the proceedings of CWSN 2019.

October 2019 Songtao Guo

Organization

CWSN 2019 was organized by China Computer Federation, the Internet of Things Professional Committee of CCF and Chongqing University.

Organizing Committee

Conference Co-chairs

Jianzhong Li

China Computer Federation, China
Xiaofeng Liao

Chongqing University, China

Yuanyuan Yang The State University of New York at Stony Brook

America, USA

Conference Honorary Chair

Hao Dai Academician of Chinese Academy of Engineering,

China

Program Co-chairs

Huadong Ma Beijing University of Posts and Telecommunications,

China

Songtao Guo Chongqing University, China

Program Vice-chairs

Chao Chen Chongqing University, China Kai Liu Chongqing University, China Liang Feng Chongqing University, China

Chairmen of the Excellent Paper Awards

Xue Wang Tsinghua University, China

Li Cui Institute of Computing Technology, Chinese Academy

of Sciences, China

Chairmen of the Excellent Young Scholars Forum

Huadong Ma Beijing University of Posts and Telecommunications,

China

Limin Sun Institute of Information Engineering, Chinese Academy

of Sciences, China

Organizing Co-chairs

Tao Xiang Chongqing University, China Kunyin Guo Chongqing University, China

Organizing Committee

Weijie Shen Chongqing University, China Hongyu Huang Chongqing University, China

Chaochan Xiang Chinese People's Liberation Army Service Academy,

China

Guangchao Yang Chongqing University, China Huiwei Wang Southwest University, China Wang Ying Southwest University, China

Program Committee

Guangwei Bai Nanjing University of Technology, China

Ming Bao Institute of Acoustics, Chinese Academy of Sciences,

China

Qingsong Cai Beijing Technology and Business University, China

Shaobin Cai Huaqiao University, China

Bin Cao Harbin Institute of Technology and Shenzhen Graduate

School, China

Fanzai Zeng Hunan University, China Guihai Chen Nanjing University, China

Hong Chen Renmin University of China, China
Jiaxing Chen Hebei Normal University, China

Xi Chen National Grid Information and Communication Branch,

China

Xiaojiang Chen Northwest University, School of Information, China

Yongle Chen Taiyuan University of Technology, China Zhikui Chen Dalian University of Technology, China Li Cui Chinese Academy of Sciences, China

Xunxue CuiArmy Officer School, ChinaZhidong DengTsinghua University, ChinaWei DongZhejiang University, China

Hongwei Du Harbin Institute of Technology and Shenzhen Graduate

School, China

Dingyi Fang Northwest University, China

Xiufang Feng Taiyuan University of Technology, China Deyun Gao Beijing Jiaotong University, China Hong Gao Harbin Institute of Technology, China

Jibin Gong Yan Shan University, China
Songtao Guo Chongqing University, China
Zhongwen Guo China Ocean University, China
Guangjie Han Hohai University, China

Yanbo Han Institute of Data Engineering and North China

University of Technology, China st China Normal University China

Daojing He East China Normal University, China Shibo He Zheijang University, China

Chengquan Hu

Yanjun Hu

Zhejiang University, Chira

Jilin University, Chira

Anhui University, Chira

Qiangsheng Hua Huazhong University of Science and Technology,

China

He Huang Suzhou University, China

Liusheng Huang China University of Science and Technology, China Hongbo Jiang Huazhong University of Science and Technology,

China

Qi Jing Peking University, School of Software

and Microelectronics, China

Bo Jing Air Force Engineering University, China
Deying Li Renmin University of China, China
Fan Li Beijing Institute of Technology, China
Fangmin Li Wuhan University of Technology, China

Guanghui Li Jiangnan University, China

Guorui Li Northeastern University Qinhuangdao Branch, China Hongwei Li University of Electronic Science and Technology,

China

Jianbo Li Qingdao University, China

Jianzhong Li Harbin Institute of Technology, China Jinbao Li Heilongjiang University, China Minglu Li Shanghai Jiaotong University, China

Renfa Li Hunan University, China

Shining Li Northwestern Polytechnical University, China

Xiangyang Li University of Science and Technology of China, China

Zhetao Li Xiangtan University, China

Liang Hongbin Southwest Jiaotong University, China

Yongzhen Liang Changzhou University, China

Wei Liang Institute of Chinese Academy of Sciences Shenyang

Institute of Automation, China

Yaping Lin Hunan University, China

Jiajia Liu Xi'an University of Electronic Science

and Technology, China

Liang Liu Beijing University of Posts and Telecommunications,

China

Min Liu Institute of Computing Technology, Chinese Academy

of Sciences, China

Xingcheng Liu Zhongshan University, China
Yunhao Liu Tsinghua University, China
Xiang Liu Peking University, China
Zhaohua Long Chongqing University of Posts
and Telecommunications, China

Juan Luo Hunan University, China

Huadong Ma Beijing University of Posts and Telecommunications,

China

Li Ma North Industrial University, China

Jianwei Niu Beijing University of Aeronautics and Astronautics,

China

Xiaoguang Niu Wuhan University, China Jian Peng Sichuan University, China Peng Li Jiangnan University, China

Shaoliang Peng National University of Defense Technology, China Wangdong Qi PLA University of Science and Technology, China

Fengyuan Ren Tsinghua University, China Shikai Shen Kunming University, China

Yulong Shen Xi'an University of Electronic Science

and Technology, China

Jian Shu Nanchang Aviation University, China

Lijuan Sun Nanjing University of Posts and Telecommunications,

China

Limin Sun Institute of information Engineering, Chinese Academy

of Sciences, China

Dan Tao Beijing Jiaotong University, China

Liqin Tian North China Institute of Science and Technology,

China

Yang Wang China University of Science and Technology, China Kun Wang Nanjing University of Posts and Telecommunications,

China

Lei Wang Dalian University of Technology, China

Liangmin Wang

Ping Wang

Chongqing University, China

Chongqing University of Posts

and Telecommunications, China

Chuanchuan Wang Nanjing University of Posts and Telecommunications,

China

Xiaoming Wang Shaanxi Normal University, China

Xiaodong Wang National University of Defense Technology, China

Xinbing Wang Shanghai Jiaotong University, China

Xue Wang Tsinghua University, China

Yiding Wang North China University of Technology, China

Yuexuan Wang Tsinghua University, China Zhibo Wang Wuhan University, China Zhi Wang Zhejiang University, China

Zhu Wang Harbin Institute of Technology, China
Wei Wei Xi'an University of Technology, China
Xingjun Wu Tsinghua Tongfang Microelectronics, China

Xiaojun Wu Shaanxi Normal University, China

Deqin Xiao South China Agricultural University, China

Fu Xiao Nanjing University of Posts and Telecommunications,

China

Kun Xie Hunan University, China

Yongping Xiong Beijing University of Posts and Telecommunications,

China

Guangtao Xue Shanghai Jiaotong University, China

Geng Yang Nanjing University of Posts and Telecommunications,

China

Weidong Yang Henan University of Technology, China

Weidong Yi University of Chinese Academy of Sciences, China

Ruiyun Yu Northeast University, China Jiguo Yu Qufu Normal University, China Shigeng Zhang Central South University, China

Shuqin Zhang Zhongyuan Institute of Technology, China

Yunzhou Zhang Northeastern University, China

Junhui Zhao East China Jiaotong University, China

Zenghua Zhao Tianjin University, China

Jiping Zheng Nanjing University of Aeronautics and Astronautics,

China

Hongzi Zhu Shanghai Jiaotong University, China Hongsong Zhu Chinese Academy of Sciences, China Yihua Zhu Zhejiang University of Technology, China Liehuang Zhu Beijing Institute of Technology, China

Shihong Zou Beijing University of Posts and Telecommunications,

China

Wei Chen Beijing Jiaotong University, China

Haiming Chen Ningbo University, China

Honglong Chen China University of Petroleum (East China), China

Xu Chen Zhongshan University, China

Silao Cheng Harbin Institute of Technology, China
Kaikai Chi Zhejiang University of Technology, China
Xiaochao Dang Northwest Normal University, China
Guangsheng Feng Harbin Engineering University, China

Zhitao Guan North China Electric Power University, China

Zhanjun Hao Northwest Normal University, China
Jie Jia Northeastern University, China
Feng Li Shandong University, China
Jie Li Northeastern University, China

Yanjun Li Zhejiang University of Technology, China Zhuo Li Beijing Information Science and Technology

University, China

Tie Qiu Dalian University of Science and Technology, China

Yiran Shen Harbin Engineering University, China Xiaoxia Song Shanxi Datong University, China Xiaohua Tian Shanghai Jiaotong University, China Qingshan Wang Hefei University of Technology School

of Mathematics, China

Tian Wang Huaqiao University, China

Hejun Wu Zhongshan University, China Ling Xiao Hunan University, China Lei Xie Nanjing University, China

Yuan Yan China Internet of Things Research and Development

Center, China

Guisong Yang University of Shanghai for Science and Technology,

China

Zuwei Yin PLA Information Engineering University, China Ju Zhang PLA (People's Liberation Army) of China,

Branch 61785, China

Lei Zhang Tianjin University, China

Shaanxi Normal University, China Zhang Hunan Normal University, China Taiyuan University of Technology, China

Anfu Zhou Beijing University of Posts and Telecommunications,

China

Changbing Zhou China University of Geosciences, China

Organizers

Lichen Zhang

Lianming Jumin Zhao

Organized by



China Computer Federation, China

Co-organized by

The Internet of Things Professional Committee of CCF

Hosted by

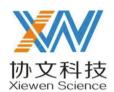


Chongqing University

Sponsoring Institutions



Huawei Technologies Co., Ltd.



Chongqing Xiewen Science Co., Ltd.



Beijing Qi'anxin Technology Co., Ltd.



Inspur Group



Chongqing University of Posts and Telecommunications



Wuxi Tsinghua Internet of Things Center





Zhongzhixun (Wuhan) Technology Co., Ltd. Chongqing Bingrun Technology Co., Ltd.

Contents

Fundamentals on Internet of Things	
Improving the Scalability of LoRa Networks Through Dynamical Parameter Set Selection	3
A Weighted Voronoi Diagram Based Self-deployment Algorithm for Heterogeneous Mobile Sensor Network in Three-Dimensional Space Li Tan, Xiaojiang Tang, Minghua Yang, and Haoyu Wang	19
Joint Uplink and Downlink Optimization for Resource Allocation Under D2D Communication Networks Di He, Guangsheng Feng, Bingyang Li, Hongwu Lv, Huiqiang Wang, and Quanming Li	35
FaLQE: Fluctuation Adaptive Link Quality Estimator for Wireless Sensor Networks	48
Rate Adaptive Broadcast in Internet of Things	61
An IOT Data Collection Mechanism Based on Cloud-Edge Coordinated Deep Learning	76
A Malicious Anchor Detection Algorithm Based on Isolation Forest and Sequential Probability Ratio Testing (SPRT)	90
Noisy Data Gathering in Wireless Sensor Networks via Compressed Sensing and Cross Validation	101
Fuzzy-K: Energy Efficient Fuzzy Clustering Routing Protocol Based on Cross-Technology Communication in Wireless Sensor Network	112
An Improved Method of Pending Interest Table in Named	125

Peiyuan Gu, Yabin Xu, and Tian Song

Applications on Internet of Things

Real-Time Bridge Structural Condition Evaluation Based on Data	1.42
Compression. Jingpei Dan, Ling Liu, Yuming Wang, Junji Chen, and Xia Huang	143
Task Assignment Algorithm Based on Social Influence in Mobile Crowd Sensing System	154
A Barrier Coverage Enhancement Algorithm in 3D Environment	169
Sensor-Cloud Based Precision Sprinkler Irrigation Management System Mingzheng Zhang, Shuming Xiong, and Liangmin Wang	184
Deep Memory Network with Auxiliary Sequences for Chinese Implied Sentiment Analysis	198
Intelligent Traffic Light System for High Priority Vehicles	212
Personalized Recommendation Based on Tag Semantics in the Heterogeneous Information Network	224
High-Quality Learning Resource Dissemination Based on Opportunistic Networks in Campus Collaborative Learning Context	236
IntelliSense, Location and Tracking	
Integrated Redundant APs Reduction and Transfer Learning for Indoor WLAN Intrusion Detection via Link-Layer Data Transformation	251
A Near-Optimal Heterogeneous Task Allocation Scheme for Mobile Crowdsensing	263
A Lightweight Neural Network Localization Algorithm for Structureless Wireless Sensor Networks	275

	Contents	xvii
A Fast Offline Database Construction Mechanism for Wi-Fi Finge Based Localization Using Ultra-Wideband Technology	*	289
A Moving Target Trajectory Tracking Method Based on CSI Zhanjun Hao, Lihua Yan, and Xiaochao Dang		302
A CSI-Based Indoor Intrusion Detection and Localization Method Xiaochao Dang, Caixia Li, Zhanjun Hao, and Yuan Cao		317
Wi-SD: A Human Motion Recognition Method Based on CSI Am and Phase Information	•	332
Data-Quality-Aware Participant Selection Mechanism for Mobile Crowdsensing		348
Infrared Small Target Detection Based on Facet-Kernel Filtering Local Contrast Measure		360
Author Index		369