

# Advances in Intelligent Systems and Computing

Volume 1122

## Series Editor

Janusz Kacprzyk, Systems Research Institute, Polish Academy of Sciences,  
Warsaw, Poland

## Advisory Editors

Nikhil R. Pal, Indian Statistical Institute, Kolkata, India

Rafael Bello Perez, Faculty of Mathematics, Physics and Computing,  
Universidad Central de Las Villas, Santa Clara, Cuba

Emilio S. Corchado, University of Salamanca, Salamanca, Spain

Hani Hagras, School of Computer Science and Electronic Engineering,  
University of Essex, Colchester, UK

László T. Kóczy, Department of Automation, Széchenyi István University,  
Gyor, Hungary


Vladik Kreinovich, Department of Computer Science, University of Texas  
at El Paso, El Paso, TX, USA

Chin-Teng Lin, Department of Electrical Engineering, National Chiao  
Tung University, Hsinchu, Taiwan

Jie Lu, Faculty of Engineering and Information Technology,  
University of Technology Sydney, Sydney, NSW, Australia

Patricia Melin, Graduate Program of Computer Science, Tijuana Institute  
of Technology, Tijuana, Mexico

Nadia Nedjah, Department of Electronics Engineering, University of Rio de Janeiro,  
Rio de Janeiro, Brazil

Ngoc Thanh Nguyen , Faculty of Computer Science and Management,  
Wrocław University of Technology, Wrocław, Poland

Jun Wang, Department of Mechanical and Automation Engineering,  
The Chinese University of Hong Kong, Shatin, Hong Kong

The series “Advances in Intelligent Systems and Computing” contains publications on theory, applications, and design methods of Intelligent Systems and Intelligent Computing. Virtually all disciplines such as engineering, natural sciences, computer and information science, ICT, economics, business, e-commerce, environment, healthcare, life science are covered. The list of topics spans all the areas of modern intelligent systems and computing such as: computational intelligence, soft computing including neural networks, fuzzy systems, evolutionary computing and the fusion of these paradigms, social intelligence, ambient intelligence, computational neuroscience, artificial life, virtual worlds and society, cognitive science and systems, Perception and Vision, DNA and immune based systems, self-organizing and adaptive systems, e-Learning and teaching, human-centered and human-centric computing, recommender systems, intelligent control, robotics and mechatronics including human-machine teaming, knowledge-based paradigms, learning paradigms, machine ethics, intelligent data analysis, knowledge management, intelligent agents, intelligent decision making and support, intelligent network security, trust management, interactive entertainment, Web intelligence and multimedia.

The publications within “Advances in Intelligent Systems and Computing” are primarily proceedings of important conferences, symposia and congresses. They cover significant recent developments in the field, both of a foundational and applicable character. An important characteristic feature of the series is the short publication time and world-wide distribution. This permits a rapid and broad dissemination of research results.

**\*\* Indexing: The books of this series are submitted to ISI Proceedings, EI-Compendex, DBLP, SCOPUS, Google Scholar and Springerlink \*\***

More information about this series at <http://www.springer.com/series/11156>

Neeta Nain · Santosh Kumar Vipparthi  
Editors

# 4th International Conference on Internet of Things and Connected Technologies (ICIoTCT), 2019

Internet of Things and Connected  
Technologies

 Springer

*Editors*

Neeta Nain  
Department of Computer Science  
and Engineering  
Malaviya National Institute of Technology  
Jaipur, Rajasthan, India

Santosh Kumar Vipparthi  
Department of Computer Science  
and Engineering  
Malaviya National Institute of Technology  
Jaipur, Rajasthan, India

ISSN 2194-5357

ISSN 2194-5365 (electronic)

Advances in Intelligent Systems and Computing

ISBN 978-3-030-39874-3

ISBN 978-3-030-39875-0 (eBook)

<https://doi.org/10.1007/978-3-030-39875-0>

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Switzerland AG 2020

This work is subject to copyright. All rights are solely and exclusively licensed 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

# ICIoTCT 2019 Preface

ICIoTCT is a platform to discuss advances in the Internet of Things (IoT) and Connected Technologies (various protocols, standards, etc.). The recent adoption of a variety of enabling wireless communication technologies like RFID tags, BLE, ZigBee, etc. and embedded sensor and actuator nodes, and various protocols like CoAP, MQTT, DNS, etc. has made IoT to step out of its infancy.

Now smart sensors can collaborate directly with the machine without human involvement to automate decision making or to control a task. Smart technologies including green electronics, green radios, fuzzy neural approaches and intelligent signal processing techniques play important roles for the developments of the wearable health care systems. This conference aims at providing a forum to discuss the recent advances in enabling technologies and applications for IoT.

In addition to the main track, several special sessions were collocated with the conference, covering a wide range of related topics:

- Internet of Things: Modeling and Framework
- Internet of Things: Advances and Applications
- Internet of Things: Hardware and Architecture Dependencies
- Advances in Computational Intelligence, Computer Vision and Cloud Computing
- Recent Trends and Application in Science, Engineering and Health Care
- Security for IoT-Enabled Web, Big Data and Cloud Services
- Related Trends and Services in IoT and Conventional Technologies

About 105 original submissions were received from around the world. A total of 41 papers are selected for presentation and publication in the conference proceedings. In order to maintain high quality, a peer review process was carried out by each special session and conference. Each paper received at least two, and several received up to five reviews. The papers are evaluated on their relevance to special sessions or main conference topics, scientific correctness and clarity of presentation.

The success of the conference owes to the dedication of many who have contributed in many different ways to select a fine scientific mix of papers and exciting social events for the conference program. First, we acknowledge the commitment and hard work of the special session and chairs who have kept the scientific

program in focus and made the discussions interesting and invaluable. We recognize the commitment and contributions of the program committee members and the extra reviewers for evaluating the papers on a very tight time schedule. We could not have done it without them.

Next, our heartfelt gratitude goes to our academic sponsor institutions for their cooperation, support and assistance: Malaviya National Institute of Technology Jaipur, India, Center for Global Management, California State University, San Bernardino, and research group at IAASSE, USA. Most importantly, we thank the authors for submitting and trusting their work to the conference.

We thank the Conference Honorary Chair, Prof. Udaykumar R Yaragatti (Director, MNIT Jaipur). We are most grateful to our Keynote Speakers Dr. Kumar Padmanabh, Senior Scientist in a research laboratory of British Telecom in Abu Dhabi, and Prof. Nishchal Kumar Verma, IIT Kanpur, for their enlightening talks and support. Last, we thank all the members of the local organizing committee. We hope the scientific program of ICIoTCT 2019 lives up to your expectations. In addition to the scientific program, we really hope that you found time to discover and appreciate the beautiful sights and events in and around Jaipur.

Neeta Nain  
Santosh Kumar Vipparthi  
General Chairs

# Organization

## Program Chairs

Neeta Nain

Malaviya National Institute of Technology  
Jaipur, India

Santosh Kumar Vipparthi

MNIT Jaipur, India

# ICIoTCT2019 Acknowledgements



Malaviya National Institute of Technology Jaipur, India



Center for Global Management, California State University, San Bernardino



International Association of Academicians (IAASSE), CA, USA



# Contents

<b>A Structural Feature Based Automatic Vehicle Classification System at Toll Plaza</b> . . . . .	1
Vivek Singh, Amish Srivastava, Snehal Kumar, and Rajib Ghosh	
<b>Classification of Chronic Kidney Disease with Genetic Search Intersection Based Feature Selection Technique</b> . . . . .	11
Sanat Kumar Sahu and Prem Kumar Chandrakar	
<b>Analysis of Wormhole Detection Features in Wireless Sensor Networks</b> . . . . .	22
Manish Patel, Akshai Aggarwal, and Nirbhay Chaubey	
<b>Propagating Minimal Messages Using Multi Set-Cover in Wireless Ad-Hoc Network</b> . . . . .	30
Sadia Sharmin	
<b>Multi Header Based Ultra Low Power MTCMOS Technique to Reduce NBTI Effect in Combinational Circuit</b> . . . . .	44
Anjan Kumar, Shelesh Krishna Saraswat, Preeti Agrawal, and Shweta Singh	
<b>Task Allocation in Distributed Real Time Database Systems in IoT</b> . . . . .	54
Shetan Ram Choudhary and C. K. Jha	
<b>Optimization of Block Diagonalization for MU-MIMO Downlink System Using PSO</b> . . . . .	69
Archana Doneriya, Manish Panchal, and Jaya Dipti Lal	
<b>Simulation Analysis of DDoS Attack in IoT Environment</b> . . . . .	77
Vikash Kumar, Vivek Kumar, Ditipriya Sinha, and Ayan Kumar Das	
<b>Blockchain Application Framework for Priority Metric Based Academic Record Repository</b> . . . . .	88
Ajita Banerjee, Arman Singhal, Lokesh Gujral, and Kavita Choudhary	

<b>Design of Attribute Based Authenticated Group Key Agreement Protocol Without Pairing</b> .....	95
Reshu Verma and Abhimanyu Kumar	
<b>A Pairing Free Attribute-Based Authenticated Key Agreement Protocol Using ECC</b> .....	105
Reshu Verma and Abhimanyu Kumar	
<b>Analysis of MEMS and Metamaterial Based Sensors and Its Involvement in Nanotechnology</b> .....	115
Bhupendra Sharma, Shraddha Gupta, Ashwani Yadav, and Rahul Runthala	
<b>High Gain Patch Array Antenna for 5G Network Communication and IoT Applications</b> .....	126
Kishana Ram Kashwan	
<b>Authentication and Privacy Preservation in IoT Based Forest Fire Detection by Using Blockchain – A Review</b> .....	133
Sreemana Datta, Ayan Kumar Das, Abhijeet Kumar, Khushboo, and Ditipriya Sinha	
<b>An IoT Based Agri-Cloud Architectural Framework for Monitoring Presence of Fertilizer Under Multilayered Soil Farming</b> .....	144
Nikhil V. Bhende, Jayant K. Purohit, and Anup A. Junankar	
<b>Analysis of Web Usage Patterns to Identify Most Frequently Accessed Web Page by Multiple Users</b> .....	151
Priyanka Verma and Nishtha Kesswani	
<b>A Composite Technique to Fortify Security for DaaS Services in Cloud Environment</b> .....	160
Samarjeet Yadav, Pratishtha Saxena, Neelam Dayal, and Shiv Prakash	
<b>Performance of Dual-Input Storage Based Induction Motor Drive for Electric and Fuel Cell Hybrid Electrical Vehicle Applications</b> .....	170
Narayan Yadav, Sushma Gupta, and Tripta Thakur	
<b>A Lightweight Authentication Scheme for RFID Using ECC</b> .....	177
Atul Kumar and Ankit Kumar Jain	
<b>Lean and Industry 4.0 Strive to Create Smart Factory Through Integration of Systems: An Exploratory Review</b> .....	184
Hardik Majiwala, Suresh Sharma, and Pankaj Gandhi	
<b>User Authentication in VANET Using SGSK (Self Generated Session Key)</b> .....	196
Lal Singh and Ram Bahadur Patel	

<b>Grid Scrutinize Based Heuristic Sensor Node Scheduling Protocol with Partial Coverage Constraint in WSN</b> .....	204
Anamika Sharma and Siddhartha Chauhan	
<b>Intensity Transformation Fusion of Landsat 8 Thermal Infrared (TIR) Imagery</b> .....	214
Kul Vaibhav Sharma, Sumit Khandelwal, and Nivedita Kaul	
<b>Efficient Spectrum Provisioning in Elastic Optical Networks</b> .....	221
Neha Mahala and Jaisingh Thangaraj	
<b>Intrusion Detection and Prevention Mechanism Implemented Using NS-2 Based on State Context and Hierarchical Trust in WSNs</b> .....	229
Abhishek Vyas and Satheesh Abimannan	
<b>Hardware Design of <math>8 \times 8</math> and <math>16 \times 16</math> 2D Discrete Cosine Transform with N/2 Equations for Image Compression</b> .....	241
Nikhil C. Bichwe and Rahul Kumar Chaurasiya	
<b>Security and Efficiency Analysis of Anti-jamming Techniques</b> .....	251
S. Kshipra Prasad and Sumit Kumar Jindal	
<b>Generalized Dynamic Multilayer Fog Computing Architecture</b> .....	260
K. P. Arjun and S. Mary Saira Bhanu	
<b>An Efficient Quantum Key Management Scheme</b> .....	269
Vishal and S. Taruna	
<b>Privacy Threat Model for IoT</b> .....	278
Shelendra Kumar Jain and Nishtha Kesswani	
<b>IoT Based Smart Luggage Monitor Alarm System</b> .....	294
Sowmya Valluripally, Deepak Sukheja, Kriti Ohri, and Suyash K. Singh	
<b>Text Steganography Based on Parallel Encryption Using Cover Text (PECT)</b> .....	303
Subhash Panwar, Mukesh Kumar, and Sakshi Sharma	
<b>Intelligence in Station-of-Things</b> .....	314
Soumya Saha, Tejashree Bhave, and Manisha Nene	
<b>Mathematical Modeling and Numerical Simulation of a Double Touch-Mode Pressure Sensor with Graphene as the Sensing Element</b> .....	321
Smiti Tripathy, Shiyona Dash, and Sumit Kumar Jindal	
<b>Quality Evaluation Model for Multimedia Internet of Things (MIoT) Applications: Challenges and Research Directions</b> .....	330
Malaram Kumhar, Gaurang Raval, and Vishal Parikh	

**A Study of Intrusion Detection System in Wireless Sensor Network . . . 337**  
Atul Agarwal and Narottam Chand Kaushal

**Energy Oriented Routing in Wireless Sensor Networks:  
Hardware Implementation . . . . . 344**  
Dipanshu and A. Nagaraju

**Text Detection Using Maximally Stable External Regions  
and Stroke Width Variation . . . . . 358**  
Nishant Singh, Vivek Kumar, and Charul Bhatnagar

**Digital Image Steganography Using Modified LSB  
and AES Cryptography . . . . . 366**  
Subhash Panwar, Mukesh Kumar, and Sakshi Sharma

**Design and Implementation of AES on FPGA for Security  
of IOT Data . . . . . 376**  
Dinesh B. Bhojar, Shelly R. Wankhede, and Swati K. Modod

**Author Index . . . . . 385**