# 2019 IEEE International Congress on Internet of Things (ICIOT 2019)

Milan, Italy 8 – 13 July 2019



IEEE Catalog Number: ISBN: CFP19L49-POD 978-1-7281-2715-6

#### **Copyright © 2019 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved**

*Copyright and Reprint Permissions*: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

#### \*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

IEEE Catalog Number:	CFP19L49-POD
ISBN (Print-On-Demand):	978-1-7281-2715-6
ISBN (Online):	978-1-7281-2714-9

#### Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA Phone: (845) 758-0400 Fax: (845) 758-2633 E-mail: curran@proceedings.com Web: www.proceedings.com



# 2019 IEEE International Congress on Internet of Things (ICIOT) ICIOT 2019

## **Table of Contents**

IEEE SERVICES 2019 Organizing Committee ix
Message from the IEEE SERVICES 2019 Steering Committee Chair _xii
Message from the IEEE SERVICES 2019 Congress General Chair xiii
Message from the IEEE SERVICES 2019 Program Chair-in-Chief and Vice Program
Chair-in-Chief _xiv
Message from the IEEE SERVICES 2019 Symposia Chairs xv
Message from the Technical Committee Chair on Services Computing xvi
Message from the IEEE ICIOT 2019 Chairs xvii
IEEE ICIOT 2019 Program Committee xviii
IEEE ICIOT 2019 Reviewers xx

#### **Session 1: Discovery**

Confidential Discovery of IoT Devices through Blockchain .1 Christian Rondanini (University of Insubria), Barbara Carminati (University of Insubria), and Elena Ferrari (University of Insubria)
Automated Detection of Rule Conflicts for Enterprise IoT .9 Mari Abe (IBM), Gaku Yamamoto (IBM), Sanehiro Furuichi (IBM), and Kazuhito Akiyama (IBM)
How to Discover IoT Devices When Network Traffic Is Encrypted .1.7 Enriquillo Valdez (IBM Research), Dimitrios Pendarakis (IBM Systems), and Hani Jamjoom (IBM Research)
Session 2: Networking
LoRa Network Planning: Gateway Placement and Device Configuration .25 Behnam Ousat (University of Calgary) and Majid Ghaderi (University of Calgary)
A Blockchain-Based Architecture for Traffic Signal Control Systems .33
Delaware), and Rui Zhang (University of Delaware)

CoAP Accelerator in Programmable Logic for Processor-Constrained Devices .50..... Lucas R.B. Brasilino (Indiana University) and Martin Swany (Indiana University)

#### **Session 3: Architecture**

- Advances in Deployment and Orchestration Approaches for IoT A Systematic Review .53..... Phu Nguyen (SINTEF), Nicolas Ferry (SINTEF), Gencer Erdogan (SINTEF), Hui Song (SINTEF), Stéphane Lavirotte (University Côte d'Azur), Jean-Yves Tigli (University Côte d'Azur), and Arnor Solberg (TelluloT)
- A Strategic Game for Task Offloading among Capacitated UAV-Mounted Cloudlets .61..... Weibin Ma (University of Delaware), Xuanzhang Liu (University of Delaware), and Lena Mashayekhy (University of Delaware)
- An Extensible Approach for Integrating Health and Activity Wearables in Mobile IoT Apps .69...... Ilse Bohé (KU Leuven), Michiel Willocx (KU Leuven), and Vincent Naessens (KU Leuven)
- ActSen Al-Enabled Real-Time IoT-Based Ergonomic Risk Assessment System .7.6..... Jia Xin Low (Nanyang Polytechnic), Yongmei Wei (Nanyang Polytechnic), Joshua Chow (Nanyang Polytechnic), and Iskandar F.B. Ali (Nanyang Polytechnic)

Designing the GDPR Compliant Consent Procedure for Personal Information Collection in the IoT Environment .79..... Goo Yeon Lee (Kangwon National University), Kyung Jin Cha (Kangwon

National University), and Hwa Jong Kim (Kangwon National University)

#### **Session 4: Security and Safety**

Detection of Anomalous Behavior in Wireless Devices Using Changepoint Analysis .82..... Ricardo Manzano (University of Waterloo), Abdurhman Albasir (University of Waterloo), Kshirasagar Naik (University of Waterloo), Jim Kozlowski (Cistech Limited), and Nishith Goel (Cistech Limited)

Authorization Transparency for Accountable Access to IoT Services .91..... Luca Ferretti (University of Modena and Reggio Emilia), Francesco Longo (University of Messina), Michele Colajanni (University of Modena and Reggio Emilia), Giovanni Merlino (University of Messina), and Nachiket Tapas (University of Messina)

A Model-Based Approach for the Design of Cyber-Physical Human Systems Emphasizing Human Concerns .1.00..... Christos Kotronis (Harokopio University of Athens), Ioannis Routis (Harokopio University of Athens), Anargyros Tsadimas (Harokopio University of Athens). Mara Nikolaidou (Harokopio University of

Athens), and Dimosthenis Anagnostopoulos (Harokopio University of Athens)

#### **Session 5: Applications**

Forecasting Building Energy Consumption with Deep Learning: A Sequence to Sequence Approach .108 Ljubisa Sehovac (Western University), Cornelius Nesen (Western University), and Katarina Grolinger (Western University)
Improving the Accuracy of Outdoor Temperature Prediction by IoT Devices .1.1.7 Nevena Golubovic (University of California, Santa Barbara), Rich Wolski (University of California, Santa Barbara), Chandra Krintz (University of California, Santa Barbara), and Markus Mock (University of Applied Sciences, Landshut)
A Prediction-Optimization Framework for Site-Wide Process Optimization .125 Dharmashankar Subramanian (IBM Research), Pavankumar Murali (IBM Research), Nianjun Zhou (IBM Research), Xiang Ma (IBM Services), Giovane Cesar Da Silva (IBM Services), Raju Pavuluri (IBM Research), and Jayant Kalagnanam (IBM Research)
Automating Energy Demand Modeling and Forecasting Using Smart Meter Data .1.33 Poojitha Amin (ARM Research), Ludmila Cherkasova (ARM Research), Rob Aitken (ARM Research), and Vikas Kache (ARM Inc.)
Session 6: Algorithms
Profiling-Based Classification Algorithms for Security Applications in Internet of Things .1.38 Eunil Seo (Sungkyunkwan University), Hyoungshick Kim (Sungkyunkwan University), and Tai-Myoung Chung (Sungkyunkwan University)
Advancements towards Global IoT Device Discovery and Integration .147 Anas Dawod (University of Melbourne), Dimitrios Georgakopoulos (Swinburne University of Technology), Prem Prakash Jayaraman (Swinburne University of Technology), and Ampalavanapillai Nirmalathas (University of Melbourne)

### **Session 7: Privacy and Security**

Adapting Users' Privacy Preferences in Smart Environments .1.65.... Md. Zulfikar Alom (University of Insubria), Barbara Carminati (University of Insubria), and Elena Ferrari (University of Insubria)

Privacy and Security in Internet-Connected Cameras .1.73 Junia Valente (University of Texas at Dallas), Keerthi Koneru (University of California, Santa Cruz), and Alvaro Cardenas (University of California, Santa Cruz)
How Secure Is Your IoT Network? .18.1 Josh Payne (Stanford University), Karan Budhraja (University of Maryland, Baltimore County), and Ashish Kundu (IBM Thomas J. Watson Research Center)
On the Bulk Ingestion of IoT Devices from Heterogeneous IoT Brokers .189 Sara Bonfitto (University of Milano), Fatima Hachem (University of Milano), Elefelious Getachew Belay (University of Milano), Stefano Valtolina (University of Milano), and Marco Mesiti (University of Milano)

Author Index 197