2020 IEEE 6th World Forum on Internet of Things (WF-IoT 2020)

New Orleans, Louisiana, USA 2 – 16 June 2020



IEEE Catalog Number: CFP2018V-POD **ISBN:**

978-1-7281-5504-3

Copyright © 2020 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: | CFP2018V-POD |
|-------------------------|-------------------|
| ISBN (Print-On-Demand): | 978-1-7281-5504-3 |
| ISBN (Online): | 978-1-7281-5503-6 |

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



Technical Program

Opening and Welcome

Opening and Welcome

Conference Co-Chair: Magdy Bayoumi & Adam Drobot

S1: IoT Enabling Technologies

S1.1: IoT Enabling Technologies Session Chairs: Prasanth Yanambak & Mahmoud Darwich

1028: Witness-Based Approach for Scaling Distributed Ledgers to Massive IoT Scenarios...1

Duc Lam Nguyen, Aalborg University, Denmark Israel Leyva-Mayorga, Aalborg University, Denmark Petar Popovski, Aalborg University, Denmark

1037: Low-Cost UFSOOK-Based Optical Camera Communication Link for IoT Applications...7

Abdelbaset Hamza, Appalachian State University, United States Tyler Tripp, Appalachian State University, United States Benjamen Underwood, Appalachian State University, United States Rahman Tashakkori, Appalachian State University, United States

1103: A New Mobility Aware Duty Cycling and Dynamic Preambling Algorithm for Wireless Sensor Network...13

Craig Thomson, Edinburgh Napier University, United Kingdom Isam Wadhaj, Edinburgh Napier University, United Kingdom Ahmed Al-Dubai, Edinburgh Napier University, United Kingdom Zhiyuan Tan, Edinburgh Napier University, United Kingdom

1130: Data Rate Enhancement for IEEE 802.15.4 Based FSK Transmission Scheme...19

Yueying Xiang, Kyoto University, Japan Ryota Okumura, Kyoto University, Japan Keiichi Mizutani, Kyoto University, Japan Hiroshi Harada, Kyoto University, Japan

1137: Coexistence of Synchronous and Asynchronous MAC Protocols for Wireless IoT Systems in Sub-Gigaherz Band...25

Kiyoshi Mizutani, Kyoto University, Japan Ryota Okumura, Kyoto University, Japan Keiichi Mizutani, Kyoto University, Japan Hiroshi Harada, Kyoto University, Japan

1152: Adaptive Strategy to Improve the Quality of Communication for IoT Edge Devices...31 Bharath Sudharsan, National University of Ireland Galway, Ireland John Breslin, National University of Ireland Galway, Ireland Muhammad Intizar Ali, National University of Ireland Galway, Ireland

1086: Evaluating Distinct Sensations by Modulating High-Frequency Electrotactile Pulses for Unobtrusive Communication with IoT Devices...37

Sina Parsnejad, Michigan State University, United States Sylmarie Dávila-Montero, Michigan State University, United States Andrew Mason, Michigan State University, United States

S1.2: IoT Technologies

Session Chairs: Mahmoud Darwich & Kasem Khalil

1232: Comparative Analysis of Depth Detection Algorithms Using Stereo Vision...42

Poluri Nikhil Koundinya, Indian Institute of Technology Hyderabad, India Yuki Ikeda, Ritsumeikan University, Japan Sanju Kumar NT, Indian Institute of Technology Hyderabad, India Pachamuthu Rajalakshmi, Indian Institute of Technology Hyderabad, India Takanori Fukao, Ritsumeikan University, Japan

1230: Enhanced LoRa Data Rate Through PATCH...47

Akshay Jadhav, Indian Institute of Technology Hyderabad, India Pachamuthu Rajalakshmi, Indian Institute of Technology Hyderabad, India

1226: Geo-Referencing System for Locating Objects Globally in LiDAR Point Cloud...53

Mrinal Senapati, Indian Institute of Technology Hyderabad, India Bhaskar Anand, Indian Institute of Technology Hyderabad, India Vivek Barsaiyan, Indian Institute of Technology Hyderabad, India Pachamuthu Rajalakshmi, Indian Institute of Technology Hyderabad, India

1234: Handwriting Tracking Using 60 GHz mmWave Radar...58

Sai Deepika Regani, University of Maryland, College Park / Origin Wireless Inc., United States Chenshu Wu, University of Maryland, College Park / Origin Wireless Inc., United States Feng Zhang, University of Maryland, College Park / Origin Wireless Inc., United States Beibei Wang, University of Maryland, College Park / Origin Wireless Inc., United States Min Wu, University of Maryland, College Park / Origin Wireless Inc., United States K. J. Ray Liu, University of Maryland, College Park / Origin Wireless Inc., United States

1290: SemSub: Semantic Subscriptions for the MQTT Protocol...64

Tobias Christian Piller, Landshut University of Applied Sciences, Germany Abdelmajid Khelil, Landshut University of Applied Sciences, Germany

1296: Sensing Systemic Awareness and Performance of Teams During Model-Based Site Design...70

Prakash Manandhar, Massachusetts Institute of Technology, United States Keran Rong, Massachusetts Institute of Technology, United States Katherine Carroll, Massachusetts Institute of Technology, United States Roland de Filippi, Massachusetts Institute of Technology, United States Ira Winder, Massachusetts Institute of Technology, United States Jeff Dieffenbach, Massachusetts Institute of Technology, United States Bryan Moser, Massachusetts Institute of Technology, United States

1298: Frequency-Based Power Efficiency Improvement of CNNs on Heterogeneous IoT Computing Systems...76

Ioannis Galanis, Southern Illinois University, United States Ourania Spantidi, Southern Illinois University, United States Iraklis Anagnostopoulos, Southern Illinois University, United States

S1.3: IoT Technologies

Session Chairs: Kasem Khalil & Ahmed Abdelgawad

1051: Satellite Guided Mobile Wireless Methane Detection for Oil and Gas Operations...82

Theodore van Kessel, IBM, United States Levente Klein, IBM, United States Muralidhar Ramachandran, IBM, United States Eric Zhang, IBM, United States Hendrik Hamann, IBM, United States

1121: Knowledge Graph in Data Quality Evaluation for IoT Applications...86

Igor Khokhlov, Rochester Institute of Technology, United States Leon Reznik, Rochester Institute of Technology, United States

1104: Data-Driven Model-Predictive Communication for Resource-Efficient IoT Networks...92

Christian Arendt, Technical University of Dortmund, Germany Stefan Böcker, Technical University of Dortmund, Germany Christian Wietfeld, Technical University of Dortmund, Germany

1220: A Sleep-Scheduling Oil Detection Routing Protocol for Smart Oceans Using Internet of Things...98

Aoun Hussain, Habib University, Pakistan Georges El-Howayek, Valparaiso University, United States

1243: Comparative Analysis on the Scaling Properties of Arbiter-Based PUFs...104

Pablo Rojas, University of Louisiana at Lafayette, United States Haytham Idriss, University of Louisiana at Lafayette, United States Magdy Bayoumi, University of Louisiana at Lafayette, United States

1250: Towards a Distributed Estimator in Smart Home Environment...110 Olumide Kayode, University of Texas at San Antonio, United States

Deepti Gupta, University of Texas at San Antonio, United States Ali Saman Tosun, University of Texas at San Antonio, United States

1301: Memory-Based Arbiter PUF: a Novel Highly Reliable and Scalable Strong PUF Design...116

Haytham Idriss, University of Louisiana at Lafayette, United States Tarek Idriss, Western Washington University, United States Phillip Williams, University of Louisiana at Lafayette, United States Magdy Bayoumi, University of Louisiana at Lafayette, United States

S2: IoT Application and Services

S2.1: IoT Application and Services

Session Chairs: Jaeseung Song & Haytham Idriss

1021: Smart Parking for Disabled Parking Improvement Using RFID and Database Authentication...122

Abdel-Shakour Abuzneid, University of Bridgeport, United States Zainab Al Taweel, University of Bridgeport, United States Lavanya Challagundla, University of Bridgeport, United States Alexander Pagán Jr., University of Bridgeport, United States

1026: Human Centric IoT Lighting Control Based on Personalized Biological Clock Estimations...127

Charikleia Papatsimpa, Eindhoven University of Technology, Netherlands Jochem Bonarius, Eindhoven University of Technology, Netherlands Jean-Paul Linnartz, Eindhoven University of Technology, Netherlands

1048: IoT for Commercial Smart Lighting: a Reality Check and Reference Architecture...133

Markus Jung, OSRAM GmbH, Germany Jiye Park, University of Duisburg-Essen, Germany Prajosh Premdas, OSRAM GmbH, Germany Volker Kamp, OSRAM GmbH, Germany Yuting Zhang, OSRAM Sylvania, United States Yang Li, OSRAM Sylvania, United States Bernhard Sießegger, OSRAM GmbH, Germany

1108: Throughput Enhancement in UAV-Aided Wireless Sensor Networks via Wake-Up Radio Technology and Priority-Based MAC Scheme...139

Angelo Trotta, University of Bologna, Italy Marco Di Felice, University of Bologna, Italy Luciano Bononi, University of Bologna, Italy Luca Perilli, University of Bologna, Italy Eleonora Franchi Scarselli, University of Bologna, Italy Tullio Salmon Cinotti, University of Bologna, Italy

1117: Cost-Effective Multi-Modal Urban Transportation with Parking Selection...145

Moussa Coulibaly, University Hassan II Casablanca, Morocco Ahmed Errami, University of Hassan II Casablanca, Morocco Essaid Sabir, University of Hassan II Casablanca, Morocco

1118: Demand Response for Residential Uses: a Data Analytics Approach...151 Abdelkareem Jaradat, University Of Western Ontario, Canada Hanan Lutfiyya, University Of Western Ontario, Canada Anwar Haque, University Of Western Ontario, Canada

S2.2: IoT Application and Services Session Chairs: Prasanth Yanambaka & Zag ElSayed

1119: V-PRISM: an Edge-Based IoT Architecture to Virtualize Multimedia Sensors...157

Anselmo Luiz Éden Battisti, Universidade Federal Fluminense, Brazil Débora Christina Muchaluat-Saade, Universidade Federal Fluminense, Brazil Flávia Coimbra Delicato, Universidade Federal Fluminense, Brazil

1135: Image Processing in Autonomous Vehicle Model Positioning and Movement Control...163

Sergey Chuprov, ITMO University, Russia Egor Marinenkov, ITMO University, Russia Ilya Viksnin, ITMO University, Russia Leon Reznik, Rochester Institute of Technology, United States Igor Khokhlov, Rochester Institute of Technology, United States

1147: The Effect of Deceiving Vehicles in an Autonomous Intersection...169

Javier Mauricio Morales Chavarro, Universidad Nacional de Colombia, Colombia Ewan Colman, University of Edinburgh, United Kingdom Luis Fernando Niño Vásquez, Universidad Nacional de Colombia, Colombia

1173: IGaaS: an IoT Gateway-as-a-Service for On-Demand Provisioning of IoT Gateways...174

Ragib Hasan, University of Alabama at Birmingham, United States Mohammad Aminul Hoque, University of Alabama at Birmingham, United States Mahmud Hossain, University of Alabama at Birmingham, United States

1189: From Smart to Intelligent Utility Meters in Natural Gas Distribution Networks...180 Ghaith Matalkah, Georgia Institute of Technology, United States Edward Coyle, Georgia Institute of Technology, United States

1197: Deep Learning for Optimal Resource Allocation in IoT-Enabled Additive Manufacturing...187 Sergio Salinas Monroy, Wichita State University, United States Farshad Mashhadi, Wichita State University, United States

S2.3: Multi-disciplinary Applications of IoT Frameworks Session Chairs: Prabha Sundaravadive & Premananda Indic

1251: Affect-Learn: an IoT-Based Affective Learning Framework for Special Education...193 Prabha Sundaravadivel, University of Texas at Tyler, United States Ghazal Yadav, Independence High School, United States Lokeshwar Kesavan, Independent Researcher, United States

1253: M-SID: an IoT-Based Edge-Intelligent Framework for Suicidal Ideation Detection...198 Prabha Sundaravadivel, University of Texas at Tyler, United States Paola Salvatore, McLean Hospital, United States Premananda Indic, University of Texas at Tyler, United States

1297: Advanced Evaluation Platform-Based RF Attenuators for Wireless Sensor Networks...204

Ilef Ketata, Leipzig University of Applied Sciences, Germany Ahmed Fakhfakh, Digital Research Center of Sfax, Tunisia Faouzi Derbel, Leipzig University of Applied Sciences, Germany

1074: Unscented Kalman Filter for Indoor Bluetooth Voice Transmission Interference Over Non-Gaussian Fading Channel...210

Ali S. Alghamdi, Majmaah University, Saudi Arabia Kun Hua, Lawrence Technological University, United States Mohamed Zohdy, Oakland University, United States Abdullah Al-Ahmadi, Majmaah University, Saudi Arabia Ahmed G. Abo-Khalil, Majmaah University, Saudi Arabia Yazeed Qasaymeh, Majmaah University, Saudi Arabia

1217: Multi-Dimensional Integration and Packaging of Devices for Internet-of-Things Applications...216

Nazek El-Atab, King Abdullah University of Science and Technology, Saudi Arabia Reem Suwaidan, King Abdullah University of Science and Technology, Saudi Arabia Yara Alghamdi, King Abdullah University of Science and Technology, Saudi Arabia Alhanouf Alhazzany, King Abdullah University of Science and Technology, Saudi Arabia Reema Almansour, King Abdullah University of Science and Technology, Saudi Arabia Sohail F. Shaikh, King Abdullah University of Science and Technology, Saudi Arabia Sherjeel M. Khan, King Abdullah University of Science and Technology, Saudi Arabia Mustafa Hussain, King Abdullah University of Science and Technology, Saudi Arabia Berkeley, Saudi Arabia

S2.4: IoT based Consumer Technologies for Smart Cities Session Chairs: Saraju Mohanty & Himanshu Thapliyal

1053: Krig-Detect: Exploring Alternative Kriging Methods for Real-Time Seizure Detection from EEG Signals...222

Saraju Mohanty, University of North Texas, United States Ibrahim Olokodana, University of North Texas, United States Elias Kougianos, University of North Texas, United States

1061: Towards Reverse Engineering Controller Area Network Messages Using Machine Learning...228

Clinton Young, Iowa State University, United States Jordan Svoboda, Iowa State University, United States Joseph Zambreno, Iowa State University, United States

1100: Secure CAN for Connected Vehicles...234

Akhilesh Tyagi, Iowa State University, United States Timothy Dee, Iowa State University, United States

1140: Kriging-Bootstrapped DNN Hierarchical Model for Real-Time Seizure Detection from EEG Signals...240

Saraju Mohanty, University of North Texas, United States Ibrahim Olokodana, University of North Texas, United States Elias Kougianos, University of North Texas, United States

1143: iGLU 1.1: Towards a Glucose-Insulin Model Based Closed Loop IoMT Framework for Automatic Insulin Control of Diabetic Patients...245

Amit Joshi, Malaviya National Institute of Technology, India Prateek Jain, Malaviya National Institute of Technology, India Saraju Mohanty, University of North Texas, India

1200: Reinforcement Learning Toward Decision-Making for Multiple Trusted-Third-Parties in PUF-Cash...251

Jim Plusquellic, University of New Mexico, United States Georgios Fragkos, University of New Mexico, United States Cyrus Minwalla, Bank of Canada, United States Eirini Eleni Tsiropoulou, University of New Mexico, United States

S2.5: IoT based Consumer Technologies for Smart Cities

Session Chairs: Deepak Puthal & Saraju Mohanty

1206: A Trusted Authentication Scheme for IoT-Based Smart Grid Applications...257

Selçuk Köse, University of Rochester, United States Fathi Amsaad, Eastern Michigan University, United States

1244: Towards Designing a Sustainable Green Smart City Using Bluetooth Beacons...263 Ragib Hasan, University of Alabama at Birmingham, United States Raiful Hasan, University of Alabama at Birmingham, United States

1278: 2-Phase Energy-Efficient Secure Positive Feedback Adiabatic Logic for CPA-Resistant IoT Devices...269

Himanshu Thapliyal, University of Kentucky, United States Zachary Kahleifeh, University of Kentucky, United States

1279: PPG Based Continuous Blood Pressure Monitoring Framework for Smart Home Environment...274

Himanshu Thapliyal, University of Kentucky, United States Rajdeep Nath, University of Kentucky, United States

1277: Enhanced Activity Recognition of the IoT Smart Home Users Through Cluster Analysis...280

Prabhat Mishra, Samsung R&D Institute Bangalore, India Shiva Busetty, Samsung R&D Institute Bangalore, India Suresh Gudla, Walmart Labs, India **S2.6: IoT for Emergency Response and Disaster Recovery** Session Chairs: Niranjan Suri & Frank Johnsen

1209: Sensor Driven Priority Routing of Health Care Data Packet in IoT Network...286 Kedir Mamo Besher, University of Texas at Dallas, United States Sara Beitelspacher, University of Texas at Dallas, United States Mohammed Ali, University of Texas at Dallas, United States

1247: Deployment Architecture for Accessing Smart City and Coalition Assets for Multi-Agency HADR Operations...293

Manas Pradhan, Fraunhofer FKIE, Germany Christoph Fuchs, Fraunhofer FKIE, Germany Joseph Noll, University of Oslo, Norway

1211: Passive People Counting Using Commodity WiFi...299

Fengyu Wang, University of Maryland, College Park / Origin Wireless Inc., United States Feng Zhang, University of Maryland, College Park / Origin Wireless Inc., United States Chenshu Wu, University of Maryland, College Park / Origin Wireless Inc., United States Beibei Wang, University of Maryland, College Park / Origin Wireless Inc., United States K. J. Ray Liu, University of Maryland, College Park / Origin Wireless Inc., United States **S2.7: IoT and Public Safety** Session Chairs: Prasanth Yanambaka & Ahmed Abdelgawad

1113: Internet-of-Things-Based Smart Transportation Systems for Safer Roads...305

Mohammad Derawi, Norwegian University of Science and Technology, Norway Yaser Dalveren, Norwegian University of Science and Technology, Norway Faouzi Alaya Cheikh, Norwegian University of Science and Technology, Norway

1299: Using Traces from IoT Devices to Solve Criminal Cases...309

João Marcos Do Valle, Federal University of Rio Grande do Norte, Brazil Gabriel Souza, Federal University of Rio Grande do Norte, Brazil Nélio Cacho, Federal University of Rio Grande do Norte, Brazil Iaslan Silva, Federal University of Rio Grande do Norte, Brazil Jaine Budke, Federal University of Rio Grande do Norte, Brazil Henrique Sales, Federal University of Rio Grande do Norte, Brazil Frederico Lopes, Federal University of Rio Grande do Norte, Brazil Daniel Araújo, Federal University of Rio Grande do Norte, Brazil Rivaldo Silva Junior, Ministério Público do Rio Grande do Norte, Ministério Público do Rio Grande do Norte

1300: SIGOc: a Smart Campus Platform to Improve Public Safety...315

Ícaro França, Federal University of Rio Grande do Norte, Brazil Natanael Araújo, Federal University of Rio Grande do Norte, Brazil Abmael Gomes, Federal University of Rio Grande do Norte, Brazil Nélio Cacho, Federal University of Rio Grande do Norte, Brazil Frederico Lopes, Federal University of Rio Grande do Norte, Brazil José Lima, Federal University of Rio Grande do Norte, Brazil Eiji Adachi, Federal University of Rio Grande do Norte, Brazil

1227: An IoT Based Efficient Waste Collection System with Smart Bins...321

Khandaker Foysal Haque, Central Michigan University, United States Rifat Zabin, Chittagong University of Engineering and Technology, Bangladesh Kumar Yelamarthi, Central Michigan University, United States Venkata Prasanth Yanambaka, Central Michigan University, United States Ahmed Abdelgawad, Central Michigan University, United States

1238: Increasing Safety and Security in Public Places Using IoT Devices...326

Christos Chatzigeorgiou, University of West Attica, Greece Michael Feidakis, University of West Attica, Greece Dimitrios Kogias, iTrack Services Ltd., Greece Charalampos Patrikakis, University of West Attica, Greece

S2.8: IoT & AI Technologies: Embedded Solutions for Future Automotive Systems Session Chairs: Jürgen Becker & Florian Oszwald

1276: A Video-Based Vehicle Counting System Using an Embedded Device in Realistic Traffic Conditions...328

Markus Luecking, FZI Research Center for Information Technology, Germany Esteban Rivera, FZI Research Center for Information Technology, Germany Lukas Kohout, FZI Research Center for Information Technology, Germany Christoph Zimmermann, FZI Research Center for Information Technology, Germany Duygu Polad, SAP SE, Germany Wilhelm Stork, Karlsruhe Institute of Technology, Germany

1291: Embedded Image Processing the European Way: a New Platform for the Future Automotive Market...334

Tim Hotfilter, Karlsruhe Institute of Technology, Germany Fabian Kempf, Karlsruhe Institute of Technology, Germany Jürgen Becker, Karlsruhe Institute of Technology, Germany Dominik Reinhardt, BMW AG, Germany Imen Baili, Menta eFPGA S.A.S, France

1308: Towards Safety in Automotive Ethernet-Based Networks with Dynamic Workloads...340

Adam Kostrzewa, Technical University of Braunschweig, Germany Dominik Stöhrmann, Technical University of Braunschweig, Germany Rolf Ernst, Technical University of Braunschweig, Germany

1004: Exploring the Suitability of BLE Beacons to Track Poacher Vehicles in Harsh Jungle Terrains...346

Charith Perera, Cardiff University, United Kingdom Karan Juj, Cardiff University, United Kingdom

1283: Autonomous Vehicles: Building a Test-Bed Prototype at a Controlled Environment...352

Samy El-Tawab, James Madison University, United States Nathan Sprague, James Madison University, United States Azeem Mufti, James Madison University, United States

1289: Region of Interest and Car Detection Using LiDAR Data for Advanced Traffic Management System...358

Mrinal Senapati, Indian Institute of Technology Hyderabad, India Bhaskar Anand, Indian Institute of Technology Hyderabad, India Vivek Barsaiyan, Indian Institute of Technology Hyderabad, India Pachamuthu Rajalakshmi, Indian Institute of Technology Hyderabad, India

S3: Security and Privacy for Internet of Things

S3.1: Security and Privacy for Internet of Things Session Chairs: Soumya Datta & Ahmed Abdelgawad

1020: Testbed Validation of Security-Aware Channel Assignment in Cognitive Radio IoT Networks...363

Monette Khadr, State University of New York at Albany, United States Haythem Salameh, Al Ain University of Science and Technology, U.A.E. Moussa Ayyash, Lewis University, United States Sufyan Almajali, Princess Sumaya University for Technology, Jordan Hany Elgala, State University of New York at Albany, United States

1023: Context Aware Family Dynamics Based Internet of Things Access Control Towards Better Child Safety...369

Charith Perera, Cardiff University, United Kingdom Yasar Majib, Cardiff University, United Kingdom

1031: Detecting Interference in Wireless Sensor Network Received Samples: a Machine Learning Approach...375

George O'Mahony, University College Cork, Ireland Philip J. Harris, United Technologies Corporation, Ireland Colin C. Murphy, University College Cork, Ireland

1032: SHAKE: SHared Acceleration Key Establishment for Resource-Constrained IoT Devices...381

Xenofon Fafoutis, Technical University of Denmark, Denmark Emil Bejder, Technical University of Denmark, Denmark Adam Krog Mathiasen, Technical University of Denmark, Denmark Michele De Donno, Technical University of Denmark, Denmark Nicola Dragoni, Technical University of Denmark, Denmark

1038: KalKi: a Software-Defined IoT Security Platform...387

Grace Lewis, Carnegie Mellon Software Engineering Institute, United States Sebastian Echeverría, Carnegie Mellon Software Engineering Institute, United States Craig Mazzotta, Carnegie Mellon Software Engineering Institute, United States Christopher Grabowski, Carnegie Mellon Software Engineering Institute, United States Kyle O'Meara, Carnegie Mellon Software Engineering Institute, United States Amit Vasudevan, Carnegie Mellon Software Engineering Institute, United States Marc Novakouski, Carnegie Mellon Software Engineering Institute, United States Matthew McCormack, Carnegie Mellon University, United States Vyas Sekar, Carnegie Mellon University, Carnegie Mellon University

1057: LPA-SDP: a Lightweight Privacy-Aware Service Discovery Protocol for IoT Environments...393

Khalid Elgazzar, University of Ontario Institute of Technology, Canada Mohamed Seliem, University of Louisiana at Lafayette, United States

1097: A Security Approach for CoAP-Based Internet of Things Resource Discovery...400

Kasem Khalil, University of Louisiana at Lafayette, United States Khalid Elgazzar, University of Ontario Institute of Technology, Canada Ahmed Abdelgawad, Central Michigan University, United States Magdy Bayoumi, University of Louisiana at Lafayette, United States

S3.2: Security and Privacy for Internet of Things

Session Chairs: Yasser Ismail & Ahmed Abdelgawad

1096: RIoTS: Risk Analysis of IoT Supply Chain Threats...406

Timothy Kieras, New York University, United States Muhammad Junaid Farooq, New York University, United States Quanyan Zhu, New York University, United States

1126: Lightweight Polymorphic Encryption for the Data Associated with Constrained Internet of Things Devices...412

Indira Kalyan Dutta, University of Louisiana at Lafayette, United States Bhaskar Ghosh, University of Louisiana at Lafayette, United States Albert H. Carlson, CipherLoc Corporation, United States Magdy Bayoumi, University of Louisiana at Lafayette, United States

1158: "Is Your Smart Home a Secure Home?" - Analysis of Smart Home Breaches and an Approach for Vulnerability Analysis and Device Isolation...418

Gokila Dorai, Florida State University, United States Eleason Williams, Florida A&M University, United States Hongmei Chi, Florida A&M University, United States Richard A. Alo, Florida A&M University, United States

1160: Deep Q-Network for Enhanced Data Privacy and Security of IoT Traffic...424

Olumide Kayode, University of Texas at San Antonio, United States Ali Saman Tosun, University of Texas at San Antonio, United States

1186: Securing Mobile IoT with Unmanned Aerial Systems...430

Aly Sabri Abdalla, Mississippi State University, United States Bodong Shang, Virginia Polytechnic Institute and State University, United States Vuk Marojevic, Mississippi State University, United States Lingjia Liu, Virginia Polytechnic Institute and State University, United States

1249: Security Aspects of Internet of Things – a Survey...436

Phillip Williams, University of Louisiana at Lafayette, United States Indira Kalyan Dutta, University of Louisiana at Lafayette, United States Hisham Daoud, University of Louisiana at Lafayette, United States Magdy Bayoumi, University of Louisiana at Lafayette, United States **S3.3: Workshop on Security & Privacy for Internet of Things & Cyber-Physical Systems** Session Chairs: Tarek Elarabi & Zag ElSayed

1258: iMAC: Implicit Message Authentication Code for IoT Devices...442 Ikram Ullah, University of Twente, Netherlands Nirvana Meratnia, University of Twente, Netherlands Paul Havinga, University of Twente, Netherlands

1164: The Importance of Security in Cyber-Physical System...448 Faisal Alrefaei, Embry-Riddle Aeronautical University, United States

1265: Cloud Based Cyber Physical System for Factory Automation...451 Ossamah Almotery, Embry-Riddle Aeronautical University, United States Meshari Almutairi, Embry-Riddle Aeronautical University, United States Yazed Alferaih, Embry-Riddle Aeronautical University, United States Norah Alilwit, Embry-Riddle Aeronautical University, United States

1266: Blockchain as a Solution to Drone Cybersecurity...458 Ossamah Almotery, Embry-Riddle Aeronautical University, United States

S4: IoT Experimental Results and Deployment Scenarios

S4: IoT Experimental Results and Deployment Scenarios Session Chairs: Mahmoud Darwich & Mohamed Shaban

1010: Decentralized IoT with Wattsworth...467

John Donnal, US Naval Academy, United States Ryan McDowell, Rockbridge Academy, United States Michael Kutzer, US Naval Academy, United States

1095: Comparison of Sensor-Based Datasets for Human Activity Recognition in Wearable IoT...473

Shivanjali Khare, University of Louisiana at Lafayette, United States Sayani Sarkar, University of Louisiana at Lafayette, United States Michael Totaro, University of Louisiana at Lafayette, United States

1101: Ranging Capabilities of LoRa 2.4 GHz...479

Frederik Rander Andersen, Technical University of Denmark, Denmark Kalpit Dilip Ballal, Technical University of Denmark, Denmark Martin Nordal Petersen, Technical University of Denmark, Denmark Sarah Ruepp, Technical University of Denmark, Denmark

1111: An Experimental Evaluation of Energy Trade-Offs in Narrowband IoT...484

Guus Leenders, Katholieke Universiteit Leuven, Belgium Gilles Callebaut, Katholieke Universiteit Leuven, Belgium Liesbet Van der Perre, Katholieke Universiteit Leuven, Belgium Lieven De Strycker, Katholieke Universiteit Leuven, Belgium

1124: Good Vibrations: an IoPT Testbed for Infotainment in a Football Stadium...489

Edward Coyle, Georgia Institute of Technology, United States Henghao Li, Georgia Institute of Technology, United States Pedro Pinto, Georgia Institute of Technology, United States Deepa Phanish, Cox Communications, United States Randal Abler, Georgia Institute of Technology, United States

1134: CarnegiePLUG: Prosumer-in-the-Loop Simulation Grid...495

Javad Mohammadi, Carnegie Mellon University, United States Juye Kim, Carnegie Mellon University, United States Carolyn Goodman, Carnegie Mellon University, United States

1080: Low-Cost Wireless Testbed for Internet of Things Ad Hoc Networks Prototyping and Evaluation...501

Paulo Alexandre Regis, Southeastern Louisiana University, United States Amar Nath Patra, University of Nevada Reno, United States Shamik Sengupta, University of Nevada Reno, United States

S5: RFID, Sensors and Actuators

S5.1: RFID, Sensors, and Actuators Session Chairs: Elfed Lewis & Omar Khaled

1050: Integrating a Traffic Preemption System on an Emergency Vehicle and Airport Runway System...507

Gideon Eromosele, University of Regina, Canada David Gerhard, University of Regina, Canada

1065: A 10.5 µW Programmable SAR ADC Frontend with SC Preamplifier for Low-Power IoT Sensor Nodes...513

Marcel Jotschke, Fraunhofer EAS/IIS, Germany Wilmar Carvajal Ossa, Fraunhofer EAS/IIS, Germany Torsten Reich, Fraunhofer EAS/IIS, Germany Christian Mayr, Technische Universitaet Dresden, Germany

1166: Temperature Calibration on a Crystal-Free Mote...519

Titan Yuan, University of California, Berkeley, United States Filip Maksimovic, University of California, Berkeley, United States David C. Burnett, University of California, Berkeley, United States Brad Wheeler, University of California, Berkeley, United States Lydia Lee, University of California, Berkeley, United States Kristofer S.J. Pister, University of California, Berkeley, United States

1169: Middleware Support for Generic and Flexible Actuation in the Internet of Mobile Things...524 Markus Endler, Pontifícia Universidade Católica do Rio de Janeiro, Brazil

Sheriton R. Valim, Pontifícia Universidade Católica do Rio de Janeiro, Brazil Felipe Nogueira, Pontifícia Universidade Católica do Rio de Janeiro, Brazil Flávia Pisani, Pontifícia Universidade Católica do Rio de Janeiro, Brazil

1181: A Comparison of Axiomatic Distance-Based Collective Intelligence Methods for Wireless Sensor Network State Estimation in the Presence of Information Injection...530

Joshua Kyle Skolfield, Arizona State University, United States Romena Yasmin, Arizona State University, United States Adolfo Escobedo, Arizona State University, United States Lauren Huie, Air Force Research Laboratory, United States

1064: A Read Range Maximization Approach for UWB Surface Acoustic Wave (SAW) RFID Tags Based on Interdigital Transducer (IDT) as a Reflector...536

Kasyap Suresh, Universiti Teknologi Petronas, Malaysia Varun Jeoti, Universiti Teknologi Petronas, Malaysia Micheal Drieberg, Universiti Teknologi Petronas, Malaysia **S5.2: Energy Aware Autonomous Sensors for IoT** Session Chairs: Olfa Kanoun & Prabha Sundaravadive

1224: Smart-Lab: Design and Implementation of an IoT-Based Laboratory Platform...542

Sabrine Khriji, Technische Universität Chemnitz, Germany Dhouha El Houssaini, Technische Universität Chemnitz, Germany Rim Barioul, Technische Universität Chemnitz, Germany Talha Rehman, Technische Universität Chemnitz, Germany Olfa Kanoun, Technische Universität Chemnitz, Germany

1261: A Secure and Efficient Login and Data Exchange Scheme for an IoT Laboratory Management System...547

Dhouha El Houssaini, Technische Universität Chemnitz, Germany Sabrine Khriji, Technische Universität Chemnitz, Germany Muhammad Waseem Mukhtar, Technische Universität Chemnitz, Germany Faouzi Derbel, Leipzig University of Applied Sciences, Germany Kamel Besbes, Faculté des Sciences de Monastir, Tunisia Olfa Kanoun, Technische Universität Chemnitz, Germany

1285: Microcontrollers for IoT: Optimizations, Computing Paradigms, and Future Directions...553

Rym Chéour, Ecole Nationale d'Ingénieurs de Sfax, Tunisia Sabrine Khriji, Technische Universität Chemnitz, Germany Mohamed Abid, Ecole Nationale d'Ingénieurs de Sfax, Tunisia Olfa Kanoun, Technische Universität Chemnitz, Germany

1293: Smart Multi-Coil Inductive Power Tranmission with IoT Based Visulization...560

Ghada Bouattour, Technische Universität Chemnitz, Germany Zheng Hu, Technische Universität Chemnitz, Germany Houda Ben Jmeaa Derbel, Faculty of Science of Sfax, Tunisia Olfa Kanoun, Technische Universität Chemnitz, Germany

1294: Electromagnetic Energy Harvester for Battery-Free IoT Solutions...566

Ghada Bouattour, Technische Universität Chemnitz, Germany Sonia Bradai, Technische Universität Chemnitz, Germany Slim Naifar, Technische Universität Chemnitz, Germany Olfa Kanoun, Technische Universität Chemnitz, Germany

1295: Design of a DC-DC Boost Converter of Hybrid Energy Harvester for IoT Devices...571

Meriam Ben Ammar, Technische Universität Chemnitz, Germany Salwa Sahnoun, Digital Research Center of Sfax, Tunisia Ahmed Fakhfakh, Digital Research Center of Sfax, Tunisia Olfa Kanoun, Technische Universität Chemnitz, Germany

1219: Accurate Stride Length Estimation via Fused Radio and Inertial Sensing...575 Chenshu Wu, University of Maryland, College Park / Origin Wireless Inc, United States K. J. Ray Liu, University of Maryland, College Park / Origin Wireless Inc., United States

S6: Power and Energy for IoT

S6.1: Power and Energy for IoT Session Chairs: Kumar Yelamarthi & Omar Khaled

1027: Energy Consumption Evaluation of Cellular Narrowband Internet of Things (NB-IoT) Modules...581

Ahmed Elhaddad, Friedrich-Alexander University Erlangen-Nuremberg, Germany Heiko Bruckmeyer, Friedrich-Alexander University Erlangen-Nuremberg, Germany Markus Hertlein, Friedrich-Alexander University Erlangen-Nuremberg, Germany Georg Fischer, Friedrich-Alexander University Erlangen-Nuremberg, Germany

1049: Communication Energy and Protocol Considerations in IoT Deployments...586

Elizabeth Liri, University of California, Riverside, United States Natasha Orie, University of California, Riverside, United States Harley Siezar, University of California, Riverside, United States Kadangode Ramakrishnan, University of California, Riverside, United States Prateek Singh, Rensselaer Polytechnic Institute, United States Wen Cai, Rensselaer Polytechnic Institute, United States Lance Gerday, Rensselaer Polytechnic Institute, United States Koushik Kar, Rensselaer Polytechnic Institute, United States Polytechnic Institute, United States Houshik Kar, Rensselaer Polytechnic Institute, United States

1056: Real-Time Implementation of Secure Distributed State Estimation for Networked Microgrids...593

Mehmet Cintuglu, ABB Inc, United States Anil Kondabathini, ABB Inc, United States Dmitry Ishchenko, ABB Inc, United States

1109: Development of a Wireless Sensor Node for Building Information Management Systems...599

Noel Bristow, Bangor University, United Kingdom Fergus Elliott, Bangor University, United Kingdom Joseph O'Mahony, Waterford Institute of Technology, Ireland Giray Kartopu, Swansea University, United Kingdom Ochai Oklobia, Swansea University, United Kingdom Stuart Irvine, Swansea University, United Kingdom Jeff Kettle, Bangor University, United Kingdom

1116: Occupancy-Aware Power Saving for Smart Parking IoT Sensors...605

Moussa Coulibaly, University Hassan II Casablanca, Morocco Ahmed Errami, University of Hassan II Casablanca, Morocco Essaid Sabir, University of Hassan II Casablanca, Morocco

1133: Hybrid Internet of Things Network for Energy Efficient Video Surveillance...611

Eyassu Dilla Diratie, University Paris-Sud, France Khaldoun Al Agha, University Paris-Sud, France

S6.2: Low-Power Computer Vision Session Chairs: Junsong Yuan & Yiran Chen

1242: Dynamically Reconfigurable Deep Learning for Efficient Video Processing in Smart IoT Systems...617

Omar Eldash, University of Louisiana at Lafayette, United States Adam Frost, University of Louisiana at Lafayette, United States Kasem Khalil, University of Louisiana at Lafayette, United States Ashok Kumar, University of Louisiana at Lafayette, United States Magdy Bayoumi, University of Louisiana at Lafayette, United States

1271: Discriminative Pose Analysis for Human Action Recognition...623

Jianyu Yang, Soochow University, China Xiaofeng Zhao, Soochow University, China Yao Huang, Soochow University, China Chunping Liu, Soochow University, China

1281: A Survey of Methods for Low-Power Deep Learning and Computer Vision...629

Abhinav Goel, Purdue University, United States Caleb Tung, Purdue University, United States Yung-Hsiang Lu, Purdue University, United States George Thiruvathukal, Loyola University Chicago, United States

1257: On Preamble-Based Grant-Free Transmission in Low Power Wide Area (LPWA) IoT Networks...635

Naveen Mysore Balasubramanya, Indian Institute of Technology Dharwad, India Harini G S, Indian Institute of Technology Dharwad, India Mrinal Rana, Indian Institute of Technology Dharwad, India

1022: Light-Weight RetinaNet for Object Detection on Edge Devices...641

Yixing Li, Arizona State University, United States Akshay Dua, Arizona State University, United States Fengbo Ren, Arizona State University, United States

1204: Multipath Event-Based Network for Low-Power Human Action Recognition...647

Xiao Wu, Peking University, China Junsong Yuan, State University of New York at Buffalo, United States

S7: Data Acquisition, Storage, and Management for IoT

S7.1: Data Acquisition, Storage, and Management for IoT *Session Chairs: Hisham Daoud & Zag ElSayed*

1042: Cost-Efficient Storage for On-Demand Video Streaming on Cloud...652

Mahmoud Darwich, Bloomsburg University of Pennsylvania, United States Yasser Ismail, Southern University and A&M College, United States Talal Darwich, Microchip Technology Inc., United States Magdy Bayoumi, University of Louisiana at Lafayette, United States

1046: An Ensemble Trust Scoring Method for Internet of Things Sensor Networks...656

Stephen Adams, University of Virginia, United States Jie Liu, University of Virginia, United States Peter Beling, University of Virginia, United States

1071: Synapse : Towards Linked Data for Smart Cities Using a Semantic Annotation Framework...662

Jonggwan An, Sejong University / Korea Electronics Technology Institute, Korea Sunil Kumar, Korea Electronics Technology Institute, Korea Jieun Lee, Sejong University, Korea Seungmyeong Jeong, Korea Electronics Technology Institute, Korea Jaeseung Song, Sejong University, Korea

1123: The Logical Architecture Essential for the Creation of a Comprehensive Patient Healthcare Profile on Blockchain...668

Steven Delaney, Ryerson University, Canada Doug Schmidt, Capital Blockchain, Canada Christopher Chan, Chaoyang University, Taiwan

1148: Cloud Connectivity of a Distributed Cyber Physical Test System...675

Peter Schulz, Fachhochschule Dortmund, Germany Noura Sleibi, Fachhochschule Dortmund, Germany Philipp Tendyra, Fachhochschule Dortmund, Germany Areej Aldaghamin, Fachhochschule Dortmund, Germany Carsten Wolff, Fachhochschule Dortmund, Germany

S7.2: Edge and Fog computing Session Chairs: Imed Ben Dhaou & Yasser Ismail

1102: Wallance, an Alternative to Blockchain for IoT...680 Loic Dalmasso, LIRMM, CNRS, Université de Montpellier, France Florent Bruguier, LIRMM, CNRS, Université de Montpellier, France Achraf Lamlih, LIRMM, CNRS, Université de Montpellier, France Pascal Benoit, LIRMM, CNRS, Université de Montpellier, France

1205: Cyber-Physical Analytics: Environmental Sound Classification at the Edge...686

David Elliott, Florida Institute of Technology, United States Evan Martino, Florida Institute of Technology, United States Carlos E. Otero, Florida Institute of Technology, United States Anthony Smith, Florida Institute of Technology, United States Adrian M. Peter, Florida Institute of Technology, United States Benjamin Luchterhand, Florida Institute of Technology, United States Eric Lam, Air Force Research Laboratory, United States Steven Leung, Air Force Research Laboratory, United States

1246: VFbed: an Architecture for Testbed-as-a-Service for Vehicular Fog-Based Systems...692

Ragib Hasan, University of Alabama at Birmingham, United States Mohammad Aminul Hoque, University of Alabama at Birmingham, United States

1252: An Edge Decentralized Security Architecture for Industrial IoT Applications...698

Gabriel Portal, Pontifical Catholic University of Rio Grande do Sul, Brazil Everton Matos, Pontifical Catholic University of Rio Grande do Sul, Brazil Fabiano Hessel, Pontifical Catholic University of Rio Grande do Sul, Brazil

1303: Enhancing Smart Grids via Advanced Metering Infrastructure and Fog Computing Fusion...704

Syed Kakakhel, University of Turku, Finland Aron Kondoro, Royal Institute of Technology, Sweden Tomi Westerlund, University of Turku, Finland Imed Ben Dhaou, University of Turku, Finland Juha Plosila, University of Turku, Finland

1008: Scheduling of Complex Computation Offloading Tasks in Mobile Edge Cloud Network with New IP Framework...710

Lijun Dong, Futurewei Technologies Inc., United States Uma Chunduri, Futurewei Technologies Inc., United States Richard Li, Futurewei Technologies Inc., United States

1131: Adaptive Approximate Computing on Hardware Accelerators Targeting Internet-of-Things...716

Iraklis Anagnostopoulos, Southern Illinois University, United States Jonathan Dickerson, Southern Illinois University, United States Ioannis Galanis, Southern Illinois University, United States Zois-Gerasimos Tasoulas, Southern Illinois University, United States Lincoln Kinley, Southern Illinois University, United States

S8: Machine Learning for IoT & Big Data

S8: Machine Learning for IoT & Big Data Session Chairs: Sanjay Patel & Kasem Khalil

1011: Resource Allocation in Mobility-Aware Federated Learning Networks: a Deep Reinforcement Learning Approach...722

Huy Thanh Nguyen, Nanyang Technological University, Singapore, Singapore Nguyen Cong Luong, Nanyang Technological University, Singapore, Singapore Jun Zhao, Nanyang Technological University, Singapore, Singapore Chau Yuen, Singapore University of Technology and Design, Singapore Dusit Niyato, Nanyang Technological University, Singapore, Singapore

1112: Machine Learning Methods Assessment for Denial of Service Detection in Wireless Sensor Networks...728

Silvio Quincozes, Universidade Federal Fluminense, Brazil Juliano Kazienko, Universidade Federal de Santa Maria, Brazil

1079: A DDPG-Based Approach for Energy-Aware UAV Navigation in Obstacle-Constrained Environment...734

Hakim Ghazzai, Stevens Institute of Technology, United States Omar Bouhamed, Stevens Institute of Technology, United States Xiangpeng Wan, Stevens Institute of Technology, United States Yehia Massoud, Stevens Institute of Technology, United States

1172: IoT Based Efficient Epileptic Seizure Prediction System Using Deep Learning...740

Hisham Daoud, University of Louisiana at Lafayette, United States Phillip Williams, University of Louisiana at Lafayette, United States Magdy Bayoumi, University of Louisiana at Lafayette, United States

1012: An Algorithmic Solution for Storing Big Data on the DNA Sequence...746

Khalid Alnafisah, Louisiana State University, United States

1212: Predictive Maintenance for Edge-Based Sensor Networks: a Deep Reinforcement Learning Approach...750

Kevin Ong, Nanyang Technological University, Singapore, Singapore Dusit Niyato, Nanyang Technological University, Singapore, Singapore Chau Yuen, Singapore University of Technology and Design, Singapore

1233: Crop Yield Prediction Using Deep Neural Network...756

Fatin Haque, Central Michigan University, United States Ahmed Abdelgawad, Central Michigan University, United States Venkata Prasanth Yanambaka, Central Michigan University, United States Kumar Yelamarthi, Central Michigan University, United States

1248: Learner's Dilemma: IoT Devices Training Strategies in Collaborative Deep Learning...760

Deepti Gupta, University of Texas at San Antonio, United States Olumide Kayode, University of Texas at San Antonio, United States Smriti Bhatt, Texas A & M University-San Antonio, San Antonio, United States Maanak Gupta, Tennessee Technological University, Cookeville, United States Ali Saman Tosun, University of Texas at San Antonio, United States

S9: Design, Integration and Testing Methods

S9: Design, Integration and Testing Methods Session Chairs: Kumar Yelamarthi & Haytham Idriss

1070: WalkID: Towards Context Awareness of Smart Home by Identifying Walking Sounds...766 Long Huang, Louisiana State University, United States Chen Wang, Louisiana State University, United States

1098: lota vs. Ripple: a Comparison Inside an Economy of Things Architecture for Industry 4.0...772

Bruno Machado Agostinho, Federal University of Santa Catarina, Brazil Mateus Manoel Pereira, Federal University of Santa Catarina, Brazil Alexandre Pereira Back, Federal University of Santa Catarina, Brazil Alex Sandro Roschildt Pinto, Federal University of Santa Catarina, Brazil Mario Antônio Ribeiro Dantas, Federal University of Juiz de Fora, Brazil

1099: IOTApass: Enabling Public Transport Payments with IOTA...778

Paulo C. Bartolomeu, Universidade de Aveiro, Portugal Emanuel Vieira, Universidade de Aveiro, Portugal Seyed H. Hosseini, Universidade de Aveiro, Portugal Joaquim Ferreira, Universidade de Aveiro, Portugal

1145: No-Code Shadow Things Deployment for the IoT...784

Ege Korkan, Technical University of Munich, Germany Emanuel Regnath, Technical University of Munich, Germany Sebastian Kaebisch, Siemens AG, Germany Sebastian Steinhorst, Technical University of Munich, Germany

1161: Distributed, Secure, Self-Sovereign Identity for IoT Devices...790

Samson Kahsay Gebresilassie, Ulster University, United Kingdom Joseph Rafferty, Ulster University, United Kingdom Philip Morrow, Ulster University, United Kingdom Liming Luke Chen, Ulster University, United Kingdom Mamun Abu-Tair, Ulster University, United Kingdom Zhan Cui, British Telecom, United Kingdom

1171: Evaluating a SysML-Based Graphical Notation for Modeling Internet of Things System Architectures...796

Eduardo Silva, Federal University of Rio Grande do Norte, Brazil Lidiane Santos, Federal University of Rio Grande do Norte, Brazil Thais Batista, Federal University of Rio Grande do Norte, Brazil Jair Leite, Federal University of Rio Grande do Norte, Brazil Everton Cavalcante, Federal University of Rio Grande do Norte, Brazil Flavio Oquendo, IRISA-UMR CNRS/Université Bretagne Sud, France

1196: Security Issues in the Design of Chips for IoT...802

Ricardo Reis, Universidade Federal do Rio Grande do Sul, Brazil Calebe Conceição, Instituto Federal Sul-rio-grandense - IFSUL, Brazil

VT1: Vertical and Topical Tracks

VT1: Vertical and Topical Tracks Session Chairs: Adam Drobot & Ahmed Abdelgawad

1307: Predicting Injectable Medication Adherence via a Smart Sharps Bin and Machine Learning...807

Yingqi Gu, Dublin City University, Ireland Akshay Zalkikar, HealthBeacon Ltd, Ireland Lara Kelly, HealthBeacon Ltd, Ireland Kieran Daly, HealthBeacon Ltd, Ireland Tomas E. Ward, Dublin City University, Ireland

1280: Reinforcement Learning on Computational Resource Allocation of Cloud-Based Wireless Networks...814

Beiran Chen, Trinity College Dublin, Ireland Yi Zhang, Trinity College Dublin, Ireland George Iosifidis, Trinity College Dublin, Ireland Mingming Liu, Dublin City University, Ireland

1282: Kubernetes in Fog Computing: Feasibility Demonstration, Limitations and Improvement Scope...820

Paridhika Kayal, University of Toronto, Canada

1262: Multi-Task Gaussian Process Learning for Energy Forecasting in IoT-Enabled Electric Vehicle Charging Infrastructure...826

Masood Parvania, University of Utah, United States Mostafa Gilanifar, University of Utah, United States Mohamad El Hariri, University of Utah, United States

1167: A Secure Cloud Migration, Monitoring and Analytics Framework for Industrial Internet of Things...832

Rafiullah Khan, Queen's University Belfast, United Kingdom Kieran McLaughlin, Queen's University Belfast, United Kingdom Boojoong Kang, Queen's University Belfast, United Kingdom David Laverty, Queen's University Belfast, United Kingdom Sakir Sezer, Queen's University Belfast, United Kingdom

1245: Sensing Teamwork During Multi-Objective Optimization...838

Ira Winder, Massachusetts Institute of Technology, United States Dylan Delaporte, University of Tokyo, Japan Shinnosuke Wanaka, National Maritime Research Institute, Japan Kazuo Hiekata, University of Tokyo, Japan

1292: A Crowdsensing Solution for Tracking Bicycle Path Conditions...844

Ilse Bohé, Katholieke Universiteit Leuven, Belgium Jeroen Gardeyn, Katholieke Universiteit Leuven, Belgium Ludo Cuypers, COMmeto, Belgium Jorn Lapon, Katholieke Universiteit Leuven, Belgium Michiel Willocx, Katholieke Universiteit Leuven, Belgium Vincent Naessens, Katholieke Universiteit Leuven, Belgium

MS1: M.Sc. Forum

MS1: M.Sc. Forum Session Chairs: Ahmed Abdelgawad & Soumya Datta

1078: Crop Yield Analysis Using Machine Learning Algorithms...850

Fatin Haque, Central Michigan University, United States Ahmed Abdelgawad, Central Michigan University, United States Venkata Prasanth Yanambaka, Central Michigan University, United States Kumar Yelamarthi, Central Michigan University, United States

1082: Proof-of-Authentication Consensus Algorithm: Blockchain-Based IoT Implementation...852

Sudip Maitra, Central Michigan University, United States Venkata Prasanth Yanambaka, Central Michigan University, United States Ahmed Abdelgawad, Central Michigan University, United Kingdom Deepak Puthal, Newcastle University, United Kingdom Kumar Yelamarthi, Central Michigan University, United States

1083: An Energy-Efficient and Reliable RPL for IoT...854

Khandaker Foysal Haque, Central Michigan University, United States Ahmed Abdelgawad, Central Michigan University, United States Venkata Prasanth Yanambaka, Central Michigan University, United States Kumar Yelamarthi, Central Michigan University, United States

1142: Intrusion Detection System in Smart Home Network Using Artificial Immune System and Extreme Learning Machine Hybrid Approach...856 Emmanuel Dare Alalade, University of Cincinnati, United States

1177: Physical Unclonable Function Based Hardware Security for Resource Constraint IoT Devices...858

Muhammed Kawser Ahmed, Central Michigan University, United States Venkata Prasanth Yanambaka, Central Michigan University, United States Ahmed Abdelgawad, Central Michigan University, United States Kumar Yelamarthi, Central Michigan University, United States

1231: Wearable Health Monitoring System Using Flexible Materials Electrodes...860

Tuan Nguyen Gia, University of Turku, Finland Shenjie Bao, University of Turku, Finland Wei Chen, Fudan University, China Tomi Westerlund, University of Turku, Finland

PhD1: PhD Forum

PhD1: PhD Forum Session Chairs: Soumya Datta & Ahmed Abdelgawad

1149: IoT Security Using Deception – Measuring Improved Risk Posture...862 David Weissman, Colorado State University, United States

1153: IoT Devices Reliability Study: Multi-RAT Communication...864

Kalpit Dilip Ballal, Technical University of Denmark, Denmark Lars Dittmann, Technical University of Denmark, Denmark Sarah Ruepp, Technical University of Denmark, Denmark Martin Nordal Petersen, Technical University of Denmark, Denmark

1154: Design and Implementation of a Cloud-Based Multi-LPWAN IoT Data Collection Service...866 Eder Ollora Zaballa, Technical University of Denmark, Denmark

Cécile Vanhelleputte, EPF École d'ingénieur, France Sarah Ruepp, Technical University of Denmark, Denmark Martin Nordal Petersen, Technical University of Denmark, Denmark Michael Stübert Berger, Technical University of Denmark, Denmark

1174: PhD Forum: Enabling Autonomic IoT for Smart Urban Services...868

Muhammad Junaid Farooq, New York University, United States Quanyan Zhu, New York University, United States

1304: Application of Machine Learning Techniques for the Calibration of Low Cost IoT Sensors in Environmental Monitoring Networks...870

Amaka Okafor, University College Dublin, Ireland Declan Delaney, University College Dublin, Ireland

D1: Demo

D1: Demo

Session Chairs: Prasanth Yanambak & Ahmed Abdelgawad

1163: The Manufacturing Data and Machine Learning Platform: Enabling Real-Time Monitoring and Control of Scientific Experiments via IoT...873

Ryan Chard, Argonne National Laboratory, United States Jakob Elias, Argonne National Laboratory, United States Joseph Libera, Argonne National Laboratory, United States Ian Foster, Argonne National Laboratory, United States Santanu Chaudhuri, Argonne National Laboratory, United States

1201: Connected Vehicles: Towards Accident-Free Intersections...875 Khalid Elgazzar, University of Ontario Institute of Technology, Canada Ghadeer Abdelkader, University of Ontario Institute of Technology, Canada

1213: Decentralized IoT Data Authorization with Pebble Tracker...877

Xinxin Fan, IoTeX, United States Qi Chai, IoTeX, United States Zhefeng Li, IoTeX, United States Tian Pan, IoTeX, United States

1214: Voice Controlled Servo Motor Using an Android Application...879

Aline Maalouf, Australian National University, Australia Advaith Sivakumar, University of Tasmania, Australia Kshitij Ajay Jain, Baraja Pvt. Ltd, Australia

1221: Multi-Layer Flexible Chipless RFID Tag Based on Group Delay Encoding...881

Raquel Aline Araújo Rodrigues Felix, Federal University of Campina Grande, Brazil Wilson Costa Felix, Federal University of Pernambuco, Brazil Edmar Candeia Gurjão, Federal University of Campina Grande, Brazil

1222: Soil Moisture Sensor with a Microstrip Band Stop Filter...887

Raquel Aline Araújo Rodrigues Felix, Federal University of Campina Grande, Brazil Wilson Costa Felix, Federal Institute of Rio Grande do Norte, Brazil Alexandre Henrique Soares de Oliveira, Federal University of Campina Grande, Brazil Raymundo de Amorim Junior, Federal University of Campina Grande, Brazil Débora Borges Nobre, Federal University of Campina Grande, Brazil Leandro de Oliveira Souto, Federal University of Campina Grande, Brazil Victor Emanuel de Silva, Federal University of Campina Grande, Brazil

1223: Proving IoT Devices Firmware Integrity with Bijective MAC Time Stamped...891 Pascal Urien, Telecom ParisTech, France

1240: DOCOR: Sensing Everything from Route Buses...893

Ismail Arai, Nara Institute of Science and Technology, Japan Masahiro Kametani, Minato Kanko Bus Inc., Japan Norihiko Honda, Minato Kanko Bus Inc., Japan Toyokazu Akiyama, Kyoto Sangyo University, Japan

Closing

Closing Conference Co-Chair: Magdy Bayoumi & Adam Drobot