2019 IEEE International Conference on Industrial Internet (ICII 2019)

Orlando, Florida, USA 11 – 12 November 2019



IEEE Catalog Number: CFP19Q38-POD ISBN: 978-1-7281-2978-5

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:
 CFP19Q38-POD

 ISBN (Print-On-Demand):
 978-1-7281-2978-5

 ISBN (Online):
 978-1-7281-2977-8

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 Conference on Industrial Internet (ICII) ICII 2019

Table of Contents

Message from the 2019 General Chair xiv Message from the 2019 Program Co-Chairs xv Organizers xvi Technical Program Committee Members xvii Steering Committee xviii Keynotes xix
W1: SCC-UAS
A Security Assessment for Consumer WiFi Drones 1. Joshua Gordon (Embry-Riddle Aeronautical University), Victoria Kraj (Georgia Institute of Technology), Ji Hun Hwang (University of Massachusetts Amherst), and Ashok Raja (Embry-Riddle Aeronautical University)
Passive Radar Based UAV Detection Using Opportunistic RF Illumination .6
Implementation of an Artificial Immune System to Mitigate Cybersecurity Threats in Unmanned Aerial Systems .12.
Meagan Shivers (Embry-Riddle Aeronautical University), Christian Llanes (Embry-Riddle Aeronautical University), and Maxwell Sherman (Gonzaga University)
Multi-layered Threat Analysis for Unmanned Aerial Vehicle .18. Tingting Wang (Zhejiang Sci-Tech University)
Deep Learning Based Offloading Scheme for IoT Networks Towards Green Computing .22. Pankaj Kumar Kashyap (Jawaharlal Nehru University), Sushil Kumar (Jawaharlal Nehru University), and Ankita Jaiswal (Jawaharlal Nehru University)
Deep Reinforcement Learning with Vehicle Heterogeneity Based Traffic Light Control for Intelligent Transportation System .28

W2: Security

Blocks' Network: Redesign Architecture Based on Blockchain Technology .34. Moataz Hanif (Embry–Riddle Aeronautical University) and Houbing Song (Embry–Riddle Aeronautical University)
A Network Anomaly Monitoring Method Based on Edge Computing for CPS/IOT 40. Zhiyong Cao (Yunnan Agricultural University), Xiaobo Cai (Yunnan Agricultural University), Haipeng Li (Yunnan Agricultural University), Wei Huang (Yunnan Agricultural University), Xiujuan Yang (Yunnan Agricultural University), Linli Tao (Yunnan Agricultural University), Xi Zhang (Yunnan Agricultural University), and Huihui Wang (Jacksonville University)
Integration of Software Defined Radios and Software Defined Networking Towards Reinforcement Learning Enabled Unmanned Aerial Vehicle Networks .44. Jian Wang (Embry-Riddle Aeronautical University), Yongxin Liu (Embry-Riddle Aeronautical University), Shuteng Niu (Embry-Riddle Aeronautical University), and Houbing Song (Embry-Riddle Aeronautical University)
Analysis of Rogue Access Points Using SDR 50 Charles Mercenit (Stetson University), Juan C. Rios (University of California, Los Angeles), Yongxin Liu (Embry-Riddle Aeronautical University), Jian Wang (Embry-Riddle Aeronautical University), Jiawei Yuan (Embry-Riddle Aeronautical University), and Houbing Song (Embry-Riddle Aeronautical University)
Blockchain-based Secure Routing Strategy for Airborne Mesh Networks .56
A Security Evaluation Model Based on Fuzzy Hierarchy Analysis for Industrial Cyber-Physical Control Systems .62.
Jun Chen (Kunming Metallurgy College), Huijun Zhu (Kunming Metallurgy College), Zhixin Chen (Kunming Omai Technology Co. Ltd.), Xiaobo Cai (Yunnan Agricultural University), and Linnan Yang (Yunnan Agricultural University)
W3: ANOM1
Software Definition Power Distribution Management System of Open Laboratory .66
The Design of Vehicular Voice Cloud Protocol 72. Hongjian Tang (Xuzhou University of Technology), Lei Chen (Xuzhou University of Technology), Yuan An (Xuzhou University of Technology), and Ping Cui (Xuzhou University of Technology)

Research on Image Data Clustering Algorithm Based on Low Rank Subspace Clustering 77. Dan Li (Xuzhou University of Technology), Lei Chen (Xuzhou University of Technology), Kailiang Zhang (Xuzhou University of Technology), and Chuangeng Tian (Xuzhou University of Technology)
Determining Relative Localization for 1-D Wireless Sensor Networks Based on Round-Trip Time .83
Centralized Network Management in SDN-based Communication Network of substation .8.7
A Highly Energy-efficient Scheduling Approach to Remote Smart Control of Optical Fiber Cores .92
On Reconstruction and Prediction of Network Traffic in Software Defined Networking .98. Yuqing Wang (UESTC, China), Dingde Jiang (UESTC, China), Liuwei Huo (Northeastern University, China), and Yong Zhao (Northeastern University, China)
Active Measurement Approach to Traffic QoS Sensing for Smart Network Access in SDN .103
W4: ANOM2
A SDN-Based Traffic Information Acquirement Approach in Internet of Things .109. *Renxiang Huang (Sichuan University of Arts and Science)
A Prediction Approach to End-to-End Traffic in Space Information Networks .1.15. Sheng Qi (University of Electronic Science and Technology of China), Dingde Jiang (University of Electronic Science and Technology of China), and Liuwei Huo (Northeastern University)

```
Huan Li (State Grid Liaoning Electric Power Supply Co., LTD, China),
   Fanbo Meng (State Grid Liaoning Electric Power Supply Co., LTD,
   China), Yitao Liu (State Grid Liaoning Electric Power Supply Co.,
   LTD, China), Gang Wang (State Grid Liaoning Electric Power Supply Co
   ., LTD, China), and Dongdong Wang (State Grid Liaoning Electric Power
   Supply Co., LTD, China)
An ARMA-Based Traffic Abnormal Identification Approach for Remote Smart Scheduling of Optical Fiber
Cores 126.
   Huan Li (State Grid Liaoning Electric Power Supply Co., LTD, China),
   Fanbo Meng (State Grid Liaoning Electric Power Supply Co., LTD,
   China), Jianhong Kong (State Grid Liaoning Electric Power Supply Co.,
   LTD, China), Gang Wang (State Grid Liaoning Electric Power Supply Co.,
   LTD, China), Bin Lu (State Grid Liaoning Electric Power Supply Co.,
   LTD, China), Yang Liu (State Grid Liaoning Electric Power Supply Co.,
   LTD, China), and Tong Li (State Grid Liaoning Electric Power Supply
   Co., LTD, China)
A Hilbert-Huang Transform-Based Traffic Estimation Algorithm to Power Line Communications 132......
   Yonggui Guo (State Grid Liaoning Electric Power Supply CO., LTD,
   China), Kunya Guo (State Grid Liaoning Electric Power Supply CO., LTD,
   China), Haiyang Cong (State Grid Liaoning Electric Power Supply CO.,
   LTD, China), Ran Li (State Grid Shenyang Electric Power Supply
   Company, China), Yi Lu (State Grid Shenyang Electric Power Supply
   Company, China), Bin Lu (State Grid Liaoning Electric Power Supply
   CO., LTD, China), Dongdong Wang (State Grid Liaoning Electric Power
   Supply CO., LTD, China), Diying Wu (State Grid Shenyang Electric Power
   Supply Company, China), and Taivi Fu (State Grid Shenyang Electric
   Power Supply Company, China)
A GRNN -Based Traffic Reconstruction Algorithm to Surface Wave-Based Power Line Communications .138.
   Yonggui Guo (State Grid Liaoning Electric Power Supply CO., LTD,
   China), Haiyang Cong (State Grid Liaoning Electric Power Supply CO.,
   LTD, China), Kunya Guo (State Grid Liaoning Electric Power Supply CO.,
   LTD, China), Ran Li (State Grid Shenyang Electric Power Supply
   Company, China), Yi Lu (State Grid Shenyang Electric Power Supply
   Company, China), Dongdong Wang (State Grid Liaoning Electric Power
   Supply CO., LTD, China), Bin Lu (State Grid Liaoning Electric Power
   Supply CO., LTD, China), Diying Wu (State Grid Shenyang Electric Power
   Supply Company, China), and Taiyi Fu (State Grid Shenyang Electric
   Power Supply Company, China)
A STFT-Based Traffic Acquirement Algorithm to Remote Smart Managements of Optical Fiber Cores 143.....
   Fanbo Meng (State Grid Liaoning Electric Power Supply Co., LTD,
   China), Huan Li (State Grid Liaoning Electric Power Supply Co., LTD,
   China), Yitao Liu (State Grid Liaoning Electric Power Supply Co., LTD,
   China), Jianhong Kong (State Grid Liaoning Electric Power Supply Co.,
   LTD, China), Bin Lu (State Grid Liaoning Electric Power Supply Co.,
   LTD, China), Zhibin Yang (State Grid Liaoning Electric Power Supply
   Co., LTD, China), and Shuai Ren (State Grid Liaoning Electric Power
   Supply Co., LTD, China)
```

A BPNN-Based Traffic Anomaly Detection Method for Remote Managements of Optical Fiber Cores .120.....

Posters

A Dynamic Security Control Architecture for Industrial Cyber-Physical System .148...... Xin Zhang (Yunnan College of Business Management), Xiaobo Cai (Yunnan Agricultural University), Chaogang Wang (Yunnan College of Business Management), Ke Han (Kunming Metallurgy College), and Shujuan Zhang (Yunnan College of Business Management) Dynamic Attack and Defense Security Situation Assessment Model for Power Information Physical Fusion System 152 Huijun Zhu (Kunming Metallurgy College), Zhicheng Ma (Kunming Metallurgy College), Xiaobo Cai (Yunnan Agricultural University), Jun Chen (Kunming Metallurgy College), Rui Jin (Kunming Metallurgy College), and Linnan Yang (Yunnan Agricultural University) A Security Control Model Based on Petri Net for Industrial IoT .156. Huijun Zhu (Kunming Metallurgy College), Jun Chen (Kunming Metallurgy College), Xiaobo Cai (Yunnan Agricultural University), Zhicheng Ma (Kunming Metallurgy College), Rui Jin (Kunming Metallurgy College), and Linnan Yang (Yunnan Agricultural University) **TS I: Industrial Wireless Systems** Analysis of Joint Scheduling and Power Control for Predictable URLLC in Industrial Wireless Networks 160... Ling Wang (Iowa State University) and Hongwei Zhang (Iowa State University) Online Period Selection for Wireless Control Systems 170. Venkata Prashant Modekurthy (Wayne State University) and Abusayeed Saifullah (Wayne State University) Enabling Direct Messaging from LoRa to ZigBee in the 2.4 GHz Band for Industrial Wireless Networks .180... Junyang Shi (State University of New York at Binghamton), Xingjian Chen (State University of New York at Binghamton), and Mo Sha (State *University of New York at Binghamton)* Analysis of Multi-user Scheduling in a TSN-enabled 5G System for Industrial Applications .190...... David Ginthör (Robert Bosch GmbH), Johannes von Hoyningen-Huene (Robert Bosch GmbH), Rene Guillaume (Robert Bosch GmbH), and Hans Schotten (Technische Universität Kaiserslautern) TS II: Security and Platforms I Microcontroller Based IoT System Firmware Security: Case Studies 200. Chao Gao (University of Massachusetts Lowell), Lan Luo (University of Central Florida), Yue Zhang (Jinan University), Bryan Pearson (University of Central Florida), and Xinwen Fu (University of Central Florida) Multiattack Intrusion Detection Algorithm for Edge-Assisted Internet of Things 2.10. Dapeng Wu (Chongqing University of Posts and Telecommunications), Junjie Yan (Chongging University of Posts and Telecommunications), Honggang Wang (University of Massachusetts Dartmouth), and Ruyan Wang (Chongging University of Posts and Telecommunications)

A Sensor Attack Detection Method in Intelligent Vehicle with Multiple Sensors .2.19	
A Personalized Privacy Protection Data Uploading Scheme for Mobile Crowdsensing .227	
TS III: Security and Platforms II	
A Hybrid RSA Algorithm in Support of IoT Greenhouse Applications 233	
FastChain: Lightweight Blockchain with Sharding for Internet of Battlefield-Things in NS-3 .241 Utsab Khakurel (Howard University), Danda Rawat (Howard University), and Laurent Njilla (US Air Force Research Lab)	
Decentralized Access Control for IoT Data Using Blockchain and Trusted Oracles .248	
TS IV: IoT Applications	
VWAN: Virtual WiFi ANtennas for Increased Indoor Localization Accuracy .258	
QoE Control for Dynamic Adaptive Video Streaming Over HTTP at Access Point 268. Yukun Yuan (Stony Brook University), Shan Lin (Stony Brook University), and Gang Zhou (College of William and Mary)	
WebIDE Cloud Server Resource Allocation with Task Pre-Scheduling in IOT Application Developmed Huaijun Wang (Xi'an University of Technology), Junhuai Li (Xi'an University of Technology), Jubo Tian (Xi'an University of Technology), and Kan Wang (Xi'an University of Technology)	ent .2.7.8
Low-Latency High-Level Data Sharing for Connected and Autonomous Vehicular Networks .287 Qi Chen (University of North Texas), Shihai Tang (University of North Texas), Jacob Hochstetler (University of North Texas), Jingda Guo (University of North Texas), Yuan Li (University of North Texas), Jinbo Xiong (Fujian Normal University), Qing Yang (University of North Texas), and Song Fu (University of North Texas)	

Poster/Demo

i-LOD: Industrial Linked Open Data System for Semantic Integration of Industrial Real-time Data in Smart City 297. JiEun Lee (Sejong University), JongGwan An (Sejong University), SeungMyeong Jeong (Korea Electronics Technologies Institute), and JaeSeung Song (Sejong University)
Poster Abstract: Modbus and IoT Platform Interworking for Smart Energy Management .299
The Sitting Posture Monitoring Method Based on Notch Sensor 301. Huaijun Wang (Xi'an University of Technology), Jing Zhao (Xi'an University of Technology), Junhuai Li (Xi'an University of Technology), and Kan Wang (Xi'an University of Technology)
Research on Leakage Diagnosis of Heating Pipe Network Based on Deep Belief Network 303. Yiliang Guo (Beijing University of Technology), Qingwu Fan (Beijing University of Technology), and Xudong Liu (Beijing University of Technology)
Service-based Architecture with Product-centric Control in a Production Island-based Agile Factory .305 <i>Udayanto Dwi Atmojo (Aalto University), Jan Olaf Blech (Aalto University), Seppo Sierla (Aalto University), and Valeriy Vyatkin (Aalto University)</i>
On Developing a Collaborative and Interoperable Mobile Production Platform for an Agile Factory: A Case Study 307
TS VI: Learning-based CPS Systems Design
On the Effectiveness of Recurrent Neural Networks for Live Modeling of Cyber-Physical Systems .309
Reinforcement Learning for Cyber-Physical Systems 318
LSTM-based Approach to Monitor Operator Situation Awareness via HMI State Prediction .328
A Perspective of Emerging Technologies for Industrial Internet .338

TS V: Edge Computing

Autonomous Cognitive GPR Based on Edge Computing and Reinforcement Learning .348
Reinforcement Learning Based Wireless Augmented Reality on Mobile Edge Computing 355
Content Placement with Unknown Popularity in Fog Radio Access Networks .361. Yangcheng Zhou (Beijing University of Posts and Telecommunications), Shi Yan (Beijing University of Posts and Telecommunications), and Mugen Peng (Beijing University of Posts and Telecommunications)
Distributed Machine Learning for Internet-of-Things in Smart Cities .368
TS VII: Short Paper I – Security and Communications
TS VII: Short Paper I – Security and Communications Fake News Detection in Social Networks Using Machine Learning and Deep Learning: Performance Evaluation 3.75. Wenlin Han (California State University, Fullerton) and Varshil Mehta (California State University, Fullerton)
Fake News Detection in Social Networks Using Machine Learning and Deep Learning: Performance Evaluation .375
Fake News Detection in Social Networks Using Machine Learning and Deep Learning: Performance Evaluation .375

TS VIII: Short Paper II – Algorithms and Applications

Multi-Sensor Information Fusion in Ocean of Things Based on Improved Adaptive Dempster-Shafer Evidence Theory .399
Design of Water Distribution Network via Auxiliary Individual Oriented Genetic Algorithm .405
Image Threshold Segmentation Based on Auxiliary Individual Oriented Crossover Genetic Algorithm .4.11 Qingwu Fan (Beijing University of Technology), Guanghuang Chen (Beijing University of Technology), Xingqi Zhou (Beijing University of Technology), and Lanbo Li (Beijing University of Technology)
A Speculative Parallel Optimization Method for Industrial Big Data Algorithms 4.17. Zhoukai Wang (Xi'an University of Technology), Huaijun Wang (Xi'an University of Technology), and Junhuai Li (Xi'an University of Technology)
Design and Implementation of Distributed Video Equipment Monitoring and Management System .423
Artificial Intelligence (AI) Driven Wireless Body Area Networks: Challenges and Directions .428
Author Index 431.