IEEE INFOCOM 2022 - IEEE Conference on Computer Communications Workshops (INFOCOM WKSHPS 2022)

Virtual Conference
2-5 May 2022

Pages 1-379

IEEE Catalog Number: CFP2223E-POD
ISBN: 978-1-6654-0927-8

Copyright © 2022 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:	CFP2223E-POD
ISBN (Print-On-Demand):	978-1-6654-0927-8
ISBN (Online):	978-1-6654-0926-1

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

TABLE OF CONTENTS

Automatic Selection Attacks Framework for Hard Label Black-Box Models 1
Xiaolei Liu, Xiaoyu Li, Desheng Zheng, Jiayu Bai, Yu Peng, Shibin Zhang

BDESF-ITS: Blockchain-Based Secure Data Exchange and Storage Framework for Intelligent Transportation System 8
Naivedya Lath, Kaustubh Thapliyal, Kartik Kandpal, Mohammad Wazid, Ashok Kumar Das, D. P. Singh

Secure Enhancement in NOMA-Based UAV-MEC Networks 14
Yuan Gao, Yang Guo, Ping Wang, Siming Yang, Jing Wang, Xiaonan Wang, Yu Ding, Weidang Lu, Yu Zhang, Guoxing Huang, Jiang Cao

Interpretability Evaluation of Botnet Detection Model Based on Graph Neural Network 20
Xiaolin Zhu, Yong Zhang, Zhao Zhang, Da Guo, Qi Li, Zhao Li

A Generative Model for Evasion Attacks in Smart Grid 26
Venkata Praveen Kumar Madhavarapu, Shameek Bhattacharjee, Sajal K. Das

PIC: Preserving Data Integrity in UAV Assisted Communication 32
Nalam Venkata Abhishek, Muhammad Naveed Aman, Teng Joon Lim, Biplab Sikdar

An Observation of Packet Classification: Most Rules Are at the Top 38
Chengjun Jia, Chenglong Li, Yifan Li, Xiaohe Hu, Jun Li

Evaluation of Deep Learning Model in the Field of Electromagnetic Signal Recognition 44
Jiabao Wang, Haoran Zha, Jiangzhi Fu

End-To-End TCP-Compatible Backpressure Routing 50
Christos Liaskos, Konstantinos Alexandris, Siyu Tang, Anindya Das

Age of Information in the Presence of an Adversary 56
Subhankar Banerjee, Sennur Ulukus

IoT Botnet Detection Framework from Network Behavior Based on Extreme Learning Machine 64
Nasimul Hasan, Zhenxiang Chen, Chuan Zhao, Yuhui Zhu, Cong Liu

Age of Loop Oriented Wireless Networked Control System: Communication and Control Co-Design in the FBL Regime 70
Jie Cao, Xu Zhu, Sumei Sun, Petar Popovski, Shaohan Feng, Yufei Jiang

Exploiting Function-Level Dependencies for Task Offloading in Edge Computing 76
Jiwei Mo, Jiangshu Liu, Zhiwei Zhao

Competitive Analyses of Online Minimum Age of Information Transmission Scheduling 82
Tung-Wei Kuo

Learning Based and Physical-Layer Assisted Secure Computation Offloading in Vehicular Spectrum Sharing Networks 90
Ying Ju, Yuchao Chen, Zhiwei Cao, Haoyu Wang, Lei Liu, Qingqi Pei, Neeraj Kumar

Identifying DDoS Attack Using Split-Machine Learning System in 5G and Beyond Networks 96
Bharat S Rawal, Sudhanshu Patel, Mithileysh Sathiyanarayanan

A Blockchain-Based Privacy-Preserving Framework for Cross-Social Network Photo Sharing 102
Ming Zhang, Zhe Sun, Hui Li, Ben Niu, Fenghua Li, Yuhang Xie, Chunhao Zheng

Deep CAPTCHA Recognition Using Encapsulated Preprocessing and Heterogeneous Datasets 108
Turhan Kimbrough, Pu Tian, Weixian Liao, Erik Blasch, Wei Yu

On the Detection of Adversarial Attacks Through Reliable AI 114
Ivan Vaccari, Alberto Carlevaro, Sara Narteni, Enrico Cambiaso, Maurizio Mongelli

MERIT: Multi-Itinerary Tourist Recommendation Engine for Industrial Internet of Things 120
Abhishek Majumder, Joy Lal Sarkar, Bibudhendu Pati, Chhabi Rani Panigrahi, V Ramasamy, Sudipta Roy, Vikas Kumar

Cost Effective Routing in Large-Scale Multi-Hop LoRa Networks 126
Silin Feng, Jiajun Chen, Zhiwei Zhao

Location Privacy-Aware Coded Offloading for Distributed Edge Computing 132
Yulong He, Xiaofan He

A Cloud-Terminal Collaborative System for Crowd Counting and Localization Using Multi-UAVs 138
Shuze Shen, Zheyi Ma, Mingqing Liu, Qingwen Liu, Yunfeng Bai, Mingliang Xiong

Malicious Transaction Identification in Digital Currency Via Federated Graph Deep Learning 144
Hanbiao Du, Meng Shen, Rungeng Sun, Jizhe Jia, Liehuang Zhu, Yanlong Zhai

Detecting Proxies Relaying Streaming Internet Traffic 150
Henry Clausen, Aditya Manocha, Michael Gibson

Adversarial Attacks on Deep Neural Networks Based Modulation Recognition 156
Mingqian Liu, Zhenju Zhang, Nan Zhao, Yunfei Chen

Radio Frequency Fingerprint Identification Method Based on Ensemble Learning 162
Yu Huang, Pengfei Liu, Jie Yang

Minimum-SNR Maximization for Robust IRS-Assisted Legitimate Monitoring System 168
Meng Wang, Qinghe Du, Likang Zhang

Dynamic Data Offloading for Massive Users in Ultra-Dense LEO Satellite Networks Based on Stackelberg Mean Field Game 174
Dezhi Wang, Wei Wang, Yuhan Kang, Zhu Han

A NUMA-Aware Key-Value Store for Hybrid Memory Architecture 180
Yuguo Li, Shaoheng Tan, Zhiwen Wang, Dingding Li

Ultra Reliable and Low Latency Authentication Scheme for Internet of Vehicles Based on Blockchain 186
Xiangyue Yang, Haoxiang Luo, Jingshan Duan, Hongfang Yu

Overlapped Connected Dominating Set for Big Data Security 191
Li Yi, Weidong Fang, Wei Chen, Wuxiong Zhang, Guoqing Jia

DRL-Based Optimization of Privacy Protection and Computation Performance in MEC Computation Offloading 196
Zhengjun Gao, Guowen Wu, Yizhou Shen, Hong Zhang, Shigen Shen, Qiying Cao

A Formal Analysis of the Count-Min Sketch with Conservative Updates 202
Younes Ben Mazziane, Sara Alouf, Giovanni Neglia

Connectivity-Aware Fast Network Forming Aided by Digital Twin for Emergency Use 208
Terry N. Guo

SCSGuard: Deep Scam Detection for Ethereum Smart Contracts 214
Huiwen Hu, Qianlan Bai, Yuedong Xu

Distribution of AoI in EH-Powered Multi-Source Systems Under Non-Preemptive and Preemptive Policies 220
Mohamed A. Abd-Elmagid, Harpreet S. Dhillon

DRL-Based Beam Allocation in Relay-Aided Multi-User MmWave Vehicular Networks 228
Ying Ju, Haoyu Wang, Yuchao Chen, Lei Liu, Tong-Xing Zheng, Qingqi Pei, Ming Xiao

PRESSGenDB: PRivacy-PrEserving Substring Search on Encrypted Genomic DataBase 234
Sara Jafarbeiki, Amin Sakzad, Shabnam Kasra Kermanshahi, Ron Steinfeld, Raj Gaire

Online Scheduling of Transmission and Processing for AoI Minimization with Edge Computing 240
Jianhang Zhu, Jie Gong

FedTSE: Low-Cost Federated Learning for Privacy-Preserved Traffic State Estimation in IoV 246
Xiaoming Yuan, Jiahui Chen, Ning Zhang, Chunsheng Zhu, Qiang Ye, Xuemin Sherman Shen

Efficient Synchronous MAC Protocols for Terahertz Networking in Wireless Data Center 252
Tao Wang, Xiangquan Shi, Jing Tao, Xiaoyan Wang, Biao Han

Multi-Frame Scheduling for Federated Learning Over Energy-Efficient 6G Wireless Networks 258
Mahdi Beitollahi, Ning Lu

Secrecy Rate Maximization for THz-Enabled Femto Edge Users Using Deep Reinforcement Learning in 6G 264
Himanshu Sharma, Ishan Budhiraja, Neeraj Kumar, Raj Kumar Tekchandani

Trusted Storage Architecture for Machine Reasoning Based on Blockchain 270
Yichuan Wang, Rui Fan, Xinyue Yin, Xinhong Hei

DDoS Attack Mitigation in Cloud Targets Using Scale-Inside Out Assisted Container Separation 276
Anmol Kumar, Gaurav Somani

Optimal Feature Set Selection for IoT Device Fingerprinting on Edge Infrastructure Using Machine Intelligence 282
Sarvesh Sanjay Wanode, Milind Anand, Barsha Mitra

Edge Intelligence-Based Privacy Protection Framework for IoT-Based Smart Healthcare Systems 288
Mahmuda Akter, Nour Moustafa, Timothy Lynar

SAC-Based Computation Offloading and Resource Allocation in Vehicular Edge Computing 296
Yanlang Zheng, Huan Zhou, Rui Chen, Kai Jiang, Yue Cao

FedCluster: A Federated Learning Framework for Cross-Device Private ECG Classification 302
Daoqin Lin, Yuchun Guo, Huan Sun, Yishuai Chen

An Empirical Analysis of CAPTCHA Image Design Choices in Cloud Services 308
Xiaojiang Zuo, Xiao Wang, Rui Han

STUN: Secret-Free Trust-Establishment for Underground Wireless Networks 314
Ebuka Oguchi, Nirnimesh Ghose, Mehmet C. Vuran

DHT-Based Edge and Fog Computing Systems: Infrastructures and Applications 320
Yahya Hassanzadeh-Nazarabadi, Sanaz Taheri-Boshrooyeh, Öznur Özkasap

A Novel IoT-Based Edge Sensing Platform for Structure Health Monitoring 326
Igor Bisio, Chiara Garibotto, Fabio Lavagetto, Andrea Sciarrone

An Investigation on Fragility of Machine Learning Classifiers in Android Malware Detection..... 332
Husnain Rafiq, Nauman Aslam, Biju Issac, Rizwan Hamid Randhawa

User Intent Driven Path Switching in Video Delivery - An Edge Computing Based Approach..... 338
Peng Qian, Ning Wang, Rahim Tafazolli

Blockchain and Edge Intelligence-Based Secure and Trusted V2V Framework Underlying 6G Networks 344
Nilesh Kumar Jadav, Rajesh Gupta, Sudeep Tanwar

Blockchain and Zero-Sum Game-Based Dynamic Pricing Scheme for Electric Vehicle Charging..... 350
Riya Kakkar, Smita Agrawal, Rajesh Gupta, Sudeep Tanwar

Deep Learning and Blockchain-Based Essential and Parkinson Tremor Classification Scheme 356
Jigna J Hathaliya, Hetav Modi, Rajesh Gupta, Sudeep Tanwar

Social Relationship Mining Based on User Telephone Communication Data for Cooperative Relationship Recommendation..... 362
Wei Zhao, Wenjie Kang, Xuchong Liu, Xin Su, Yue Zhang, Hao Jiang

Efficient and Privacy-Preserving Logistic Regression Scheme Based on Leveled Fully Homomorphic Encryption 368
Chengjin Liu, Zoe L. Jiang, Xin Zhao, Qian Chen, Junbin Fang, Daojing He, Jun Zhang, Xuan Wang

WMDefense: Using Watermark to Defense Byzantine Attacks in Federated Learning..... 374
Xu Zheng, Qihao Dong, Anmin Fu

Impact of Subjectivity in Deep Reinforcement Learning Based Defense of Cloud Storage 380
Zahra Aref, Narayan B. Mandayam

Dynamic and Secure Resource Allocation Framework of Slices for 5G-Enabled Cyber Physical Systems..... 386
Haotong Cao, Yue Hu, Shengchen Wu, Yongan Guo

Programmable Packet Scheduling with SP-PIFO: Theory, Algorithms and Evaluation 392
Balázs Vass, Csaba Sarkadi, Gábor Rétvári

DDPG-Based Computation Offloading and Service Caching in Mobile Edge Computing 398
Lingxiao Chen, Guoqiang Gong, Kai Jiang, Huan Zhou, Rui Chen

AI-Empowered Secure Data Communication in V2X Environment with 6G Network..... 404
Anuja R. Nair, Nilesh Kumar Jadav, Rajesh Gupta, Sudeep Tanwar

Interference Mitigation and Secrecy-Ensured D2D Resource Allocation Scheme Using Game Theory 410
Rajesh Gupta, Sudeep Tanwar

A Deep Reinforcement Learning Based Intrusion Detection Strategy for Smart Vehicular Networks..... 416
Zhihao Wang, Dingde Jiang, Zhihan Lv, Houbing Song

HVNet: Hardware-Assisted Virtual Networking on a Single Physical Host 422
Florian Wiedner, Max Helm, Sebastian Gallenmüller, Georg Carle

Security Performance Analysis of NOMA System Based on Multi-Slot Combined Reception 428
Haoyu Zhu, Ninghao Zhou, Jia Hou

Smartphone-Aided Human Activity Recognition Method Using Residual Multi-Layer Perceptron 434
Shang Shi, Yu Wang, Heng Dong, Guan Gui, Tomoaki Ohtsuki

Super Resolution for Augmented Reality Applications 440
Vladislav Li, George Amponis, Jean-Christophe Nebel, Vasileios Argyriou, Thomas Lagkas, Savvas Ouzounidis, Panagiotis Sarigiannidis

Unsupervised Bias Evaluation of DNNs in non-IID Federated Learning Through Latent micro-Manifolds 446
Ilias Siniosoglou, Vasileios Argyriou, Thomas Lagkas, Ioannis Moscholios, George Fragulis, Panagiotis Sarigiannidis

Secure and Trusted Attestation Protocol for UAV Fleets 452
Gaurang Bansal, Biplab Sikdar

P^{2}COMM: A Secure and Low-Cost Message Dissemination Scheme for Connected Vehicles 458
Umesh Bodkhe, Sudeep Tanwar

A Hybrid RF-FSO Offloading Scheme for Autonomous Industrial Internet of Things 464
Dimitrios Pliatsios, Thomas Lagkas, Vasileios Argyriou, Antonios Sarigiannidis, Dimitrios Margounakis, Theocharis Saoulidis, Panagiotis Sarigiannidis

Machine Learning Model for IoT-Edge Device Based Water Quality Monitoring 470
Yogendra Kumar, Siba K Udgata

Incentive and Knowledge Distillation Based Federated Learning for Cross-Silo Applications 476
Beibei Li, Yaxin Shi, Yuqing Guo, Qinglei Kong, Yukun Jiang

L3Fog: Fog Node Selection and Task Offloading Framework for Mobile IoT 482
Mehbub Alam, Nurzaman Ahmed, Rakesh Matam, Ferdous Ahmed Barbhuiya

Feature-Attended Multi-Flow LSTM for Anomaly Detection in Internet of Things 488
Luhan Zou, Yunkai Wei, Lixiang Ma, Supeng Leng

Novel Efficient Block Chain and Rule-Based Intelligent Privacy Share System in Future Network 494
Xiaolong Deng, Tiejun Lv, Linming Song

Semi-Federated Learning: An Integrated Framework for Pervasive Intelligence in 6G Networks 502
Jingheng Zheng, Wanli Ni, Hui Tian, Deniz Gündüz, Tony Q. S. Quek

Joint UAVs Position Optimization and Offloading Decision for Blockchain-Enabled Intelligent Transportation 508
Chen Wang, Daosen Zhai, Ruonan Zhang, Huan Li, Haotong Cao, Anish Jindal

General Decentralized Federated Learning for Communication-Computation Tradeoff 514
Wei Liu, Li Chen, Weidong Wang

Hierarchical Attention Network for Interpretable and Fine-Grained Vulnerability Detection 520
Mianxue Gu, Hantao Feng, Hongyu Sun, Peng Liu, Qiuling Yue, Jinglu Hu, Chunjie Cao, Yuqing Zhang

When Wireless Federated Learning Meets Physical Layer Security: The Fundamental Limits 526
Haonan Zhang, Chuanchuan Yang, Bin Dai

LSE: A Learning-Based Per-Flow Spread Estimation Framework for Network Data Streams 532
Dongyang Yang, Yifan Han, Yang Du, He Huang, Yu-E Sun, Shigang Chen

Wireless Resource Management in Intelligent Semantic Communication Networks 538
Le Xia, Yao Sun, Xiaoqian Li, Gang Feng, Muhammad Ali Imran

Machine and Deep Learning Approaches for IoT Attack Classification 544
Alfredo Nascita, Francesco Cerasuolo, Davide Di Monda, Jonas Thern Aberia Garcia, Antonio Montieri, Antonio Pescapè

Intelligent Sensing and Communication Assisted Pedestrians Recognition in Vehicular Networks: An Effective Throughput Maximization Approach 550
Dengfeng Yao, Minghui Dai, Tianshun Wang, Yuan Wu, Zhou Su

Phishing Attack Detection with ML-Based Siamese Empowered ORB Logo Recognition and IP Mapper 556
Manish Bhurtel, Yuba R. Siwakoti, Danda B. Rawat

DRL-Based Fountain Codes for Concurrent Multipath Transfer in 6G Networks 562
Chengxiao Yu, Wei Quan, Kang Liu, Mingyuan Liu, Ziheng Xu, Hongke Zhang

UAV Deployment for Data Collection in Energy Constrained WSN System 568
Hassaan Hydher, Dushantha Nalin K. Jayakody, Kasun T. Hemachandra, Tharaka Samarasinghe

A Conceptual Trust Management Framework Under Uncertainty for Smart Vehicular Networks 574
Vishal Venkatraman, Shantanu Pal, Zahra Jadidi, Alireza Jolfaei

DRL-Based Resource Allocation Optimization for Computation Offloading in Mobile Edge Computing 581
Guowen Wu, Yuhan Zhao, Yizhou Shen, Hong Zhang, Shigen Shen, Shui Yu

ACT: An Acoustic Communications Testbed 587
Diego A. Cuji, Zhengnan Li, Milica Stojanovic

Exploring LoRa for Drone Detection 593
Jian Fang, Zhiyi Zhou, Sunhaoran Jin, Lei Wang, Bingxian Lu, Zhenquan Qin

Simultaneous Intra-Group Communication: Understanding the Problem Space 595
Jagnyashini Debadarshini, Sudipta Saha

Efficient Coordination Among Electrical Vehicles: An IoT-Assisted Approach 597
Jagnyashini Debadarshini, Sudipta Saha

Time-Sensitive Networking Experimentation on Open Testbeds 599
Gilson Miranda, Esteban Municio, Jetmir Haxhibeqiri, Daniel F. Macedo, Jeroen Hoebeke, Ingrid Moerman, Johann M. Marquez-Barja

Implementation of Service Function Chain Deployment with Allocation Models in Kubernetes 605
Rui Kang, Mengfei Zhu, Eiji Oki

EFTA: An Energy-Efficient, Fault-Tolerant, and Area-Optimized UAV Placement Scheme for Search Operations 607
Prateek Mahajan, Anusha Kumar, G. S. S. Chalapathi, Rajkumar Buyya

Quality-Aware Incentive Mechanism Design Based on Matching Game for Hierarchical Federated Learning 613
Du Hui, Li Zhuo, Chen Xin

Online Node Cooperation Strategy Design for Hierarchical Federated Learning 619
Shen Xin, Li Zhuo, Chen Xin

MbRE IDS: An AI and Edge Computing Empowered Framework for Securing Intelligent Transportation Systems 625
Varun Kohli, Amit Chougule, Vinay Chamola, F. Richard Yu

Resource Aware Fog Based Remote Health Monitoring System 631
Dilwar Hussain Barbhuiya, Adittya Dey, Rajdeep Ghosh, Kunal Das, Kumarjit Ray, Nabajyoti Medhi

How Degrading Network Conditions Influence Machine Learning End Systems Performance? 637
Sergei Chuprov, Leon Reznik, Antoun Obeid, Srujan Shetty

Dynamic Pricing for Idle Resource in Public Clouds: Guarantee Revenue from Strategic Users..... 643
Jiawei Li, Jessie Hui Wang, Jilong Wang

Heterogeneous Airborne mmWave Cells: Optimal Placement for Power-Efficient Maximum Coverage..... 645
Nima Namvar, Fatemeh Afghah

STATOEUVER: State-Aware Load Balancing for Network Function Virtualization 651
Wendi Feng, Ranzheng Cao, Zhi-Li Zhang

Resolving Conflicts Among Unbalanced Multi-Source Data When Multi-Value Objects Exist 653
Xiu Susie Fang, Quan Z. Sheng, Jian Yang, Guohao Sun, Xianzhi Wang, Yihong Zhang

Testbed and Performance Evaluation of 3D MmWave Beam Tracking in Mobility Scenario..... 655
Qixun Zhang, Chang Yang

Static Obstacle Detection Based on Acoustic Signals 657
Runze Tang, Gaolei Duan, Lei Xie, Yanling Bu, Ming Zhao, Zhenjie Lin, Qiang Lin

Game Theoretic Analysis of Age of Information for Slotted ALOHA Access with Capture..... 659
Leonardo Badia, Andrea Zanella, Michele Zorzi

Joint Modulation of 3-PPM and Quantum Squeezed States in Communication Systems 665
Yaoyao Wang, Xiaoguang Chen

AI-Driven Service-Aware Real-Time Slicing for Beyond 5G Networks 670
Theodoros Tsourdinis, Ilias Chatzistefanidis, Nikos Makris, Thanasis Korakis

Latency-Aware C-ITS Application for Improving the Road Safety with CAM Messages on the Smart Highway Testbed 676
Vincent Charpentier, Nina Slamnik-Krijestorac, Johann Marquez-Barja

Joint Communication and Sensing Enabled Cooperative Perception Testbed for Connected Automated Vehicles 682
Qixun Zhang, Xinye Gao

The End of Eavesdropping Attacks Through the Use of Advanced End to End Encryption Mechanisms..... 684
Leandros Maglaras, Nick Ayres, Sotiris Moschoyiannis, Leandros Tassiulas

Demonstration of Policy-Induced Unsupervised Feature Selection in a 5G Network 686
Jalil Taghia, Farnaz Moradi, Hannes Larsson, Xiaoyu Lan, Masoumeh Ebrahimi, Andreas Johnsson

Coexistence of Age Sensitive Traffic and High Throughput Flows: Does Prioritization Help? 688
Tanya Shreedhar, Sanjit K. Kaul, Roy D. Yates

LoRaCoin: Towards a Blockchain-Based Platform for Managing LoRa Devices 694
Eloi Cruz Harillo, Felix Freitag

Improving AoI Via Learning-Based Distributed MAC in Wireless Networks 696
Yash Deshpande, Onur Ayan, Wolfgang Kellerer

Order Matters: On the Impact of Swapping Order on an Entanglement Path in a Quantum Network 704
Alena Chang, Guoliang Xue

An ns3-Based Energy Module for 5G mmWave Base Stations 710
Argha Sen, Sashank Bonda, Jay Jayatheerthan, Sandip Chakraborty

Demo Abstract: Environment-Adaptive 3D Human Pose Tracking with RFID 712
Chao Yang, Lingxiao Wang, Xuyu Wang, Shiwen Mao

Demo Abstract: Technology-Agnostic Approach to RF Based Human Activity Recognition 714
Chao Yang, Xuyu Wang, Shiwen Mao

The AERPAW Experiment Workflow - Considerations for Designing Usage Models for a Computing-Supported Physical Research Platform 716
Magreth Mushi, Harshvardhan P. Joshi, Rudra Dutta, Ismail Guvenc, Mihail L. Sichitiu, Brian Floyd, Thomas Zajkowski

Demo: A Disaggregated O-RAN Platform for Network Slice Deployment and Assurance 724
Ahan Kak, Van-Quan Pham, Huu-Trung Thieu, Nakjung Choi

A Virtualization Approach to Validate Services and Subsystems of a MALE UAS 726
Victor Sanchez-Aguero, Francisco Valera, Ivan Vidal, Borja Nogales, Jaime Cabezas, Carlos Vidal

Resource Defragmentation for Network Slicing 732
Paolo Medagliani, Sébastien Martin, Jérémie Leguay, Shengming Cai, Feng Zeng, Nicolas Huin

Evaluating Time-Sensitive Networking Features on Open Testbeds 734
Gilson Miranda, Esteban Municio, Jetmir Haxhibeqiri, Daniel F. Macedo, Jeroen Hoebeke, Ingrid Moerman, Johann M. Marquez-Barja

Remote Meter Reading Based on Lightweight Edge Devices 736
Ziwei Liu, Lei Xie, Jingyi Ning, Ming Zhao, Liming Wang, Hao Peng

Experimental Demonstration of Multiple Input Multiple Output Communications Above 100 GHz 738
Jacob Hall, Duschia Bodet, Josep Miquel Jornet

Noise-Resilient Federated Learning: Suppressing Noisy Labels in the Local Datasets of Participants 740
Rahul Mishra, Hari Prabhat Gupta, Tanima Dutta

Vision Aided Beam Tracking and Frequency Handoff for mmWave Communications 742
Tengyu Zhang, Jun Liu, Feifei Gao

Differentiating Losses in Wireless Networks: A Learning Approach 744
Yuhao Chen, Jinyao Yan, Yuan Zhang, Karin Anna Hummel

USV Control with Adaptive Compensation Under False Data Injection Attacks 746
Panxin Bai, Heng Zhang, Jian Zhang, Hongran Li

Lightweight Self-Adaptive Cloud-IoT Monitoring Across Fed4FIRE+ Testbeds 748
Marco Gaglianese, Stefano Forti, Federica Paganelli, Antonio Brogi

LoRa-Based Outdoor 3D Localization 754
Jian Fang, Lei Wang, Zhenquan Qin, Bingxian Lu

On Carrier Scheme Convergence: A WFRFT-Based Hybrid Carrier Scheme Demonstration 756
Zhuangzhuang Liao, Xiaojie Fang, Ning Zhang, Tao Han, Xuejun Sha

Receiver Design and Frame Format for Uplink NOMA in Wi-Fi 758
Roman Zlobin, Aleksey Kureev, Evgeny Khorov

Battery-Less Massive Access for Simultaneous Information Transmission and Federated Learning in WPT Networks 760
Wanli Ni, Xufeng Liu, Hui Tian

Visualizing Multi-Agent Reinforcement Learning for Robotic Communication in Industrial IoT Networks 762
Ruyu Luo, Wanli Ni, Hui Tian

QUIC-Enabled Data Aggregation for Short Packet Communication in mMTC 764
Haoran Zhao, Bo He, He Zhou, Jiangyin Zhou, Qi Qi, Jingyu Wang, Haifeng Sun, Jianxin Liao

Demo Abstract: Pixel Similarity-Based Content Reuse in Edge-Assisted Virtual Reality 766
Ying Chen, Hazer Inaltekin, Maria Gorlatova

Are Malware Detection Models Adversarial Robust Against Evasion Attack? 768
Hemant Rathore, Adithya Samavedhi, Sanjay K. Sahay, Mohit Sewak

Demonstrating QoE-Aware 5G Network Slicing Emulated with HTB in OMNeT++ 770
Marija Gajic, Marcin Bosk, Susanna Schwarzmann, Stanislav Lange, Thomas Zinner

A Novel TCP/IP Header Hijacking Attack on SDN 772
Ali Akbar Mohammadi, Rasheed Hussain, Alma Oracevic, Syed Muhammad Ahsan Raza Kazmi, Fatima Hussain, Moayad Aloqaily, Junggab Son

Collaborative Learning for Large-Scale Discrete Optimal Transport Under Incomplete Populational Information 774
Navpreet Kaur, Juntao Chen

Beacon-Based Wireless TSN Association 776
Pablo Avila-Campos, Jetmir Haxhibeqiri, Ingrid Moerman, Jeroen Hoebeke

Leveraging Spanning Tree to Detect Colluding Attackers in Federated Learning 778
Priyesh Ranjan, Federico Corò, Ashish Gupta, Sajal K. Das

Network Attached FPGAs in the Open Cloud Testbed (OCT) 780
Suranga Handagala, Miriam Leeser, Kalyani Patle, Michael Zink

Enabling Large-Scale Human Genome Sequence Analysis on CloudLab 786
Praveen Rao, Arun Zachariah

Assessing the Impact of CAM Messages in Vehicular Communications in Real Highway Environments..... 788
Vincent Charpentier, Nina Slamnik-Krijestorac, Johann Marquez-Barja

PCNsim: A Flexible and Modular Simulator for Payment Channel Networks 790
Gabriel Antonio F. Rebello, Gustavo F. Camilo, Maria Potop-Butucaru, Miguel Elias M. Campista, Marcelo Dias De Amorim, Luís Henrique M. K. Costa

A Real-Time Ultra-Broadband Software-Defined Radio Platform for Terahertz Communications 792
Hussam Abdellatif, Viduneth Ariyarathna, Sergey Petrushkevich, Arjuna Madanayake, Josep Miquel Jornet

Network Security Situation Awareness Based on Spatio-Temporal Correlation of Alarms 794
Zehua Ren, Yang Liu, Huixiang Liu, Baoxiang Jiang, Xiangzhen Yao, Lin Li, Haiwen Yang, Ting Liu

Demo: Untethered Haptic Teleoperation for Nuclear Decommissioning Using a Low-Power Wireless Control Technology..... 796
Joseph Bolarinwa, Alex Smith, Adnan Aijaz, Aleksandar Stanoev, Manuel Giuliani

A3C-Based Computation Offloading and Service Caching in Cloud-Edge Computing Networks..... 798
Zhenning Wang, Mingze Li, Liang Zhao, Huan Zhou, Ning Wang

Demo: Deep Reinforcement Learning for Resource Management in Cellular Network Slicing..... 800
Baidi Xiao, Yan Shao, Rongpeng Li, Zhifeng Zhao, Honggang Zhang

Dynamic Load Combined Prediction Framework with Collaborative Cloud-Edge for Microgrid..... 802
Wenjing Hou, Hong Wen, Ning Zhang, Wenxin Lei, Haojie Lin

Trueno: A Cross-Platform Machine Learning Model Serving Framework in Heterogeneous Edge Systems..... 804
Danyang Song, Yifei Zhu, Cong Zhang, Jiangchuan Liu

MANTRA: Semantic Mobility Knowledge Analytics Framework for Trajectory Annotation 806
Shreya Ghosh, Soumya K Ghosh

Adaptive Decision-Making Framework for Federated Learning Tasks in Multi-Tier Computing..... 808
Wenxin Lei, Sijing Wang, Ning Zhang, Hong Wen, Wenjing Hou, Haojie Lin, Zhu Han

Physical Layer Security Authentication Based Wireless Industrial Communication System for Spoofing Detection..... 810
Songlin Chen, Sijing Wang, Xingchen Xu, Long Jiao, Hong Wen

Unreliable Multi-Hop Networks Routing Protocol for Age of Information-Sensitive Communication 812
Abdalaziz Sawwan, Jie Wu

Computing Power Network: A Testbed and Applications with Edge Intelligence 814
Junlin Liu, Yukun Sun, Junqi Su, Zhaojiang Li, Xing Zhang, Bo Lei, Wenbo Wang

DEMO Abstract: An UAV-Based 3D Spectrum Real-Time Mapping System 816
Qiuming Zhu, Yi Zhao, Yang Huang, Zhipeng Lin, Lu Hanjie Wang, Yunpeng Bai, Tianxu Lan, Fuhui Zhou, Qihui Wu

Channel Estimation for Massive MIMO Systems Using Tensor Cores in GPU 818
Bhargav Gokalgandhi, Ivan Seskar

Experimenting with an SDN-Based NDN Deployment Over Wireless Mesh Networks 824
Sarantis Kalafatidis, Vassilis Demiroglou, Lefteris Mamatas, Vassilis Tsaoussidis

Optimal Entanglement Distribution Using Satellite Based Quantum Networks 830
Nitish K. Panigrahy, Prajit Dhara, Don Towsley, Saikat Guha, Leandros Tassiulas

Adaptive, Continuous Entanglement Generation for Quantum Networks..... 836
Alexander Kolar, Allen Zang, Joaquin Chung, Martin Suchara, Rajkumar Kettimuthu

An Extension of Imagechain Concept that Allows Multiple Images Per Block..... 842
Katarzyna Koptyra, Marek R. Ogiela

Shellcoding: Hunting for Kernel32 Base Address..... 844
Tarek Ahmed, Shengjie Xu

A Dual-RFID-Tag Based Indoor Localization Method with Multiple Apertures..... 846
Cihang Cheng, Ming Liu, Ke Xiong

Experimental Demonstration of RoFSO Transmission Combining WLAN Standard and WDM-FSO Over 100m Distance..... 848
Jong-Min Kim, Ju-Hyung Lee, Yeongrok Lee, Hong-Seol Cha, Hyunsu Park, Jincheol Sim, Chulwoo Kim, Young-Chai Ko

Spectrum Sharing in UAV-Assisted HetNet Based on CMB-AM Multi-Agent Deep Reinforcement Learning 850
Wei Guan, Bo Gao, Ke Xiong, Yang Lu

Vehicular Virtual Edge Computing Using Heterogeneous V2V and V2C Communication 852
Gurjashan Singh Pannu, Seyhan Ucar, Takamasa Higuchi, Onur Altintas, Falko Dressler

Inverse Reinforcement Learning Meets Power Allocation in Multi-User Cellular Networks..... 854
Ruichen Zhang, Ke Xiong, Xingcong Tian, Yang Lu, Pingyi Fan, Khaled Ben Letaief

Demo: TINGLE: Pushing Edge Intelligence in Synchronization and Useful Data Transfer for Human-Robotic Arm Interactions 856
Xinjie Gu, Xiaolong Wang, Yuchen Feng, Yuzhu Long, Mithun Mukherjee, Zhigeng Pan, Mian Guo, Qi Zhangz

A Scalable Mixed Reality Platform for Remote Collaborative LEGO Design 858
Xinyi Yao, Jiangong Chen, Ting He, Jing Yang, Bin Li

Ruling Out IoT Devices in LoRaWAN 860
Pierluigi Locatelli, Pietro Spadaccino, Francesca Cuomo

REGRETS: A New Corpus of Regrettable (Self-)Disclosures on Social Media..... 862
Hervais Simo, Michael Kreutzer

Cyber Attacks Detection Using Machine Learning in Smart Grid Systems..... 864
Sohan Gyawali, Omar Beg

Age-Energy Efficiency in WPCNs: A Deep Reinforcement Learning Approach..... 866
Haina Zheng, Ke Xiong, Mengying Sun, Zhangdui Zhong, Khaled Ben Letaief

Quantum Data Networking for Distributed Quantum Computing: Opportunities and Challenges 868
Chunming Qiao, Yangming Zhao, Gongming Zhao, Hongli Xu

Quantum Networking and Communications at Oak Ridge National Laboratory 874
N. A. Peters, M. Alshowkan, J. C. Chapman, P. G. Evans, D. A. Hooper, W. P. Grice, H.-H. Lu, J. M. Lukens, R. C. Pooser, C. E. Marvinney, A. Miloshevsky, B. P. Williams, B. A. Wilson

Author Index