2021 19th International Symposium on Modeling and **Optimization in Mobile, Ad Hoc,** and Wireless Networks (WiOpt 2021)

Philadelphia, Pennsylvania, USA 18 – 21 October 2021



IEEE Catalog Number: CFP21357-POD **ISBN:**

978-1-6654-3292-4

Copyright © 2021, International Federation for Information Processing (IFIP) 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:	CFP21357-POD
ISBN (Print-On-Demand):	978-1-6654-3292-4
ISBN (Online):	978-3-903176-37-9

Additional Copies of This Publication Are Available From:

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



Note: All times shown below are EDT (Philadelphia, USA, Eastern Daylight Time).

Day 1: Monday, October 18, 2021

- Workshop on Caching, Computing and Delivery in Wireless Networks (CCDWN)
- Workshop on Reinforcement Learning and Stochastic Control in Queues and Networks (ReStoq)
- Workshop on Machine Learning in Wireless Communications (WMLC)

Day 2: Tuesday, October 19, 2021

8:30-8:45: **Welcome to WiOpt 2021** - General Chairs: Bo Ji (Virginia Tech), Eytan Modiano (MIT), Jie Wu (Temple University)

8:45- 9:00: **Technical Program and Best Paper Award Announcements** - TPC Chairs: Javad Ghaderi (Columbia University), Elif Uysal (Middle East Technical University), Guoliang Xue (Arizona State University)

9:00-10:00: Keynote 1: Ness Shroff (The Ohio State University)

Title: Delay Optimality in Load-Balancing Systems

10:00-10:15: Q&A

10:15-10:30: Break

- 10:30-12:30: Session: Resource Allocation, Scheduling, Wireless Networks I
- 12:30-14:00: Break

14:00-16:00: Session: Sampling Over Networks

16:00-16:30: Break

16:30-18:30: Session: Federated Learning

Day 3: Wednesday, October 20, 2021

9:00-10:00: Keynote 2: Gil Zussman (Columbia University) Title: TBA 10:00-10:15: Q&A 10:15-10:30: Break 10:30-12:30: Session: Resource Allocation, Scheduling, Wireless Networks II 12:30-14:00: Break 14:00-16:00: Session: Age of Information 16:00-16:30: Break

Day 4: Thursday, October 21, 2021

9:00-10:30: Session: Social Networks, Pricing, Economics

10:30-11:00: Break

11:00-12:00: Keynote 3: Athina Markopoulou (University of California, Irvine)

Title: TBA

12:00-12:15: Q&A

12:15-14:00: Break

14:00-16:00: Session: Invited Track I

16:00-16:30: Break

16:30-18:30: Session: Invited Track II

WiOpt 2021 Main Conference Papers

Session: Resource Allocation, Scheduling, Wireless Networks I

- Average-Case Analysis of Greedy Matching for D2D Resource Sharing.......1 Shuqin Gao (Singapore University of Technology and Design, Singapore), Costas Courcoubetis (The Chinese University of Hong Kong, Shenzhen, China) and Lingjie Duan (Singapore University of Technology and Design, Singapore)
- An Analysis of Probabilistic Forwarding of Coded Packets on Random Geometric Graphs.........9

B. R. Vinay Kumar, Navin Kashyap and D. Yogeshwaran (Indian Institute of Science, Bengaluru, India)

• Low-Overhead Distributed MAC for Serving Dynamic Users over Multiple Channels.......17

Xujin Zhou, Irem Koprulu, Atilla Eryilmaz (The Ohio State University, USA) and Michael J.Neely (University of Southern California, USA)

• Opportunistic Spectrum Access: Does Maximizing Throughput Minimize File Transfer Time?......25

Jie Hu, Vishwaraj Doshi and Do Young Eun (North Carolina State University, USA)

• Throughput bound minimization for random access channel assignment.......33 Dutta Abhinanda and Steven Weber (Drexel University, USA)

Session: Sampling Over Networks

• Minimization of Age of Incorrect Estimates of Autoregressive Markov Processes.......41

Bhavya Joshi, Rajshekhar V Bhat, B. N. Bharath (IIT Dharwad, India) and Rahul Vaze (TIFR Mumbai, India)

- Remote Tracking of Distributed Dynamic Sources over A Random Access Channel with One-bit Updates..........49 Sunjung Kang, Atilla Eryilmaz and Ness Shroff (The Ohio State University, USA)
- Computation and Communication Co-Design for Real-Time Monitoring and Control in Multi-Agent Systems........65
 Vishrant Tripathi (MIT, USA), Luca Ballotta (University of Padova, Italy), Luca Carlone and Eytan Modiano (MIT, USA)
- Optimal Fresh Data Sampling and Trading.......73 Junyi He (Chinese University of Hong Kong, Shenzhen, China), Qian Ma (Sun Yat-sen University, China), Meng Zhang (Northwestern University, USA) and Jianwei Huang (Chinese University of Hong Kong, Shenzhen, China)

Session: Federated Learning

- Data-Free Evaluation of User Contributions in Federated Learning.......81 Hongtao Lv, Zhenzhe Zheng, Fan Wu (Shanghai Jiao Tong University, China), Tie Luo (Missouri University of Science and Technology, USA), Shaojie Tang (University of Texas at Dallas, USA), Lifeng Hua, Rongfei Jia and Chengfei Lv (Alibaba Group, China)

- Quality-Aware Distributed Computation and Communication Scheduling for Fast Convergent Wireless Federated Learning......105
 Dongsheng Li, Yuxi Zhao and Xiaowen Gong (Auburn University, USA)
- CFedAvg: Achieving Efficient Communication and Fast Convergence in Non-IID Federated Learning.......113 Haibo Yang, Jia Liu (The Ohio State University, USA) and Elizabeth S. Bentley (Air Force Research Laboratory, USA)

Session: Resource Allocation, Scheduling, Wireless Networks II

- Experimental measurement of the capacity region of wireless networks........121 Yiannis Thomas, Nikolaos Smyrnioudis and Stavros Toumpis (Athens University of Economics and Business, Greece)
- Distributed Learning for Proportional-Fair Resource Allocation in Coexisting WiFi Networks.......129
 Piotr Gawlowicz (Technical University of Berlin, Germany), Jean Walrand (University of California, Berkeley, USA) and Adam Wolisz (Technical University of Berlin, Germany)
- Optimal Precoder Design for MIMO-OFDM-based Joint Automotive Radar-Communication Networks..........137

Ceyhun Deniz Ozkaptan, Eylem Ekici (The Ohio State University, USA), Chang-Heng Wang and Onur Altintas (Toyota Motor North America, USA)

- BEAMWAVE: Cross-Layer Beamforming and Scheduling for Superimposed Transmissions in Industrial IoT mmWave Networks.......145 Luis F. Abanto-Leon, Matthias Hollick and Gek Hong Sim (Technische Universität Darmstadt, Germany)
- Opportunistic Overlapping: Joint scheduling of uplink URLLC/eMBB traffic in NOMA based Wireless Systems.......153
 Arjun Anand (Intel Labs, USA), Gustavo De Veciana (The University of Texas at Austin, USA), Derya Malak (Rensselaer Polytechnic Institute, USA), Ayman Elezabi (The American University in Cairo, Egypt) and Aniruddh Venkatakrishnan (The University of Texas at Austin, USA)

Session: Age of Information

- Age of Sensed Information in a Cognitive Radio Network..........161 Clement Kai-Ming Kam, Sastry Kompella (U.S. Naval Research Laboratory, USA) and Anthony Ephremides (University of Maryland, USA)
- When To Pull Data for Minimum Age Penalty.......169 Orhan Tahir Yavaşcan, Elif Tugce Ceran, Zeynep Cakir(METU, Turkey), Onur Kaya (Isik University, Turkey) and Elif Uysal (METU, Turkey)
- Online Energy Minimization Under A Peak Age of Information Constraint.......177 Kumar Saurav and Rahul Vaze (Tata Institute of Fundamental Research, Mumbai, India)

Mohamed A. Abd-Elmagid and Harpreet S. Dhillon (Virginia Tech, USA)

Session: Caching

- A Coupon Collector based approximation for LRU cache hits under Zipf requests.......200
 Pawan Poojary (Northwestern University, USA), Sharayu Moharir (Indian Institute of
 Technology Bombay, India) and Krishna Jagannathan (Indian Institute of Technology
 Madras, India)
- Memory-Rate Tradeoff for Decentralized Caching under Nonuniform File
 Popularity.......208

Yong Deng and Min Dong (Ontario Tech University, Canada)

• Optimal Load-Splitting and Distributed-Caching for Dynamic Content.......216 Bahman Abolhassani (The Ohio State University, USA), John Tadrous (Gonzaga University, USA), and Atilla Eryilmaz (The Ohio State University, USA)

Session: Social Networks, Pricing, Economics

• Personalized Pricing through User Profiling in Social Networks.......224

Qinqi Lin (The Chinese University of Hong Kong, Shenzhen, China), Lingjie Duan (Singapore University of Technology and Design, Singapore) and Jianwei Huang (The Chinese University of Hong Kong, Shenzhen, China)

- Social Influencer Selection by Budgeted Portfolio Optimization.......232 Ricardo José ópez Dawn and Anastasios Giovanidis (Sorbonne Université NRS-LIP6, France)
- Edgeconomics: Price Competition and Selfish Computation Offloading in Multi-Server Edge Computing Networks......240 Ziya Chen, Qian Ma (Sun Yat-sen University, China), Lin Gao Harbin Institute of

Technology), and Xu Chen (Sun Yat-sen University, China)

Session: Invited Track I

- The Gittins Policy in the M/G/1 Queue......248 Ziv Scully and Mor Harchol-Balter (Carnegie Mellon University, USA)

Ertan Kazıklı, Sinan Gezici (Bilkent University, Turkey) and Serdar Yüksel (Queen's University, Canada)

- Federated Learning with Correlated Data: Taming the Tail for Age-Optimal Industrial IoT.......272

Chen-Feng Liu and Mehdi Bennis (University of Oulu, Finland)

• A Framework for Sustainable Federated Learning.......278 Basak Guler (University of California, Riverside, USA) and Aylin Yener (The Ohio State University, USA)

Session: Invited Track II

Francesco Malandrino (CNR-IEIIT, Italy), Alessandro Nordio (CNR-IEIIT, Italy) and Carla Fabiana Chiasserini (Politecnico di Torino, Italy)

 Age of Information in Ultra-Dense Computation-Intensive Internet of Things (IoT) Systems.......293

Bo Zhou and Walid Saad (Virginia Tech, USA)

Derya Malak (Rensselaer Polytechnic Institute, USA), Faruk V. Mutlu, Jinkun Zhang and Edmund M. Yeh (Northeastern University, USA)

• The Case for Small-Scale, Mobile-Enhanced COVID-19 Epidemiology.......309 Fan Yi, Yaxiong Xie and Kyle Jamieson (Princeton University, USA)

Additional Papers: