

21-25 September
London, UK



Association for
Computing Machinery

Advancing Computing as a Science & Profession

MobiCom '20

Proceedings of the 26th Annual International Conference on Mobile
Computing and Networking

MobiCom 2020



**Association for
Computing Machinery**

Advancing Computing as a Science & Profession

The Association for Computing Machinery
2 Penn Plaza, Suite 701
New York, New York 10121-0701

Copyright © 2020 by the Association for Computing Machinery, Inc. (ACM). Permission to make digital or hard copies of portions of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyright for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, to republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permission to republish from permissions@acm.org or Fax +1 212 869-0481.

For other copying of articles that carry a code at the bottom of the first or last page, copying is permitted provided that the per-copy fee indicated in the code is paid through www.copyright.com.

Notice to Past Authors of ACM-Published Articles

ACM intends to create a complete electronic archive of all articles and/or other material previously published by ACM. If you have written a work that has been previously published by ACM in any journal or conference proceedings prior to 1978, or any SIG Newsletter at any time, and you do NOT want this work to appear in the ACM Digital Library, please inform permissions@acm.org, stating the title of the work, the author(s), and where and when published.

ISBN: 978-1-4503-7085-1

Additional copies may be ordered prepaid from:

ACM Order Department
PO Box 30777
New York, NY 10087-0777, USA

Phone: +1 800 342-6626 (USA and Canada)

+1 212 626-0500 (Global)

Fax: +1 212 944-1318

Email: acmhelp@acm.org

Hours of Operation: 8:30 am–4:30 pm ET

Contents

Papers

From Relative Azimuth to Absolute Location: Pushing the Limit of PIR Sensor based Localization	1
Xuefeng Liu (<i>Beihang University</i>); Tianye Yang (<i>Huazhong University of Science and Technology</i>); Shaojie Tang (<i>University of Texas at Dallas</i>); Peng Guo (<i>Huazhong University of Science and Technology</i>); Jianwei Niu (<i>Beihang University</i>)	
Redefining Passive in Backscattering with Commodity Devices	14
Mohammad Rostami (<i>UMass Amherst</i>); Karthik Sundaresan, Eugene Chai, Sampath Rangarajan (<i>NEC Labs America</i>); Deepak Ganesan (<i>UMass Amherst</i>)	
X-Array: Approximating Omnidirectional Millimeter-Wave Coverage Using an Array of Phased-Arrays	27
Song Wang, Jingqi Huang, Xinyu Zhang (<i>University of California, San Diego</i>); Hyoil Kim (<i>Ulsan National Institute of Science and Technology</i>); Sujit Dey (<i>University of California, San Diego</i>)	
Millimeter-Wave Full Duplex Radios	41
Vaibhav Singh, Susnata Mondal, Akshay Gadre (<i>Carnegie Mellon University</i>); Milind Srivastava (<i>Indian Institute of Technology Madras</i>); Jeyanandh Paramesh, Swarun Kumar (<i>Carnegie Mellon University</i>)	
EagleEye: Wearable Camera-based Person Identification in Crowded Urban Spaces	55
Juheon Yi (<i>Seoul National University</i>); Sunghyun Choi (<i>Samsung Research</i>); Youngki Lee (<i>Seoul National University</i>)	
Renovating Road Signs for Infrastructure-to-Vehicle Networking: A Visible Light Backscatter Communication and Networking Approach	69
Purui Wang, Lilei Feng, Guojun Chen, Chenren Xu, Yue Wu, Kenuo Xu (<i>Peking University</i>); Guobin Shen (<i>JoveAI, Inc.</i>); Kuntai Du, Gang Huang, Xuanzhe Liu (<i>Peking University</i>)	
Voice Localization Using Nearby Wall Reflections	82
Sheng Shen, Daguan Chen (<i>University of Illinois at Urbana-Champaign</i>); Yu-Lin Wei, Zhijian Yang, Romit Roy Choudhury (<i>University of Illinois at Urbana Champaign</i>)	
Ghost Calls from Operational 4G Call Systems: IMS Vulnerability, Call DoS Attack, and Countermeasure	96
Yu-Han Lu, Chi-Yu Li, Yao-Yu Li, Sandy Hsin-Yu Hsiao (<i>National Chiao Tung University</i>); Tian Xie (<i>Michigan State University</i>); Guan-Hua Tu (<i>Michigan State University</i>); Wei-Xun Chen (<i>National Chiao Tung University</i>)	
Hummingbird: Energy Efficient GPS Receiver for Small Satellites	110
Sujay Narayana, R Venkatesha Prasad, Vijay S Rao (<i>TU Delft</i>); Luca Mottola (<i>Politecnico di Milano, Italy and RI.SE SICS Sweden</i>); T Venkata Prabhakar (<i>IISc, India</i>)	
ScatterMIMO: Enabling Virtual MIMO with Smart Surfaces	123
Manideep Dunna, Chi Zhang (<i>UC San Diego</i>); Daniel Sievenpiper, Dinesh Bharadia (<i>University of California San Diego</i>)	
ViVo: Visibility-Aware Mobile Volumetric Video Streaming	137
Bo Han (<i>AT&T Labs – Research</i>); Yu Liu, Feng Qian (<i>University of Minnesota – Twin Cities</i>)	

PDLens: Smartphone Knows Drug Effectiveness among Parkinson's via Daily-Life Activity Fusion	150
Hanbin Zhang, Gabriel Guo, Chen Song, Chenhan Xu, Kevin Cheung, Jasleen Alexis, Huining Li (<i>University at Buffalo, SUNY</i>); Dongmei Li (<i>University of Rochester Medical Center</i>); Kun Wang (<i>University of California, Los Angeles</i>); Wenyao Xu (<i>University at Buffalo, SUNY</i>)	
TinyLink 2.0: Integrating Device, Cloud, and Client Development for IoT Applications	164
Gaoyang Guan, Borui Li, Yi Gao, Yuxuan Zhang, Jiajun Bu, Wei Dong (<i>Zhejiang University</i>)	
Challenge: COSMOS: A City-Scale Programmable Testbed for Experimentation with Advanced Wireless	177
Dipankar Raychaudhuri, Ivan Seskar (<i>Rutgers University</i>); Gil Zussman (<i>Columbia University</i>); Thanasis Korakis (<i>New York University</i>); Dan Kilper (<i>University of Arizona</i>); Tingjun Chen (<i>Columbia University</i>); Jakub Kolodziejcki, Michael Sherman (<i>Rutgers University</i>); Zoran Kostic (<i>Columbia University</i>); Xiaoxiong Gu (<i>IBM Research</i>); Harish Krishnaswamy (<i>Columbia University</i>); Sumit Maheshwari (<i>Rutgers</i>); Panagiotis Skrimponis (<i>New York University</i>); Craig Gutterman (<i>Columbia University</i>)	
M-Cube: A Millimeter-Wave Massive MIMO Software Radio	190
Renjie Zhao, Timothy Woodford, Teng Wei, Kun Qian, Xinyu Zhang (<i>University of California San Diego</i>)	
Experience: Advanced Network Operations in (Un)-Connected Remote Communities	204
Diego Perino (<i>Telefonica Research</i>); Xiaoyuan Yang (<i>Telefonica</i>); Joan Serra (<i>Dolby Labs</i>); Andra Lutu (<i>Telefonica Research</i>); Ilias Leontiadis (<i>Samsung AI</i>)	
Deep Learning based Wireless Localization for Indoor Navigation	214
Roshan Ayyalasomayajula, Aditya Arun, Chenfeng Wu, Sanatan Sharma (<i>UCSD</i>); Abhishek Sethi (<i>Amazon</i>); Deepak Vasisht (<i>MIT</i>); Dinesh Bharadia (<i>UCSD</i>)	
Single Shot Single Antenna Path Discovery in THz Networks	228
Yasaman Ghasempour, Chia-Yi Yeh (<i>Rice University</i>); Rabi Shrestha, Daniel Mittleman (<i>Brown University</i>); Edward W. Knightly (<i>Rice University</i>)	
MET: A Novel Magneto-Inductive Sensing Based Electric Toothbrushing Monitoring System . . .	241
Hua Huang, Shan Lin (<i>Stony Brook University</i>)	
Experience: Aging or Glitching? Why Does Android Stop Responding and What Can We Do About It?	255
Mingliang Li (<i>Xiaomi Co. LTD & Tsinghua University</i>); Hao Lin (<i>Tsinghua University</i>); Cai Liu (<i>Xiaomi Co. LTD</i>); Zhenhua Li (<i>Tsinghua University</i>); Feng Qian (<i>University of Minnesota - Twin Cities</i>); Yunhao Liu (<i>MSU & Tsinghua University</i>); Nian Sun (<i>Xiaomi Co. LTD</i>); Tianyin Xu (<i>University of Illinois Urbana-Champaign</i>)	
WiChronos : Energy-Efficient Modulation for Long-Range, Large-Scale Wireless Networks	266
Yaman Sangar, Bhuvana Krishnaswamy (<i>University of Wisconsin-Madison</i>)	
Towards Flexible Wireless Charging for Medical Implants Using Distributed Antenna System . .	280
Xiaoran Fan (<i>Wireless Information Network Laboratory (WINLAB), Rutgers University</i>); Longfei Shangguan (<i>Microsoft Cloud&AI</i>); Richard Howard (<i>Wireless Information Network Laboratory (WINLAB), Rutgers University</i>); Yanyong Zhang (<i>University of Science and Technology of China</i>); Yao Peng (<i>Northwest University</i>); Jie Xiong (<i>UMass Amherst</i>); Yunfei Ma (<i>Alibaba Group US</i>); Xiang-Yang Li (<i>University of Science and Technology of China</i>)	

Towards 3D Human Pose Construction Using WiFi	295
Wenjun Jiang, Hongfei Xue, Chenglin Miao, Shiyang Wang, Sen Lin, Chong Tian, Srinivasan Murali, Haochen Hu, Zhi Sun, Lu Su (<i>State University of New York at Buffalo</i>)	
TouchPass: Towards Behavior-irrelevant on-touch User Authentication on Smartphones Leveraging Vibrations	309
Xiangyu Xu, Jiadi Yu (<i>Shanghai Jiao Tong University</i>); Yingying Chen (<i>Rutgers University</i>); Qin Hua, Yanmin Zhu, Yi-Chao Chen, Minglu Li (<i>Shanghai Jiao Tong University</i>)	
Internet-of-Microchips: Direct Radio-to-Bus Communication with SPI Backscatter	322
Songfan Li, Chong Zhang, Yihang Song, Hui Zheng, Lu Liu (<i>University of Electronic Science and Technology of China</i>); Li Lu (<i>School of Computer Science and Engineering, University of Electronic Science and Technology of China (UESTC), P.R. China</i>); Mo Li (<i>Nanyang Technological University</i>)	
Bleep: Motor-Enabled Audio Side-Channel for Constrained UAVs	336
Adeola Bannis (<i>Carnegie Mellon University</i>); Hae Young Noh (<i>Stanford University</i>); Pei Zhang (<i>Carnegie Mellon University</i>)	
ThermoWave: A New Paradigm of Wireless Passive Temperature Monitoring via mmWave Sensing	349
Baicheng Chen (<i>University at Buffalo</i>); Huining Li (<i>SUNY University at Buffalo</i>); Zhengxiong Li (<i>The State University of New York at Buffalo</i>); Xingyu Chen (<i>University at Buffalo</i>); Chenhan Xu (<i>University at Buffalo, SUNY</i>); Wen Yao Xu (<i>SUNY Buffalo</i>)	
NEMO: Enabling Neural-enhanced Video Streaming on Commodity Mobile Devices	363
Hyunho Yeo, Chan Ju Chong, Youngmok Jung, Juncheol Ye, Dongsu Han (<i>KAIST</i>)	
OnRL: Improving Mobile Video Telephony via Online Reinforcement Learning	377
Huanhuan Zhang, Anfu Zhou, Jiamin Lu, Ruoxuan Ma, Yuhua Hu, Cong Li (<i>Beijing University of Posts and Telecommunications</i>); Xinyu Zhang (<i>University of California San Diego</i>); Huadong Ma (<i>Beijing University of Posts and Telecommunications</i>); Xiaojiang Chen (<i>Taobao Inc.</i>)	
Sniffing Visible Light Communication Through Walls	391
Minhao Cui, Yuda Feng (<i>University of Massachusetts Amherst</i>); Qing Wang (<i>Delft University of Technology</i>); Jie Xiong (<i>University of Massachusetts Amherst</i>)	
Billion-Scale Federated Learning on Mobile Clients: A Submodel Design with Tunable Privacy	405
Chaoyue Niu, Fan Wu (<i>Shanghai Jiao Tong University</i>); Shaojie Tang (<i>University of Texas at Dallas</i>); Lifeng Hua, Rongfei Jia, Chengfei Lv, Zhihua Wu (<i>Alibaba Group</i>); Guihai Chen (<i>Shanghai Jiao Tong University</i>)	
SDR Receiver Using Commodity WiFi via Physical-Layer Signal Reconstruction	419
Woojae Jeong, Jinhwan Jung (<i>KAIST</i>); Yuanda Wang (<i>Michigan State University</i>); Shuai Wang (<i>George Mason University</i>); Seokwon Yang (<i>KAIST</i>); Qiben Yan (<i>Michigan State University</i>); Yung Yi, Song Min Kim (<i>KAIST</i>)	
SociTrack: Infrastructure-Free Interaction Tracking through Mobile Sensor Networks	433
Andreas Biri (<i>ETH Zurich</i>); Neal Jackson (<i>University of California, Berkeley</i>); Lothar Thiele (<i>ETH Zurich</i>); Pat Pannuto (<i>University of California, San Diego</i>); Prabal Dutta (<i>University of California, Berkeley</i>)	

Understanding and Embracing the Complexities of the Molecular Communication Channel in Liquids	447
Jiaming Wang, Dongyin Hu, Chirag Shetty, Haitham Hassanieh (<i>University of Illinois Urbana Champaign</i>)	
Heimdall: Mobile GPU Coordination Platform for Augmented Reality Applications	462
Juheon Yi, Youngki Lee (<i>Seoul National University</i>)	
Nephalai: Towards LPWAN C-RAN with Physical Layer Compression	476
Jun Liu (<i>UNSW Sydney</i>); Weitao Xu (<i>City University of Hong Kong</i>); Sanjay Jha, Wen Hu (<i>UNSW Sydney</i>)	
SPINN: Synergistic Progressive Inference of Neural Networks over Device and Cloud	488
Stefanos Laskaridis, Stylianos I. Venieris, Mario Almeida, Ilias Leontiadis (<i>Samsung AI Center Cambridge</i>); Nicholas D. Lane (<i>Samsung AI Center Cambridge and University of Cambridge</i>)	
Microscope: Mobile Service Traffic Decomposition for Network Slicing as a Service	503
Chaoyun Zhang (<i>University of Edinburgh</i>); Marco Fiore (<i>IMDEA Networks Institute</i>); Cezary Ziemlicki (<i>Orange Labs</i>); Paul Patras (<i>University of Edinburgh</i>)	
C-14: Assured Timestamps for Drone Videos	517
Zhipeng Tang, Fabien Delattre, Pia Bideau, Mark D. Corner, Erik Learned-Miller (<i>University of Massachusetts Amherst</i>)	
EarSense: Earphones as a Teeth Activity Sensor	530
Jay Prakash (<i>Singapore University of Technology and Design, Singapore</i>); Zhijian Yang, Yu-Lin Wei, Haitham Hassanieh (<i>University of Illinois Urbana Champaign</i>); Romit Roy Choudhury (<i>University of Illinois at Urbana Champaign</i>)	
TransLoc: Transparent Indoor Localization with Uncertain Human Participation for Instant Delivery	543
Yu Yang (<i>Rutgers University</i>); Yi Ding (<i>University of Minnesota</i>); Dengpan Yuan, Guang Wang, Xiaoyang Xie (<i>Rutgers University</i>); Yunhuai Liu (<i>Peking University</i>); Tian He (<i>University of Minnesota</i>); Desheng Zhang (<i>Rutgers University</i>)	
Tunnel Emitter: Tunnel Diode based Low-Power Carrier Emitters for Backscatter Tags	557
Ambuj Varshney, Lorenzo Corneo (<i>Uppsala University, Sweden</i>)	
LMAC: Efficient Carrier-Sense Multiple Access for LoRa	571
Amalinda Gamage, Jansen Christian Liando, Chaojie Gu, Rui Tan, Mo Li (<i>Nanyang Technological University</i>)	
iCellSpeed: Increasing Cellular Data Speed with Device-Assisted Cell Selection	584
Haotian Deng (<i>Purdue University</i>); Qianru Li (<i>UCLA</i>); Jingqi Huang, Chunyi Peng (<i>Purdue University</i>)	
mmVib: Micrometer-Level Vibration Measurement with mmWave Radar	597
Chengkun Jiang, Junchen Guo, Yuan He, Meng Jin, Shuai Li (<i>Tsinghua University</i>); Yunhao Liu (<i>Tsinghua University & MSU</i>)	
Experience: Towards Automated Customer Issue Resolution in Cellular Networks	610
Amit Sheoran, Sonia Fahmy (<i>Purdue University</i>); Matthew Osinski (<i>AT&T Labs Research</i>); Chunyi Peng, Bruno Ribeiro (<i>Purdue University</i>); Jia Wang (<i>AT&T Labs Research</i>)	

Joltik: Enabling Energy-Efficient "Future-Proof" Analytics on Low-Power Wide-Area Networks	623
Mingran Yang (<i>Carnegie Mellon University and Massachusetts Institute of Technology</i>); Junbo Zhang, Akshay Gadre (<i>Carnegie Mellon University</i>); Zaoxing Liu (<i>Carnegie Mellon University and Boston University</i>); Swarun Kumar, Vyas Sekar (<i>Carnegie Mellon University</i>)	
Re-identification of Mobile Devices using Real-Time Bidding Advertising Networks	637
Keen Sung, JianYi Huang, Mark D. Corner, Brian N. Levine (<i>University of Massachusetts Amherst</i>)	
FaceRevelio: A Face Liveness Detection System for Smartphones with a Single Front Camera . . .	650
Habiba Farrukh, Reham Mohamed Aburas, Siyuan Cao, He Wang (<i>Purdue University</i>)	
Towards Quantum Belief Propagation for LDPC Decoding in Wireless Networks	663
Srikar Kasi, Kyle Jamieson (<i>Princeton University</i>)	
Demystifying Millimeter-Wave V2X: Towards Robust and Efficient Directional Connectivity Under High Mobility	677
Song Wang, Jingqi Huang, Xinyu Zhang (<i>University of California San Diego</i>)	
SpiroSonic: Monitoring Human Lung Function via Acoustic Sensing on Commodity Smartphones	691
Xingzhe Song, Boyuan Yang, Ge Yang, Ruirong Chen, Erick Forno, Wei Chen, Wei Gao (<i>University of Pittsburgh</i>)	
Deaf-Aid: Mobile IoT Communication Exploiting Stealthy Speaker-to-Gyroscope Channel	705
Ming Gao (<i>Zhejiang University, Alibaba-Zhejiang University Joint Research Institute of Frontier Technoligise</i>); Feng Lin, Weiye Xu, Muertikepu Nuermaimaiti (<i>Zhejiang University</i>); Jinsong Han (<i>Zhejiang University, Alibaba-Zhejiang University Joint Research Institute of Frontier Technoligise</i>); Wen Yao Xu (<i>SUNY Buffalo</i>); Kui Ren (<i>Zhejiang University</i>)	
RFGo: A Seamless Self-checkout System for Apparel Stores Using RFID	718
Carlos Bocanegra (<i>Northeastern University</i>); Mohammad A. (Amir) Khojastepour, Mustafa Y. Arslan, Eugene Chai, Sampath Rangarajan (<i>NEC Labs America</i>); Kaushik R. Chowdhury (<i>Northeastern University</i>)	
Understanding Power Consumption of NB-IoT in the Wild: Tool and Large-scale Measurement . .	732
Deliang Yang (<i>Michigan State University</i>); Xianghui Zhang (<i>Nanjing University of Aeronautics and Astronautics, The Chinese University of Hong Kong</i>); Xuan Huang (<i>The Chinese University of Hong Kong</i>); Liqian Shen (<i>Nanjing University of Aeronautics and Astronautics</i>); Jun Huang (<i>Peking University, Massachusetts Institute of Technology</i>); Xiangmao Chang (<i>Nanjing University of Aeronautics and Astronautics</i>); Guoliang Xing (<i>The Chinese University of Hong Kong</i>)	
Ear-AR: Indoor Acoustic Augmented Reality on Earphones	745
Zhijian Yang, Yu-Lin Wei (<i>University of Illinois Urbana Champaign</i>); Sheng Shen (<i>University of Illinois at Urbana-Champaign</i>); Romit Roy Choudhury (<i>University of Illinois at Urbana Champaign</i>)	
GROOT: A Real-time Streaming System for High-Fidelity Volumetric Videos	759
Kyungjin Lee, Juheon Yi, Youngki Lee (<i>Seoul National University</i>); Sunghyun Choi (<i>Samsung Research</i>); Youngmin Kim (<i>Seoul National University</i>)	
CLIO: Enabling automatic compilation of deep learning pipelines across IoT and Cloud	773
Jin Huang, Colin Samplawski, Deepak Ganesan, Benjamin Marlin (<i>UMass Amherst</i>); Heesung Kwon (<i>ARL</i>)	

Self-Reconfigurable Micro-Implants for Cross-Tissue Wireless and Batteryless Connectivity . . .	785
Mohamed R. Abdelhamid, Ruicong Chen, Joonhyuk Cho, Anantha P. Chandrakasan, Fadel Adib (<i>Massachusetts Institute of Technology</i>)	
DMM: Fast Map Matching Framework for Cellular Data	799
Zhihao Shen (<i>Xi'an Jiaotong University</i>); Wan Du (<i>University of California, Merced</i>); Xi Zhao, Jianhua Zou (<i>Xi'an Jiaotong University</i>)	
Airdropping Sensor Networks from Drones and Insects	813
Vikram Iyer, Maruchi Kim, Qiuyue(Shirley) Xue, Anran Wang, Shyamnath Gollakota (<i>University of Washington</i>)	
Contactless Seismocardiography via Deep Learning Radars	827
Unsoo Ha, Salah Assana (<i>MIT Media Lab</i>); Fadel Adib (<i>Massachusetts Institute of Technology</i>)	
MobiCom'20 Demonstration	
Demo: BeeCast: A Collaborative Video Streaming System	841
Asaad AlGhamdi, Younes Balah, Muhamad Felemban, Mohammad AlBejadi (<i>King Fahd University of Petroleum and Minerals</i>)	
Demo: 5G Edge Enhanced Mobile Augmented Reality	844
Xiang Su (<i>University of Helsinki and University of Oulu</i>); Jacky Cao (<i>University of Oulu</i>); Pan Hui (<i>University of Helsinki and The Hong Kong University of Science and Technology</i>)	
Demo: A Hyperlocal Mobile Web for the Next 3 Billion Users	847
Arjuna Sathiseelan, Arko Chatterjee, Mukund Lal, Yasir Zaki, Lakshminarayanan Subramanian (<i>Gaius Networks</i>)	
Demo: M-Cube: An Open-Source Millimeter-Wave MIMO Software Radio for Wireless Communication and Sensing Applications	850
Renjie Zhao, Timothy Woodford, Teng Wei, Kun Qian, Xinyu Zhang (<i>University of California San Diego</i>)	
Demo: A Query Engine for Zero-streaming Cameras	853
Mengwei Xu (<i>Peking University</i>); Tiantu Xu (<i>Purdue ECE</i>); Yunxin Liu (<i>Microsoft Research</i>); Xuanzhe Liu, Gang Huang (<i>Peking University</i>); Felix Xiaozhu Lin (<i>Purdue ECE</i>)	
Demo: The Implementation of Stigmergy in Network-assisted Multi-agent System	856
Kun Chen, Rongpeng Li (<i>Zhejiang University</i>); Jon Crowcroft (<i>University of cambridge</i>); Zhifeng Zhao (<i>Zhejiang Lab</i>); Honggang Zhang (<i>Zhejiang University</i>)	
Demo: WhiteHaul: White Space Spectrum Aggregation System for Backhaul	858
Mohamed M. Kassem (<i>Cairo University</i>); Morteza Kheirkhah (<i>University College London</i>); Mahesh K. Marina, Peter Buneman (<i>The University of Edinburgh</i>)	
Demo: Bringing Hybrid Analog-Digital Beamforming to Commercial MU-MIMO WiFi Networks .	861
Thomas Kühne, Piotr Gawłowicz, Anatolij Zubow, Falko Dressler, Giuseppe Caire (<i>Technische Universität Berlin</i>)	
Demo: Service-Oriented Intelligent and Extensible RAN	864
Robert Schmidt, Navid Nikaein (<i>EURECOM</i>)	

Demo: WiChronos: Energy-Efficient Modulation for Long-Range, Large-Scale Wireless Networks	867
Yaman Singh Sangar, Bhuvana Krishnaswamy (<i>University of Wisconsin - Madison</i>)	
Demo: Accelerometer-based Smartphone Eavesdropping	870
Zhongjie Ba (<i>Zhejiang University</i>); Tianhang Zheng (<i>University of Toronto</i>); Zhan Qin, Hanlin Yu, Liu Liu (<i>Zhejiang University</i>); Baochun Li (<i>University of Toronto</i>); Xue Liu (<i>McGill University</i>); Kui Ren (<i>Zhejiang University</i>)	
Demo: Remote Experimentation with Open-Access Full-Duplex Wireless in the COSMOS Testbed	872
Manav Kohli, Tingjun Chen, Jackson Welles, Mahmood Baraani Dastjerdi (<i>Columbia University</i>); Jakub Kolodziejwski, Michael Sherman, Ivan Seskar (<i>WINLAB, Rutgers University</i>); Harish Krishnaswamy, Gil Zussman (<i>Columbia University</i>)	
Demo: Slicing-Enabled Private 4G/5G Network for Industrial Wireless Applications	875
Jaya Thota, Adnan Aijaz (<i>Toshiba Europe Ltd.</i>)	
Demo: Edge-SLAM: Edge-Assisted Visual Simultaneous Localization and Mapping	878
Ali J. Ben Ali, Zakieh Sadat Hashemifar, Karthik Dantu (<i>University at Buffalo</i>)	
MobiCom'20 Poster Presentations	
Poster: Using Magnetic Fingerprints to Position Cars on Multi-layer Roads	881
Ping-Fan Ho, Chia-Cheng Wang, Jyh-Cheng Chen (<i>National Chiao Tung University</i>)	
Poster: Homecoming: A Wireless Homing Device for UAVs	884
Yifeng Cao, Ashutosh Dhekne (<i>Georgia Institute of Technology</i>)	
Poster: Performance Bottlenecks Identification in Cloudified Mobile Networks	887
Georgios Patounas (<i>Simula Metropolitan Center for Digital Engineering</i>); Xenofon Foukas (<i>Microsoft Research</i>); Ahmed Elmokashfi (<i>Simula Metropolitan Center for Digital Engineering</i>); Mahesh Marina (<i>The University of Edinburgh</i>)	
Poster: Bringing Temperature-Awareness to Millimeter-Wave Networks	890
Moh Sabbir Saadat, Sanjib Sur, Srihari Nelakuditi (<i>University of South Carolina</i>)	
Poster: Constructing 3-Dimensional 5G Coverage Map for Real-time Airborne Missions	893
Sejin Seo, Seunghwan Kim, Sujin Kook, Sihun Baek, Seong-Lyun Kim (<i>Yonsei University</i>)	
Poster: What You Wear Know How You Feel: An Emotion Inference System with Multi-modal Wearable Devices	896
Dan Wang, Haibo Lei, Haozhi Dong, Yunshu Wang, Yongpan Zou, Kaishun Wu (<i>Shenzhen University</i>)	
Poster: SmartPatch: A patch prioritization framework for SCADA chain in Smart grid	899
Geeta Yadav (<i>Indian Institute of Technology, Delhi, India</i>); Praveen Gauravaram (<i>Tata Consultancy Services, Australia</i>); Arun Kumar Jindal (<i>Tata Consultancy Services, New Delhi, India</i>)	
Poster: TSFCC: High Availability Service Function Chain Composition Approach in Mobile Network	902
Meng Niu, Bo Cheng, Wenyan Gu, Meng Wang, Junliang Chen (<i>Beijing University of Posts and Telecommunications</i>)	

Poster: Hybrid Communication and Storage System with User Privacy Preservation for Public Management, Analysis and Prediction	905
Lifeng Liu, Yingxuan Zhu (<i>FutureWei Technologies Inc.</i>); Jian Li (<i>Futurewei Technologies Inc.</i>)	
Poster: Toward a Secure QR Code System by Fingerprinting Screens	908
Yijie Li, Yi-Chao Chen (<i>Shanghai Jiao Tong University</i>); Xiaoyu Ji (<i>Zhejiang University</i>); Hao Pan, Lanqing Yang, Guangtao Xue, Jiadi Yu (<i>Shanghai Jiao Tong University</i>)	
Poster: A Seamless Virtualized Network Functions Migration Mechanism in Mobile Edge Networks	911
Biyi Li, Bo Cheng, Yi Yue, Meng Wang, Junliang Chen (<i>Beijing University of Posts and Telecommunications</i>)	
Poster: A Reliable Intelligent Routing Mechanism in 5G Core Networks	914
Tze-Jie Tan, Fu-Lian Weng, Wei-Ting Hu, Jyh-Cheng Chen, Cheng-Ying Hsieh (<i>National Chiao Tung University</i>)	
Poster: CarML: Distributed Machine Learning in Vehicular Clouds	917
Anran Du, Yicheng Shen, Lewis Tseng (<i>Boston College</i>)	
Poster: Throughput Optimization VNF Placement For Mapping SFC Requests in MEC-NFV Enabled Networks	920
Yi Yue, Bo Cheng, Biyi Li, Xuan Liu, Meng Wang (<i>Beijing University of Posts and Telecommunications</i>)	
Poster: Design of an IoT-based water flow monitoring system	923
Zill Ullah Khan, M Umair Anwar (<i>Information Technology University</i>); Sabah Pirani (<i>University of Michigan</i>); Faisal Lalani (<i>Microsoft Research</i>); Babatunde Adegoke (<i>University of Colorado Boulder</i>); Tauseef Tauqeer (<i>Information Technology University</i>); Mustafa Naseem (<i>University of Michigan</i>)	
Poster: Age of Information in Wireless Networks: from Theory to Implementation	926
Igor Kadota, M. Shahir Rahman, Eytan Modiano (<i>MIT LIDS</i>)	
Author index	929