

# **2019 IEEE International Conference on Pervasive Computing and Communications (PerCom 2019)**

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Tuesday, March 12

Tuesday, March 12 8:30 - 8:45

## O1: Conference Opening

Chairs: Behrooz Shirazi (Washington State University, USA), Keiichi Yasumoto (Nara Institute of Science and Technology, Japan)

Tuesday, March 12 8:45 - 9:45

## K1: Keynote-1

Networked Robot Swarms-Ready or Not?

**Kevin Fall (ACM, USA)**

Chair: Behrooz Shirazi (Washington State University, USA)

### **Networked Robot Swarms-Ready or Not?**

Kevin Fall (ACM, USA)

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Tuesday, March 12 10:20 - 11:50

## S1: Pervasive Sensing and Data Collection

Chair: Christine Julien (University of Texas at Austin, USA)

### **WiWear: Wearable Sensing via Directional WiFi Energy Harvesting**

Vu Tran and Archan Misra (Singapore Management University, Singapore); Jie Xiong (University of Massachusetts Amherst, USA); Rajesh K Balan (Singapore Management University, Singapore)

pp. 2-11

### **bioSmartSense: A Bio-inspired Data Collection Framework for Energy-efficient, QoI-aware Smart City Applications**

Satyaki Roy (Missouri University of Science and Technology, USA); Nirnay Ghosh (Singapore University of Technology and Design (SUTD), Singapore); Sajal K. Das (Missouri University of Science and Technology, USA)

pp. 12-21

### **Improving Experience Sampling with Multi-view User-driven Annotation Prediction**

Jonathan Liono and Flora D Salim (RMIT University, Australia); Niels van Berkel and Vassilis Kostakos (The University of Melbourne, Australia); Alex Kai Qin (Swinburne University of Technology, Australia)

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Tuesday, March 12 1:30 - 3:30

## S2: Trust, Security, Privacy

Chair: Sergio Mascetti (Università degli Studi di Milano & EveryWare Technologies, Italy)

### **On The Performance Bound of Structured Key-Based RFID Authentication**

Kazuya Sakai (Tokyo Metropolitan University, Japan); Min-Te Sun (National Central University, Taiwan); Wei-Shinn Ku (Auburn University, USA); Ten-Hwang Lai (Ohio State university, USA)

pp. 33-42

### **Aggregating Crowd Wisdom via Blockchain: A Private, Correct, and Robust Realization**

Huayi Duan, Yifeng Zheng and Yuefeng Du (City University of Hong Kong, Hong Kong); Zhou Anxin (City of University of Hong Kong, Hong Kong); Cong Wang (City University of Hong Kong, Hong Kong); Man Ho Au (The Hong Kong Polytechnic University, Hong Kong)

pp. 43-52

### **Do You See What I See? Detecting Hidden Streaming Cameras Through Similarity of Simultaneous Observation**

Kevin Wu (University of Washington, USA); Brent Lagesse (University of Washington Bothell, USA)

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**DoubleEcho: Mitigating Context-Manipulation Attacks in Copresence Verification**

Hien Thi Thu Truong (NEC Laboratories Europe, Germany); Juhani Toivonen (University of Helsinki, Finland); Thien Duc Nguyen (Technische Universität Darmstadt, Germany); Claudio Soriente (NEC Laboratories Europe, Germany); Sasu Tarkoma (University of Helsinki, Finland); N. Asokan (Aalto University & University of Helsinki, Finland)  
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Tuesday, March 12 4:00 - 5:00

**S3: Concise Contributions**

Chair: Ali Hurson (Missouri University of Science and Technology, USA)

**Autoencoders for QoS Prediction at the Edge**

Gary White (Trinity College Dublin, Ireland); Andrei Palade (Distributed Systems Group, School of Computer Science and Statistics, Trinity College Dublin, Ireland); Christian Cabrera and Siobhán Clarke (Trinity College Dublin, Ireland)  
pp. 72-80

**Representation Learning for Minority and Subtle Activities in a Smart Home Environment**

Andrea Rosales Sanabria, Tom Kelsey and Juan Ye (University of St Andrews, United Kingdom (Great Britain))  
pp. 81-87

**Hot or Not? Robust and Accurate Continuous Thermal Imaging on FLIR cameras**

Titti Malmivirta, Jonatan Hamberg, Eemil Lagerspetz and Xin Li (University of Helsinki, Finland); Ella Peltonen (University of Oulu, Finland); Huber Flores (University of Helsinki, Finland); Petteri Nurmi (University of Helsinki, Finland & Lancaster University, United Kingdom (Great Britain))  
pp. 88-96

**Robust Audio Sensing with Multi-Sound Classification**

Peter M Haubrick and Juan Ye (University of St Andrews, United Kingdom (Great Britain))  
pp. 97-103

Wednesday, March 13

Wednesday, March 13 8:45 - 9:45

**K2: Keynote-2**

Chair: Keiichi Yasumoto (Nara Institute of Science and Technology, Japan)

**Studies on Interactive Robots**

Hiroshi Ishiguro (Osaka University, Japan)  
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Wednesday, March 13 10:15 - 11:45

**S4: Best Paper Candidates**

Chair: Gregor Schiele (University of Duisburg-Essen, Germany)

**Quantifying the Breakability of Voice Assistants**

Maliheh Shirvanian (Visa Research, USA); Summer Vo (Massachusetts Institute of Technology, USA); Nitesh Saxena (University of Alabama at Birmingham, USA)  
pp. 105-115

**Always-On Quick Charging for Mobile Devices**

Daeyong Kim, Seunghyeok Jeon and Sukjun Lee (Yonsei University, Korea); Hojung Cha (Yonsei University, S. Korea, Korea)  
pp. 116-125

**Securely Storing and Sharing Memory Cues in Memory Augmentation Systems: A Practical Approach**

Agon Bexheti, Marc Langheinrich and Ivan Elhart (Università della Svizzera Italiana (USI), Switzerland); Nigel Davies (Lancaster University, United Kingdom (Great Britain))  
pp. 126-135

Wednesday, March 13 1:15 - 3:15

## S5: Activity Recognition and Applied Machine Learning

Chair: Flora D Salim (RMIT University, Australia)

### ***Passive Capacitive based Approach for Full Body Gym Workout Recognition and Counting***

Sizhen Bian (German Research Center for Artificial Intelligence, Germany); Vitor F Rey (Deutsches Forschungszentrum für Künstliche Intelligenz & University of Kaiserslautern, Germany); Peter Hevesi (German Research Center for Artificial Intelligence (DFKI), Germany); Paul Lukowicz (DFKI and University of Kaiserslautern, Germany)

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### ***Super Low Resolution RF Powered Accelerometers for Alerting on Hospitalized Patient Bed Exits***

Michael Chesser and Asangi Jayatilaka (The University of Adelaide, Australia); Renuka Visvanathan (The Queen Elizabeth Hospital, Australia); Christophe Fumeaux (The University of Adelaide & School of Electrical and Electronic Engineering, Australia); Alanson Sample (University of Michigan, USA); Damith C. Ranasinghe (The University of Adelaide, Australia)

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### ***Avoiding Stress Driving: Online Trip Recommendation from Driving Behavior Prediction***

Rohit Verma (Indian Institute of Technology, Kharagpur, India); Bivas Mitra and Sandip Chakraborty (Indian Institute of Technology Kharagpur, India)

pp. 156-165

### ***Automatic Detection of Urban Features from Wheelchair Users' Movements***

Gabriele Civitarese (University of Milan, Italy); Sergio Mascetti (Università degli Studi di Milano & EveryWare Technologies, Italy); Alberto Butifar (Università' degli Studi di Milano, Italy); Claudio Bettini (University of Milan, Italy)

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Thursday, March 14

Thursday, March 14 8:45 - 9:45

## P1: PerCom Panel

Chair: Claudio Bettini (University of Milan, Italy)

### ***Is Privacy Regulation Slowing Down or Enabling the Wide Adoption of Pervasive Systems? Panel Summary***

Claudio Bettini (University of Milan, Italy)

pp. 220-221

Thursday, March 14 10:10 - 12:10

## S6: Localisation and Context Detection

Chair: Daniela Nicklas (University of Bamberg & Faculty Information Systems and Applied Computer Science, Germany)

### ***EHAAS: Energy Harvesters As A Sensor for Place Recognition on Wearables***

Yoshinori Umetsu and Yugo Nakamura (Nara Institute of Science and Technology, Japan); Yutaka Arakawa (Nara Institute of Science and Technology & NAIST, Japan); Manato Fujimoto and Hirohiko Suwa (Nara Institute of Science and Technology, Japan)

pp. 222-231

### ***WiDeep: WiFi-based Accurate and Robust Indoor Localization System using Deep Learning***

Moustafa Abbas (Alexandria University, Egypt); Moustafa Elhamshary (Egypt-Japan University for Science and Technology & School of Communication and Computer Science, Egypt); Hamada Rizk (EJUST, Egypt); Marwan Torki and Moustafa Youssef (Alexandria University, Egypt)

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### ***Automatic Detection of Everyday Social Behaviours and Environments from Verbatim Transcripts of Daily Conversations***

Kristina Jordanova (University of Rostock, Germany); Burcu Demiray (University of Zurich, Switzerland); Matthias R. Mehl (University of Arizona, USA); Mike Martin (University of Zurich, Switzerland)

pp. 242-251

### ***HCFContext: Smartphone Context Inference via Sequential History-based Collaborative Filtering***

Vidyasagar Sadhu and Saman Zonouz (Rutgers University, USA); Vincent Sritapan (DHS, USA); Dario Pompili (Rutgers University, USA)

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Thursday, March 14 1:20 - 3:20

## S7: Edge Computing and Offloading

Chair: Hirozumi Yamaguchi (Osaka University, Japan)

### ***Low-latency distributed computation offloading for pervasive environments***

Claudio Cicconetti, Marco Conti and Andrea Passarella (IIT-CNR, Italy)  
pp. 262-271

### ***Context-Aware Data and Task Placement in Edge Computing Environments***

Martin Breitbach, Dominik Schäfer and Janick Edinger (University of Mannheim, Germany); Christian Becker (Universität Mannheim, Germany)  
pp. 272-281

### ***POET: Privacy on the Edge with Bidirectional Data Transformations***

Nianyu Li (Peking University, P.R. China); Christos Tsigkanos (TU Wien, Austria); Zhi Jin (Peking University, P.R. China); Schahram Dustdar (Vienna University of Technology, Austria); Zhenjiang Hu (National Institute of Informatics, Japan); Carlo Ghezzi (Politecnico di Milano, Italy)  
pp. 282-291

### ***Extreme SDN Framework for IoT and Mobile Applications Flexible Privacy at the Edge***

Mostafa Uddin (Bell Labs (Nokia), USA); Tamer Nadeem and Santosh Kumar Nukavarapu (Virginia Commonwealth University, USA)  
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## S8: Pervasive and Augmented User Interfaces

Chair: Kristina Yordanova (University of Rostock, Germany)

### ***HIBEY: Hide the Keyboard in Augmented Reality***

Lik Hang Lee, Kit Yung Lam, Yui Pan Yau and Tristan Braud (The Hong Kong University of Science and Technology, Hong Kong); Pan Hui (Hong Kong University of Science and Technology & University of Helsinki, Hong Kong)  
pp. 303-312

### ***AcouDigits: Enabling Users to Input Digits in the Air***

Yongpan Zou, Qiang Yang, Yetong Han and Dan Wang (Shenzhen University, P.R. China); Jiannong Cao (Hong Kong Polytechnic Univ, Hong Kong); Kaishun Wu (Shenzhen University, P.R. China)  
pp. 313-321

### ***M2A: A Framework for Visualizing Information from Mobile Web to Mobile Augmented Reality***

Kit Yung Lam, Lik Hang Lee and Tristan Braud (The Hong Kong University of Science and Technology, Hong Kong); Pan Hui (Hong Kong University of Science and Technology & University of Helsinki, Hong Kong)  
pp. 322-331

### ***Sonification of Rotation Instructions to Support Navigation of People with Visual Impairment***

Dragan Ahmetovic (Università degli Studi di Torino, Italy); Federico Avanzini (University of Milano, Italy); Adriano Baratè, Cristian Bernareggi and Gabriele Galimberti (Università degli Studi di Milano, Italy); Luca Ludovico (Università degli Studi di Milano & LIM, Italy); Sergio Mascetti (Università degli Studi di Milano & EveryWare Technologies, Italy); Giorgio Presti (Università degli Studi di Milano, Italy)  
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Wednesday, March 13 3:45 - 5:45

## 11: Industry Session

Chairs: Nabil Alshurafa (Northwestern University, USA), Paul Havinga (University of Twente, The Netherlands)

### ***Improving Infrastructure-based Indoor Positioning Systems with Device Motion Detection***

Huy Tran (Portland State University, USA); Abhishek Mukherji (Cisco Systems Inc. & Worcester Polytechnic Institute, USA); Nirupama Bulusu (Portland State University, USA); Santosh Pandey (Cisco Systems Inc, USA); Xu Zhang (Cisco Systems, USA)  
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### ***Local App Classification using Deep Neural Network based on Mobile App Market Data***

Keiichi Ochiai and Fatina Putri (NTT DOCOMO, INC., Japan); Yusuke Fukazawa (NTT DOCOMO, Inc., Japan)  
pp. 186-191

### ***OnlineAirTrajClus: An Online Aircraft Trajectory Clustering for Tarmac Situation Awareness***

Wei Shao, Flora D Salim, Jeffrey Chan, Kai Qin and Jiaman Ma (RMIT University, Australia); Bradley Feest (Northrop Grumman Cooperation, Australia)  
pp. 192-201

### ***TenSense: IIoT enabled sensor node for remote measurement of a bolted joint tension***

Michail Sidorov and Nhut Phan Viet (Toyohashi University of Technology, Japan); Atsushi Okubo (Toyo Metal Co., LTD, Japan); Yukihiro Matsumoto and Ren Ohmura (Toyohashi University of Technology, Japan)  
pp. 202-211

### ***A Study on Behavior of Autonomous Vehicles Cooperating with Manually-Driven Vehicles***

Yusuke Nishimura (Sumitomo Electric Industries, Ltd., Japan); Atsushi Fujita, Akihito Hiromori, Hirozumi Yamaguchi and Teruo Higashino (Osaka University, Japan); Akira Suwa (Sumitomo Electric Industries, Ltd., Japan); Hirofumi Urayama (Sumitomo Electric Industries, LTD., Japan); Susumu Takeshima (Sumitomo Electric Industries, Ltd., Japan); Mineo Takai (University of California, Los Angeles, USA)  
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