

**2020 IEEE International
Conference on Pervasive
Computing and Communications
Workshops
(PerCom Workshops 2020)**

**Austin, Texas, USA
23 – 27 March 2020**



**IEEE Catalog Number: CFP20344-POD
ISBN: 978-1-7281-4717-8**

**Copyright © 2020 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:	CFP20344-POD
ISBN (Print-On-Demand):	978-1-7281-4717-8
ISBN (Online):	978-1-7281-4716-1

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

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

USABILITY OF A HANDS-FREE VOICE INPUT INTERFACE FOR ECOLOGICAL MOMENTARY ASSESSMENT	1
<i>Rebecca Adaimi, Ka Tai Ho, Edison Thomaz</i>	
SMILECITYREPORT: EMOTION-AWARE PARTICIPATORY SENSING FOR SMART CITIES WITH DOUBLE-SIDED PHOTO SHOOTING.....	6
<i>Wataru Sasaki, Yusaku Eigen, Arturo Medela, Antonis Litke, Vanessa Clemente Núñez, Tadashi Okoshi, Jin Nakazawa</i>	
ACTIVITY RECOGNITION USING MULTI-CLASS CLASSIFICATION INSIDE AN EDUCATIONAL BUILDING	12
<i>Anooshmita Das, Mikkel Baun Kjærgaard</i>	
SWIFTPAD: EXPLORING WYSIWYG T _E X EDITING ON ELECTRONIC PAPER.....	18
<i>Elliott Wen, Gerald Weber</i>	
SEPSIS PREDICTION USING CONTINUOUS AND CATEGORICAL FEATURES ON SPORADIC DATA	22
<i>Varsha Sharma, Chirayata Bhattacharyya, Tanuka Bhattacharjee, Sundeep Khandelwal, Murali Poduval, Anirban Dutta Choudhury</i>	
IMPROVED SLEEP DETECTION THROUGH THE FUSION OF PHONE AGENT AND WEARABLE DATA STREAMS	28
<i>Gonzalo J. Martinez, Stephen M. Mattingly, Jessica Young, Louis Faust, Anind K. Dey, Andrew T. Campbell, Munmun De Choudhury, Shayan Mirjafari, Subigya K. Nepal, Pablo Robles-Granda, Koustuv Saha, Aaron D. Striegel</i>	
SMARTWATCH AS A KINAESTHETIC SYSTEM FOR SHOULDER FUNCTION ASSESSMENT	34
<i>Srinivasan Jayaraman, Joseph Joshy, Ponnuraj Kirthi Priya, Murali Poduval, Ajay Balakumaran Thangavel</i>	
MULTIMODAL CO-PRESENCE DETECTION WITH VARYING SPATIO-TEMPORAL GRANULARITY	40
<i>Michael Haus, Aaron Yi Ding, Jörg Ott</i>	
DRIVER AUTHENTICATION BY QUANTIFYING DRIVING STYLE USING GPS ONLY.....	47
<i>Tanushree Banerjee, Arijit Chowdhury, Tapas Chakravarty, Avik Ghose</i>	
TOWARDS ACTIVE LEARNING INTERFACES FOR MULTI-INHABITANT ACTIVITY RECOGNITION.....	53
<i>Claudio Bettini, Gabriele Civitarese</i>	
TOWARDS ADAPTIVE SENSOR DATA QUALITY IMPROVEMENT BASED ON CONTEXT MODELS	59
<i>Aboubakr Benabbas, Simon Steuer, Daniela Nicklas</i>	
ANNOTATION PERFORMANCE FOR MULTI-CHANNEL TIME SERIES HAR DATASET IN LOGISTICS.....	65
<i>Christopher Reining, Fernando Moya Rueda, Friedrich Niemann, Gernot A. Fink, Michael Ten Hompel</i>	

HYPER-LOCAL URBAN CONTEXTUAL AWARENESS THROUGH OPEN DATA INTEGRATION	71
<i>Yuan Lai</i>	
ON THE QUALITY OF REAL-WORLD WEARABLE DATA IN A LONGITUDINAL STUDY OF INFORMATION WORKERS.....	77
<i>Gonzalo J. Martinez, Stephen M. Mattingly, Shayan Mirjafari, Subigya K. Nepal, Andrew T. Campbell, Anind K. Dey, Aaron D. Striegel</i>	
E-SIGHT: REAL-TIME CLOUD PLATFORM FOR VISUALIZING EDGE TRANSPORT INFRASTRUCTURE INFORMATION	83
<i>Marco Jansen, Fatjon Seraj</i>	
K-SPECNET: LOCALIZATION AND CLASSIFICATION OF INDOOR SUPERIMPOSED SOUND FOR ACOUSTIC SENSOR NETWORKS	89
<i>Wei Wang, Fatjon Seraj, Paul J. M. Havinga</i>	
RACON: A GESTURE RECOGNITION APPROACH VIA DOPPLER RADAR FOR INTELLIGENT HUMAN-ROBOT INTERACTION.....	95
<i>Kaijie Zhang, Zhiwen Yu, Dong Zhang, Zhu Wang, Bin Guo</i>	
ARCHITECTURE OF AN INTELLIGENT INTRUSION DETECTION SYSTEM FOR SMART HOME	101
<i>Julian Graf, Katrin Neubauer, Sebastian Fischer, Rudolf Hackenberg</i>	
WASMACHINE: BRING IOT UP TO SPEED WITH A WEBASSEMBLY OS.....	107
<i>Elliott Wen, Gerald Weber</i>	
AUTOMATING THE INTERACTIONS AMONG IOT DEVICES USING NEURAL NETWORKS.....	111
<i>Javier Rojo, Daniel Flores-Martin, Jose Garcia-Alonso, Juan M. Murillo, Javier Berrocal</i>	
A BLOCKCHAIN BASED ARCHITECTURE FOR IOT DATA SHARING SYSTEMS	117
<i>Mingyu Hou, Tianyu Kang, Li Guo</i>	
ACTIVIOME: A SYSTEM FOR ANNOTATING FIRST-PERSON PHOTOS AND MULTIMODAL ACTIVITY SENSOR DATA.....	123
<i>Edison Thomaz</i>	
A DEADLINE-AWARE OFFLOADING SCHEME FOR VEHICULAR FOG COMPUTING AT SIGNALIZED INTERSECTION	129
<i>Beichen Yang, Min Sun, Xiaoyan Hong, Xiaoming Guo</i>	
DETECTING SOCIAL INTERACTIONS IN INDOOR ENVIRONMENTS WITH THE RED- HUP ALGORITHM.....	135
<i>Paolo Barsocchi, Antonino Crivello, Michele Girolami, Fabio Mavilia</i>	
AIRITE: TOWARDS ACCURATE & INFRASTRUCTURE-FREE 3-D TRACKING OF SMART DEVICES	141
<i>Vivek Chandel, Shivam Singhal, Avik Ghose</i>	
A PROPOSAL OF AN INCENTIVE-BASED CROWDSENSING METHOD USING A CELLULAR NETWORK AND D2D COMMUNICATION	147
<i>Tetsushi Matsuda, Toru Inada, Susumu Ishihara</i>	

A COMPARISON OF UNIDIRECTIONAL AND BIDIRECTIONAL LSTM NETWORKS FOR HUMAN ACTIVITY RECOGNITION	153
<i>Luay Alawneh, Belal Mohsen, Mohammad Al-Zinati, Ahmed Shatnawi, Mahmoud Al-Ayyoub</i>	
MACHINE LEARNING FOR A CONTEXT MINING FACILITY	159
<i>Nourhène Ben Rabah, Manuele Kirsch Pinheiro, Bénédicte Le Grand, Ali Jaffal, Carine Souveyet</i>	
CNNs FOR HEART RATE ESTIMATION AND HUMAN ACTIVITY RECOGNITION IN WRIST WORN SENSING APPLICATIONS	166
<i>Eoin Brophy, Willie Muehlhausen, Alan F. Smeaton, Tomás E. Ward</i>	
BITS: BLOCKCHAIN BASED INTELLIGENT TRANSPORTATION SYSTEM WITH OUTLIER DETECTION FOR SMART CITY	172
<i>Shirshak Raja Maskey, Shahriar Badsha, Shamik Sengupta, Ibrahim Khalil</i>	
MAKE MULTI-HOP BROADCAST IN VANET FAST BY SELECTING A BETTER ROUTE FOR SOURCE VEHICLE	178
<i>Haochen Pan, Lewis Tseng</i>	
EMOTION RECOGNITION USING WEARABLES: A SYSTEMATIC LITERATURE REVIEW - WORK-IN-PROGRESS	184
<i>Stanislaw Saganowski, Anna Dutkowiak, Adam Dziadek, Maciej Dziezyc, Joanna Komoszynska, Weronika Michalska, Adam Polak, Michal Ujma, Przemyslaw Kazienko</i>	
FEDERATED NETWORK UTILITY MAXIMIZATION	190
<i>Nurullah Karakoç, Anna Scaglione</i>	
ACCURATE SELF-LOCALIZATION IN TRANSIT STATIONS: A CASE STUDY	196
<i>Fatemeh Mirzaei, Jonathan Lam, Roberto Manduchi</i>	
MONITORING THE EARLY PHYSIOLOGICAL EFFECTS OF FITNESS REGIMES USING PPG SIGNALS	202
<i>Ramesh Kumar Ramakrishnan, Rahul Gavas, Venkata Subramaninan Viraraghavan, Lalit Kumar Hissaria, Arpan Pal, P. Balamuralidhar</i>	
A PROOF OF CONCEPT DENIAL OF SERVICE ATTACK AGAINST BLUETOOTH IOT DEVICES	207
<i>Shane Ditton, Ali Tekeoglu, Korkut Bekiroglu, Seshadhri Srinivasan</i>	
TOWARDS A METHODOLOGY FOR ACCEPTANCE TESTING AND VALIDATION OF MONITORING BODYWORN DEVICES	213
<i>Emma L. Tonkin, Miquel Perello Nieto, Haixia Bi, Antonis Vafeas</i>	
WORKERSENSE: MOBILE SENSING PLATFORM FOR COLLECTING PHYSIOLOGICAL, MENTAL, AND ENVIRONMENTAL STATE OF OFFICE WORKERS	219
<i>Yuri Tani, Shuichi Fukuda, Yuki Matsuda, Sozo Inoue, Yutaka Arakawa</i>	
AMBIENT AND WEARABLE SENSOR FUSION FOR ABNORMAL BEHAVIOUR DETECTION IN ACTIVITIES OF DAILY LIVING	225
<i>M. Garcia-Constantino, A. Konios, M. A. Mustafa, C. Nugent, G. Morrison</i>	
MACHINE VISION SMART PARKING USING INTERNET OF THINGS (IOTS) IN A SMART UNIVERSITY	231
<i>Noah Sieck, Cameron Calpin, Mohammad Almalag</i>	

TOWARDS OPTIMAL KINETIC ENERGY HARVESTING FOR THE BATTERYLESS IOT	237
<i>Muhammad Moid Sandhu, Kai Geissdoerfer, Sara Khalifa, Raja Jurdak, Marius Portmann, Brano Kusy</i>	
AN EMBEDDED CNN IMPLEMENTATION FOR ON-DEVICE ECG ANALYSIS	243
<i>Alwyn Burger, Chao Qian, Gregor Schiele, Domenik Helms</i>	
TOWARDS LONGEVITY OF SMART HOME SYSTEMS	249
<i>Peter Zdankin, Marian Waltereit, Viktor Matkovic, Torben Weis</i>	
CLI-DOS: COLLABORATIVE COUNTERACTION AGAINST DENIAL OF SERVICE IN THE INTERNET OF THINGS	255
<i>Syafiq Al Atiiq, Christian Gehrman</i>	
NEURON-INSPIRED COMMUNICATIONS FOR ENERGY EFFICIENT INTERNET OF THINGS NETWORKS	261
<i>Pawel Kryszkiewicz</i>	
MODELING AND REASONING OF CONTEXTS IN SMART SPACES	265
<i>Jae Woong Lee, Sumi Helal</i>	
A CONTEXT MODEL FOR HOLISTIC MONITORING AND MANAGEMENT OF COMPLEX IT ENVIRONMENTS	271
<i>Mathias Mormul, Christoph Stach</i>	
A FURTHER STEP TOWARDS AUTOMATIC DOMAIN MODELLING BY RELEVANT INFORMATION EXTRACTION	277
<i>Lars Krupp, Gernot Bahle, Agnes Gruenerbl, Paul Lukowicz</i>	
CAPP: A CONTEXT-AWARE PROOF OF PRESENCE FOR CROWDSENSING INCENTIVES	283
<i>Nicholas Handaja, Brent Lagesse</i>	
TRUSTWORTHY, SECURE, AND PRIVACY-AWARE FOOD MONITORING ENABLED BY BLOCKCHAINS AND THE IOT	289
<i>Christoph Stach, Clémentine Gritti, Dennis Przytarski, Bernhard Mitschang</i>	
REAL-TIME SLEEP APNEA DIAGNOSIS METHOD USING WEARABLE DEVICE WITHOUT EXTERNAL SENSORS	293
<i>Yeongjun Jeon, Kukho Heo, Soon Ju Kang</i>	
BUILDING AN OPEN, MULTI-SENSOR, DATASET OF WATER POLLUTION OF GANGA BASIN AND APPLICATION TO ASSESS IMPACT OF LARGE RELIGIOUS GATHERINGS	298
<i>Biplav Srivastava, Sandeep Singh Sandha, Vaskar Raychoudhury, Sukanya Randhawa, Viral Kapoor, Anmol Agrawal</i>	
MYOKEY: SURFACE ELECTROMYOGRAPHY AND INERTIAL MOTION SENSING-BASED TEXT ENTRY IN AR	304
<i>Young D. Kwon, Kirill A. Shatilov, Lik-Hang Lee, Serkan Kumyol, Kit-Yung Lam, Yui-Pan Yau, Pan Hui</i>	
A NEW AUTHENTICATION APPROACH FOR PEOPLE WITH UPPER EXTREMITY IMPAIRMENT	308
<i>Brittany Lewis, Joshua Hebert, Krishna Venkatasubramanian, Matthew Provost, Kelly Charlebois</i>	

KITCHEN TASK ASSESSMENT DATASET FOR MEASURING ERRORS DUE TO COGNITIVE IMPAIRMENTS	314
<i>Kristina Yordanova, Albert Hein, Thomas Kirste</i>	
ID SEQUENCE ANALYSIS FOR INTRUSION DETECTION IN THE CAN BUS USING LONG SHORT TERM MEMORY NETWORKS	320
<i>Araya Kibrom Desta, Shuji Ohira, Ismail Arai, Kazutoshi Fujikawa</i>	
GUIDINGALL: A SMART PROACTIVE IBEACON SYSTEM WITH CROWDSOURCED SENSING BASED ON IOT TECHNOLOGIES.....	326
<i>Lien-Wu Chen, Jun-Xian Liu, Wei-Chu Huang</i>	
GEOSPATIAL DASHBOARDS FOR INTELLIGENT MULTIMODAL TRAFFIC MANAGEMENT	329
<i>Casper Van Gheluwe, Ivana Semanjski, Suzanne Hendrikse, Sidharta Gautama</i>	
SECRECY LIMITS OF ENERGY HARVESTING IOT NETWORKS UNDER CHANNEL IMPERFECTIONS.....	332
<i>Furqan Jameel, Zheng Chang, Riku Jäntti</i>	
DEPLOYMENT OF APIS ON ANDROID MOBILE DEVICES AND MICROCONTROLLERS	338
<i>Sergio Laso, Marino Linaje, Jose Garcia-Alonso, Juan M. Murillo, Javier Berrocal</i>	
ENTROPY AS A SERVICE: A LIGHTWEIGHT RANDOM NUMBER GENERATOR FOR DECENTRALIZED IOT APPLICATIONS	341
<i>Ikram Ullah, Nirvana Meratnia, Paul J. M. Havinga</i>	
PERFORMING WIFI SENSING WITH OFF-THE-SHELF SMARTPHONES.....	347
<i>Steven M. Hernandez, Eyuphan Bulut</i>	
TOSNOS: TO ONLINE SHOP, OR NOT-TO ONLINE SHOP - ENABLING COMBINED IMPROVEMENTS	350
<i>Amiah Gooding, Matthew Martin, Maxwell Minard, Smruthi Sandhanam, Travis Stanger, Yana Alexandrova, Ashfaq Khokhar, Goce Trajcevski</i>	
PRIVACY-PRESERVING MOBILE VIDEO SHARING USING FULLY HOMOMORPHIC ENCRYPTION.....	353
<i>Utsav Goswami, Kevin Wang, Gabriel Nguyen, Brent Lagesse</i>	
DELIVERING IOT SMART SERVICES THROUGH COLLECTIVE AWARENESS, MOBILE CROWDSENSING AND OPEN DATA	356
<i>Federico Montori, Luca Bedogni, Gianluca Iselli, Luciano Bononi</i>	
INITIAL DESIGN OF TWO-STAGE ACOUSTIC VEHICLE DETECTION SYSTEM FOR HIGH TRAFFIC ROADS	362
<i>Masato Uchino, Billy Dawton, Yuki Hori, Shigemi Ishida, Shigeaki Tagashira, Yutaka Arakawa, Akira Fukuda</i>	
LITEDOC: MAKE COLLABORATIVE EDITING FAST, SCALABLE, AND ROBUST	368
<i>Saptarni Kumar, Haochen Pan, Roger Wang, Lewis Tseng</i>	
CAPTURING USER-DEFINED FACIAL FEATURES FOR SCIENTIFIC EVIDENCE OF ELDERLY CARE	374
<i>Kosuke Hirayama, Sachio Saiki, Masahide Nakamura, Kiyoshi Yasuda</i>	

A FRAMEWORK FOR TRANSIT MONITORING SYSTEM USING IOT TECHNOLOGY: TWO CASE STUDIES	380
<i>Samy El-Tawab, Ismail Arai, Ahmad Salman, B. Brian Park</i>	
QUANTIFYING BIASES IN SOCIAL MEDIA ANALYSIS OF RECREATION IN URBAN PARKS	386
<i>Afra Mashhadi, Samantha G. Winder, Emilia H. Lia, Spencer A. Wood</i>	
DEMAND COLLECTION SYSTEM USING LPWA FOR SENIOR TRANSPORTATION WITH VOLUNTEER	393
<i>Yuya Sano, Yuito Sugata, Teruhiro Mizumoto, Hirohiko Suwa, Keiichi Yasumoto</i>	
MOTION CAPTURE OF MODERN GREEK VERBS: MEASURING ASPECTS AND RELATIONS AMONG ACTIONS.....	399
<i>Panagiotis Kouris, Marietta Sionti, Chrysovalantis Korfitis, Stella Markantonatou</i>	
COOKING EVENT DETECTION FROM TEMPORAL THERMAL CONDITION OF RESIDENTIAL HOME	406
<i>Naima Khan, Nirmalya Roy</i>	
MULTIVARIATE VARIATIONAL MODE DECOMPOSITION BASED APPROACH FOR BLINK REMOVAL FROM EEG SIGNAL.....	412
<i>Rahul Gavas, Dibyanshu Jaiswal, Debatri Chatterjee, Venkata Viraraghavan, Ramesh Kumar Ramakrishnan</i>	
TOWARDS PEOPLE COUNTING USING WI-FI CSI OF MOBILE DEVICES.....	418
<i>Masahide Mizutani, Akira Uchiyama, Tomoki Murakami, Hirantha Abeysekera, Teruo Higashino</i>	
MBP: NOT JUST AN IOT PLATFORM.....	424
<i>Ana Cristina Franco Da Silva, Pascal Hirmer, Jan Schneider, Seda Ulusal, Matheus Tavares Frigo</i>	
EASY-TO-DEPLOY LIVING ACTIVITY SENSING SYSTEM AND DATA COLLECTION IN GENERAL HOMES	427
<i>Tomokazu Matsui, Kosei Onishi, Shinya Misaki, Manato Fujimoto, Hirohiko Suwa, Keiichi Yasumoto</i>	
DYNAMIC TASK OFFLOAD SYSTEM ADAPTING TO THE STATE OF NETWORK RESOURCES IN MOBILE EDGE COMPUTING	433
<i>Hayata Satake, Yuki Kobayashi, Ryotaro Tani, Hiroshi Shigeno</i>	
SHOOT LIKE RONALDO: PREDICT SOCCER PENALTY OUTCOME WITH WEARABLES.....	439
<i>Avijoy Chakma, Abu Zaher Md Faridee, Nirmalya Roy, H M Sajjad Hossain</i>	
CAPTURING LAUGHTER AND SMILES UNDER GENUINE AMUSEMENT VS. NEGATIVE EMOTION.....	445
<i>Cleo Forman, Pablo Thiel, Raymond Ptucha, Miguel Dominguez, Cecilia O. Alm</i>	
THE PASSIVE SENSING AGENT: A MULTIMODAL ADAPTIVE MHEALTH APPLICATION.....	451
<i>Sharon Mozgai, Arno Hartholt, Albert Rizzo</i>	
PREDICTING DEPRESSION AND ANXIETY MOOD BY WRIST-WORN SLEEP SENSOR.....	454
<i>Shuichi Fukuda, Yuki Matsuda, Yuri Tani, Yutaka Arakawa, Keiichi Yasumoto</i>	

A NAS INTEGRATED FILE SYSTEM FOR ON-SITE IOT DATA STORAGE.....	460
<i>Yuki Okamoto, Kenichi Arai, Toru Kobayashi, Takuya Fujihashi, Takashi Watanabe, Shunsuke Saruwatari</i>	
SMARTPHONE-BASED RISKY TRAFFIC SITUATION DETECTION AND CLASSIFICATION.....	467
<i>Ryota Akikawa, Akira Uchiyama, Akihito Hiromori, Hirozumi Yamaguchi, Teruo Higashino, Masaki Suzuki, Yasuhiko Hiehata, Takeshi Kitahara</i>	
STANDESCORER: A DATA DRIVEN APPROACH TO SCORE BADMINTON PLAYER.....	473
<i>Indrajeet Ghosh, Sreenivasan Ramasamy Ramamurthy, Nirmalya Roy</i>	
GPSR-PPU: GREEDY PERIMETER STATELESS ROUTING WITH POSITION PREDICTION AND UNCERTAINTY FOR FANETS	479
<i>A. Rodrigues, A. B. Reis, S. Sargento</i>	
FOREST FIRE MONITORING THROUGH A NETWORK OF AERIAL DRONES AND SENSORS	485
<i>D. Simões, A. Rodrigues, A. B. Reis, S. Sargento</i>	
EVALUATION OF CONGESTION MITIGATION EFFECT AT SAGS BROUGHT BY LANE CHANGE CONTROL USING RVC SYSTEM.....	491
<i>Yuuki Shibuya, Hiroaki Morino</i>	
A TIME ALIGNMENT METHOD FOR MULTIPLE SENSING SYSTEMS WITH GNSS TIMING AND IMUS WITH FRAME-SYNC INPUT	495
<i>Takashi Ando, Tomoya Kitani</i>	
DEVICE-DRIVEN ON-DEMAND DEPLOYMENT OF SERVERLESS COMPUTING FUNCTIONS.....	501
<i>Trang Quang, Yang Peng</i>	
GRAPH4EDGE: A GRAPH-BASED COMPUTATION OFFLOADING STRATEGY FOR MOBILE-EDGE WORKFLOW APPLICATIONS	507
<i>Lingmin Fan, Xiao Liu, Xuejun Li, Dong Yuan, Jia Xu</i>	
A DEMOCRATICALLY COLLABORATIVE LEARNING SCHEME FOR FOG-ENABLED PERVASIVE ENVIRONMENTS.....	511
<i>Tiehua Zhang, Zhishu Shen, Jiong Jin, Xi Zheng</i>	
TOWARDS AN EDGE-CLOUD PLATFORM FOR MULTIROBOT-MULTIHUMAN COOPERATION IN URBAN IOT ECOSYSTEMS	515
<i>Seng W. Loke, Amin B. Abkenar, Niroshinie Fernando</i>	
CONVINCE: COLLABORATIVE CROSS-CAMERA VIDEO ANALYTICS AT THE EDGE.....	519
<i>Hannaneh Barahouei Pasandi, Tamer Nadeem</i>	
FENGHUOLUN: A FEDERATED LEARNING BASED EDGE COMPUTING PLATFORM FOR CYBER-PHYSICAL SYSTEMS	524
<i>Chong Zhang, Xiao Liu, Xi Zheng, Rui Li, Huai Liu</i>	
OPTIMISATION OF LIGHTWEIGHT KLEIN ENCRYPTION ALGORITHM WITH 3 S-BOX.....	528
<i>Seyed Ramin Ghorashi, Tanveer Zia, Yinhao Jiang</i>	
NEXT PLACE PREDICTION USING GPS TRACES AND WEB SEARCH QUERIES.....	533
<i>Ryo Imai, Kota Tsubouchi, Masamichi Shimosaka</i>	

UNBOXING MAC PROTOCOL DESIGN OPTIMIZATION USING DEEP LEARNING	537
<i>Hannaneh Barahouei Pasandi, Tamer Nadeem</i>	
PRACTICAL SECURITY FOR COOPERATIVE AD HOC SYSTEMS	542
<i>Hans Walter Behrens, K. Selçuk Candan</i>	
COMPARING SMART CITIES CONCEPTS.....	544
<i>Lukas Übelmesser, Sonja Klingert, Christian Becker</i>	
MODEL PERSONALIZATION FOR HUMAN ACTIVITY RECOGNITION.....	550
<i>Ching-Yi Lin, Radu Marculescu</i>	
HUMAN-CENTERED INFORMATION FOR DECISION-MAKING PROCESSES OF FUTURE SPACE DESIGNS.....	557
<i>Krister Jens, Anooshmita Das, Mikkel Baun Kjærgaard, Jay Sterling Gregg</i>	
STOIC: SERVERLESS TELEOPERABLE HYBRID CLOUD FOR MACHINE LEARNING APPLICATIONS ON EDGE DEVICE.....	564
<i>Michael Zhang, Chandra Krintz, Rich Wolski</i>	
COSMOS SMART INTERSECTION: EDGE COMPUTE AND COMMUNICATIONS FOR BIRD'S EYE OBJECT TRACKING.....	570
<i>Shiyun Yang, Emily Bailey, Zhengye Yang, Jonatan Ostrometzky, Gil Zussman, Ivan Seskar, Zoran Kostic</i>	
EMBROIDERED INDUCTIVE STRAIN SENSOR FOR WEARABLE APPLICATIONS	577
<i>Yulong Liu, Miao Wang, Mengxia Yu, Bingyi Xia, Terry Tao Ye</i>	
ESTIMATION OF WALKING DIRECTION WITH VIBRATION SENSOR BASED ON PIEZOELECTRIC DEVICE	583
<i>Shinya Akiyama, Makoto Yoshida, Yumiko Moriyama, Hirohiko Suwa, Keiichi Yasumoto</i>	
END-USER DEVELOPMENT OF ACTIVITY-SUPPORTING SERVICES FOR SMART HOMES	589
<i>Rafik Belloum, Charles Consel</i>	
CONTEXTUAL MACHINE TEACHING	591
<i>Lars Holmberg, Paul Davidsson, Carl Magnus Olsson, Per Linde</i>	
CAPTURING HUMAN POSE USING MMWAVE RADAR	597
<i>Guangzheng Li, Ze Zhang, Hanmei Yang, Jin Pan, Dayin Chen, Jin Zhang</i>	
PERFORMANCE ASSESSMENT OF MHEALTH APPS	603
<i>Gerson Rodriguez, Devasena Inupakutika, Sahak Kaghyan, David Akopian, Palden Lama, Patricia Chalela, Amelie G. Ramirez</i>	
PERSONALIZED FALL DETECTION SYSTEM	610
<i>Anne H. Ngu, Vangelis Metsis, Shaun Coyne, Brian Chung, Rachel Pai, Joshua Chang</i>	
SENSOR SELF-REPORT ALIGNMENT (SSRA): REDUCING SUN EXPOSURE ASSESSMENT ERROR	617
<i>Jayalakshmi Jain, Tammy K. Stump, June K. Robinson, Nabil Alshurafa</i>	
LORAQUATICA: STUDYING RANGE AND LOCATION ESTIMATION USING LORA AND IOT IN AQUATIC SENSING	623
<i>Marko Radeta, Miguel Ribeiro, Dinarte Vasconcelos, Hildegardo Noronha, Nuno Jardim Nunes</i>	

QUICK EDGE-DEVICE DEPLOYMENT FOR CONNECTING FIRST RESPONDERS IN PUBLIC SAFETY NETWORKS.....	629
<i>Ghazaleh Jowkar, Mohammadbagher Fotouhi, Wei Cheng</i>	
SCALING UP AN EDGE SERVER DEPLOYMENT	635
<i>Lauri Lovén, Tero Lähderanta, Leena Ruha, Teemu Leppänen, Ella Peltonen, Jukka Riekki, Mikko J. Sillanpää</i>	
HIGH THROUGHPUT MOBILE VISIBLE LIGHT COMMUNICATION	642
<i>Rashed Rahman, Ashwin Ashok</i>	
LONGEVITY OF SMART HOMES	644
<i>Peter Zdankin, Torben Weis</i>	
TOWARDS ENHANCING BIKE NAVIGATION SAFETY AND EXPERIENCE USING SENSOR ENABLED DEVICES	646
<i>Viktor Matkovic, Torben Weis</i>	
TOWARDS AUTOMATED GENERATION OF SEMANTIC ANNOTATION FOR ACTIVITY RECOGNITION PROBLEMS.....	648
<i>Kristina Yordanova</i>	
A FEATURE SPACE FOCUS IN MACHINE TEACHING	654
<i>Lars Holmberg, Paul Davidsson, Per Linde</i>	
SLEEPSMART: SMART MATTRESS INTEGRATED WITH E-TEXTILES AND IOT FUNCTIONS FOR SLEEP APNEA MANAGEMENT	656
<i>Gozde Cay, Kunal Mankodiya</i>	
ENCOURAGING DATA SHARING FOR SAFE AUTONOMOUS DRIVING.....	658
<i>Keonhyeong Kim, Im Y. Jung</i>	
CROSS-LAYER ENERGY OPTIMIZATION FOR IOT-ENABLED SMART SPACES	663
<i>Nailah Saleh Alhassoun, Nalini Venkatasubramanian</i>	
3-D LOCALIZATION OF INDOOR ACCESS POINTS VIA OPPORTUNISTIC CROWDSENSING	665
<i>Tatsuya Amano, Teruo Higashino</i>	
IN-NETWORK COLLABORATIVE MOBILE CROWDSENSING	667
<i>Yifan Du, Valérie Issarny, Françoise Sailhan</i>	
LOAD BALANCED CONTROLLER ASSOCIATION IN WIRELESS DISTRIBUTED SDNS.....	669
<i>Allen Starke, Janise McNair</i>	
PROVABLE CONSENT FOR VOICE USER INTERFACES.....	671
<i>Stephan Sigg, Le Ngu Nguyen, Pablo Perez Zarazaga, Tom Backstrom</i>	
A PRIVACY-CENTERED SYSTEM MODEL FOR SMART CONNECTED HOMES	675
<i>Joseph Bugeja, Andreas Jacobsson, Paul Davidsson</i>	
TRUSTWORTHY AI IN THE AGE OF PERVASIVE COMPUTING AND BIG DATA.....	679
<i>Abhishek Kumar, Tristan Braud, Sasu Tarkoma, Pan Hui</i>	

INVITED PAPER: EDGE-BASED PROVISIONING OF HOLOGRAPHIC CONTENT FOR CONTEXTUAL AND PERSONALIZED AUGMENTED REALITY	685
<i>Michael Glushakov, Yunfan Zhang, Yuqi Han, Timothy James Scargill, Guohao Lan, Maria Gorlatova</i>	
INVITED PAPER: MMMOREEDGE: A MMWAVE MODULAR AND RECONFIGURABLE TESTBED DESIGN USING A SMART EDGE FRAMEWORK.....	691
<i>Heena Rathore, Abhay Samant, Joe Camp, George Koutitas</i>	
KEYNOTE: A CROSS-DOMAIN MACHINE LEARNING FRAMEWORK FOR PERVASIVE SENSING.....	697
<i>Nirmalya Roy</i>	
STEAL YOUR LIFE USING 5 CENTS: HACKING ANDROID SMARTPHONES WITH NFC TAGS	698
<i>Carlos Bermejo, Huber Flores, Pan Hui</i>	
TUTORIAL: DEEP DIVE INTO APACHE CASSANDRA: THEORY, DESIGN, AND APPLICATION.....	704
<i>Lewis Tseng, Haochen Pan, Yingjian Wu</i>	
KEYNOTE: DIGITAL-WELLBEING POWERED BY IT/AI TECHNOLOGIES.....	706
<i>Tadashi Okoshi</i>	
PANEL: EVOLVING IOT TECH ENABLES AGING IN PLACE.....	707
<i>Mohammad Arif Ul Alam, Nabil Alshurafa, Ahmad Salman, Abhishek Mukherji, Hiro Takagi</i>	
TUTORIAL: GOOGLE CLOUD FOR BEGINNERS: ARCHITECTURE, STORAGE, AND COMPUTATION.....	709
<i>Lewis Tseng, Haochen Pan, Yingjian Wu</i>	
FULFILLING THE PROMISE OF MOBILE DEVICE CROWDS (PERCROWD 2020 KEYNOTE PAPER)	711
<i>Mostafa Ammar</i>	
KEYNOTE: BUILDING STORAGE SYSTEMS FOR EMERGING APPLICATIONS AND TECHNOLOGIES.....	712
<i>Vijay Chidambaram</i>	
KEYNOTE: ISSUES OF ANNOTATIONS IN DESIGNING UBIQUITOUS APPLICATIONS	713
<i>Hirohiko Suwa</i>	
KEYNOTE: SITUATIONAL AWARENESS PLATFORM FOR CITY TRANSPORTATION.....	714
<i>Hirozumi Yamaguchi</i>	
KEYNOTE: PRIVACY AND SECURITY IN REAL-WORLD DATA ANNOTATION.....	715
<i>Emma L. Tonkin</i>	
KEYNOTE: COMMUNITY-BASED SENSING, ACTIVITY RECOGNITION, AND BEHAVIOR CHANGE TECHNIQUES.....	716
<i>Jamie Payton</i>	
KEYNOTE: AFFORDABLE AND PRACTICAL HOME CONTEXT RECOGNITION WITH “IMAGE AS A DOCUMENT” APPROACH.....	717
<i>Masahide Nakamura</i>	

INVITED TALK: SOFTWARE ENGINEERING, AI AND AUTONOMOUS VEHICLES: SECURITY ASSURANCE.....	718
<i>James Xi Zheng</i>	
POSITION TALK: ETHICALLY ALIGNED VOICE USER INTERFACES: RISKS, CHALLENGES AND OPPORTUNITIES.....	719
<i>Stephan Sigg</i>	
INVITED TALK: EMERGING ROLE OF DIGITAL ASSISTANT IN AUGMENTED REALITY DRIVEN HUMAN-CITY INTERACTION.....	720
<i>Lik-Hang Lee</i>	
PANEL SESSION: HOW COULD WE BUILD A COMMUNITY FOR SHARING ANNOTATION ACTIVITIES, METHODS, AND OUTCOMES?	721
<i>Emma L. Tonkin, Kristina Yordanova</i>	
EDGE INTELLIGENCE ENABLED BY MULTI-DEVICE SYSTEMS: (PERCROWD 2020 PANEL).....	722
<i>Huber Flores</i>	
SMART VEHICULAR ROUTING BASED ON CROWDSENSED DATA USING DYNAMIC TRAFFIC LIGHT CONTROL.....	724
<i>Andreea Sonea, Ciprian Dobre, Radu-Ioan Ciobanu, George Suciu</i>	
A PRIVACY PRESERVING FRAMEWORK FOR REWARDING USERS IN OPPORTUNISTIC MOBILE CROWDSENSING	730
<i>Federico Montori, Luca Bedogni</i>	
ON OPTIMAL CROWD-SENSING TASK MANAGEMENT IN DEVELOPING COUNTRIES	736
<i>Andrea Coletta, Novella Bartolini, Gaia Maselli, David P. Hughes</i>	
THE FUTURE OF WEARABLES IN HEALTH	742
<i>Wendy Nilsen</i>	
THE 3RD WRISTSENSE PANEL FOR DISCUSSION REGARDING HOW TO ESTABLISH OBJECTIVE GOLD STANDARD MEASUREMENTS FOR HEALTH CONSTRUCTS	743
<i>Nabil Alshurafa, Archan Misra, Abhishek Mukherji</i>	

Author Index