

**2020 12th International Congress
on Ultra Modern
Telecommunications and Control
Systems and Workshops
(ICUMT 2020)**

**Brno, Czech Republic
5 – 7 October 2020**



**IEEE Catalog Number: CFP2063G-POD
ISBN: 978-1-7281-9282-6**

**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:	CFP2063G-POD
ISBN (Print-On-Demand):	978-1-7281-9282-6
ISBN (Online):	978-1-7281-9281-9
ISSN:	2157-0221

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

PRIORITY-BASED COEXISTENCE OF EMBB AND URLLC TRAFFIC IN INDUSTRIAL 5G NR DEPLOYMENTS	1
<i>Ekaterina Markoval, Dmitri Moltchanov, Rustam Pirmagomedov, Daria Ivanova, Yevgeni Koucheryavy, Konstantin Samouylov</i>	
HANDOVER-BASED LOAD BALANCING ALGORITHM FOR 5G AND BEYOND HETEROGENEOUS NETWORKS.....	7
<i>Abdussamet Hatipoglu, Mehmet Basaran, Mehmet Akif Yazici, Lütfiye Durak-Ata</i>	
PITFALLS OF LPWA POWER CONSUMPTION: HANDS-ON DESIGN OF CURRENT PROBE	13
<i>Radek Mozny, Pavel Masek, Martin Stusek, Michal Mikulasek, Aleksandr Ometov, Jiri Hosek</i>	
TUNING CHANNEL ACCESS TO ENABLE REAL-TIME APPLICATIONS IN WI-FI 7	20
<i>Dmitry Bankov, Kirill Chemrov, Evgeny Khorov</i>	
LEARNING-AIDED MULTI-RAT OPERATION FOR BATTERY LIFETIME EXTENSION IN LPWAN SYSTEMS.....	26
<i>Martin Stusek, Dmitri Moltchanov, Pavel Masek, Jiri Hosek, Sergey Andreev, Yevgeni Koucheryavy</i>	
INTEGRATED DIAGNOSTIC SYSTEM FOR WINDING FAULT DETECTION OF THE THREE-PHASE PMSM.....	33
<i>Lukáš Otava, Ludek Buchta</i>	
HUMAN ACTION RECOGNITION USING AN IMAGE-BASED TEMPORAL AND SPATIAL REPRESENTATION.....	41
<i>Vinícius Silva, Filomena Soares, João Sena Esteves, Gianni Vercelli</i>	
SCADA-BASED MESSAGE GENERATOR FOR MULTI-VENDOR SMART GRIDS: INTEGRATION AND VERIFICATION OF TASE.2.....	47
<i>Petr Ilgner, Martin Stusek, Petr Cika, Marek Sikora</i>	
COMPUTER SIMULATION AND ANALYSIS OF A DOUBLY FED INDUCTION GENERATOR WITH A ONE SIDE DIRECTLY CONNECTED TO THE GRID	52
<i>Nguyen Huu Nam, Tran Xuan Trung</i>	
AN EMPIRICAL STUDY OF FATIGUE-INDUCED ELECTRICAL IMPEDANCE MODELS OF BICEPS TISSUES.....	58
<i>Norbert Herencsar</i>	
ON THE GENERATION OF PULSE OFDM SIGNALS	62
<i>Mikhail Bakulin, Vitaly Kreyndelin, Dmitry Petrov, Sergei Melnik</i>	
ON THE PERFORMANCE SLOPE OF SHORT LDPC CODES.....	67
<i>Luiza R. Medova, Pavel S. Rybin, Igor E. Sidorenko</i>	
PERFORMANCE OF COMBINATIONAL COOPERATIVE DETECTION METHOD UNDER REALISTIC CONDITIONS	73
<i>Rameez Ahmed Samo, Mehmet Basaran, Serhat Erkiüçük</i>	

TRAFFIC ANALYSIS OF IEEE 802.11 ON PHYSICAL LAYER BY USING SOFTWARE DEFINED RADIO	78
<i>Jiri Pokorny, Radek Fujdiak, Martin Kovanda, Martin Strajt, Jiri Hosek</i>	
APPLICATION FOR AN EARLY DETECTION OF TRANSMISSION PARAMETERS DEGRADATION OF POINT-TO-POINT MICROWAVE LINKS	82
<i>Milan Bubniak, Petr Musil, Petr Mlýnek</i>	
CRYPTOGRAPHIC PROTOCOLS FOR CONFIDENTIALITY, AUTHENTICITY AND PRIVACY ON CONSTRAINED DEVICES	87
<i>Jan Hajny, Petr Dzurenda, Raul Casanova Marques, Lukas Malina</i>	
DEVELOPMENT OF A PSEUDO-RANDOM SEQUENCE GENERATION FUNCTION BASED ON THE CRYPTOGRAPHIC ALGORITHM "KUZNECHIK"	93
<i>Vladimir Grozov, Alexei Guirik, Marina Budko, Mikhail Budko</i>	
DESIGN OF ADVANCED SLOW DENIAL OF SERVICE ATTACK GENERATOR	99
<i>Marek Sikora, Andrej Krivulcik, Radek Fujdiak, Petr Blazek</i>	
REVIEW AND ANALYSIS OF THE CLASSICAL AND POST-QUANTUM RING SIGNATURE ALGORITHMS	105
<i>Anton Leevik, Vladislav Beliaev, Boris Stasenko, Vadim Davydov, Sergey Bezzateev</i>	
DETECTION OF WIRELESS FAKE ACCESS POINTS	113
<i>Norbert Lovinger, Tomas Gerlich, Zdenek Martinasek, Lukas Malina</i>	
APPLYING MACHINE LEARNING TO LTE TRAFFIC PREDICTION: COMPARISON OF BAGGING, RANDOM FOREST, AND SVM	119
<i>Nikolai Stepanov, Daria Alekseeva, Aleksandr Ometov, Elena Simona Lohan</i>	
PARKINSON'S DISEASE DETECTION BASED ON CHANGES OF EMOTIONS DURING SPEECH	124
<i>Justyna Skibinska, Radim Burget</i>	
HARDWARE UTILIZATION OF MODELS OF GENETIC ALGORITHMS	131
<i>Vladislav Skorpil, Vaclav Oujezsky, Martin Tuleja</i>	
DEEP RECURRENT ARCHITECTURE BASED SCENE DESCRIPTION GENERATOR FOR VISUALLY IMPAIRED	136
<i>Aviral Chharia, Rahul Upadhyay</i>	
GENDER DIFFERENTIATED CONVOLUTIONAL NEURAL NETWORKS FOR SPEECH EMOTION RECOGNITION	142
<i>Puneet Mishra, Ruchir Sharma</i>	
FIELD SENSOR NETWORK FOR MICROCLIMATOLOGICAL MEASUREMENTS	149
<i>Radovan Juran, Ales Povalac</i>	
COMPARISON OF APPLICATION DYNAMICS IN TWO TYPES OF CLOUD SOLUTIONS	154
<i>Stefan Pocarovsky, Milos Orgon</i>	
BROADBAND POWER LINE MODULE INTEGRATED INTO POWER PLUG FOR SMART BUILDINGS	159
<i>Martin Ruzs, Petr Mlýnek</i>	

COMMON NOISE SOURCES AND THEIR IMPACT ON OFDM HIGHSPEED HOMEPLUG PLC NETWORKS	163
<i>Roman Duriga, Martin Koppl, Stefan Pocarovsky, Milos Orgon</i>	
IMPACT OF HOUSEHOLD ELECTRICAL APPLIANCES ON TRANSMISSION SPEED IN PLC NETWORKS	168
<i>Roman Duriga, Martin Koppl, Stefan Pocarovsky, Milos Orgon</i>	
NETWORK ASYMMETRIES AND PRICING IN 5G TELECOMMUNICATIONS.....	173
<i>Sergey Vasilyev, Igor Levichev, Daniel Peres Acosta</i>	
COMPUTATIONAL GEOMETRY DATA STRUCTURES IN LOGISTICS AND NAVIGATION TASKS	179
<i>Miloš Šeda, Pavel Seda</i>	
QUANTUM MECHANICS WITH NON-NEGATIVE DISTRIBUTION AND MEASUREMENTS	185
<i>Alexandre Zorin, Nikolay Tretyakov</i>	
MATHEMATICAL MODEL FOR RELIABILITY ANALYSIS OF A HETEROGENEOUS REDUNDANT DATA TRANSMISSION SYSTEM	189
<i>H. G. K. Houankpo, D. V. Kozyrev, E. Nibasumba, M. N. B. Mouale</i>	
RSS FINGERPRINTING DATASET SIZE REDUCTION USING FEATURE-WISE ADAPTIVE K-MEANS CLUSTERING	195
<i>Lucie Klus, Darwin Quezada-Gaibor, Joaquín Torres-Sospedra, Elena Simona Lohan, Carlos Granell, Jari Nurmi</i>	
CELLULAR-ENABLED WEARABLES IN PUBLIC SAFETY NETWORKS: STATE OF THE ART AND PERFORMANCE EVALUATION	201
<i>Salwa Saafi, Jiri Hosek, Aneta Kolackova</i>	
IMPROVING DBSCAN FOR INDOOR POSITIONING USING WI-FI RADIO MAPS IN WEARABLE AND IOT DEVICES	208
<i>Darwin Quezada-Gaibor, Lucie Klus, Joaquín Torres-Sospedra, Elena Simona Lohan, Jari Nurmi, Joaquín Huerta</i>	
HTC VIVE AS A GROUND-TRUTH SYSTEM FOR ANCHOR-BASED INDOOR LOCALIZATION	214
<i>Laura Fluoratoru, Elena Simona Lohan, Jari Nurmi, Dragos Niculescu</i>	
MANAGING COVID-19 GLOBAL PANDEMIC WITH HIGH-TECH CONSUMER WEARABLES: A COMPREHENSIVE REVIEW	222
<i>Asma Channa, Nirvana Popescu, Najeeb Ur Rehman Malik</i>	
TECHNICAL PERSPECTIVES OF CONTACT-TRACING APPLICATIONS ON WEARABLES FOR COVID-19 CONTROL.....	229
<i>Viktoriia Shubina, Aleksandr Ometov, Elena Simona Lohan</i>	
ARDEFENSE: DDOS DETECTION AND PREVENTION USING NFV AND SDN.....	236
<i>Aman Kumar Singh, Raj K Jaiswal, Khakimov Abdukodir, Ammar Muthanna</i>	
APPROACHES TO MODELING BLOCKCHAIN SYSTEMS.....	242
<i>Anastasia V. Spirikina, Elizaveta A. Aptrieva, Vasilii S. Elagin, Artem A. Shvidkiy, Anastasiia A. Savelieva</i>	

EVALUATION OF THE IMPACT THE HYPER-CONVERGED INFRASTRUCTURE STORAGE SUBSYSTEM SYNCHRONIZATION ON THE OVERALL PERFORMANCE	248
<i>Artem A. Shvidkiy, Anastasia V. Spirkina, Anastasiia A. Savelieva, Aleksey V. Tarlykov</i>	
METHODS FOR BUILDING A TRUSTED ENVIRONMENT IN UNIX OPERATING SYSTEMS BASED ON THE IMPLEMENTATION OF A DIGITAL WATERMARK	253
<i>A. V. Krasov, S. I. Shterenberg</i>	
A TECHNIQUE FOR ANALYZING BYTECODE IN A JAVA PROJECT FOR THE PURPOSE OF AN AUTOMATED ASSESSMENT OF THE POSSIBILITY AND EFFECTIVENESS OF THE HIDDEN INVESTMENT OF INFORMATION AND ITS VOLUMES IN A JAVA PROJECT	258
<i>Krasov Andrey, Sharikov Pavel</i>	
MACHINE LEARNING BASED PREDICTING STUDENT ACADEMIC SUCCESS	264
<i>Khalfan Al Mayahi, Mahmood Al-Bahri</i>	
INTELLIGENT SYSTEM ARCHITECTURE FOR SMART CITY AND ITS APPLICATIONS BASED EDGE COMPUTING	269
<i>Mehdhar Al-Gaashani, Mohammed Saleh Ali Muthanna, Khakimov Abdukodir, Ammar Muthanna, Ruslan Kirichek</i>	
DELAY PREDICTION IN IOT USING MACHINE LEARNING APPROACH	275
<i>Ali R. Abdellah, Omar Abdulkareem Mahmood, Andrey Koucheryavy</i>	
SEARCH FOR COORDINATES OF WSN NODES USING MULTIDIMENSIONAL SCALING METHOD	280
<i>Ilya Grishin, Van Dai Pham, Darina Okuneva, Ruslan Kirichek</i>	
GUIDELINES FOR USING MACHINE LEARNING TECHNOLOGY TO ENSURE INFORMATION SECURITY	285
<i>Kovtsur Maxim Mikhailovich, Mikhailova Anastasia Valerievna, Potemkin Pavel Andreevich, Ushakov Igor Alexandrovich, Krasov Andrey Vladimirovich</i>	
THE METHOD AND METHODOLOGY OF EFFICIENCY ASSESSMENT OF PROTECTION SYSTEM OF DISTRIBUTED INFORMATION SYSTEMS	291
<i>Minyaev A. Andrey, Krasov V. Andrey, Saharov V. Dmitriy</i>	
PRACTICAL RETROSPECTIVE OF 5-YEAR EVOLUTION OF THE IEEE 802.11 CLIENT DEVICE CAPABILITIES	296
<i>A. Vikulov, A. Paramonov</i>	
CLUSTERING ALGORITHMS FOR UAV PLACEMENT IN 5G AND BEYOND NETWORKS	301
<i>Vadim Kovalenko, Abbas Alzagher, Artem Volkov, Ammar Muthanna, Andrey Koucheryavy</i>	
METHODS FOR CORRECTING POSITIONS OF TETHERED UAVS IN ADVERSE WEATHER CONDITIONS	308
<i>Ilya Grishin, Vladimir Vishnevsky, Truong Duy Dinh, Anastasia Vybornova, Ruslan Kirichek</i>	
SDN-ASSISTED UNMANNED AERIAL SYSTEM FOR MONITORING SENSOR DATA	313
<i>Vladimir Vishnevsky, Van Dai Pham, Ruslan Kirichek, Vasiliy Elagin, Andrei Vladyko, Alexander Shestakov</i>	
MULTI-LEVEL EDGE COMPUTING SYSTEM ARCHITECTURE FOR V2X TECHNOLOGY	318
<i>Mahmood Al-Bahri, Ammar Muthanna, Ravindra R Dharamshi, Naeem Al-Shukail, Dmitriy Sazonov, Salim Al-Wardi</i>	

DATA UPDATING MODELS FOR PRIORITY VEHICLES 325
Alexander V. Shestakov, Yaroslav A. Pletnev, Kristina A. Frolova

Author Index