

# **International Scientific Conference of Communications, Information, Electronic and Energy Systems (CIEES 2020)**

IOP Conference Series: Materials Science and Engineering  
Volume 1032

Borovets, Bulgaria  
26 - 29 November 2020

ISBN: 978-1-7138-4557-7  
ISSN: 1757-8981

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

This work is licensed under a Creative Commons Attribution 3.0 International Licence.  
Licence details: <http://creativecommons.org/licenses/by/3.0/>.

No changes have been made to the content of these proceedings. There may be changes to pagination and minor adjustments for aesthetics.

Printed with permission by Curran Associates, Inc. (2022)

For permission requests, please contact the Institute of Physics  
at the address below.

Institute of Physics  
Dirac House, Temple Back  
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481  
Fax: 44 1 17 920 0979

[techtracking@iop.org](mailto:techtracking@iop.org)

**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  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

The CIEES 2020 Conference Chair’s Preface	
Peer review declaration	
Resilient satellite navigation empowers modern science, economy, and society .....	1
<i>R Filjar, M C Damas, T B Iliev</i>	
Performance of free-space optical systems in the presence of receiver imperfections .....	10
<i>G T Djordjevic, D N Milic, I D Radojkovic</i>	
Modelling and performance analysis of DWDM passive optical network .....	18
<i>S M Sadinov, K K Angelov, P Kogias</i>	
Deployment of mesh network in an indoor scenario for application in IoT communications .....	24
<i>K K Angelov, S M Sadinov, P Kogias</i>	
Security of the sensory data in the cloud .....	30
<i>F A Tsvetanov, M N Pandurski</i>	
Statistical techniques to determine of optimal and acceptable noise levels.....	36
<i>I S Balabanova, S S Kostadinova, V I Markova, S M Sadinov, G I Georgiev</i>	
Voice control and management in smart home system by artificial intelligence.....	42
<i>I S Balabanova, S S Kostadinova, V I Markova, S M Sadinov, G I Georgiev</i>	
Evolution of mobile networks and seamless transition to 5G.....	48
<i>E P Ivanova, T B Iliev, I S Stoyanov, G Y Mihaylov</i>	
Conceptual framework for quality assessment in human-centric 6G XR services .....	55
<i>V Stoynov, A Ivanov, D Mihaylova</i>	
Energy detectors performance evaluation for interweave cognitive radio network scenario in 5G .....	61
<i>A Ivanov, V Stoynov, D Mihaylova, V Poulkov</i>	
An overview of methods to combat eavesdropping in NOMA-based networks through physical layer security .....	66
<i>D Mihaylova, V Stoynov, A Ivanov, Z Valkova-Jarvis</i>	
Storing data from sensors networks.....	72
<i>F A Tsvetanov</i>	
Study the influence of intermodulation products on navigation signals .....	79
<i>T B Iliev, I S Stoyanov, G Y Mihaylov, E P Ivanova</i>	
An industrial IoT edge node for buffer level detection in a cardboard production line.....	88
<i>G Avramidis, D Karampatzakis</i>	
6LoWPAN network analysis using simulations and experiments .....	94
<i>A M Haka, V P Aleksieva, H G Valchanov</i>	
Deployment and analysis of Bluetooth low energy network .....	100
<i>A M Haka, V P Aleksieva, H G Valchanov</i>	

Selection of countermeasures against propagation of harmful information via Internet .....	106
<i>L A Vitkova, A P Pronichev, E V Doynikova, I B Saenko</i>	
On numerical method for modeling oil filtration problems in piecewise-inhomogeneous porous medium.....	112
<i>A Nematov, E Sh Nazirova, R T Sadikov</i>	
Comparative analysis of prototypes for two-touch finger interfaces of smartwatch .....	119
<i>Y N Dimitrov, V P Aleksieva, H G Valchanov</i>	
Objects distance measurement in augmented reality for providing better user experience .....	124
<i>N Neshov, A Manolova</i>	
Technique for storing and automated processing of weather station data in cloud platforms .....	130
<i>S Sokolov, S Vlaev, M Chalashkanov</i>	
Software-defined wireless urban network .....	137
<i>O V Streltsov, Y G Birka, V Y Gnatenko, V S Sytnikov, P V Stupen</i>	
Analysis of the energy recovery possibilities of energy from lavender straws after a steam distillation process.....	144
<i>D Chakyrova, N Doseva</i>	
Bin weather data of Varna and their influence on the seasonal efficiency of heat pumps with energy source outdoor air .....	150
<i>D Chakyrova, N Doseva, N Kalcheva</i>	
Experimental study and analysis of hydraulic characteristics of diaphragm (chamber) gas flow meter.....	156
<i>P G Tsankov, NA Georgeva, S G Delcheva</i>	
Analysis of energy consumption in the industrial sector in the European Union .....	163
<i>Nely Georgeva, Petko Tsankov</i>	
The gaps of renewable energy legislation in Bulgaria.....	169
<i>T D Stankova, D S Toneva</i>	
Achievement of maximum energy efficiency through vector control of induction motor electric drive.....	176
<i>S Rachev, G Ivanova</i>	
Influence of buoyancy forces in multi-storey buildings on the efficiency of a regenerative air handling unit with heat recovery .....	181
<i>A Penev, L Tsokov</i>	
Hydraulic power take off system for wave energy utilization .....	186
<i>R Velichkova, M Pushkarov, R A Angelova, I Simova, D Markov, I Denev, P Stankov</i>	
Experimental investigation of the refrigeration cycle of water-to-water heat pump .....	192
<i>Z D Kolev, P G Mushakov, S Y Kadirova</i>	
Fly ash zeolites as a dual system for simultaneous CO <sub>2</sub> capture and its utilization in the production of synthetic gas.....	198
<i>D M Zgureva, S V Boycheva, K B Filipov</i>	
Studies on the thermochemical energy storage in the coal ash zeolite/water system .....	203
<i>S V Boycheva, D M Zgureva, I K Marinov, S Miteva, I Yankov, A Ivanov, A N Asenov</i>	

Methodology for assessing the residual resource during the operation of high-temperature units.....	209
<i>A Nikiforov, E Prikhodko, A Kinzhibekova, A Karmanov</i>	
Modeling the influence of the characteristics of renewable organic materials on the energy performance of the boiler .....	218
<i>A Nikiforov, E Prikhodko, A Kinzhibekova, Sh Nurkina</i>	
Modeling the basis power in the systems for continuous transport of fluids and bulk materials .....	225
<i>O Dinolov, K Ilieva</i>	
Development of innovative methods of thermal waste processing in modular waste burners with a high degree capture of harmful emissions.....	232
<i>R K Orumbayev, A A Kibarin, I K Iliev, A A Torgayev, M B Kumargazina</i>	
Studies of integrated natural capillary-porous coatings.....	237
<i>A A Genbach, D Y Bondartsev, H I Beloev</i>	
A study of thermal devices with porous coatings .....	244
<i>A A Genbach, D Y Bondartsev, H I Beloev</i>	
Solar energy potentials in different climatic zones of Nigeria.....	250
<i>S T Ogunjo, A A Obafaye, A B Rabi</i>	
Wind energy assessment for low complex terrain using reference meteorological mast .....	255
<i>A K Terziev, Y Pantelev, M Ivanov</i>	
Estimation of wind speed and energy potential by atmospheric model for day-ahead market and wind power plants in Turkey .....	262
<i>M A Devrim, A Sakalli</i>	
Impacts of climate change and distribution of precipitation on hydroelectric power generation in Turkey .....	268
<i>U Bulut, A Sakalli</i>	
Utilization of the energy potential of waste meal and creating of “green” workplaces.....	273
<i>M K Mladenov, S A Yaneva</i>	
Change point detection in recent hydropower generation in Romania .....	279
<i>A Neagoe, E-I Tică, F Popa, B Popa</i>	
The comparison of five proton linac beams in order to set up a thermal neutron radiography installation .....	285
<i>J G Fantidis, G E Nicolaou, G Tsakalos, A Thysiadou</i>	
Automatic detection of characteristic segments of a recorded ECG signal with noise handling methods .....	291
<i>B Glushica, B Aleksovski, A Kuhar</i>	
Plexiglass glove box for organic solar cells .....	297
<i>L A Szolga, C A Stan</i>	
Robotic arm controlled by Android app through Bluetooth connection for organic solarcell manipulation.....	303
<i>L A Szolga, G Fluera</i>	
High-level model based calibration technique design for SAR ADC .....	309
<i>M N Skripnichenko</i>	

Information management and monitoring system for a grapes harvesting robot.....	315
<i>K Tziridis, A Nikolaou, T Kalampokas, E Vrochidou, T Pachidis, G A Papakostas, V G Kaburlasos</i>	
Kinematic model of a cow milking manipulator with simultaneous positioning at four given points .....	321
<i>S S Ruzin, D V Shilin, A S Dorokhov, D Yu Pavkin, E L Chepurina</i>	
A review on the methods for big data analysis in agriculture.....	327
<i>B I Evstatiev, K G Gabrovska-Evstatieva</i>	
Modeling of three-phase inverter power supply system in Simulink .....	333
<i>V B Ivanov</i>	

**Author Index**