

2018 Ural Symposium on Biomedical Engineering, Radioelectronics and Information Technology (USBEREIT 2018)

**Yekaterinburg, Russia
7-8 May 2018**



**IEEE Catalog Number: CFP18P00-POD
ISBN: 978-1-5386-4947-3**

**Copyright © 2018 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:	CFP18P00-POD
ISBN (Print-On-Demand):	978-1-5386-4947-3
ISBN (Online):	978-1-5386-4946-6

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

Pages	Title	Authors
1	A Novel Segmentation Algorithm for MRI Brain Tumor Images	<i>A.R.A. Abdurraqeb, W.A. Al-haidri and L.T. Sushkova</i>
5	Prospects of electrochemical urea elimination method for wearable “artificial kidney”	<i>Nikolai Bazaev, Nikita Zhilo and Victor Grinval'd</i>
9	Modeling of gas bubble dynamics in liquid media under Doppler effect of ultrasound radiation	<i>O.V. Muravieva, O.P. Bogdan, Yu.S. Dudina and E.P. Kuznetsov</i>
13	Experimental study of combined treatment using laser, cryogenic and radiofrequency preliminary processing	<i>Nikita Vladimirovich Belikov, Irina Vitalyevna Khaydukova, Gennady Victorovich Savrasov, Aleksandr Vasilievich Gavrilenko and Anna Sergeevna Borde</i>
17	Electrodes interchangeability during electromyogram and bioimpedance joint recording	<i>A.N.Briko, A.V.Kobelev and S.I.Shchukin</i>
21	The development of the evaluation methodology of the methodological quality of scientific publications about clinical trials and requirements for the information system for its automation	<i>Ostavnov Stanislav S., Briko Andrey N., Khachatryan George R., Musina Nuriya Z., Fedieva Vlada K. and Sukhorukikh Olga A.</i>
25	Combined mathematical model of the electrical and mechanical activity of the human cardiomyocyte	<i>Tatiana Sulman, Olga Solovyova and Leonid Katsnelson</i>
29	Hybrid Mock Circulatory Loop for Training and Study Purposes	<i>Dmitry Telyshev, Alexander Pugovkin, Sergey Selishchev, Daniel Rüschen and Steffen Leonhardt</i>
33	Anthropomorphic prosthesis control based on the electrical impedance signals analysis	<i>A.V.Kobelev and S.I.Shchukin</i>
37	Research coaxial needle electrode characteristics for the automated vein puncture control system	<i>A.V. Shcherbachev, E.A Bychkov, I.A. Kudashov and A.K. Volkov</i>
41	Stabilization of Keplerate-type Spheric Porous Nanocluster Polyoxometalate Mo72Fe30	<i>Ilya Gagarin, Margarita Tonkushina and Alexander Ostroushko</i>
45	Mobile-based decision support system for gestational diabetes mellitus	<i>Evgenii Pustozarov and Polina Popova</i>
49	Development of the gait tracking sensor with low power consumption	<i>Y.A. Stryzhak and I.O. Chernobylov</i>
53	Estimation of features informativeness of the EMG signal in the problem of forearm prosthesis controlling	<i>M. V. Markova, D. O. Shestopalov and A. P. Nikolaev</i>
57	The Influence of Neuroelectrostimulation on the Functional and Psychometric Parameters in the Problem of Learning Ability	<i>A.A. Petrenko and A.P. Kozhevnikova</i>
61	An algorithm of system identification for implantable rotary blood pumps	<i>Dmitry Petukhov, Dmitry Telyshev, Marian Walter and Leonie Korn</i>
64	The model for computation of electroerosol flows for burn injuries treatment	<i>V.A. Karpukhin, K.S. Mustafina and G.S. Klimiashvili</i>
68	Optimization of left ventricular lead position based on a computer model of the heart for cardiac resynchronization therapy	<i>S. Khamzin, A. Dokuchaev, A. Bazhutina, T. Chumarnaya, S. Zubarev, T. Lyubimseva, D. Lebedev and O. Solovyova</i>
72	Development of the Mobile Application for Control of the Neuro-electrostimulator of Type 'SYMPATHOCOR-01' Using Apache Cordova	<i>Babich Lyudmila Vladimirovna, Svalov Dmitriy Andreyevich, Smirnov Aleksey Leonidovich and Babich Mikhail Vladimirovich</i>
76	Identification of the left ventricle endocardial border on two-dimensional ultrasound images using the convolutional neural network Unet	<i>Vasily Zyuzin, Porshnev Sergey, Andrey Mukhtarov, Tatyana Chumarnaya, Olga Solovyova, Anastasia Bobkova and Vladislav Myasnikov</i>
79	The Brachial Artery Localization For Blood Pressure Monitoring Using Electrical Impedance measurement	<i>Al-harosh Mugeb, Volkov A.K. and Kudashov Ivan</i>
83	A Method and Algorithm for Remote Monitoring of Patients in Asthma	<i>Anna Glazova, Zafar Yuldashev and Anna Bashkova</i>

- 87 Convolutional neural network application for cells segmentation in immunocytochemical study
Dmitry Parpulov, Andrey Samorodov, Denis Makhov, Elena Slavnova, Nadezhda Volchenko and Vladimir Iglonikov
- 91 The optimal stimulation mode and the number of averaging epochs selection for P300 detection
Alexander Dmitriev, Mugeb Al-harosh, Sergeev Igor and Alexander Nikolaev
- 95 Bioradiolocation-Based Non Contact Fall Detection Method Development
Julia Lutsenko, Lesya Anishchenko and Irina Apollonova
- 99 Machine Learning in Video Surveillance for Fall Detection
Lesya Anishchenko
- 103 The development of the methodical approach to the innovative medical devices creation projects feasibility evaluation
Otstavnov Stanislav S., Otstavnov Nikita S. and Breusov Alexey V.
- 107 Modeling of Calcium Sparks in Heart Cells. 2D Calcium Diffusion Problem
Alexander Ryvkin and Nikita Markov
- 111 New approaches to the correction of metabolic disorders in experimental diabetes mellitus
Viktor Emelianov, Irina Danilova, Irina Gette, Ksenia Sokolova, Larisa Sidorova and Tatyana Tseitler
- 113 Noninvasive Detection of Magnetic Particles in Biological Objects
Michail Belodedov, Levan Ichkitidze and Sergei Selishchev
- 116 Device for recording the physiological parameters of the patient and its position in three-dimensional space under complex dynamic postural loads
Konstantin G. Kuliabin, Timofey V. Sergeev, Alexander V. Belov and Nicolay B. Suvorov
- 120 Estimation of Informational Contents of Morphological Features of Pseudo-phase Portrait of Rhythmograms on the Basis of Cluster Analysis
Karina Khachatryan and Lyudmila Manilo
- 124 Detection of Borderline Mental Disorder On Electrocardiosignals Using EMD
Alexander Yu. Tychkov, Alan K. Alimuradov, Pyotr P. Churakov and Alexey V. Ageykin
- 128 A Method to Determine Cepstral Markers of Speech Signals under Psychogenic Disorders
Alan K. Alimuradov, Alexander Yu. Tychkov, Alexey V. Ageykin and Pyotr P. Churakov
- 132 Low-intensity optical irradiation: thermographic study of the effects produced
Larisa Zhorina, Grigoriy Zmievskey and Anastasiya Solntceva
- 136 Situational Approach to Information Security
Lyudmila Astakhova and Ivan Zemtsov
- 140 Computer-aided system for metallurgy production output: from heterogeneous data bases to unified data warehouse
Sergey Porshnev, Andrey Borodin, Elena Dymova and Olga Ponomareva
- 144 Inverse Problem of Spectral Reflection Prediction by Artificial Neural Networks: Preliminary Results
Dmitry Tarasov, Oleg Milder and Andrey Tyagunov
- 148 Primary data processing problems in the RES generation forecasting systems
Nina V. Kharlamova and Alexandra I. Khalyasmaa
- 152 Visualization of graphs of complex functions and exact geometric method of finding complex roots of a polynomial
Sergey Trofimov and Olga Trofimova
- 156 Influence of topology of the corporate computer network on properties of the information highways flowing in it
Stoychin Krasimir, Shabrov Andrey, Dymova Elena Evgenyevna
- 160 Adapting to disturbances regulator
Yurlova Alisa Alexeevna and Strashinin Evgeniy Erastovich
- 165 On accuracy of periodic discrete finite-length signal reconstruction by means of a Whittaker-Kotelnikov Shannon interpolation formula
S.V. Porshnev, D.V. Kusaykin and M.A. Klevakin
- 169 Prospects and Modern Technologies in the Development of VR/AR
Alexander Ptukhin, Konstantin Serkov, Artem Khrushkov and Ekaterina Bozhko
- 174 Intelligent Instrument Transformer for Control Systems of Digital Substations
Topolsky, D.V., Topolskaya, I.G., Topolsky, N.D.
- 179 System of indicators for monitoring the activities of an educational institution
Saule Kumargazhanova, Aizhan Erulanova, Gulzhan Soltan, Laura Suleimenova and Gulnaz Zhomartkyzy
- 183 Design Of An Automatic System Testing Materials For Tension
Aizhan Erulanova, Aslima Alimkhanova, Nariman Mechshanov and Marzhan Amangeldina
- 189 Example of Control Vector Construction for A Local Economic System
O.M.Zvereva

- 193 Construction of a Maximum Lifetime Route Tree in Wireless Sensor Networks for Nodes with a Two Level Transmission Power *Alexander Titaev*
- 199 Monthly sunspot numbers forecast with artificial neural network combined with dynamo model: comparison with modern methods *Nikolai Safiullin, Sergey Porshnev and Nathan Kleorin*
- 203 Method of Vibration Measurement Based on the Analysis of the Central Asymmetric Blur Image of a Circular Mark *Alexey Grigoriev, Ilya Rybakov, Alexey Grishko, Sergey Brostilov and Evgeniya Danilova*
- 208 Simulation modeling as a service for intelligent systems *Andrey S. Kondratyev, Konstantin A. Akseyonov, Natalia A. Buravova and Olga P. Akseyonova*
- 212 Application of the Process Parameter Analysis Tree for Technological Process Analysis *Konstantin Akseyonov and Anna Antonova*
- 216 Open-ended Practice to Study the Influence of the Crowd on the Condition of Wireless Communication *Kirill Zeyde*
- 220 Reliability Control of Complex Systems at Different Stages of Their Life Cycle *Alexey Grishko, Pavel Adnreev, Nikolay Goryachev, Vasily Trusov and Evgeniya Danilova*
- 224 Mathematical Modeling of Heterogeneous Structure Dynamics of an Electronic Block under Applied Shock *Artamonov D.V., Litvinov A.N., Yurkov N.K., Kochegarov I.I. and Lysenko A.V.*
- 229 Using Headphones to Implement a Technical Channel for the Leakage of Voice Information *Asyaev Grigorii Dmitrievich and Antyasov Ivan Sergeevich*
- 233 Synthetic-Aperture Radar Clutter Reflections Suppression Algorithm Analysis for One Target and One Clutter Case with Inexactly Known Clutter Coordinates *Dorosinskiy Leonid and Kurganski Andrew*
- 237 A FMCW - Interferometry Approach for Ultrasonic Flow Meters *Mikhail Ronkin and Aleksey Kalmykov*
- 241 The Influence of Load Variations on the of Autodyne Response Formation in Microwave Oscillators under Strong Reflected Emission *Noskov V.Ya., Ignatkov K.A. and Chupahin A.P.*
- 245 Investigation of Microstrip Band-pass Filters Based on 2D Electromagnetic Crystal *Boris Belyaev, Sergey Khodenkov and Dmitry Dmitriev*
- 249 Simulation of Extended Radar Objects on the Basis of Several Signal Channel Mixing *Alexander S. Bokov, Sergey A. Margilevsky and Vladimir G. Vazhenin*
- 253 Comparative Analysis of Narrow Band Interference Immunity for BOC and MSK-BOC Receivers *Timur V. Krasnov, Valerij N. Bondarenko, Vadim F. Garifullin, Denis S. Feoktistov and Evgenij V. Bogatyrev*
- 256 The Protection of Digital Communication Systems from Interference and Radio Counteraction *Dolmatov A. G., Luchinin A.S., Malygin I.V. and Yazovsky A.A.*
- 260 A Noncontact System for Monitoring of in-service Condition of Helicopter Main Rotor Blades *Semyon V. Zhukov and Alexander I. Danilin*
- 263 Electromagnetic Non-Contact Measurement Method for Rotation Speed and Movements *Stanislav Polyakov and Kirill Shaidurov*
- 267 Autodyne Response Formation in Stabilized Microwave Oscillators at Strong Reflected Emission *Noskov V.Ya. And Chupahin A.P.*
- 271 Decreasing the Dynamic Range of OFDM Signals Based on Extrapolation for Information Security Increasing *Grigory S. Voronkov, Anna V. Voronkova, Ruslan V. Kutluyarov and Igor V. Kuznetsov*
- 275 Gas Turbine Engine In-flight Diagnostics Using 3D Vibration Spectra *Fanis Mirsaitov and Ignatkov K.A.*
- 279 Oxide Layer Thickness Effects on the Resistance Switching Characteristics of Ti/TiO₂-NT/Au Structure *Irina B. Dorosheva, Alexander S. Vokhmintsev, Robert V. Kamalov, Aleksey O. Gryaznov and Ilya A. Weinstein*
- 283 The Non-Linear Scale Building for Two-Frequency Phase Method of Distance Determination *Igor Shirokov, Dmitriy Murzin and Andrey Azarov*
- 287 The Increasing of Operation Range of Local Positioning System *Igor Shirokov and Elena Shirokova*
- 291 Simulation of 3600-3800 MHz Frequency Band Antenna for Fifth Generation Mobile Communication *Denis A. Letavin and Danil A. Trifonov*
- 295 The Coordinate Expression of the Propagation Constant for a Moving Dielectric Medium *Kirill Zeyde*

- 299 Determination of the Electrodynamics Properties of the Material and Their Subsequent Use for the Realization of a Miniature Microstrip Coupler Device *Denis A. Letavin, Nikolay S. Knyazev and Alexander I. Malkin*
- 303 Microstrip ultra-wideband antenna measurements *Guzel I. Abdrakhmanova, Elizaveta P. Grakhova, Nikolay S. Knyazev, Ivan K. Meshkov, Grigory S. Voronkov and Albert K. Sultanov*
- 308 A Classification of Optical Fibers Types on the Characteristics of the Mandelstam – Brillouin Backscatter Spectrum *Igor V. Bogachkov*
- 313 C-band Digitally Controlled Variable Gain Amplifier Design *Ivan Kravchenko, Ivan Filippov and Valeriy Vertegel*
- 317 Interaction of Linear Mode Coupling and Nonlinearity in Optical Space Division Multiplexed Systems *Ruslan V. Kutluyarov, Azat R. Gizatulín and Valeriy Kh. Bagmanov*
- 321 Bandwidth and Impedance Matching Enhancement of Printed Quadrifilar Antenna for GPS (L1), GLONASS (L1), Baidu (B11) *Victor Chechetkin, Alexey Korotkov and Arthur Abbasov*
- 325 Potential Accuracy Estimation of Radar Slant Range Measurement *Sergey I. Kudinov, Vyacheslav E. Ivanov, Andrei V. Gusev and Oleg V. Plokhikh*
- 329 Influence on the Course Line Position of Errors in the Amplitude-Phase Distribution of the Difference Channel Signals in ILS Localizer Antenna *N.I. Voytovich, B.V. Zhdanov and O.Y. Korablev*
- 334 Comparison of Luneburg Lens Antennas Made from Homogeneous Material *Alexey Korotkov and Yuriy Mitelman*
- 338 Model of Evaporation Duct *Denis Serebriakov and Renat Abdullin*
- 342 New Mathematical Model for Analysis of Open Circular Dielectric Waveguides *Yuriy Mitelman*
- 348 Unidirectional Synapse-Like Behavior of Zr/ZrO₂-NT/Au Layered Structure *Alexander S. Vokhmintsev, Robert V. Kamalov, Anna V. Kozhevina, Ilya A. Petrenyov, Nikolay A. Martemyanov and Ilya A. Weinstein*
- 352 A Method of Ambiguous Range Suppression *V. A. Khlusov and A. V. Novikov*
- 355 Analysis and Experimental Research of Ultra-Wideband Divider-Combiner of Pico- and Nanosecond Pulses *V. N. Fedorov, N.D. Malyutin and N. B. Drobotun*
- 359 Results of the Development and Experimental Studies of the Digital Magnetic Compass System *Vu Xuan Hau and Vyacheslav E. Ivanov*
- 363 Compability of Primary and Secondary Users in the Same Frequency Band *Kornilov I.N.*
- 367 Phase Based Frequency Estimator for Short Range FMCW Radar Systems *Mikhail Ronkin and Aleksey Kalmykov*
- 371 Radar Detection of Small-Size UAVs *Mikhail E. Rovkin, Valery A. Khlusov, Nickolay D. Malyutin, Alexey V. Hristenko, Anatoly S. Novikov, Dmitry M. Nosov, Mikhail V. Osipov, Maxim O. Konovalenko, Artyom O. Marchenko and Vasly E. Ilchenkoy*
- 375 Block Diagram of the Multichannel Master Generator of the Adaptive Information-Measuring System for Vibro Tests of the Radioelectronic Equipment *Alexey Lysenko, Nikolay Yurkov, Nikolay Goryachev, Rybakov Ilya and Igor Kochegarov*