

2020 Signal Processing: Algorithms, Architectures, Arrangements, and Applications (SPA 2020)

**Poznan, Poland
23 – 25 September 2020**



**IEEE Catalog Number: CFP2007D-POD
ISBN: 978-1-7281-7746-5**

**Copyright © 2020, Division of Signal Processing and Electronic Systems
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: | CFP2007D-POD |
| ISBN (Print-On-Demand): | 978-1-7281-7746-5 |
| ISBN (Online): | 978-8-36206-539-4 |
| ISSN: | 2326-0262 |

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

| | |
|---|-----|
| Program summary..... | N/A |
| General information..... | 7 |
| TUTORIALS: | |
| I. Michael Hübner, Flexible hardware architectures for robust Cyberphysical systems | 9 |
| II. Gilbert Strang, The Victory of Orthogonality | 10 |
| III. Georgios Keramidas, The SMART4ALL toolbox for boosting technology and business development in South, Eastern and Central Europe | 11 |
| IV. Antonio Montalvo, SMART4ALL Open Calls, the right funding instrument to boost technology and business development in South, East and Central Europe | 12 |
| SESSION 1: Biosignal Processing | |
| 1. Barbara Wilk, Małgorzata Augustyn, Grzegorz Wilk, Algorithm for Human Fall Detection Based on Acceleration Measurement | 13 |
| 2. Jakub Garstka, Michał Strzelecki, Pneumonia detection in X-ray chest images based on convolutional neural networks and data augmentation methods | 18 |
| 3. Ibtissem Cherfa, Anissa Mokraoui, Abdenour Mekhmoukh, Karim Mokrani, Adaptively Regularized Kernel-Based Fuzzy C-Means Clustering Algorithm Using Particle Swarm Optimization for Medical Image Segmentation | 24 |
| 4. T. K. M. Lee, H. W. Chan, K. H. Leo, E. Chew, Ling Zhao, S. Sanei, Surrogate Data for Deep Learning Architectures in Rehabilitative Edge Systems | 30 |
| 5. Javier Hoffmann, Safdar Mahmood, Priscile Suawa Fogou, Nevin George, Solaiman Raha, Sabur Safi, Kurt JG Schmailzl, Marcelo Brandalero, Michael Hübner, A Survey on Machine Learning Approaches to ECG Processing | 36 |
| SESSION 2: DSP Theory & Implementation | |
| 6. Eugene V. Rybenkov, Nick A. Petrovsky, High performance multiplier-less pipelined FPGA architecture for 2-D non-separable quaternionic filter banks | 42 |
| 7. Maciej Niedźwiecki, Marcin Ciolek, Artur Gańcza, Piotr Kaczmarek, A New Method of Noncausal Identification of Time-varying Systems | 48 |
| 8. Cao Silei, Li Tianyu, Wang Yao, Robust Beamforming Method Based on Doublelayer Reconstruction of Covariance Matrix | 53 |
| 9. Radu Matei, Analytic Design of Uniform Circular Filter Banks | 58 |
| 10. Javier Hoffmann, Marcelo Brandalero, Michael Hübner, TIRUB: A Safety and Energy-Aware Scheduling Algorithm | 63 |
| SESSION 3: Image Processing | |
| 11. Imen Kadri, Gabriel Dauphin, Anissa Mokraoui, Zied Lachiri, Stereoscopic Image Coding Using a Global Disparity Estimation Algorithm Optimizing the Compensation Scheme Impact | 69 |
| 12. Dirk Siegmund, Luís Rüger Sacco, Arjan Kuijper, Issue Based OCR Error Prediction in Video Streams | 75 |
| 13. Mustafa Othman, Ken Chen, Anissa Mokraoui, A Study of QoE-Aware Adaptation Mechanism for DASH Video Streaming based on Objective Visual Quality Assessment | 81 |
| 14. Kacper Podbucki, Jakub Suder, Tomasz Marciniak, Adam Dąbrowski, CCTV based system for detection of anti-virus masks | 87 |
| 15. Karol Piniarski, Paweł Pawłowski, Adam Dąbrowski, Improved pedestrian detection by adjustment of segmented ROI in thermal night vision | 92 |
| 16. Julian Balcerak, Adam Konieczka, Karol Piniarski, Paweł Pawłowski, Classification of road surfaces using convolutional neural network | 98 |
| SESSION 4: DSP Implementations | |
| 17. Przemysław Falkowski-Gilski, Marek Kulawiak, Marcin Kulawiak, Geospatial Coverage and Signal Quality Measurements of Terrestrial DAB+ Network in Northern Poland | 104 |

| | |
|--|-----|
| 18. Piotr Kłosowski, Artificial intelligence application to improve the performance of distance learning servers during the coronavirus pandemic threat period | 110 |
| 19. Marek Szlachetka, Dariusz Borkowski, Jaroslaw Was, Stationary environment models for Advanced Driver Assistance Systems | 116 |
| 20. Joanna Stanisiz, Konrad Lis, Tomasz Kryjak, Marek Gorgon, Optimisation of the PointPillars network for 3D object detection in point clouds | 122 |
| 21. Agata Dąbrowska, Michał Adamski, Adam Dąbrowski, Tomasz Jankowski, Michał Kliczkowski, Environmental quality monitoring with unmanned aircraft vehicle | 128 |
| 22. Paweł Pawłowski, Rafał Długosz, Adam Dąbrowski, Switched-capacitor finite impulse response rotator filter | 133 |
| SESSION 5: Audio Processing 1 | |
| 23. Maciej Błaszke, Damian Koszewski, Determination of Low-Level Audio Descriptors of a Musical Instrument Sound Using Neural Network | 138 |
| 24. Adam Kurowski, Szymon Zaporowski, Andrzej Czyzewski, 1D convolutional context-aware architectures for acoustic sensing and recognition of passing vehicle type | 142 |
| 25. Marta Stefaniak, Andrzej Czyzewski, Comparison of two methods of sound extraction from guitar string video recordings | 146 |
| 26. Maciej Walczyński, Patryk Grzybała, Selected methods of parametrization in problem of automatic classification classical music from the Renaissance era against the classical works from other eras | 151 |
| 27. Tomasz Grzywalski, Szymon Drgas, Speech enhancement by iterating forward pass through U-net | 157 |
| SESSION 6: Audio Processing 2 | |
| 28. Michał Łuczyński, Andrzej Dobrucki, Stefan Brachmański, Active tone elimination algorithm using FFT with interpolation and zero-padding | 163 |
| 29. Katarzyna Kotarba, Michał Kotarba, Efficient detection of specific language impairment in children using ResNet classifier | 169 |
| 30. Adam Dustor, Speaker verification with TIMIT corpus - some remarks on classical methods | 174 |
| 31. Dawid Weber, Szymon Zaporowski, Daniel Korzekwa, Constructing a Dataset of Speech Recordings with Lombard Effect | 180 |
| Index of Authors | 186 |