

# IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT

A PUBLICATION OF THE IEEE INSTRUMENTATION AND MEASUREMENT SOCIETY



OCTOBER 2019

VOLUME 68

NUMBER 10

IEIMAO

(ISSN 0018-9456)

## PART I OF TWO PARTS

### SURVEY/REVIEW PAPER

- A Review of New Time-to-Digital Conversion Techniques ..... *S. Tancock, E. Arabul, and N. Dahnoun* 3406

### REGULAR PAPERS

#### Acoustics and Ultrasonics Instrumentation and Measurements

- Design of Low-Complexity 3-D Underwater Imaging System With Sparse Planar Arrays ..... *D. Zhao, F. Zhou, R. Jiang, X. Liu, and Y. Chen* 3418
- An Enhanced Time-Reversal Imaging Algorithm-Driven Sparse Linear Array for Progressive and Quantitative Monitoring of Cracks ..... *Q. Wang, Y. Xu, Z. Su, M. Cao, and D. Yue* 3433

#### A/D and D/A Conversion, Analog and Digital Instrumentation

- An Improved Sine Wave Histogram Test Method for ADC Characterization ..... *V. Pálfi* 3446

#### Analog and Digital Data, Image and Signal Processing

- Molten Steel Level Detection From Thermal Image Sequence Based on the Characteristics of Adhesive Flux ..... *Q. He, H. Meng, Z. Hu, and Z. Xie* 3456
- Reduced Leakage Synchrophasor Estimation: Hilbert Transform Plus Interpolated DFT ..... *G. Frigo, A. Derviškadić, and M. Paolone* 3468

#### Instrumentation for Measurement in Communications

- Design of Experiments to Compare Base Station Antenna Configurations ..... *S. Caban, M. Lerch, S. Pratschner, E. Zöchmann, P. Svoboda, and M. Rupp* 3484

#### Controls and Control Systems Instrumentation and Measurement

- Resolver-To-Digital Conversion Based on Acceleration-Compensated Angle Tracking Observer ..... *F. Wang, T. Shi, Y. Yan, Z. Wang, and C. Xia* 3494

#### Instrumentation for Measurement of Electric Power Systems, Energy Metering, Electric Power Quality

- A Novel Technique for Fundamental and Harmonic Parameter Estimation Using Nonergodic S-Transform ..... *J. Yi, M. Zhou, Z. Li, and J. Li* 3503

#### Embedded and Low-Power Systems

- Ultralow-Power Synchronous Demodulation for Low-Level Sensor Signal Detection ..... *P. M. Maya-Hernández, B. Calvo-López, and M. T. Sanz-Pascual* 3514

(Contents Continued on Page 3405)



<b>Built-in Self-Test, Design-for-Testing, Fault Diagnosis and Fault-Tolerance</b>		
Low Frequency Model-Based Identification of Soft Impedance Faults in Cables .....	A. Cozza	3524
Entropy-Based Local Irregularity Detection for High-Speed Railway Catenaries With Frequent Inspections .....	H. Wang, Z. Liu, A. Núñez, and R. Dollevoet	3536
<b>Imaging Techniques and Instrumentation</b>		
A Novel Sensitivity Matrix Construction Method for Ultrasonic Tomography Based on Simulation Studies .....	N. Li, K. Xu, K. Liu, C. He, and B. Wu	3548
A Novel Stereo Vision Measurement System Using Both Line Scan Camera and Frame Camera .....	Z. Liu, S. Wu, Q. Wu, C. Quan, and Y. Ren	3563
Temperature Measurement and Compensation Method of Blast Furnace Molten Iron Based on Infrared Computer Vision .....	D. Pan, Z. Jiang, Z. Chen, W. Gui, Y. Xie, and C. Yang	3576
<b>Mechatronics, Industrial Applications and Robotics</b>		
Monocular Vision-Based Parameter Estimation for Mobile Robotic Painting .....	Q. Zhao, X. Li, J. Lu, and J. Yi	3589
<b>Medical and Biomedical Instrumentation and Applications</b>		
Video-Based Heart Rate Measurement: Recent Advances and Future Prospects .....	X. Chen, J. Cheng, R. Song, Y. Liu, R. Ward, and Z. J. Wang	3600
A Single-Channel SSVEP-Based Instrument With Off-the-Shelf Components for Trainingless Brain-Computer Interfaces .....	L. Angrisani, P. Arpaia, D. Casinelli, and N. Moccaldi	3616
<b>Measurement Techniques</b>		
Kerr Electro-Optic Sensor for Electric Field in Large-Scale Oil-Pressboard Insulation Structure .....	C. Gao, B. Qi, Y. Gao, Z. Zhu, and C. Li	3626
Investigation of Material Nonlinearity Measurements Using the Third-Harmonic Generation .....	S. Zhang, X. Li, H. Jeong, and S. Cho	3635
A 2.3-ps RMS Resolution Time-to-Digital Converter Implemented in a Low-Cost Cyclone V FPGA .....	T. Sui, Z. Zhao, S. Xie, Y. Xie, Y. Zhao, Q. Huang, J. Xu, and Q. Peng	3647
<b>Metrology, Standards and Calibration</b>		
Pixels and 3-D Points Alignment Method for the Fusion of Camera and LiDAR Data ....	S. Xie, D. Yang, K. Jiang, and Y. Zhong	3661
A Novel Calibration Method for Magnetometer Array in Nonuniform Background Field .....	Y. Mu, C. Wang, X. Zhang, and W. Xie	3677
<b>Networking, Networks and Sensor Networks</b>		
Scalable Wi-Fi Client Self-Positioning Using Cooperative FTM-Sensors ....	L. Banin, O. Bar-Shalom, N. Dvorecki, and Y. Amizur	3686
<b>Optical Instrumentation, Measurement and Systems</b>		
Linearized Bregman Iterations for Automatic Optical Fiber Fault Analysis .....	M. Lunglmayr and G. C. Amaral	3699
Technical and Physical Limitations in the Determination of Background Mercury Concentration .....	P. Vybornov	3712
<b>RF, Microwave, Millimeter Wave and Tera-Hertz</b>		
RFID 3-D Indoor Localization for Tag and Tag-Free Target Based on Interference .....	M. Liu, H. Wang, Y. Yang, Y. Zhang, L. Ma, and N. Wang	3718
A Near-Field to Far-Field RCS Measurement Method for Multiple-Scattering Target .....	C. Hu, N. Li, W. Chen, and S. Guo	3733
<b>Sensors, Sensor Fusion and Transducers</b>		
In-Motion Coarse Alignment Based on the Vector Observation for SINS .....	T. Zhang, Y. Zhu, X. Xu, J. Wang, and Y. Li	3740
Gravity Disturbance Compensation for Inertial Navigation System .....	L. Chang, F. Qin, and M. Wu	3751
Comparative Study on Modeling Approaches of V-Shaped MEMS Temperature Sensors .....	Y. Cohen and A. Ya'akovitz	3766
<b>Signals, Systems and System Identification</b>		
Bee Swarm Detection Based on Comparison of Estimated Distributions Samples of Sound .....	G. Krzywoszja, R. Rybski, and G. Andrzejewski	3776
<b>Time and Frequency Domain Circuits and Systems</b>		
An Arc Fault Detection Method Based on Current Amplitude Spectrum and Sparse Representation ....	N. Qu, J. Wang, and J. Liu	3785
<b>SHORT PAPER</b>		
<b>Controls and Control Systems Instrumentation and Measurement</b>		
Novel Complex-Valued Stator Current-Based MRAS Estimators With Different Adaptation Mechanisms .....	E. Zerdali and E. C. Mengüç	3793
<b>Reviewer List Correction</b>		
Errata for Reviewers List 2018 .....		3796