

2018 IEEE XXVII International Scientific Conference Electronics - ET

**Sozopol, Bulgaria
13-15 September 2018**



**IEEE Catalog Number: CFP18H39-POD
ISBN: 978-1-5386-6693-7**

**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:	CFP18H39-POD
ISBN (Print-On-Demand):	978-1-5386-6693-7
ISBN (Online):	978-1-5386-6692-0

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

CONTENTS

Biomedical Engineering

Paced Electrocardiogram Simulation 1

I. Iliev, S. Tabakov, I. Jekova

Algorithm for Pace Pulses Detection in a Single Lead ECG: Performance in Case of EMG Artifacts 5

I. Jekova, I. Iliev, V. Tsibulko, S. Tabakov

Led Lamps - Money or Health 9

P. Manoilov, A. Borodzhieva

Three-step Attribute Selection for Stress Detection based on Physiological Signals 13

V. Markova, T. Ganchev

Circuits and Systems

Symbolic Formulas for Settling Time and Phase Margin of OA with Arbitrary Number of Poles and Zeros 17

A. Gheorghe, F. Constantinescu, M. Marin

Digitally Programmable All-pass CFA Filter based on Follow-the-Leader-Feedback Topology 21

I. Pandiev

Design of CMOS Analog Circuits in Subthreshold Region of Operation 25

E. Manolov

A SAR Logic for Glitch-less Operation of a Current-steering DAC in a SAR ADC 29

G. Panov, A. Popov

Noise Performance Analysis of Op-Amps in Use with Passive Inductive Transducers and Inductive Sensors 32

B. Ribov

An Extremely Massive High-Quality True-Random Binary Data Stream Generator 36

J. Genoff

Some Challenges in Creating of Tactile Sensor Network in Internet Environment 40

S. Kamenov, V. Todorova

Approach to Build a Class of Software Systems through a Combination of Design Patterns 43

D. Nikolaeva, V. Bozhikova

Education and Learning Technologies

Some Functional Enhancements of the “E-Management” Platform 47

R. Radonov, V. Videkov

WEB Design of Digital Filters in LabVIEW and Connection with MSSQL and MySQL Databases 51

I. Balabanova, G. Georgiev, S. Kostadinova

Multi-functional Demo Module for Microprocessor Development Systems for Educational Purposes 55

V. Rankovska, S. Rankovski

Towards Attractive STEM Education by Using Open Source Hardware and Software 59

P. Yakimov

Using Proteus to Support Engineering Student Learning: Microcontroller-Driven Sensors Case Study 63

K. Asparuhova, D. Shehova, S. Lyubomirov

Decoder Synthesis in Teamwork Using Logisim 67

A. Borodzhieva, P. Manoilov

Concept for Network Intrusion Detection System based on Recurrent Neural Network Classifier 71

D. Nikolov, I. Kordev, S. Stefanova

Electrical Losses in Semiconductor Devices during Control of the Processes 75

S. Filipova-Petrakieva, Y. Shopov

Embedded Systems

Software-Implemented Fault Injection for Physical and Simulated Embedded CPUs 79

J. Vankeirsbilck, T. Cauwelier, J. Van Waes, H. Hallez, J. Boydens

Instruction Level Duplication and Comparison for Data Error Detection: a First Experiment 83

V. Thati, J. Vankeirsbilck, D. Pissoort, J. Boydens

Mobile Edge Service for D2D Communications 87

E. Pencheva, I. Atanasov

Energy Investigation of Microprocessor Addressing Modes - Towards Full System Energy Exploration 91

L. Bogdanov, R. Ivanov

Firmware Field Updates Using Bluetooth Low Energy and STM32 Microcontrollers 95

K. Todorov, L. Bogdanov, R. Ivanov, N. Iliev

Research and Development of IoT based Solutions for Introduction the Cloud-aided Control in the Energy Systems 99

P. Yakimov, A. Iovev

Implementation of Internet of Things based Solution of Wireless Infrared Camera with MLX90621 Sensor 103

G. Spasov, V. Tsvetkov, G. Petrova

Research of the Communication Protocols between the IoT Embedded System and the Cloud Structure 107

N. Nikolov

Research Firmware Update over the Air from the Cloud 111

N. Nikolov

Remote Real-time Tracking of Vehicle Data from LIN-bus over the Internet 115

D. Vrachkov, D. Todorov

Stability Study of the Digital Phase Locked Loop Implemented on Xilinx FPGA 118

D. Badarov, G. Mihov

Examination of an FPGA-based Sinc Filter for High Precision Current Sensing Signals 122

I. Gochev

DAEDALED: A GUI Tool for the Optimization of Smart City LED Street Lighting Networks 125

L. Bogdanov, S. Polstra, P. Yakimov, M. Marinov

Autonomous Navigation and Speed Control for Line Following Robot 129

D. Nikolov, G. Zafirov, I. Stefanov, K. Nikov, S. Stefanova

Model-based Development as an Approach for System Analyses and Architecture Definition 133

N. Brayonov

Instrumentation and Measurement

Shieldless Eddy-Current Displacement Sensor with Improved Measurement Sensitivity 137

J. Vogel, V. Chaturvedi, S. Nihtianov

Spectral-correlation Method of Investigation of High-voltage Electrical Insulation Components 141

D. Kiesewetter, V. Malyugin, A. Reznik, N. Zhuravleva

Automated Experimental Setup for the Study of Vortices in Optical Fibers 144

D. Kiesewetter, V. Malyugin, N. Ilyin

Architectures and Challenges for the Household Energy Management Systems 148

Z. Kokolanski, T. Shuminoski, C. Gavrovski

Measurement of Impedance with Computer Controlled Setup 152

I. Zhivkov, I. Todorov, M. Hrabal, R. Yordanov, M. Vala

Research and Development of a Strain Gauge Anemometer 156

D. Iliev

Experimental Investigation of Textile Planar Capacitive Sensors 160

I. Iliev, G. Nikolov, S. Tabakov, B. Tzaneva

Performance Evaluation of Low-cost Carbon Dioxide (NDIR) Sensors 164

M. Marinov, N. Djermanova, B. Ganev, G. Nikolov, E. Janchevska

Design and Development of an Electrostatic Voltmeter based on Surface Potential Sensor 168

S. Sotirov, D. Tokmakov, N. Mileva, S. Stoyanova-Petrova, N. Kafadarova

Dielectric Properties Measurement of Flexible Substrates 172

B. Nikolova, G. Nikolov, E. Gieva, I. Ruskova

Fisheye Camera Calibration and Distortion Correction for Ground Based Sky Imagery 176

S. Hensel, M. Marinov, R. Schwarz

Mixed Reality Smart Glasses Application for Interactive Working 180

M. Dontschewa, D. Stamatov, M. Marinov

Measurement and Analysis of the Road Traffic 184

R. Yordanov, R. Miletiev, I. Damyanov, E. Iontchev

Microelectronics

An Overview of On-Chip ESD Protection in Modern Deep Sub-Micron CMOS Technology 187

G. Angelov, B. Dobrichkov, J. Liou

Influence of the Layout Parasitic Effects on the Performance of Current Mode Amplifier Designed Using 32nm CMOS Technology 191

Y. Hristov, S. Kostadinov, D. Gaydazhiev, I. Uzunov

Analysis of Experimental Data for 14-nm FinFETs 195

G. Angelov, D. Nikolov, M. Spasova, I. Ruskova, J. Rusev, R. Rusev

Behavioral Model of Perovskite Solar Cells 199

R. Rusev

Algorithm for Single Axis Solar Tracker 203

N. Katrandzhiev, N. Karnobatev

Problems when Harvesting Energy with Piezoelectric Beam Elements 207

D. Kolev, V. Todorova, C. Tramantzas

Some Investigations on Heat Extraction in Multilayer PCB Structures 211

S. Andreev, N. Spasova, D. Chikurtev

Nanoelectronics and Technologies in Electronics

Influence of Topology and Volume of Solder Paste on Melting Time in the Reflow Process 215

V. Videkov, V. Tsenev

Electroless Copper Deposition into Anodic Aluminium Oxide on Aluminum Substrate 219

V. Milusheva, M. Georgieva, B. Tzaneva, M. Petrova

Effect of Electroless Nickel Deposition on the Breakdown Voltage of Nanoporous Aluminium Oxide 223

B. Tzaneva, S. Andreev, A. Zahariev, K. Ruskova

Power Electronics

Mathematical Model of a Five-Phase Pentacle Connected IM Supplied by a VSI Inverter with PWM Output Voltage Control 227

P. Záskalický

Design and Construction of an Inverter for a Photovoltaic System 233

Abdelkader El Kebir, Hafida Belhadj, Karim Negadi, A. Baghdad Bey

Resonant Converter for Inductive Charging of Light Electric Vehicles 237

D. Hvarchilkov, V. Dimitrov, D. Arnaudov

Strategy for Dispatching of Multiple Electric Vehicles Recharging in a Microgrid 241

H. Kanchev, V. Shterev, N. Hinov

A Flyback Converter Based System for an Active Charge Balancing of Li-Ion Battery Packs 245

D. Stefanov, T. Todorova, V. Valchev

DC Characteristics of a Series Resonant DC/DC Converter at Variable-Frequency Control Methods 249

T. Grigorova, A. Vuchev

Static Characteristics of a Phase-Shift Controlled Series Resonant DC-DC Converter 253

A. Vuchev, T. Grigorova, Y. Madankov

Simulation Investigations of a Bidirectional Series Resonant DC-DC Converter 257

A. Lichev, A. Vuchev

Investigation of Resonant Converters Parallel Operation to a Common Load 261

D. Arnaudov, S. Vuchev

Mathematical Modeling of Transformerless DC-DC Converters 265

N. Hinov

Modeling of Buck DC-to-DC Converter with Generalized Nets 269

P. Gocheva, N. Hinov, V. Gochev

Modeling and Research of Magnetic Flux Generator 273

B. Sokerov, D. Arnaudov

Study of Multiple Operation Modes of Mini, Micro and Nanogrids 277

G. Vacheva, R. Stanev, H. Kanchev, N. Hinov

Contactless Transmission of Power and Control Signals by Multiplexing the Frequency 281

N. Madzharov, L. Petkov, P. Kogias, K. Karakoulidis

Sensorless Indirect Neural Control of Induction Motor 285

Z. Zhekov

A Study into the Relationship between the Procedures for the Pole Placement Problem and Linear Quadratic Regulator 289

N. Atanasov, M. Alexandrova, I. Grigorov, I. Zlateva

Single Input Single Output System with Modal Adaptive State Controller 293

N. Nikolov, M. Alexandrova, I. Zlateva

Quantum, Nuclear and Optoelectronics

The 32-channel Readout Front end Card FEC32S based on SAMPa ASIC for the Dubna NICATPC 297

A. Pilyar

Performance of the Front-End Electronics of the PADME Charged Particle Detector System 300

G. Georgiev, S. Ivanov, V. Kozhuharov, M. Mitev, R. Simeonov, L. Tsankov

Interactive Ambient LED Lighting System for Multimedia Applications 304

K. Angelov

LED Horticulture Lighting for High-voltage AC Operation 308

P. Mashkov, H. Beloev, B. Gyoch, R. Kandilarov

LED Lamp with Customizable Light Regimes for Horticulture Applications 312

R. Kandilarov

Interpolation of Green Color in CMOS Image Sensor Frames 315

T. Djamiykov

Accuracy Characteristics of Space Optical Communication Systems in Photon Counting Mode 318

B. Pachedjieva

Influence of the Atmospheric Turbulence on Free- Space Laser Communication Research and Design 321

B. Pachedjieva, T. Grigorova

New Competitive Solutions of Hardware Elements for Optical Communications Based on Interference Wedged Structures 325

M. Deneva, M. Nenchev, E. Stoykova

High Voltage Power Supply for Photomultipliers with Extended Functionality 329

M. Mitev, C. Dutsov, L. Tsankov, K. Mitev

Development of Modular Components for Low-cost, SiPM-based Scintillator Detector Assemblies 333

S. Ivanov, S. Ivanov, V. Kozhuharov

Testing, Quality and Reliability

Reliability Modeling of MOSFETs in Resonant Full Bridge Inverter 337

D. Zlatev, A. Georgiev, T. Papanchev, J. Garipova, T. Stefanova

Improving Control of Excitation Sources in Transient and Lock-in Thermography 341

A. Stoyanova, D. Todorov, B. Bonev

Using CFD Simulations for the Thermal Evaluation of New Solutions in the Thermal Management of High Power LEDs 345

N. Vakrilov

Methodology for Analysis of Defects in Electronic Assembly Using Xray 349

V. Tsenev

Are Disaster Recovery Levels Sufficient to Assess the Data Center's Disaster Preparedness? 353

R. Radkov, I. Dimitrov

Reference Highly Reliable IT Infrastructures for the Micro-, Small- and Medium-Sized Companies 357

R. Radkov

Research Algorithms to Optimize the Drone Route Used for Security 361

I. Boychev

Author Index