

# **2016 IEEE Biomedical Circuits and Systems Conference (BioCAS 2016)**

**Shanghai, China  
17-19 October 2016**



**IEEE Catalog Number: CFP16837-POD**  
**ISBN: 978-1-5090-2960-0**

**Copyright © 2016 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 publication is a representation of what appears in the IEEE Digital Libraries. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP16837-POD
ISBN (Print-On-Demand):	978-1-5090-2960-0
ISBN (Online):	978-1-5090-2959-4
ISSN:	2163-4025

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

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

## Table of Contents

<b>MESSAGE FROM THE GENERAL CHAIR</b> .....	i
<b>TECHNICAL PROGRAM CHAIR'S MESSAGE</b> .....	iii
<b>ORGANIZING COMMITTEE</b> .....	v
<b>TECHNICAL PROGRAM COMMITTEE</b> .....	vii
<b>PROGRAMS AT GLANCE</b> .....	ix
<b>KEYNOTE SPEECHES</b> .....	x
KEYNOTE I: Wearable Healthcare Circuits and Systems .....	x
KEYNOTE II: Deep Brain stimulation from clinical to brain research.....	xii
<b>TUTORIALS</b> .....	xiv
Tutorial I: High-Fidelity Sensing and Manipulation of Brain Neurochemistry.....	xiv
Tutorial II: System-In-Package and System-On-Chip for Remote Monitoring of Human Metabolism .....	xvi
Tutorial III: Compressive Sensing: Theory, Implementation and Applications .....	xviii
<b>LECTURE SESSIONS</b> .....	xx
Biosignal Processing and Bioimaging Session .....	xx
Biosensors and Interfacing Circuits Session .....	xxi
Bio-inspired and Neuromorphic Circuits and Systems Session .....	xxii
Biosignal Processing Session.....	xxiii
Brain Machine Interfaces Session.....	xxiv
Implantable Electronics Session .....	xxv
Emerging Technologies Session.....	xxvi
Special Session: Smart Sensing Point-of-Care System for Rapid Diagnosis .....	xxvii
<b>INTERACTIVE SESSIONS</b> .....	xxviii
Interactive Session - Lab-on-Chip and Biosensor Devices .....	xxviii
Interactive Session - Assistive Technologies .....	xxix
Interactive Session - Biomedical Imaging.....	xxx
Interactive Session - Biosignal Processing.....	xxxi
Interactive Session- Biosensors and Interfacing Circuits .....	xxxiii
Interactive Session - Medical Information and Bioinformatics .....	xxxv

Interactive Session - Wireless Technologies.....xxxvi  
Interactive Session - Emerging Topics in Bio-Circuits .....xxxvii  
Interactive Session - Implantable Electronics.....xxxix  
Interactive Session - Body Sensor Network & Brain Machine Interfaces .....xl  
Interactive Session - Neuromorphic Circuits and Systems .....xli  
Live Demonstration Session .....xlili

# TABLE OF CONTENTS

## **BIO SIGNAL PROCESSING AND BIOIMAGING SESSION**

<b>FAST ITERATIVE RECONSTRUCTION ALGORITHM FOR MICROWAVE-INDUCED THERMOACOUSTIC IMAGING</b> .....	1
<i>Hao Nan ; Benyamin Allahgholizadeh Haghi ; Miaad S. Aliroteh ; Mojtaba Fallahpour ; Amin Arbabian</i>	
<b>A NOVEL CONTINUOUS TIME TERNARY ENCODING BASED SS-OCT CALIBRATION</b> .....	5
<i>Amir Tofighi Zavareh ; Oscar Barajas ; Michael Serafino ; Javier Jo ; Brian Applegate ; Brian M. Sadler ; Sebastian Hoyos</i>	
<b>DESIGN AND IMPLEMENTATION OF A HIGH-PRECISION ELECTRICAL IMPEDANCE TOMOGRAPHY DATA ACQUISITION SYSTEM FOR BRAIN IMAGING</b> .....	9
<i>Xuetao Shi ; Fusheng You ; Canhua Xu ; Zhenyu Ji ; Ruiqiang Liu ; Xiuzhen Dong ; Feng Fu ; Xuyang Huo</i>	
<b>A 410-NW EFFICIENT QRS PROCESSOR FOR MOBILE ECG MONITORING IN 0.18-<math>\mu</math>M CMOS</b> .....	14
<i>Peng Li ; Hanjun Jiang ; Wendi Yang ; Ming Liu ; Xu Zhang ; Xiaohui Hu ; Bo Pang ; Zhaolin Yao ; Hongda Chen</i>	
<b>TRAINING-FREE COMPRESSED SENSING FOR WIRELESS NEURAL RECORDING</b> .....	18
<i>Biao Sun ; Yuming Ni ; Wenfeng Zhao</i>	

## **INTERACTIVE SESSION – LAB-ON-CHIP AND BIOSENSOR DEVICES**

<b>INTEGRATED 0.35 PM CMOS CAPACITANCE SENSOR WITH ATTO-FARAD SENSITIVITY FOR SINGLE CELL ANALYSIS</b> .....	22
<i>Kaveh Mohammad ; Douglas A. Buchanan ; Douglas J. Thomson</i>	
<b>DESIGN CONSIDERATIONS AND OPTIMIZATION OF CALORIMETRIC FLOW SENSOR FOR RESPIRATORY MONITORING</b> .....	26
<i>Vasileios Kitsos ; Simeon West ; Andreas Demosthenous ; Xiao Liu</i>	
<b>MOLECULARLY IMPRINTED POLYMER-BASED FET BIOSENSOR FOR OLIGOSACCHARIDES SENSING TO TARGET CANCER CELLS</b> .....	30
<i>Shoichi Nishitani ; Toshiya Sakata ; Taira Kajisa</i>	
<b>A PLANAR MICRO-MAGNETIC PLATFORM FOR STIMULATION OF NEURAL CELLS IN VITRO</b> .....	34
<i>M. E. Rizou ; T. Prodromakis</i>	
<b>FLEXIBLE DOPAMINE SENSOR BASED ON ELECTROLYTE GATED CARBON NANOTUBE FIELD EFFECT TRANSISTOR</b> .....	38
<i>Vijay Deep Bhatt ; Saumya Joshi ; Katharina Melzer ; Paolo Lugli</i>	
<b>A WEAK INVERSION ISFET CURRENT MIRROR FOR DIFFERENTIAL BIO-SENSING</b> .....	42
<i>Dora Ma ; Pantelis Georgiou ; Chris Toumazou</i>	
<b>DESIGN OF AN INTEGRATED MICROELECTRODE ARRAY SYSTEM FOR HIGH SPATIOTEMPORAL RESOLUTION CHEMICAL IMAGING</b> .....	46
<i>William Tedjo ; Rachel Feeny ; Chad Eitel ; Luke Schwerdtfeger ; Stacy Willett ; Charles Henry ; Stuart Tobet ; Tom Chen</i>	
<b>A ROBUST ISFET ARRAY WITH IN-PIXEL QUANTISATION AND AUTOMATIC OFFSET CALIBRATION</b> .....	50
<i>Nicolas Moser ; Tor Sverre Lande ; Pantelis Georgiou</i>	
<b>A CMOS ISFET ARRAY FOR WEARABLE THERMOELECTRICALLY POWERED PERSPIRATION ANALYSIS</b> .....	54
<i>Matthew Douthwaite ; Nicolas Moser ; Ermis Koutsos ; David Yates ; Paul Mitcheson ; Pantelis Georgiou</i>	
<b>REACTANT COST MINIMIZATION THROUGH TARGET CONCENTRATION SELECTION ON MICROFLUIDIC BIOCHIPS</b> .....	58
<i>Yung-Chun Lei ; Yi-Ling Chen ; Juinn-Dar Huang</i>	

## **INTERACTIVE SESSION – ASSISTIVE TECHNOLOGIES**

<b>QUANTITATIVE ANALYSIS OF LUMBAR MUSCLES PERFORMANCE OF PATIENTS WITH LUMBAR DISC HERNIATION BASED ON SURFACE ELECTROMYOGRAPHY</b> .....	62
<i>Fang Zhou ; Huihui Li ; Gaojun Song ; Kamen Ivanov ; Wenjing Du ; Fei Peng ; Lei Wang</i>	

<b>NONINVASIVE CONTINUOUS BLOOD PRESSURE ESTIMATION WITH PERIPHERAL PULSE TRANSIT TIME</b> .....	66
<i>Yibin Li ; Xiaomeng Chen ; Yang Zhang ; Ning Deng</i>	
<b>A FUZZY-PD MODEL FOR MASTER-SLAVE TRACKING IN TELEOPERATED ROBOTIC SURGERY</b> .....	70
<i>Olatunji Mumini Omisore ; Shipeng Han ; Lingxue Ren ; Lei Wang</i>	
<b>A NOVEL DISTRIBUTED FUNCTIONAL ELECTRICAL STIMULATION AND ASSESSMENT SYSTEM FOR HAND MOVEMENTS USING WEARABLE TECHNOLOGY</b> .....	74
<i>Hai-Peng Wang ; Ai-Wen Guo ; Zheng-Yang Bi ; Yu-Xuan Zhou ; Zhi-Gong Wang ; Xiao-Ying Lu</i>	
<b>A LOW-POWER NEUROMORPHIC SYSTEM FOR RETINAL IMPLANTS AND SENSORY SUBSTITUTION</b> .....	78
<i>Nora Gaspar ; Anish Sondhi ; Benjamin Evans ; Konstantin Nikolic</i>	
<b>TOWARDS A WIRELESS MULTIMODAL SPEECH CAPTURE SYSTEM</b> .....	82
<i>Nordine Sebkhii ; Dhyey Desai ; Amir Khan ; Nischal Prasad ; Shurjo Banerjee ; Justin Eng ; Kimberly R. Wilson ; Maysam Ghovanloo</i>	
<b>SCALABLE EEG SEIZURE DETECTION ON AN ULTRA LOW POWER MULTI-CORE ARCHITECTURE</b> .....	86
<i>S. Benatti ; F. Montagna ; D. Rossi ; L. Benini</i>	
<b>AN EEG PRE-PROCESSING TECHNIQUE FOR THE FAST RECOGNITION OF MOTOR IMAGERY MOVEMENTS</b> .....	90
<i>Kalogiannis Gregory ; Kapsimanis George ; Hassapis George</i>	
<b>A REAL-TIME CLOSED-LOOP CONTROL SYSTEM FOR MODULATING GAIT CHARACTERISTICS VIA ELECTRICAL STIMULATION OF PERIPHERAL NERVES</b> .....	95
<i>Hangue Park ; Kyunggeune Oh ; Boris I. Prilutsky ; Stephen P. Deweerth</i>	
<b>ORIENTATION ESTIMATION AND GRASP TYPE DETECTION OF HOUSEHOLD OBJECTS FOR UPPER LIMB PROSTHESES WITH DYNAMIC VISION SENSOR</b> .....	99
<i>Siyi Tang ; Rohan Ghosh ; Nitish V. Thakor ; Sumil L. Kukreja</i>	

## **INTERACTIVE SESSION – BIOMEDICAL IMAGING**

<b>AN IMAGE COMPRESSION ALGORITHM FOR WIRELESS ENDOSCOPY AND ITS ASIC IMPLEMENTATION</b> .....	103
<i>Yingke Gu ; Hanjun Jiang ; Xiang Xie ; Guolin Li ; Zhihua Wang</i>	
<b>A LOW POWER PREDICTION SAR ADC INTEGRATED WITH DPCM DATA COMPRESSION FEATURE FOR WCE APPLICATION</b> .....	107
<i>Qinyi Wang ; Shoushun Chen</i>	
<b>REAL-TIME ARTEFACT FILTER FOR INTRAOPERATIVE THERMOGRAPHIC IMAGING</b> .....	111
<i>Jens Muller ; Jan Muller ; Bill Thaute ; Ronald Tetzlaff</i>	
<b>A TOOLCHAIN FOR THE 3D-VISUALIZATION OF BIOARTIFICIAL VASCULAR GRAFTS BASED ON ULTRASOUND IMAGES</b> .....	115
<i>C. Leibold ; J. Wilkening ; C. Blume ; H. Blume</i>	
<b>INTRACRANIAL HEART RATE DETECTION USING UWB RADAR</b> .....	119
<i>Timo Lauteslager ; Mathias T?mmer ; Kristian G. Kjølgaard ; Tor S. Lande ; Timothy G. Constandinou</i>	
<b>DIRECT 3D SEGMENTATION OF CAROTID PLAQUES FROM 3D ULTRASOUND IMAGES</b> .....	123
<i>Jieyu Cheng ; Yanyan Yu ; Bernard Chiu</i>	

## **LIVE DEMONSTRATION SESSION**

<b>LIVE DEMO: FRONTEND CIRCUITRY DESIGN IN EEG READING FOR EPILEPTIC SEIZURE DETECTION HEADBAND</b> .....	127
<i>Yu-Jui Chen ; Yu-Shan Lin ; Herming Chiueh</i>	
<b>LIVE DEMONSTRATION: A WIRELESS MULTI-CHANNEL PHYSIOLOGICAL SIGNAL ACQUISITION SYSTEM-ON-CHIP FOR WEARABLE DEVICES</b> .....	128
<i>Yu-Shan Lin ; Sheng-Cheng Lee ; Yu-Jui Chen ; Chia-Ming Huang ; Herming Chiueh</i>	
<b>LIVE DEMONSTRATION: PORTABLE IMPEDANCE-BASED BIOSENSOR SYSTEM FOR METABOLOMIC SENSING</b> .....	129
<i>Scott Mackay ; Ryan Corpuz ; Calvin Chong ; Jie Chen ; David Wishart</i>	
<b>LIVE DEMONSTRATION: A SUPPORT VECTOR MACHINE BASED HARDWARE PLATFORM FOR BLOOD PRESSURE PREDICTION</b> .....	130
<i>Bo Liang ; Kefeng Duan ; Qingsong Xie ; Mohamed Atef ; Zhiliang Qian ; Guoxing Wang ; Yong Lian</i>	

<b>LIVE DEMONSTRATION: CURRENT-MODE ANALOG-TO-TIME CONVERTER FOR A LARGE SCALE CMOS BIOSENSOR ARRAY</b> .....	131
<i>Kei Ikeda ; Atsuki Kobayashi ; Kazuo Nakazato ; Kiichi Niitsu</i>	
<b>LIVE DEMONSTRATION: NOISE-IMMUNE CURRENT-INTEGRATION-BASED CMOS AMPEROMETRIC SENSOR PLATFORM WITH 1.2 <math>\mu\text{M}</math> <math>\times</math> 2.05<math>\mu\text{M}</math> ELECTROLESS-PLATED MICROELECTRODE ARRAY FOR ROBUST BACTERIA COUNTING</b> .....	132
<i>Kohei Gamo ; Kazuo Nakazato ; Kiichi Niitsu</i>	
<b>LIVE DEMONSTRATION: EVALUATION OF CONSUMER'S PREFERENCE USING AUGMENTED REALITY AND EEG</b> .....	133
<i>Gang Li ; Yong Lian ; Guoxing Wang</i>	
<b>LIVE DEMO: A REAL-TIME PORTABLE SIGN LANGUAGE TRANSLATION SYSTEM</b> .....	134
<i>Lih-Jen Kau ; Bo-Xun Zhuo</i>	
<b>LIVE DEMONSTRATION: REAL-TIME ORIENTATION ESTIMATION AND GRASPING OF HOUSEHOLD OBJECTS FOR UPPER LIMB PROSTHESES WITH A DYNAMIC VISION SENSOR</b> .....	135
<i>Siyi Tang ; Rohan Ghosh ; Nitish V. Thakor ; Sunil L. Kukreja</i>	

### **BIOSENSORS AND INTERFACING CIRCUITS SESSION**

<b>2048 ACTION POTENTIAL RECORDING CHANNELS WITH 2.4 <math>\mu\text{VRMS}</math> NOISE AND STIMULATION ARTIFACT SUPPRESSION</b> .....	136
<i>Vijay Viswam ; Yihui Chen ; Amir Shadmani ; Jelena Dragas ; Raziye Bounik ; Radivojevic Milos ; Jan Müller ; Andreas Hierlemann</i>	
<b>19.2 CM<sup>3</sup> FLEXIBLE FETAL HEART RATE SENSOR FOR IMPROVED QUALITY OF PREGNANCY LIFE</b> .....	140
<i>Hiroyuki Sato ; Kazuhiro Yoshimura ; Hiroyuki Nakamoto ; Daijiro Ishibashi ; Yoshihiro Nakata ; Yoshinori Yaginuma ; Shoichi Masui</i>	
<b>A SENSOR MEASURING DEFORMATION AND PRESSURE, ENTIRELY BIODEGRADABLE, FOR ORTHOPEDIC APPLICATIONS</b> .....	144
<i>Clementine M. Boutry ; Bob C. Schroeder ; Zhenan Bao ; Anaïs Legrand ; Paige Fox</i>	
<b>AN ENERGY-AUTONOMOUS BIO-SENSING SYSTEM USING A BIOFUEL CELL AND 0.19V 53<math>\mu\text{W}</math> 65NM-CMOS INTEGRATED SUPPLY-SENSING SENSOR WITH A SUPPLY-INSENSITIVE TEMPERATURE SENSOR AND INDUCTIVE-COUPPLING TRANSMITTER</b> .....	148
<i>Atsuki Kobayashi ; Kei Ikeda ; Yudai Ogawa ; Matsuhiko Nishizawa ; Kazuo Nakazato ; Kiichi Niitsu</i>	
<b>MICROFLUIDIC ENCRYPTION OF ON-CHIP BIOCHEMICAL ASSAYS</b> .....	152
<i>Sk Subidh Ali ; Mohamed Ibrahim ; Ozgur Sinanoglu ; Krishnendu Chakrabarty ; Ramesh Karri</i>	

### **BIO-INSPIRED AND NEUROMORPHIC CIRCUITS AND SYSTEMS SESSION**

<b>AUTOMATIC GAIN CONTROL OF ULTRA-LOW LEAKAGE SYNAPTIC SCALING HOMEOSTATIC PLASTICITY CIRCUITS</b> .....	156
<i>Ning Qiao ; Giacomo Indiveri ; Chiara Bartolozzi</i>	
<b>AN AUTO-SCALING WIDE DYNAMIC RANGE CURRENT TO FREQUENCY CONVERTER FOR REAL-TIME MONITORING OF SIGNALS IN NEUROMORPHIC SYSTEMS</b> .....	160
<i>Ning Qiao ; Giacomo Indiveri</i>	
<b>MEMBRANE-DEPENDENT NEUROMORPHIC LEARNING RULE FOR UNSUPERVISED SPIKE PATTERN DETECTION</b> .....	164
<i>Sadique Sheik ; Somnath Paul ; Charles Augustine ; Gert Cauwenberghs</i>	
<b>A CONVOLUTIONAL NEURAL NETWORK BASED SINGLE-FRAME SUPER-RESOLUTION FOR LENSLESS BLOOD CELL COUNTING</b> .....	168
<i>Xiwei Huang ; Yu Jiang ; Hang Xu ; Xu Liu ; Han Wei Hou ; Mei Yan ; Hao Yu</i>	
<b>LOCALIZED DNA CIRCUIT DESIGN WITH MAJORITY GATES</b> .....	172
<i>Jinwook Jung ; Youngsoo Shin</i>	

### **INTERACTIVE SESSION – BIOSIGNAL PROCESSING**

<b>NEIGHBORHOOD COARSE GRAINING BASED LEMPEL-ZIV COMPLEXITY FOR ANALYSIS ON CENTER OF PRESSURE</b> .....	176
<i>Yao Sun ; Wei Wei ; Zhizeng Luo ; Zhongming Ji</i>	

<b>THE TIME — FREQUENCY CHARACTERISTICS OF EEG ACTIVITIES WHILE RECOGNIZING MICROEXPRESSIONS .....</b>	<b>180</b>
<i>Xunbing Shen ; Huajie Sui</i>	
<b>EXPERIMENTAL MEASUREMENTS OF MULTI-CARRIER BASED DOPPLER HEARTRATE TRACKER .....</b>	<b>184</b>
<i>Dong Kyoo Kim ; Young Woo Choi ; Jae Doo Huh</i>	
<b>PULSE TRANSIT TIME MEASUREMENT USING SEISMOCARDIOGRAM AND IN-EAR ACOUSTIC SENSOR .....</b>	<b>188</b>
<i>Chenxi Yang ; Negar Tavassolian</i>	
<b>A STREAMING PCA BASED VLSI CHIP FOR NEURAL DATA COMPRESSION .....</b>	<b>192</b>
<i>Tong Wu ; Wenfeng Zhao ; Hongsun Guo ; Hubert Lim ; Zhi Yang</i>	
<b>ADVANCED EMD METHOD USING VARIANCE CHARACTERIZATION FOR PPG WITH MOTION ARTIFACT .....</b>	<b>196</b>
<i>Bo Pang ; Ming Liu ; Xu Zhang ; Peng Li ; Zhaolin Yao ; Xiaohui Hu ; Hongda Chen ; Qi Gong</i>	
<b>INCOMPLETE ELECTROCARDIOGRAM TIME SERIES PREDICTION .....</b>	<b>200</b>
<i>Weiwei Shi ; Yongxin Zhu ; Philip S. Yu ; Mengyun Liu ; Guoxing Wang ; Zhiliang Qian ; Yong Lian</i>	
<b>ANNOTATION OF SEISMOCARDIOGRAM USING GYROSCOPIC RECORDINGS .....</b>	<b>204</b>
<i>Chenxi Yang ; Sunli Tang ; Negar Tavassolian</i>	
<b>BATFLASH: A HEAD-MOUNTED LED FOR DETECTING BAT ECHOLOCATION .....</b>	<b>208</b>
<i>Junghee J. Kim ; Timothy K. Horiuchi ; Melville Wohlgenuth ; Cynthia F. Moss</i>	
<b>HARDWARE EFFICIENT, DETERMINISTIC QCAC MATRIX BASED COMPRESSED SENSING ENCODER ARCHITECTURE FOR WIRELESS NEURAL RECORDING APPLICATION .....</b>	<b>212</b>
<i>Wenfeng Zhao ; Biao Sun ; Tong Wu ; Zhi Yang</i>	
<b>AN FPGA-BASED MORPHOLOGICAL FILTER FOR BASELINE WANDERING CORRECTION IN PHOTOPLETHYSMOGRAPHY .....</b>	<b>216</b>
<i>Kefeng Duan ; Yufei Hu ; Zhiliang Qian ; Guoxing Wang</i>	
<b>IMAGE ENHANCEMENT TECHNIQUES IN AN IMAGE MONITORING SYSTEM FOR TOTAL KNEE ARTHROPLASTY .....</b>	<b>220</b>
<i>Zhi Bie ; Shaolin Xiang ; Mingzhu Long ; Hanjun Jiang ; Xiang Xie ; Zhihua Wang</i>	
<b>FPGA IMPLEMENTATION OF EEG SYSTEM-ON-CHIP WITH AUTOMATIC ARTIFACTS REMOVAL BASED ON BSS-CCA METHOD .....</b>	<b>224</b>
<i>Chia-Ching Chou ; Tsan-Yu Chen ; Wai-Chi Fang</i>	
<b>ON THE USE OF COMPRESSIVE SENSING (CS) EXPLOITING BLOCK SPARSITY FOR NEURAL SPIKE RECORDING .....</b>	<b>228</b>
<i>Hossein Zamani ; Hamid Bahrani ; Pedram Mohseni</i>	
<b>A NEUROMORPHIC BASED MEDIAN FREQUENCY TRACKER FOR MUSCLE FATIGUE MONITORING .....</b>	<b>232</b>
<i>Daiwen Sun ; Ermis Koutsos ; Pantelis Georgiou</i>	
<b>SYNCHRONOUS MULTI-SIGNAL ACQUISITION FOR WBSNS USING GOLD-CODE BASED JOINT-COMPRESSIVE SENSING .....</b>	<b>236</b>
<i>Arya Alex Rahimi ; Leonardo Bosco Carreira ; Subhanshu Gupta</i>	
<b>MULTI-SCALE ANALYSIS OF THE DYNAMICS OF BRAIN FUNCTIONAL CONNECTIVITY USING EEG .....</b>	<b>240</b>
<i>Ali Haddad ; Laleh Najafizadeh</i>	

## **INTERACTIVE SESSION – BIOSENSORS AND INTERFACING CIRCUITS**

<b>A NON-CONTACT ECG SENSING SYSTEM WITH MOTION ARTIFACT EQUALIZATION .....</b>	<b>244</b>
<i>Shanqing Gao ; Ding-Yu Huang ; Wai-Chi Fang</i>	
<b>A 0.8-V 1.7-<math>\mu</math>W25.9-FJ CONTINUOUS-TIME SIGMA-DELTA MODULATOR FOR BIOMEDICAL APPLICATIONS .....</b>	<b>248</b>
<i>Wenbin Bai ; Yifei Wang ; Zhangming Zhu</i>	
<b>A PCB-BASED ELECTRONIC ELISA SYSTEM FOR RAPID, PORTABLE INFECTIOUS DISEASE DIAGNOSIS .....</b>	<b>252</b>
<i>Konstantinos I. Papadimitriou ; Daniel Evans ; Hywel Morgan ; Themistoklis Prodromakis</i>	
<b>ARTIFACT-COMPENSATED TIME-CONTINUOUS RECORDING FROM NEURAL TISSUE DURING STIMULATION USING A CAPACITIVELY COUPLED IN-VITRO CMOS-MEA WITH 4K RECORDING AND 1K STIMULATION SITES .....</b>	<b>256</b>
<i>Gabriel Bertotti ; Florian Jetter ; Norman Dodel ; Stefan Keil ; Clemens Boucsein ; Andreas Möller ; Karl-Heinz Boven ; Günther Zeck ; Roland Thewes</i>	

<b>A COMPACT SIGNAL GENERATION AND ACQUISITION CIRCUIT FOR ELECTROCHEMICAL IMPEDANCE SPECTROSCOPY .....</b>	<b>260</b>
<i>Lang Yang ; Tom Chen</i>	
<b>FAST CAPACITANCE-TO-DIGITAL CONVERTER WITH INTERNAL REFERENCE.....</b>	<b>264</b>
<i>Kaiyuan Gao ; Delong Shang ; Fei Xia ; Alex Yakovlev</i>	
<b>A 14.9<math>\mu</math>W ANALOG FRONT-END WITH CAPACITIVELY-COUPLED INSTRUMENTATION AMPLIFIER AND 14-BIT SAR ADC FOR EPILEPSY DIAGNOSIS SYSTEM .....</b>	<b>268</b>
<i>Xiaolin Yang ; Menglian Zhao ; Yangtao Dong ; Xiaobo Wu</i>	
<b>A 17nA, 47.2dB DYNAMIC RANGE, ADAPTIVE SAMPLING CONTROLLER FOR ONLINE DATA RATE REDUCTION IN LOW POWER ECG SYSTEMS.....</b>	<b>272</b>
<i>V. Rajesh Pamula ; Marian Verhelst ; Chris Van Hoof ; Refet Firat Yazicioglu</i>	
<b>MAIN PARAMETERS UNIFORMITY ENHANCEMENT IN MULTICHANNEL INTEGRATED CIRCUITS DEDICATED TO BIOMEDICAL SIGNALS RECORDINGS.....</b>	<b>276</b>
<i>Piotr Kmon ; Agnieszka Lisicka ; Miroslaw Zoladz</i>	
<b>FAST-SETTLING TECHNIQUE UNDER LARGE ELECTRODE OFFSET IN INTEGRATED BIOPOTENTIAL AMPLIFIERS.....</b>	<b>280</b>
<i>Hailiang Yao ; Xiong Zhou ; Sanfeng Zhang ; Qiang Li</i>	
<b>A CMOS LOW-POWER POLAR DEMODULATOR FOR ELECTRICAL BIOIMPEDANCE SPECTROSCOPY USING ADAPTIVE SELF-SAMPLING SCHEMES.....</b>	<b>284</b>
<i>Soon-Jae Kweon ; Seongheon Shin ; Jeong-Ho Park ; Ji-Hoon Suh ; Hyung-Joun Yoo</i>	
<b>A 470 nA PERFORMANCE-ENHANCED INSTRUMENTAL AMPLIFIER FOR BIO-SIGNAL ACQUISITION.....</b>	<b>288</b>
<i>Hao Zhang ; Ye Li</i>	
<b>A LINEAR PROGRAMMABLE-GATE ISFET ARRAY OPERATING IN VELOCITY SATURATION.....</b>	<b>292</b>
<i>Nicholas Miscourides ; Pantelis Georgiou</i>	
<b>ADAPTIVE NOISE CANCELLATION METHOD FOR CAPACITIVELY COUPLED ECG SENSOR USING SINGLE INSULATED ELECTRODE.....</b>	<b>296</b>
<i>Yoshito Tanaka ; Shintaro Izumi ; Yuta Kawamoto ; Hiroshi Kawaguchi ; Masahiko Yoshimoto</i>	
<b>A CMOS LOCK-IN-AMPLIFIER WITH SEMI-DIGITAL AUTOMATIC PHASE TUNING .....</b>	<b>300</b>
<i>M. N. Kharak ; B. Gosselin ; S. Martel ; Y. De Koninck</i>	
<b>WIDE-RANGE AND PRECISE TISSUE IMPEDANCE ANALYSIS CIRCUIT WITH ULTRALOW CURRENT SOURCE USING GATE-INDUCED DRAIN-LEAKAGE CURRENT.....</b>	<b>304</b>
<i>Koji Kiyoyama ; Yoshiki Takezawa ; Tatsuya Goto ; Keita Ito ; Shoma Uno ; Kenji Shimokawa ; Satoru Nishino ; Hisashi Kino ; Tetsu Tanaka</i>	

### **INTERACTIVE SESSION – MEDICAL INFORMATION AND BIOINFORMATICS**

<b>A NEW CRITERION TO SELECT DISCRIMINATORY GENE PAIRS FOR ALZHEIMER'S DISEASE.....</b>	<b>308</b>
<i>Jia Lv ; Qinke Peng ; Zhi Sun</i>	
<b>CROSS ENTROPY-BASED AUTOMATIC THRESHOLDS SETTING-UP METHOD FOR SLEEP STAGING SYSTEM .....</b>	<b>312</b>
<i>Chen Chen ; Adrien Ugon ; Xun Zhang ; Amara Amara ; Patrick Garda ; Jean-Gabriel Ganascia ; Amina Kotti ; Carole Phillippe ; Andrea Pinna</i>	
<b>FROM BYTES TO INSIGHTS WITH MODELLING AS A SERVICE A NEW PARADIGM FOR COMPUTATIONAL MODELLING ILLUSTRATED WITH PYRHO .....</b>	<b>316</b>
<i>Benjamin D. Evans ; Konstantin Nikolic</i>	
<b>COLOR BASED SEGMENTATION IN MONOCULAR SYSTEM FOR PROSTHESIS POSE ESTIMATION DURING TOTAL HIP REPLACEMENT SURGERY .....</b>	<b>320</b>
<i>Shaojie Su ; Guangli Jiang ; Hong Chen ; Zhihua Wang</i>	

### **INTERACTIVE SESSION – WIRELESS TECHNOLOGIES**

<b>MODELING AND OPTIMIZATION OF MM-SIZED SOLENOID COILS FOR BIOMEDICAL IMPLANTS.....</b>	<b>324</b>
<i>Yuhua Cheng ; Gaofeng Wang ; Maysam Ghovanloo</i>	
<b>A WIRELESS CHARGING CIRCUIT WITH HIGH POWER EFFICIENCY AND SECURITY FOR IMPLANTABLE DEVICES.....</b>	<b>328</b>
<i>Yao Lu ; Hanjun Jiang ; Songping Mai ; Zhihua Wang</i>	

<b>ADAPTIVE BUCK-BOOST CONVERTER FOR RF ENERGY HARVESTING AND TRANSFER IN BIOMEDICAL APPLICATIONS</b> .....	332
<i>Gustavo C. Martins ; Wouter A. Serdijn</i>	
<b>A FLEXIBLE AND WEARABLE ENERGY HARVESTER WITH AN EFFICIENT AND FAST-CONVERGING ANALOG MPPT</b> .....	336
<i>Taiyang Wu ; Md Shamsul Arefin ; Doron Shmilovitz ; Jean-Michel Redoute ; Mehmet Rasit Yuce</i>	

## **BIO SIGNAL PROCESSING SESSION**

<b>RELIABLE PPG-BASED ALGORITHM IN ATRIAL FIBRILLATION DETECTION</b> .....	340
<i>Shih-Ming Shan ; Sung-Chun Tang ; Pei-Wen Huang ; Yu-Min Lin ; Wei-Han Huang ; Dar-Ming Lai ; An-Yeu Andy Wu</i>	
<b>A LOW-COST AND ENERGY-EFFICIENT EEG PROCESSOR FOR CONTINUOUS SEIZURE DETECTION USING WAVELET TRANSFORM AND ADABOOST</b> .....	344
<i>Shan Huang ; Jun Han ; Xin Li ; Zongxian Yang ; Xiaoyang Zeng</i>	
<b>SAMPLING MODULATION: AN ENERGY EFFICIENT NOVEL FEATURE EXTRACTION FOR BIO SIGNAL PROCESSING</b> .....	348
<i>M. Causo ; S. Benatti ; A. Frappé ; A. Cathelin ; E. Farella ; A. Kaiser ; L. Benini ; J. M. Rabaey</i>	
<b>APPLICATION OF COMPRESSED SENSING TO ECG SIGNALS: DECODER-SIDE BENEFITS OF THE RAKENESS APPROACH</b> .....	352
<i>Mauro Mangia ; Daniele Bortolotti ; Andrea Bartolini ; Fabio Pareschi ; Luca Benini ; Riccardo Rovatti ; Gianluca Setti</i>	
<b>RAKENESS AND BEYOND IN ZERO-COMPLEXITY DIGITAL COMPRESSED SENSING: A DOWN-TO-BITS CASE STUDY</b> .....	356
<i>Mauro Mangia Arces ; Fabio Pareschi ; Riccardo Rovatti ; Gianluca Setti</i>	

## **BRAIN MACHINE INTERFACES SESSION**

<b>A 2.7<math>\mu</math>W/MIPS, 0.88GOPS/MM<sup>2</sup> DISTRIBUTED PROCESSOR FOR IMPLANTABLE BRAIN MACHINE INTERFACES</b> .....	360
<i>Lieuwe B. Leene ; Timothy G. Constandinou</i>	
<b>A MINIATURIZED BRAIN-MACHINE-SPINAL CORD INTERFACE (BMSI) FOR CLOSED-LOOP INTRASPINAL MICROSTIMULATION</b> .....	364
<i>Shahab Shahdoost ; Shawn Frost ; David Guggenmos ; Jordan Borrell ; Caleb Dunham ; Scott Barbay ; Randolph Nudo ; Pedram Mohseni</i>	
<b>MIXED-SIGNAL QUADRATIC OPERATORS FOR THE FEATURE EXTRACTION OF NEURAL SIGNALS</b> .....	368
<i>Manuel Delgado-Restituto ; Rafaella Fiorelli ; Manuel Carrasco-Robles ; Angel Rodriguez-Vazquez</i>	
<b>A BIDIRECTIONAL NEURAL INTERFACE FEATURING A TUNABLE RECORDER AND ELECTRODE IMPEDANCE ESTIMATION</b> .....	372
<i>Michael Haas ; Jens Anders ; Maurits Ortmanns</i>	
<b>AN ADAPTIVE IMPEDANCE TRACKING FRONTEND FOR INDUCTIVELY POWERED BODY SENSOR NODES</b> .....	376
<i>Zhaolin Yao ; Xu Zhang ; Ming Liu ; Xurui Mao ; Peng Li ; Xiaohui Hu ; Bo Pang ; Weihua Pei ; Hongda Chen</i>	

## **IMPLANTABLE ELECTRONICS SESSION**

<b>ASIC DESIGN OF AN IMPLANTABLE SYSTEM FOR IMPROVED CONTROL OF HAND PROSTHESIS</b> .....	380
<i>Antonios Nikas ; Leonhard Klein ; Alfred Holzberger ; Johann Hauer ; Matthias Voelker ; Christoph Hoppe ; Roman Ruff ; Klaus-Peter Hoffmann</i>	
<b>TELEMETRIC SYSTEM FOR MONITORING OF ENDOLEAK IN ABDOMINAL AORTA ANEURYSM USING MULTIPLE PRESSURE SENSORS INTEGRATED ON A STENT GRAFT</b> .....	384
<i>Bibin John ; Clemens Spink ; Markus Braunschweig ; Rajeev Ranjan ; Dietmar Schroeder ; Andreas Koops ; Gregor Woldt ; Ilka Rauh ; Andreas Leuzinger ; Gerhard Adam ; Wolfgang H. Krautschneider</i>	
<b>MINIMALLY INVASIVE MUSCLE-BASED RECORDING OF PHOTOPLETHYSMOGRAM TOWARD CHRONIC IMPLANTATION</b> .....	388
<i>Fatemeh Marefat ; Reza Erfani ; Kevin L. Kilgore ; Pedram Mohseni</i>	

<b>AN OPTRODE WITH BUILT-IN SELF-DIAGNOSTIC AND FRACTURE SENSOR FOR CORTICAL BRAIN STIMULATION</b> .....	392
<i>Reza Ramezani ; Fahimeh Dehkhoda ; Ahmed Soltan ; Patrick Degenaar ; Yan Liu ; Timothy Constandinou</i>	
<b>OPTIMAL DESIGN OF A 3-COIL INDUCTIVE LINK FOR MILLIMETER-SIZED BIOMEDICAL IMPLANTS</b> .....	396
<i>Pyungwoo Yeon ; S. Abdollah Mirbozorgi ; Maysam Ghovanloo</i>	

## **EMERGING TECHNOLOGIES SESSION**

<b>A CLOCKLESS FSK RECEIVER ARCHITECTURE WITH SCALABLE DATA RATE FOR EPIDERMAL ELECTRONICS</b> .....	400
<i>Zhe Zhang ; Yongfu Li ; Guoxing Wang ; Yong Lian</i>	
<b>AN EVENT-DRIVEN SOC FOR NEURAL RECORDING</b> .....	404
<i>Song Luan ; Yan Liu ; Ian Williams ; Timothy G. Constandinou</i>	
<b>TOWARDS A MEMRISTOR-BASED SPIKE-SORTING PLATFORM</b> .....	408
<i>I. Gupta ; A. Serb ; A. Khat ; T. Prodromakis</i>	
<b>FLUORESCENCE DETECTION OF SUBMICROMOLAR CONCENTRATION USING A FILTER-FREE FLUORESCENCE SENSOR</b> .....	412
<i>Yong Joon Choi ; Kazuhiro Takahashi ; Fumihiro Dasai ; Nobuo Misawa ; Yasuyuki Kimura ; Tatsuya Iwata ; Kazuaki Sawada</i>	
<b>A MULTI-CORE RECONFIGURABLE ARCHITECTURE FOR ULTRA-LOW POWER BIO-SIGNAL ANALYSIS</b> .....	416
<i>Loris Duch ; Soumya Basu ; Rubén Braojos ; David Atienza ; Giovanni Ansaloni ; Laura Pozzi</i>	

## **INTERACTIVE SESSION – EMERGING TOPICS IN BIO-CIRCUITS**

<b>A WEARABLE METHOD FOR AUTONOMOUS FALL DETECTION BASED ON KALMAN FILTER AND K-NN ALGORITHM</b> .....	420
<i>Jian He ; Mingwo Zhou ; Xiaoyi Wang ; Yi Han</i>	
<b>A NOVEL APPROACH TO TRANSCUTANEOUS LOCALIZATION OF BLOOD VESSELS USING A DYNAMICALLY RECONFIGURABLE ELECTRODE (DRE) ARRAY</b> .....	424
<i>Zaheer Q. Hashim ; Loukas Constantinou ; Panayiotis A. Kyriacou ; Iasonas F. Triantis</i>	
<b>IN VITRO CHARACTERIZATION OF ELECTRONICALLY STIMULATED IONIC ELECTROACTIVE POLYMERS WITH APPLICATION TO MUSCLE PROSTHESIS</b> .....	428
<i>Yi Huang ; Daniel Browe ; Sanjeevi Thirumurugesan ; Joseph Freeman ; Laleh Najafizadeh</i>	
<b>A PROGRAMMABLE CONTROLLER FOR SPATIO-TEMPORAL PATTERN STIMULATION OF CORTICAL VISUAL PROSTHESIS</b> .....	432
<i>Tomoki Sugiura ; Arif Ullah Khan ; Jaehoon Yu ; Yoshinori Takeuchi ; Seiji Kameda ; Takatsugu Kamata ; Yuki Hayashida ; Tetsuya Yagi ; Masaharu Imai</i>	
<b>SCALING ISFET INSTRUMENTATION WITH IN-PIXEL QUANTISATION TO DEEP SUBMICRON TECHNOLOGIES</b> .....	436
<i>Nicolas Moser ; Tor Sverre Lande ; Pantelis Georgiou</i>	
<b>STOCHASTIC IMPLEMENTATION OF THE ACTIVATION FUNCTION FOR ARTIFICIAL NEURAL NETWORKS</b> .....	440
<i>Injune Yeo ; Sang-Gyun Gi ; Byung-Geun Lee ; Myonglae Chu</i>	
<b>CYBERPHYSICAL ADAPTATION IN DIGITAL-MICROFLUIDIC BIOCHIPS</b> .....	444
<i>Mohamed Ibrahim ; Krishnendu Chakrabarty</i>	
<b>PLACEMENT OPTIMIZATION OF CYBER-PHYSICAL DIGITAL MICROFLUIDIC BIOCHIPS</b> .....	448
<i>Chun-Hao Kuo ; Guan-Ruei Lu ; Tsung-Yi Ho ; Hung-Ming Chen ; Shiyun Hu</i>	
<b>HEMODYNAMIC IMAGING USING AN IMPLANTABLE SELF-RESET IMAGE SENSOR</b> .....	452
<i>Kiyotaka Sasagawa ; Takahiro Yamaguchi ; Makito Haruta ; Yasumi Ohta ; Hiroaki Takehara ; Toshihiko Noda ; Takashi Tokuda ; Jun Ohta</i>	
<b>MEMRISTOR CIRCUITS AND SYSTEMS FOR FUTURE COMPUTING AND BIO-INSPIRED INFORMATION PROCESSING</b> .....	456
<i>Son Ngoc Truong ; Khoa Van Pham ; Wonsun Yang ; Kyeong-Sik Min</i>	
<b>A HIGH TIME-RESOLUTION TWO-TAP CMOS LOCK-IN PIXEL IMAGE SENSOR FOR TIME-RESOLVED MEASUREMENTS AND ITS APPLICATIONS</b> .....	460
<i>Min-Woong Seo ; Yuya Shirakawa ; Keiichiro Kagawa ; Keita Yasutomi ; Yoshimasa Kawata ; Nobukazu Teranishi ; Shoji Kawahito</i>	

<b>DEVELOPMENT AND EXPERIMENTAL VALIDATION OF A MECHANISTIC MODEL OF A RECOMBINASE-BASED TEMPORAL LOGIC GATE .....</b>	<b>464</b>
<i>Jack Bowyer ; Victoria Hsiao ; Declan G. Bates</i>	

### **INTERACTIVE SESSION – IMPLANTABLE ELECTRONICS**

<b>SILVER-DIAMOND ANTENNA FOR IMPLANTABLE MM-SIZE BIO-DEVICES .....</b>	<b>468</b>
<i>Milad Faizollah ; Farhad Goodarzy ; David J. Garrett ; David B. Grayden</i>	
<b>A PROGRAMMABLE FULLY-INTEGRATED MICROSTIMULATOR FOR NEURAL IMPLANTS AND INSTRUMENTATION.....</b>	<b>472</b>
<i>Anh Tuan Nguyen ; Jian Xu ; Wing-Kin Tam ; Wenfeng Zhao ; Tong Wu ; Zhi Yang</i>	
<b>IMPLANTABLE WIRELESS 64-CHANNEL SYSTEM WITH FLEXIBLE ECOG ELECTRODE AND OPTOGENETICS PROBE .....</b>	<b>476</b>
<i>Shusuke Yoshimoto ; Tepei Araki ; Takafumi Uemura ; Toshikazu Nezu ; Tsuyoshi Sekitani ; Takafumi Suzuki ; Fumiaki Yoshida ; Masayuki Hirata</i>	
<b>A DIGITAL CRYSTAL-LESS CLOCK GENERATION SCHEME FOR WIRELESS BIOMEDICAL IMPLANTS .....</b>	<b>480</b>
<i>Hongxia Luo ; Dake Liu ; Chen Gong ; Min Li</i>	
<b>IMPACT OF THE ANGLE OF IMPLANTATION OF TRANSVERSE INTRAFASCICULAR MULTICHANNEL ELECTRODES ON AXON ACTIVATION.....</b>	<b>484</b>
<i>F. Kolbl ; M. Capllonch Juan ; F. Sepulveda</i>	
<b>AN ACCURATE SWITCHED-CAPACITOR HEART RESISTANCE MEASUREMENT FOR CARDIAC PACEMAKER .....</b>	<b>488</b>
<i>Jiangtao Xu ; Jialu Wang ; Minshun Wu ; Ruizhi Zhang</i>	
<b>A WIDE-INPUT-RANGE LOW-POWER ASK DEMODULATOR FOR WIRELESS DATA TRANSMISSION IN RETINAL PROSTHESIS .....</b>	<b>492</b>
<i>Huijie Zhang ; Xi Chen ; Mingyi Chen ; Guoxing Wang</i>	
<b>AN ACTIVE CHARGE BALANCING METHOD BASED ON SELF-OSCILLATION OF THE ANODIC CURRENT .....</b>	<b>496</b>
<i>Reza Ranjandish ; Alexandre Schmid</i>	
<b>ULTRALOW-POWER DATA COMPRESSION FOR IMPLANTABLE BLADDER PRESSURE MONITOR: ALGORITHM AND HARDWARE IMPLEMENTATION .....</b>	<b>500</b>
<i>Robert Karam ; Steve Majerus ; Dennis Bourbeau ; Margot S. Damaser ; Swarup Bhunia</i>	

### **INTERACTIVE SESSION – BODY SENSOR NETWORK & BRAIN MACHINE INTERFACES**

<b>A 0.5 V, 40NW VOLTAGE REFERENCE FOR WBAN DEVICES .....</b>	<b>504</b>
<i>Junchao Mu ; Lianxi Liu ; Zhangming Zhu ; Yintang Yang</i>	
<b>A MULTIFUNCTIONAL WIRELESS BODY AREA SENSORS NETWORK WITH REAL TIME EMBEDDED DATA ANALYSIS .....</b>	<b>508</b>
<i>Yuan Wang ; Yiping Zheng ; Ou Bai ; Qisong Wang ; Dan Liu ; Xin Liu ; Jinwei Sun</i>	
<b>THE DISTORTION OF DATA COMPRESSION VIA COMPRESSED SENSING IN EEG TELEMONITORING FOR THE EPILEPTIC .....</b>	<b>512</b>
<i>Benyuan Liu ; Zhilin Zhang</i>	
<b>DETECTION OF MEDIA ENJOYMENT USING SINGLE-CHANNEL EEG .....</b>	<b>516</b>
<i>Zhen Liang ; Hongtao Liu ; Joseph N. Mak</i>	
<b>EXTRACELLULAR SINGLE NEURON STIMULATION WITH HIGH-DENSITY MULTI-ELECTRODE ARRAY .....</b>	<b>520</b>
<i>Alessio Paolo Buccino ; Tristan Stöber ; Solveig Næss ; Gert Cauwenberghs ; Philipp Häfliger</i>	
<b>IMPROVING NEURAL SPIKE SORTING PERFORMANCE USING TEMPLATE ENHANCEMENT .....</b>	<b>524</b>
<i>Zack Frehlick ; Ian Williams ; Timothy G. Constandinou</i>	
<b>A 32-CH. BIDIRECTIONAL NEURAL/EMG INTERFACE WITH ON-CHIP SPIKE DETECTION FOR SENSORIMOTOR FEEDBACK .....</b>	<b>528</b>
<i>Ian Williams ; Adrien Rapeaux ; Yan Liu ; Song Luan ; Timothy G. Constandinou</i>	
<b>A TAKAGI-SUGENO FUZZY NEURAL NETWORK-BASED ALGORITHM WITH SINGLE-CHANNEL EEG SIGNAL FOR THE DISCRIMINATION BETWEEN LIGHT AND DEEP SLEEP STAGES .....</b>	<b>532</b>
<i>Tsung-Han Tsai ; Lih-Jen Kau ; Kun-Mao Chao</i>	

<b>A MULTIMODAL DROWSINESS MONITORING EAR-MODULE SYSTEM WITH CLOSED-LOOP REAL-TIME ALARM</b> .....	536
<i>Unsoo Ha ; Hoi-Jun Yoo</i>	
<b>EEG CHANNEL INTERPOLATION USING ELLIPSOID GEODESIC LENGTH</b> .....	540
<i>Hristos S. Courellis ; John R. Iversen ; Howard Poizner ; Gert Cauwenberghs</i>	

### **INTERACTIVE SESSION – NEUROMORPHIC CIRCUITS AND SYSTEMS**

<b>TOWARD A SPINTRONIC DEEP LEARNING SPIKING NEURAL PROCESSOR</b> .....	544
<i>Abhronil Sengupta ; Bing Han ; Kaushik Roy</i>	
<b>ROBUSTNESS ANALYSIS OF DNA-BASED BIOMOLECULAR FEEDBACK CONTROLLERS TO PARAMETRIC AND TIME DELAY UNCERTAINTIES</b> .....	548
<i>Rucha Sawlekar ; Mathias Foo ; Declan G. Bates</i>	
<b>SCALING MIXED-SIGNAL NEUROMORPHIC PROCESSORS TO 28 NM FD-SOI TECHNOLOGIES</b> .....	552
<i>Ning Qiao ; Giacomo Indiveri</i>	
<b>BAT-INSPIRED HAIR SENSOR</b> .....	556
<i>Alexander Castro ; Hyungdae Bae ; Miao Yu ; Pamela Abshire</i>	
<b>AN SRAM-BASED IMPLEMENTATION OF A CONVOLUTIONAL NEURAL NETWORK</b> .....	560
<i>Runchun Wang ; Gregory Cohen ; Chetan Singh Thakur ; Jonathan Tapson ; André Van Schaik</i>	
<b>ELECTRONIC COCHLEA: CAR-FAC MODEL ON FPGA</b> .....	564
<i>Ying Xu ; Chetan Singh Thakur ; Ram Kuber Singh ; Runchun Wang ; Jonathan Tapson ; André Van Schaik</i>	
<b>HIGH DENSITY <math>\mu</math>LED ARRAY FOR RETINAL PROTHESIS WITH A EYE-TRACKING SYSTEM</b> .....	568
<i>Ahmed Soltan ; Giovanni Passetti ; Pleun Maaskant ; Patrick Degenaar</i>	
<b>MODELLING OF NANOWIRE FETS BASED NEURAL NETWORK FOR TACTILE PATTERN RECOGNITION IN E-SKIN</b> .....	572
<i>William Taube ; Fengyuan Liu ; Anastasios Vilouras ; Dhayalan Shaktivel ; Carlos Garcia Nunez ; Hadi Heidari ; Fabrice Labeau ; Duncan Gregory ; Ravinder Dahiya</i>	
<b>BIPHASIC MICRO-LED DRIVER FOR OPTOGENETICS</b> .....	576
<i>Fahimeh Dehkhoda ; Ahmed Soltan ; Reza Ramezani ; Patrick Degenaar</i>	
<b>FORWARD TABLE-BASED PRESYNAPTIC EVENT-TRIGGERED SPIKE-TIMING-DEPENDENT PLASTICITY</b> .....	580
<i>Bruno U. Pedroni ; Sadique Sheik ; Siddharth Joshi ; Georgios Detorakis ; Somnath Paul ; Charles Augustine ; Emre Neftci ; Gert Cauwenberghs</i>	
<b>DATA ASSIMILATION OF MEMBRANE DYNAMICS AND CHANNEL KINETICS WITH A NEUROMORPHIC INTEGRATED CIRCUIT</b> .....	584
<i>Jun Wang ; Daniel Breen ; Abraham Akinin ; Henry D. I. Abarbanel ; Gert Cauwenberghs</i>	
<b>A CMOS CIRCUIT IMPLEMENTATION OF RETROGRADE SIGNALING IN ASTROCYTE-NEURON NETWORKS</b> .....	588
<i>Rebecca K. Lee ; Alice C. Parker</i>	

### **SPECIAL SESSION: SMART SENSING POINT-OF-CARE SYSTEM FOR RAPID DIAGNOSIS**

<b>DESIGN OF A 0.5 V 1.68MW NOSE-ON-A-CHIP FOR RAPID SCREEN OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE</b> .....	592
<i>Ting-I Chou ; Shih-Wen Chiu ; Kwuang-Han Chang ; Yi-Ju Chen ; Chen-Ting Tang ; Chung-Hung Shih ; Chih-Cheng Hsieh ; Meng-Fan Chang ; Chia-Hsiang Yang ; Herming Chiuieh ; Kea-Tiong Tang</i>	
<b>NANOPARTICLE-ON-CHIP: A CMOS DNA ANALYZER</b> .....	596
<i>Yi Tian ; Derek Ho</i>	
<b>COMPACT LENSLESS DIGITAL COUNTING SYSTEM FOR FLUORESCENT MICRO-REACTION-CHAMBER ARRAY</b> .....	600
<i>Hironari Takehara ; Yuta Nakamoto ; Kiyotaka Sasagawa ; Hiroaki Takehara ; Toshihiko Noda ; Takashi Tokuda ; Jun Ohta</i>	
<b>A LINEAR REGRESSION MODEL WITH DYNAMIC PULSE TRANSIT TIME FEATURES FOR NONINVASIVE BLOOD PRESSURE PREDICTION</b> .....	604
<i>Yi-Yen Hsieh ; Ching-Da Wu ; Shey-Shi Lu ; Yu Tsao</i>	
<b>AUTHOR INDEX</b>	