

24th IMEKO TC4 International Symposium and 22nd International Workshop on ADC and DAC Modelling and Testing (IMEKO TC-4 2020)

Palermo, Italy
14 - 16 September 2020

ISBN: 978-1-7138-2010-9

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2020) by the International Measurement Confederation (IMEKO)
All rights reserved.

Printed with permission by Curran Associates, Inc. (2021)

For permission requests, please contact the International Measurement Confederation (IMEKO)
at the address below.

IMEKO Secretariat
Dalszinhaz utca 10, 1st floor, Office room No. 3
H-1061 Budapest (6th district)
Hungary

Phone/Fax: +36 1 353 1562

imeko@t-online.hu

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
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

AR-BASED MONITORING OF INSTRUMENTATION IN THE OPERATING ROOM	1
<i>P. Arpaia, E. De Benedetto, C. A. Dodaro, L. Duraccio, G. Servillo, M. Vargas</i>	
A NEW CS METHOD FOR ECG SIGNAL	6
<i>Jan Saliga, Pavol Dolinsky, Imrich Andras, Linus Michaeli</i>	
SMART IOT SYSTEM FOR REMOTE PATIENT MONITORING	12
<i>Pasquale Arpaia, Vincenzo Canfora, Federica Crauso, Egidio De Benedetto, Giovanni Improta, Francesco Serino</i>	
EEG-BASED ATTENTION ASSESSMENT IN MOTOR-REHABILITATION	17
<i>Andrea Apicella, Pasquale Arpaia, Mirco Frosolone, Giovanni Improta, Francesco Isgrò, Nicola Moccaldi, Angela Natalizio</i>	
RECENT DEVELOPMENT IN IOMT BASED BIOMEDICAL MEASUREMENT SYSTEMS: A REVIEW	23
<i>Imran Ahmed, Francesco Lamonaca</i>	
DERIVATION AND CALIBRATION OF A CARDIOVASCULAR RISK SCORE FOR OCCUPATIONAL MEDICINE.....	29
<i>Giuseppina Affinito, Raffaele Palladino, Maria Triassi, Pasquale Arpaia</i>	
AUTOMATED TESTING SYSTEM FOR ELECTRO-MECHANICAL ACTUATORS USED IN AVIATION	34
<i>Ondrej Hanus, Radislav Smid</i>	
THD UNCERTAINTY ESTIMATION FOR INDUCTIVE CURRENT TRANSFORMERS USING THE ACCURACY CLASS INFORMATION.....	39
<i>A. Mingotti, D. Cavaliere, L. Peretto, R. Tinarelli</i>	
A TMR BASED TRIAXIAL ECT PROBE	44
<i>Andrea Bernieri, Giovanni Betta, Luigi Ferrigno, Marco Laracca, Antonio Rasile</i>	
A SIMPLIFIED PROCEDURE FOR THE ACCURATE FREQUENCY RESPONSE IDENTIFICATION OF VOLTAGE TRANSFORMERS.....	50
<i>G. Crotti, D. Giordano, P. S. Letizia, A. Delle Femine, M. Luiso</i>	
DEVELOPMENT AND CHARACTERIZATION OF A FIBER BRAGG GRATING ETHANOL SENSOR FOR LIQUIDS	55
<i>Antonino Quattrocchi, Roberto Montanini, Mariangela Latino, Nicola Donato</i>	
FAST CALIBRATION PROCEDURE FOR LOW POWER VOLTAGE TRANSFORMERS UP TO 2.5 KHZ USING SINC RESPONSE	60
<i>A. Ghaderi, A. Mingotti, L. Peretto, R. Tinarelli</i>	
VNA-BASED BROADBAND EVM MEASUREMENT OF AN RF NONLINEAR PA UNDER LOAD MISMATCH CONDITIONS	65
<i>G. P. Gibiino, A. M. Angelotti, A. Santarelli, P. A. Traverso</i>	
SURFACE RESISTANCE SCANNER OF THE IRREGULAR PIPE STRUCTURES	70
<i>Kostiantyn Torokhtii, Andrea Alimenti, Nicola Pompeo, Enrico Silva</i>	

DUAL FREQUENCY RESONATOR FOR THE CORRECT DETERMINATION OF THE IN-FIELD SURFACE IMPEDANCE FREQUENCY DEPENDENCE OF SUPERCONDUCTORS	75
<i>Nicola Pompeo, Kostiantyn Torokhtii, Andrea Alimenti, Enrico Silva</i>	
DEVELOPMENT AND METROLOGICAL EVALUATION OF A MICROSTRIP RESONATOR FOR GAS SENSING APPLICATIONS	80
<i>G. Gugliandolo, D. Aloisio, G. Campobello, G. Crupi, N. Donato</i>	
SPLIT RING RESONATOR FOR COMPLEX PERMITTIVITY MEASUREMENT	85
<i>Erika Pittella, Emanuele Piuze</i>	
REAL-TIME MONITORING SYSTEM OF THE ELECTRICITY CONSUMPTION IN A HOUSEHOLD USING NILM TECHNIQUES	90
<i>B. Cannas, S. Carcangiu, D. Carta, A. Fanni, C. Muscas, G. Sias, B. Canetto, L. Fresi, P. Porcu</i>	
UNDERWATER TO ABOVE WATER LORA TRANSMISSION: TECHNICAL ISSUES AND PRELIMINARY TESTS	96
<i>Irene Cappelli, Ada Fort, Marco Mugnaini, Stefano Parrino, Alessandro Pozzebon</i>	
PERVASIVE ENVIRONMENTAL MONITORING BY MEANS OF SELF-POWERED PARTICULATE MATTER LORAWAN SENSOR NODES.....	102
<i>Tommaso Addabbo, Ada Fort, Matteo Intravaia, Marco Mugnaini, Lorenzo Parri, Alessandro Pozzebon, Valerio Vignoli</i>	
EXPERIMENTAL VALIDATION OF A DOUBLE D COIL SIMPLIFIED MATHEMATICAL MODEL.....	107
<i>Nicola Campagna, Rosario Miceli, Giuseppe Caravello, Antonio Cataliotti, Ciro Spataro</i>	
POWER QUALITY IN DC RAILWAY SYSTEM: A FACILITY TO CHARACTERIZE THE ON-BOARD DETECTION SYSTEMS.....	112
<i>D. Giordano, D. Signorino, C. Landi, A. Delle Femine, M. Luiso, G. Crotti</i>	
OVERVIEW OF THE REQUISITES TO DEFINE STEADY AND TRANSIENT POWER QUALITY INDEXES FOR DC GRIDS	117
<i>Andrea Mariscotti</i>	
MEASURING THE IMPACT OF REVERSIBLE SUBSTATIONS ON ENERGY EFFICIENCY IN RAIL TRANSPORT	123
<i>F. Cascetta, G. Cipolletta, A. Delle Femine, D. Gallo, D. Giordano, D. Signorino</i>	
A MACHINE LEARNING APPROACH FOR EVALUATION OF BATTERY STATE OF HEALTH.....	129
<i>Davide Aloisio, Giuseppe Campobello, Salvatore Gianluca Leonardi, Francesco Sergi, Giovanni Brunaccini, Marco Ferraro, Vincenzo Antonucci, Antonino Segreto, Nicola Donato</i>	
DC SERIES ARC FAULTS IN PV SYSTEMS. DETECTION METHODS AND EXPERIMENTAL CHARACTERIZATION	135
<i>Giovanni Artale, Giuseppe Caravello, Antonio Cataliotti, Valentina Cosentino, Dario Di Cara, Salvatore Guaiana, Nicola Panzavecchia, Giovanni Tinè</i>	
DIGITAL POST-DISTORTION OF AN ADC ANALOG FRONT-END FOR GAMMA SPECTROSCOPY MEASUREMENTS	141
<i>T. Kowalski, G. P. Gibiino, P. Barmuta, J. Szewinski, P. A. Traverso</i>	
A CS METHOD FOR DAC NONLINEARITY TESTING.....	146
<i>Pasquale Daponte, Luca De Vito, Grazia Iadarola, Sergio Rapuano</i>	

DESIGN OF DIGITAL SAMPLING IMPEDANCE BRIDGE FOR BATTERY IMPEDANCE SPECTROSCOPY.....	151
<i>Stanislav Mašlán</i>	
A FAST AND SIMPLE BROADBAND EIS MEASUREMENT SYSTEM FOR LI-ION BATTERIES	157
<i>Alessio De Angelis, Paolo Carbone, Antonio Moschitta, Marco Crescentini, Roberta Ramilli, Pier Andrea Traverso</i>	
A REAL-TIME SMART CHARGE CONTROLLER TO EFFICIENCY CHARGE PROCESSES OF LIFEPO4 BATTERIES	162
<i>F. Ruffa, G. Fulco, M. Lugarà, P. Filianoti, C. De Capua</i>	
HIGH CAPACITANCE SIMULATION USING MUTUAL INDUCTORS.....	168
<i>Stanislav Mašlán</i>	
DOPPLER ESTIMATION AND CORRECTION IN UNDERWATER INDUSTRIAL INTERNET OF THINGS	174
<i>Concetta Baldone, Giovanni E. Galioto, Daniele Croce, Ilenia Tinnirello, Chiara Petrioli</i>	
A NEW FOG-ENABLED WIRELESS SENSOR NETWORK ARCHITECTURE FOR INDUSTRIAL INTERNET OF THINGS APPLICATIONS.....	179
<i>Zakaria Benomar, Giuseppe Campobello, Francesco Longo, Giovanni Merlino, Antonio Puliafito</i>	
TESTING WEARABLE IOT APPLICATIONS THROUGH SENSOR VIRTUALIZATION	185
<i>Salvatore Gaglio, Giuseppe Lo Re, Daniele Peri, Riccardo Rizzo, Claudio Sorrenti</i>	
RELIABILITY MEASUREMENTS OF AN AUGMENTED REALITY-BASED 4.0 SYSTEM FOR SUPPORTING WORKMEN IN HANDMADE ASSEMBLY	190
<i>Pasquale Arpaia, Dominique Dallet, Ernesto Erra, Annarita Tedesco</i>	
MAGNETIC PROPERTIES OF A NANOCRYSTALLINE MATERIAL FOR CURRENT DERIVATIVE SENSORS OF MAGNETS PROTECTION SYSTEMS.....	196
<i>Pasquale Arpaia, Marco Buzio, Ernesto De Matteis, Alessandro Parrella, Mariano Pentella</i>	
A MECHANICAL ANALYSIS OF ROTATING-COIL MAGNETOMETERS	201
<i>S. Sorti, C. Petrone, S. Russenschuck, F. Braghin</i>	
DISTANCE CALIBRATION OF LARGE PCB INDUCTION-COIL ARRAYS IN ACTIVEMODE.....	206
<i>Melvin Liebsch, Olaf Dunkel, Andrea Del Carme Fontanet Valls, Stephan Russenschuck, Stefan Kurz</i>	
DESIGN OF HIGH-SPEED ATE CALIBRATION EQUIPMENT	211
<i>Yong Hu, Qiangmin Xia, Ying Xiao</i>	
TRACEABLE ELECTRIC CURRENT CLAMP METER CALIBRATION USING CURRENT COIL.....	217
<i>Marcelo Costa</i>	
FMEA FOR TCAL: RISK ANALYSIS IN COMPLIANCE TO EN ISO/IEC 17025:2017 REQUIREMENTS	222
<i>Sasho Andonov, Marija Cundeva-Blajer</i>	

TRACEABILITY ESTABLISHMENT IN ELECTRICAL CALIBRATION LABORATORY USING REFERENCE DIGITAL MULTIMETER	228
<i>Marcelo Costa</i>	
A COAXIAL CRYOGENIC PROBE FOR QUANTUM HALL EFFECT MEASUREMENTS IN THE AC REGIME	233
<i>Martina Marzano, Ngoc Thanh Mai Tran, Vincenzo D Elia, Danilo Serazio, Emanuele Enrico, Massimo Ortolano, Klaus Pierz, Jan Kucera, Luca Callegaro</i>	
THE QUANTUM LIMIT TO INCOHERENT IMAGING IS ACHIEVED BY LINEAR INTERFEROMETRY	239
<i>Cosmo Lupo, Zixin Huang, Pieter Kok</i>	
WEAK MEASUREMENTS FOR REUTILIZING ENTANGLEMENT	244
<i>Giulio Foletto, Luca Calderaro, Armin Tavakoli, Matteo Schiavon, Francesco Picciariello, Adán Cabello, Paolo Villoresi, Giuseppe Vallone</i>	
EFFECT OF CROSS-TALK ON CONDITIONAL MEASUREMENTS PERFORMED WITH MULTI-PIXEL PHOTON COUNTERS.....	249
<i>Giovanni Chesi, Alessia Allevi, Maria Bondani</i>	
DISPOSABLE LABEL – FREE IMMUNOSENSOR ON SCREEN – PRINTED ELECTRODES FOR THE DETECTION OF AFLATOXIN B1 IN FOOD.....	254
<i>Francesca Malvano, Roberto Pilloton, Donatella Albanese</i>	
SENSOR TO SAFEGUARD QUALITY IN THE CONSERVATION OF SICILIAN EXTRA VIRGIN OLIVE OIL	260
<i>Diego Planeta</i>	
IMPLEMENTATION OF A WIRELESS INSTRUMENTED SPHERE FOR FRUIT PROCESSING.....	265
<i>Maria Alleri, Filippa Bono, Pietro Catania, Eliseo Roma, Mariangela Vallone</i>	
ELECTRICAL CHARACTERIZATION OF A MONITORING SYSTEM FOR PRECISION FARMING UNDER TEMPERATURE STRESS.....	270
<i>Lorenzo Ciani, Marcantonio Catelani, Alessandro Bartolini, Giulia Guidi, Gabriele Patrizi</i>	
THE COLOR OF DRIED FRUIT THROUGH THE COLOR ANALYSIS SENSOR.....	276
<i>Diego Planeta, Onofrio Corona, Aldo Todaro, Luciano Cinquanta</i>	
QUANTUM TWO-PHASE ESTIMATION INSIDE A PHOTONIC INTEGRATED DEVICE.....	281
<i>Mauro Valeri, Emanuele Polino, Martina Riva, Raffaele Silvestri, Davide Poderini, Ilaria Gianani, Giacomo Corrielli, Andrea Crespi, Roberto Osellame, Nicolò Spagnolo, Fabio Sciarrino</i>	
HIGH SENSITIVITY NITROGEN-VACANCY-ASSISTED MAGNETIC/ELECTRIC FIELD SENSING AT INRIM.....	286
<i>E. Moreva, E. Bernardi, V. Pugliese, P. Traina, A. Sosso, S. Ditalia Tchernij, J. Forneris, F. Piccolo, G. Petrini, Z. Pastuovic, I. P. Degiovanni, P. Olivero, M. Genovese</i>	
COMPARISON OF CORRECTION METHODS OF WIND SPEED FOR PERFORMANCE EVALUATION OF WIND TURBINES.....	291
<i>Alessio Carullo, Alessandro Ciocia, Paolo Di Leo, Francesco Giordano, Gabriele Malgaroli, Luca Peraga, Filippo Spertino, Alberto Vallan</i>	
LOW-COST ENERGY METER WITH POWER QUALITY FUNCTIONALITIES	297
<i>Paolo Castello, Carlo Muscas, Paolo Attilio Pegoraro, Sara Sulis</i>	

MEASUREMENT OF POWERLINE PERFORMANCE IN RESIDENTIAL CONTEXT	303
<i>Fabrizio Ciancetta, Giovanni Bucci, Edoardo Fiorucci, Simone Mari, Andrea Fioravanti, Alberto Prudenzi</i>	
AUTOMATIC STATION FOR MONITORING A MICROGRID	309
<i>G. Fulco, F. Ruffa, M. Lugarà, P. Filianoti, C. De Capua</i>	
DMPPT EXPERIMENTAL DEMONSTRATION UNIT BASED ON BUCK CONVERTER.....	315
<i>Marco Balato, Annalisa Liccardo, Carlo Petrarca</i>	
TRANSIT TIME MEASUREMENT OF A PRESSURE WAVE THROUGH AN ELASTIC TUBE BASED ON LVDT SENSORS	321
<i>Fabio Fuiano, Giorgia Fiori, Federica Vurchio, Andrea Scorza, Salvatore A. Sciuto</i>	
A COMPARISON AMONG THREE DIFFERENT IMAGE ANALYSIS METHODS FOR THE DISPLACEMENT MEASUREMENT IN A NOVEL MEMS DEVICE.....	327
<i>Federica Vurchio, Giorgia Fiori, Andrea Scorza, Salvatore Andrea Sciuto</i>	
A PRELIMINARY STUDY ON A NOVEL METHOD FOR DEPTH OF PENETRATION MEASUREMENT IN ULTRASOUND QUALITY ASSESSMENT.....	332
<i>Giorgia Fiori, Fabio Fuiano, Federica Vurchio, Andrea Scorza, Maurizio Schmid, Silvia Conforto, Salvatore A. Sciuto</i>	
LOWEST DETECTABLE SIGNAL IN MEDICAL PW DOPPLER QUALITY CONTROL BY MEANS OF A COMMERCIAL FLOW PHANTOM: A CASE STUDY	337
<i>Giorgia Fiori, Fabio Fuiano, Federica Vurchio, Andrea Scorza, Jan Galo, Silvia Conforto, Salvatore A. Sciuto</i>	
A PRELIMINARY STUDY ON THE IMPORTANCE OF NORMALIZATION METHODS IN INFRARED MICRO-SPECTROSCOPY FOR BIOMEDICAL APPLICATIONS.....	342
<i>Andrea Zancla, Serena De Santis, Andrea Scorza, Salvatore Andrea Sciuto, Giovanni Sotgiu, Monica Orsini</i>	
SYSTEM FOR ACOUSTIC DETECTION	347
<i>Jakub Svatos, Jan Belak, Jan Holub</i>	
ASSESSMENT OF A LOW-COST ANGLE-METER BASED ON RESISTANCE MEASUREMENTS	353
<i>U. Cesaro, H. Coppier, P. Arpaia, M. Chadli, D. Gatti, M. Pezzetti</i>	
STOCHASTIC TWO-BIT ON-LINE TEMPERATURE MEASUREMENT WITH RTD PT-100 SENSOR OPERATING IN A NONLINEAR MODE	359
<i>Platon Sovilj, Bojan Vujicic, Dragan Pejic, Aleksandar Radonjic, Vladimir Vujicic</i>	
CALIBRATION METHOD OF BULLET SPEED MEASURING DEVICES	364
<i>Zexin Guan, Mei Yang, Wenqiang Li, Xuefeng Ma, Xinyanwang, Shang Wang</i>	
STABILITY OF AC CURRENT MEASUREMENTS USING AC-DC SHUNTS AND THE AC QUANTUM VOLTMETER	369
<i>Damir Ilic, Ralf Behr, Jinni Lee</i>	
ALTERNATIVE METHOD FOR EVALUATION OF REFERENCE VALUE ON COOMET KEY COMPARISON FOR POWER.....	374
<i>Oleh Velychko, Irina Karpenko, Stanislav Karpenko, Tetyana Gordiyenko</i>	

MEASUREMENT COMPARISON BETWEEN A COMMERCIAL HIGH RESISTANCE BRIDGE AND VALIDATED SYSTEMS AT ULTRA-HIGH RESISTANCE VALUES	379
<i>Flavio Galliana, Pier Paolo Capra, Iulian Mihai</i>	
EVALUATING UNCERTAINTY OF ALTERNATING CURRENT REPRODUCTION USING NATIONAL STANDARD.....	385
<i>Valentyn Isaiev, Oleh Velychko</i>	
A NOVEL RECURSIVE ANALOG TO DIGITAL CONVERSION METHOD.....	390
<i>Karsten Leitis, Tommy Halim</i>	
A NOVEL MEASUREMENT METHOD FOR DAC FREQUENCY RESPONSE CHARACTERIZATION.....	395
<i>Luca De Vito, Francesco Picariello, Ioan Tudosa</i>	
LOW POWER STOCHASTIC SENSOR IN IOT, IIOT AND INDUSTRY 4.0 ENVIRONMENTS.....	401
<i>Marjan Urekar, Platon Sovilj, Ivan Gutai, Dragan Pejic, Bojan Vujicic, Djordje Novakovic</i>	
PRECISE LOW-COST METHOD FOR CHECKING ACCURACY OF CURRENT TRANSFORMERS CALIBRATION UNIT	406
<i>Valentyn Isaiev, Oleh Velychko</i>	
COMPRESSIVE SAMPLING-BASED VECTOR SIGNAL ANALYSIS FOR DISTRIBUTED SPECTRUM MONITORING	411
<i>Luca De Vito, Francesco Picariello, Sergio Rapuano, Ioan Tudosa</i>	
STUDY ON THE MAGNETIC DECOUPLING METHOD OF MAGNETIC LEVITATION SUPPORT FOR INTERFERENCE SPECTROMETERS	417
<i>Ding Chao</i>	
LOW FREQUENCY BIAS-INDUCED IMPEDANCE.....	422
<i>Sioma Baltianski</i>	
WAVEFORM RECOVERY TECHNIQUE BASED ON DIFFERENTIAL LOCALIZATION ALGORITHM.....	428
<i>Gu Yi</i>	
EFFECT OF NOISE AND PARTIAL SYNCHRONIZATION ON AMPLITUDE MEASUREMENT OF MULTIPLE CHIRP SPREAD SPECTRUM SIGNALS	433
<i>Antonio Moschitta, Antonella Comuniello, Alessio De Angelis, F. Santoni, Paolo Carbone</i>	
MULTILAYER CASE INFLUENCE UPON SAR EVALUATION.....	439
<i>Ovidiu Bejenaru, Catalin Lazarescu, Marius-Vasile Ursachianu, Alexandru Salceanu</i>	
KRONOS: A LOW-COST DATA-LOGGER FOR SEISMOLOGICAL APPLICATIONS.....	445
<i>Antonino D Alessandro, Giovanni Vitale</i>	
FORMATIONS OF SMALL SATELLITES TO REALIZE SENSOR NETWORKS FOR EARTH OBSERVATION.....	450
<i>Klaus Schilling, Andreas Nüchter</i>	
REAL-TIME FLOOD PREDICTION USING RECURRENT NEURAL NETWORKS AND RANDOM FOREST	455
<i>Petar Sekulic, Paola Regina, Luana Spadafina, Giuseppe Dentamaro, Alessandro Porcelli, Cristiano Bove, Slavko Kovacevic, Mirko Kalezic</i>	

AN ACCURATE MEASUREMENT PROCEDURE OF POWER LOSSES VARIATIONS IN ELECTRICAL DRIVES	460
<i>M. Caruso, A. O. Di Tommaso, G. Lisciandrello, Rosario Miceli, C. Nevoloso, C. Spataro</i>	
IDENTIFICATION OF EQUIVALENT CIRCUIT OF TRANSFORMER INSULATION PARAMETERS ASSISTED BY CONSTRAINED GAANDPSO ALGORITHMS	466
<i>Giuseppe Marsala, Carmelo Lodato, Giovanni Tinè</i>	
COMPARISON OF NORMATIVE LIMITS FOR ELECTROMAGNETIC EMISSIONS OF ELECTRIC MACHINES AND DRIVES TO USE IN DIFFERENT APPLICATIONS.....	472
<i>Andrea Mariscotti</i>	
EXPERIMENTAL INVESTIGATION ON HIGH-EFFICIENCY CONTROL ALGORITHMS FOR THREE-PHASE INDUCTION MOTORS.....	478
<i>M. Caruso, A. O. Di Tommaso, R. Miceli, C. Spataro, F. Viola</i>	

Author Index