

# **2011 8th European Radar Conference**

**(EuRAD 2011)**

**Manchester, United Kingdom  
12-14 October 2011**



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## EuRAD01 : Short Range Imaging

Chair: Felix Yanovsky, National Aviation University, Ukraine — Co-Chair: Galina Babur, TU Delft, The Netherlands

Venue: Charter 1, 08:30 - 10:10, Thursday 13th October 2011

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- 1 **C** **Time Reversal-Based Processing for Human Targets Detection in Realistic Through-the-Wall Scenarios**  
*R. Dubroca<sup>1</sup>, N. Fortino<sup>2</sup>, J.-Y. Dauvignac<sup>2</sup>, L. Bellomo<sup>1</sup>, S. Pioch<sup>1</sup>, M. Saillard<sup>1</sup>, Thomas Lepetit<sup>3</sup>, J. de Rosny<sup>3</sup>, C. Prada<sup>3</sup>, P. Millot<sup>4</sup>, N. Maaref<sup>4</sup>, B. Boudamouz<sup>4</sup>*  
<sup>1</sup>LSEET, France; <sup>2</sup>LEAT, France; <sup>3</sup>LOA (UMR 7587), France; <sup>4</sup>ONERA, France
- 5 **C** **Sensitivity-Based Imaging with Near-Zone Microwave Raster Scanning**  
*Yifan Zhang, Li Liu, Natalia K. Nikolova, McMaster University, Canada*
- 9 **C** **Radar Mapping of Buildings Using Sparse Reconstruction with an Overcomplete Dictionary**  
*J.J.M. de Wit, Laura Anitori, Wim L. van Rossum, R.G. Tan, TNO, The Netherlands*
- 13 **C** **Efficient Signal Processing in MIMO Radars**  
*P.F. Sannarino, J. Fortuny-Guasch, D. Tarchi, European Commission JRC, Italy*
- 17 **C** **Three-Dimensional Radar Imaging by Digital Beamforming**  
*Marlene Harter<sup>1</sup>, Andreas Zirolli<sup>2</sup>, Thomas Zwick<sup>1</sup>*  
<sup>1</sup>KIT, Germany; <sup>2</sup>Siemens AG, Germany

## EuRAD02 : Radar Sub-Systems

Chair: Winfried Mayer, Endress+Hauser, Germany — Co-Chair: Eddy van Eeuwijk, Thales, The Netherlands

Venue: Charter 2, 08:30 - 10:10, Thursday 13th October 2011

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- 21 **C** **Compact and High-Performance 76GHz Millimeter-Wave Radar Front-End Module for Autonomous Unmanned Helicopters**  
*Shunichi Futatsumori, Akiko Kohmura, Naruto Yonemoto, ENRI, Japan*
- 25 **C** **Over 200-W High Isolation GaN-Switch for L-Band Radar Module**  
*Takao Fujii<sup>1</sup>, Akihiko Akasegawa<sup>2</sup>, Syouji Amatatsu<sup>2</sup>, Masao Moriwaki<sup>2</sup>, Hisao Shigematsu<sup>2</sup>, Hisanori Irie<sup>3</sup>, Hirotaka Hayashi<sup>3</sup>, Takayuki Shimizu<sup>3</sup>, Reiji Satou<sup>3</sup>*  
<sup>1</sup>Fujitsu System Integration Laboratories Ltd., Japan; <sup>2</sup>Fujitsu Ltd., Japan; <sup>3</sup>Ministry of Defense, Japan
- 29 **C** **Miniature Interferometric Down-Converter for V-Band Radar Applications**  
*K. Haddadi, O. Benzaim, D. Glay, T. Lasri, IEMN, France*
- 33 **C** **Compact Short Circuit for Slotted Waveguide Array BFNs**  
*Roberto Vincenti Gatti<sup>1</sup>, Sonia Calzuola<sup>2</sup>, Roberto Sorrentino<sup>2</sup>*  
<sup>1</sup>RF Microtech, Italy; <sup>2</sup>Università di Perugia, Italy
- 37 **C** **Development and Verification of an Accurate FEM Electromagnetic Model for a Complex Multi-Stage RADAR Limiter**  
*N. Farrington, M. Douthwaite, G. Fletcher, K. Newsome, B.M. Coaker, e2v Microwave Technology Centre, UK*

## EuRAD03: EuRAD Opening Session

Chair: Anthony Brown, University of Manchester, UK — Co-Chair: Stephen Harman, QinetiQ Ltd., UK

Venue: Charter 6, 10:50-12:30, Thursday 13th October 2011

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- (NA) **C Breakthroughs Enabling Low-Cost, More Capable Phased-Arrays and Radars**  
*Eli Brookner, Raytheon Company, USA*
  
- (NA) **C Ultra-Wideband Sensors for Biomedical Diagnostics**  
*Matthias A. Hein<sup>1</sup>, C. Geyer<sup>2</sup>, M. Helbig<sup>1</sup>, I. Hilger<sup>2</sup>, W. Kaiser<sup>2</sup>, O. Kosch<sup>3</sup>, G. Rimkus<sup>2</sup>, J. Sachs<sup>1</sup>, F. Scotto di Clemente<sup>1</sup>, U. Schwarz<sup>1</sup>, F. Seifert<sup>3</sup>, R. Stephan<sup>1</sup>, F. Thiel<sup>3</sup>*  
*<sup>1</sup>Technische Universität Ilmenau, Germany; <sup>2</sup>University Hospital Jena, Germany; <sup>3</sup>PTB, Germany*

## EuRAD04: SAR Signal Processing

Chair: Krzysztof Kulpa, Warsaw University of Technology, Poland — Co-Chair: Stephane Meric, IETR, France

Venue: Charter 1, 13:40-15:00, Thursday 13th October 2011

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- 41 **C First Spaceborne Experiment of Digital Beam Forming with TerraSAR-X Dual Receive Antenna Mode**  
*Jung-Hyo Kim, Marwan Younis, Martina Gabele, Pau Prats, Gerhard Krieger, DLR, Germany*
  
- 45 **C High Resolution Permittivity Reconstruction of One Dimensional Stratified Dielectric Media from Broadband Measurement Data in the W-Band**  
*Harald von Aschen, Frank Gumbmann, Lorenz-Peter Schmidt, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*
  
- 49 **C AutoESP — An Iterative Algorithm of Soil Permittivity Estimation for GPR**  
*Mariusz Zych, Przemysław Instytut Telekomunikacji S.A., Poland*
  
- 53 **C Real-Time Implementation of an FMCW Backprojection Algorithm for 1D and 2D Apertures**  
*Andreas Haderer, Philipp Scherz, Jochen Schrattenecker, Andreas Stelzer, Johannes Kepler Universität Linz, Austria*

## EuRAD05 : FMCW Radar

Chair: Patrick Beasley, QinetiQ Ltd., UK — Co-Chair: Wolfgang Menzel, University of Ulm, Germany

Venue: Charter 2, 13:40 - 15:00, Thursday 13th October 2011

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- 57 **C** **Railway Level Crossing Obstruction Detection Using MIMO Radar**  
*Arvind Hari Narayanan<sup>1</sup>, Paul V. Brennan<sup>1</sup>, Ralph Benjamin<sup>1</sup>, Nadia Mazzino<sup>2</sup>, Giovanni Bochetti<sup>2</sup>, Antonio Lancia<sup>3</sup>*  
<sup>1</sup>University College London, UK; <sup>2</sup>Ansaldo STS S.p.A, Italy; <sup>3</sup>Heuristics GmbH, Switzerland
- 61 **C** **Sliding De-Ramping Processing in FM-CW Radar with Agile Range Coverage**  
*G. Babur, Oleg A. Krasnov, L.P. Ligthart, Technische Universiteit Delft, The Netherlands*
- 65 **C** **A Switched-Beam FMCW Radar for Wireless Indoor Positioning System**  
*Ruey-Hsuan Lee, Zong-Da Tsai, Chung-Ting Lang, Chia-Chan Chang, Sheng-Fuh Chang, National Chung Cheng University, Taiwan*
- 69 **C** **MIMO Surface Wave Radar Using Time Staggered FMCW Chirp Signals**  
*T. Fickenscher, A. Gupta, J. Hinz, M. Holters, U. Zölzer, Helmut Schmidt Universität, Germany*

## EuRAD06 : Radar Phenomenology and Sub-systems

Chair: Naruto Yonemoto, ENRI, Japan — Co-Chair: Wilhelm Grüner, Cassidian, Germany

Venue: Charter 1, 15:40 - 17:00, Thursday 13th October 2011

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- 73 **C** **94-GHz Tarsier Radar Measurements of Wind Waves and Small Targets**  
*Tom Leonard, Tim Lamont-Smith, Robert Hodges, Patrick Beasley, QinetiQ Ltd., UK*
- 77 **C** **Simulation Model for Sea Clutter in Airborne Radars**  
*Laura Santos Ugarte, Gonzalo de Miguel Vela, Juan A. Besada Portas, Universidad Politécnica de Madrid, Spain*
- 81 **C** **Transceiver Module Using GaAs Gunn Diode and Schottky Diode Mixer for W-Band FMCW Radar Sensor Application**  
*Dong-Sik Ko, Tae-Jong Baek, Sang-Jin Lee, Seok-Gyu Choi, Min Han, Jin-Koo Rhee, Dongguk University, Korea*
- 85 **C** **Passive Compensation of Beam Shift in an Array on a Bending Surface**  
*T.J. Seidel, W.S.T. Rowe, Kamran Ghorbani, RMIT University, Australia*

## EuRAD07: Radar Modelling and Simulation

Chair: Mauro Leonardi, Tor Vergata University Rome, Italy — Co-Chair: Paul Snoeij, ESA, The Netherlands

Venue: Charter 2, 15:40-17:00, Thursday 13th October 2011

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- 89 **C** **A Millimeter-Wave FMCW Radar System Simulator for Automotive Applications Including Nonlinear Component Models**  
*Manuel Dudek, Dietmar Kissinger, Robert Weigel, Georg Fischer, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*
- 93 **C** **Using Real Data for the Implementation of Multistatic Passive Radar Geometry Optimization Procedure**  
*F. Gumiero, S. Santarelli, C. Bongioanni, Fabiola Colone, Pierfrancesco Lombardo, Università di Roma "La Sapienza", Italy*
- 97 **C** **Radar Cross-Section Analysis of Wind Turbine Blades with Radar Absorbing Materials**  
*L.S. Rashid, Anthony K. Brown, University of Manchester, UK*

## EuRAD08: Automotive Radar

Chair: Wolfgang Menzel, Ulm University, Germany — Co-Chair: Alexander Yarovoy, University of Delft, The Netherlands

Venue: Charter 7, 15:40-17:00, Thursday 13th October 2011

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- 101 **C** **77GHz Automotive Radar Sensor in Low-Cost PCB Technology**  
*Jürgen Hasch, Uwe Wostradowski, Raphael Hellinger, Delf Mittelstrass, Robert Bosch GmbH, Germany*
- 105 **C** **77GHz Compact Multi-Port Radar Sensor for Automotive Applications**  
*E. Moldovan<sup>1</sup>, B. Boukari<sup>1</sup>, S.O. Tatu<sup>1</sup>, R.G. Bosisio<sup>2</sup>, Ke Wu<sup>2</sup>*  
*<sup>1</sup>INRS-EMT, Canada; <sup>2</sup>École Polytechnique de Montréal, Canada*
- 109 **C** **A Novel Front End Module for 77GHz Automotive Radar Implemented on Low Temperature Co-Fired Ceramic Technology**  
*Tim Mobley<sup>1</sup>, Sergio Cardona<sup>1</sup>, Deepukumar Nair<sup>2</sup>*  
*<sup>1</sup>nMode Solutions Inc., USA; <sup>2</sup>DuPont Electronics, USA*
- 113 **C** **Reduced Interference of 79GHz UWB Automotive Radars to Radio Astronomy Stations by Signal Integration Effects**  
*Hiroshi Kondoh<sup>1</sup>, Katsuyoshi Sato<sup>2</sup>, Tetsuo Horimatsu<sup>3</sup>, Satoshi Oyama<sup>4</sup>*  
*<sup>1</sup>EHF Consulting, Japan; <sup>2</sup>NICT, Japan; <sup>3</sup>Fujitsu Ltd., Japan; <sup>4</sup>Hitachi Ltd., Japan*

## EuRAD09: Short Range Radars

Chair: Herman Rohling, TUH, Germany — Co-Chair: Stephane Kemkemian, Thales, France

Venue: Charter 1, 08:30 - 10:10, Friday 14th October 2011

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- 117 **C** **FMCW Radar System with Additional Phase Evaluation for High Accuracy Range Detection**  
*Serdal Ayhan, Mario Pauli, Thorsten Kayser, Steffen Scherr, Thomas Zwick, KIT, Germany*
- 121 **C** **A Method of Calculation Load Reduction for High Resolution Process**  
*Makoto Nakai, Masaru Ogawa, Kazuo Sato, Toyota Central R&D Labs Inc., Japan*
- 125 **C** **Range Migration Compensation for Moving Targets with Unknown Constant Velocity in Chirp Radars**  
*Takafumi Nagano, Takashi Iwamoto, Teruyuki Hara, Yasutaka Takeda, Mitsubishi Electric Corporation, Japan*
- 129 **C** **Measuring the Target Range and Relative Velocity in UWB Radar for Automobile Applications II**  
*Jong-Hun Lee<sup>1</sup>, Myung-Hun Jang<sup>2</sup>, Seokjun Ko<sup>2</sup>*  
*<sup>1</sup>DGIST, Korea; <sup>2</sup>Jeju National University, Korea*
- 134 **C** **Doppler Velocity Measurement Method with a Second-Time-Around Echoes Suppression for Synthetic Bandwidth Radars**  
*Kentaro Isoda, Teruyuki Hara, Mitsubishi Electric Corporation, Japan*

## EuRAD10: Multistatic and MIMO Radar

Chair: Hugh Griffiths, UCL, UK — Co-Chair: Mike Cherniakov, Birmingham University, UK

Venue: Charter 2, 08:30 - 10:10, Friday 14th October 2011

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- 138 **C** **Range-Doppler Migration in Coherent MIMO Radar**  
*Peter W. Moo, Defence R&D Canada, Canada*
- 142 **C** **Resource Allocation Challenges for Reconfigurable Multi-Sensor Networks**  
*T.H. de Groot<sup>1</sup>, R.F. Tigrek<sup>1</sup>, Oleg A. Krasnov<sup>1</sup>, A. Huizing<sup>2</sup>, Alexander G. Yarovoy<sup>1</sup>*  
*<sup>1</sup>Technische Universiteit Delft, The Netherlands; <sup>2</sup>TNO, The Netherlands*
- 146 **C** **A New Bistatic Radar System: PARSAX + TARA**  
*Oleg A. Krasnov, Zongbo Wang, Fred van der Zwan, Alexander G. Yarovoy, Technische Universiteit Delft, The Netherlands*
- 150 **C** **The Determination of Coordinates of Ground Targets in Multistatic Forward-Scattering Radar**  
*Alexander V. Myakinkov, Daria M. Smirnova, Nizhny Novgorod State Technical University, Russia*
- 154 **C** **Passive Bistatic Radar Based on Mixed DSSS and OFDM WiFi Transmissions**  
*Fabiola Colone, Paolo Falcone, Pierfrancesco Lombardo, Università di Roma "La Sapienza", Italy*

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Chair: Oleg Krasnov, Delft University of Technology, The Netherlands — Co-Chair: Enzo Dalle Mese, Università di Pisa, Italy

Venue: Charter 3, 08:30 - 10:10, Friday 14th October 2011

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- 158 **C** **Meteorological Applications of Multiparameter Polarimetric Radar**  
*F.J. Yanovsky, Yu.A. Averyanova, National Aviation University, Ukraine*
- 162 **C** **Using of Radar and Geostationary Satellites Signals for Determination of Hydrometeors Water Content**  
*Igor Mytsenko, Dmytro Khalameyda, National Academy of Sciences of Ukraine, Ukraine*
- 166 **C** **FMCW Phased Array Radar for Automatically Triggered Measurements of Snow Avalanches**  
*M. Ash<sup>1</sup>, Paul V. Brennan<sup>1</sup>, N.M. Vriend<sup>2</sup>, J.N. McElwaine<sup>2</sup>, C.J. Keylock<sup>3</sup>*  
<sup>1</sup>University College London, UK; <sup>2</sup>University of Cambridge, UK; <sup>3</sup>University of Sheffield, UK
- 170 **C** **Array Configurations of a UWB Near Field Imaging System for the Detection of Water Accumulation in Human Body**  
*Xuyang Li, M. Jalilvand, Lukasz Zwirello, Thomas Zwick, KIT, Germany*
- 174 **C** **Sentinel-1 CSAR Operational Scenarios**  
*Paul Snoeij, Malcolm Davidson, Bjorn Rommen, Nicolas Floury, Dirk Geudtner, Ramon Torres, ESA, The Netherlands*

## EuRAD12 : Radar Signal Processing

Chair: Francois Le Chevalier, TU Delft, The Netherlands — Co-Chair: Stephen Harman, QinetiQ Ltd., UK

Venue: Charter 1, 10:50 - 12:30, Friday 14th October 2011

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- 178 **C** **Orthogonal and Complementary Radar Signals for Multichannel Applications**  
*Gaspere Galati, Gabriele Pavan, Università di Roma "Tor Vergata", Italy*
- 182 **C** **Application of I-OFDM Signals for Simultaneous Polarimetric Measurement**  
*Zongbo Wang, Firat Tigrek, Oleg A. Krasnov, Fred van der Zwan, Piet van Genderen, Alexander G. Yarovoy, Technische Universiteit Delft, The Netherlands*
- 186 **C** **Feasibility Study of DTV Based PCL Radar in South Africa**  
*Titus Oyedokun, University of Cape Town, South Africa*
- 190 **C** **Extending the Integration Time in DVB-T-Based Passive Radar**  
*Mateusz Malanowski<sup>1</sup>, Krzysztof Kulpa<sup>1</sup>, Karl Erik Olsen<sup>2</sup>*  
<sup>1</sup>Warsaw University of Technology, Poland; <sup>2</sup>Norwegian Defence Research Establishment, Norway
- 194 **C** **Moving Target Classification in Ground Surveillance Radar ATR System by Using Novel Bicepstral-Based Information Features**  
*Pavlo O. Molchanov<sup>1</sup>, Jaakko T. Astola<sup>1</sup>, Karen O. Egiazarian<sup>1</sup>, Alexander V. Totsky<sup>2</sup>*  
<sup>1</sup>Tampere University of Technology, Finland; <sup>2</sup>National Aerospace University, Ukraine

## EuRAD13: UWB Radar

Chair: Alexander Yarovoy, University of Delft, The Netherlands — Co-Chair: Michele Fiorini, SELEX, Italy

Venue: Charter 2, 10:50-12:30, Friday 14th October 2011

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- 198 **C** **Balanced Pulse Generator for UWB Radar Application**  
*Ahmed Abbas H. Ameri, Günter Kompa, Axel Bangert, Universität Kassel, Germany*
- 202 **C** **TR-UWB Detection and Synchronization — Using the Time Delayed Sampling and Correlation Detection Method**  
*Jorge A. Pardiñas-Mir, Muriel Muller, Roger Lamberti, Claude Gimenes, Télécom SudParis, France*
- 206 **C** **Analysis of a Digital UWB Receiver for Biomedical Applications Using Equivalent-Time Sampling**  
*M. Strackx<sup>1</sup>, E. D'Agostino<sup>2</sup>, P. Leroux<sup>1</sup>, Patrick Reynaert<sup>1</sup>*  
*<sup>1</sup>Katholieke Universiteit Leuven, Belgium; <sup>2</sup>SCK•CEN, Belgium*
- 210 **C** **A Polarity Correlator in a UWB-PN-Radar for the Detection of Multiple Targets**  
*Steffen Scherr, Xuyang Li, Serdal Ayhan, Thomas Zwick, KIT, Germany*

## EuRAD14: Imaging Radar

Chair: William Miceli, UCL, UK — Co-Chair: Naruto Yonemoto, ENRI, Japan

Venue: Charter 3, 10:50-12:30, Friday 14th October 2011

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- 214 **C** **SAR with MIRANDA — Millimeterwave Radar Using Analog and New Digital Approach**  
*Stephan Stanko<sup>1</sup>, Winfried Johannes<sup>1</sup>, Rainer Sommer<sup>1</sup>, Alfred Wahlen<sup>1</sup>, Jörn Wilcke<sup>1</sup>, Helmut Essen<sup>1</sup>, Axel Tessmann<sup>2</sup>, I. Kallfass<sup>2</sup>*  
*<sup>1</sup>Fraunhofer FHR, Germany; <sup>2</sup>Fraunhofer IAF, Germany*
- 218 **C** **Noise SAR Using Waveform with Reduced Correlation Noise Floor**  
*Lukasz Maslikowski, Janusz S. Kulpa, Warsaw University of Technology, Poland*
- 222 **C** **76.5GHz Millimeter-Wave Radar for Foreign Object Debris Detection on Airport Runways**  
*K. Mazouni<sup>1</sup>, A. Zeitler<sup>1</sup>, J. Lanteri<sup>1</sup>, Ch. Pichot<sup>1</sup>, J.-Y. Dauvignac<sup>1</sup>, C. Migliaccio<sup>1</sup>, Naruto Yonemoto<sup>2</sup>, Akiko Kohmura<sup>2</sup>, Shunichi Futatsumori<sup>2</sup>*  
*<sup>1</sup>LEAT, France; <sup>2</sup>ENRI, Japan*
- 226 **C** **Development of Through-Wall Imaging Radar with Planar MIMO Array**  
*T.G. Savelyev<sup>1</sup>, Xiaodong Zhuge<sup>1</sup>, Alexander G. Yarovoy<sup>1</sup>, L.P. Ligthart<sup>1</sup>, J.M. Lerat<sup>2</sup>, L. Duchesne<sup>2</sup>, J. Fortuny-Guasch<sup>3</sup>*  
*<sup>1</sup>Technische Universiteit Delft, The Netherlands; <sup>2</sup>SATIMO, France; <sup>3</sup>European Commission JRC, Italy*
- 230 **C** **Investigation of Bandwidth Effects on UWB Near-Field Imaging**  
*Xiaodong Zhuge, Alexander G. Yarovoy, Technische Universiteit Delft, The Netherlands*



## EuRAD15 : EuRAD Closing Session

Chair: Anthony Brown, University of Manchester, UK — Co-Chair: Stephen Harman, QinetiQ Ltd., UK

Venue: Charter 3, 13:40 - 15:00, Friday 14th October 2011

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- 234 **C** **C-Band SAR for the GMES Sentinel-1 Mission**  
*Allan Østergaard<sup>1</sup>, Paul Snoeij<sup>1</sup>, Ignacio Navas Traver<sup>1</sup>, Michael Ludwig<sup>1</sup>,  
Friedhelm Rostan<sup>2</sup>, Renato Croci<sup>3</sup>*  
<sup>1</sup>ESA, The Netherlands; <sup>2</sup>EADS Astrium GmbH, Germany; <sup>3</sup>Thales Alenia Space, Italy

## EuRAD Poster01 : EuRAD Poster Session

Chair: Stephen Harman, QinetiQ Ltd., UK

Venue: Exhibition Hall, 12:30 - 16:00, Thursday 13th October 2011

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- 241 **C** **Imaging Procedures for the Inverse Synthetic Aperture Radar Application**  
*Maxim Konovalyuk, Yury Kuznetsov, Andrey Baev, Moscow Aviation Institute, Russia*
- 245 **C** **Method of the Radar Signals Detection and Selection Using Polarization Parameters**  
*V. Gromov, G. Sharygin, M. Mironov, TUSUR, Russia*
- 249 **C** **On Physical Principles of Quantitative Detection of Algae Bloom Using Radar**  
*S.A. Ermakov<sup>1</sup>, I.A. Sergievskaya<sup>1</sup>, T.N. Lazareva<sup>1</sup>, I.A. Kapustin<sup>1</sup>, E.V. Makarov<sup>1</sup>,  
O.Yu. Lavrova<sup>1</sup>, N.V. Andrijanova<sup>2</sup>*  
<sup>1</sup>Russian Academy of Sciences, Russia; <sup>2</sup>Nizhny Novgorod Centre of Hydrometeorology & Environmental Monitoring, Russia
- 253 **C** **Resolution Improvement in Radiometric Partial Discharge Detection by Fusion of Detected Levels**  
*Uditha W. Bandara, Nemai C. Karmakar, Andrew Price, Monash University, Australia*
- 257 **C** **Coherent Integration for Wideband LFM CW Applied to PARSAX Experimental Data**  
*Stéphanie Bidon<sup>1</sup>, François Deudon<sup>1</sup>, Oleg A. Krasnov<sup>2</sup>, François Le Chevalier<sup>2</sup>*  
<sup>1</sup>ISAE, France; <sup>2</sup>Technische Universiteit Delft, The Netherlands
- 261 **C** **Design, Characterization, and Optimization of Ultrawideband Cavity-Backed Spiral Antennas at Microwave Frequencies**  
*Mohammed Afsar<sup>1</sup>, Nahid Rahman<sup>1</sup>, Rudolph Cheung<sup>2</sup>*  
<sup>1</sup>Tufts University, USA; <sup>2</sup>Microwave Engineering Corporation, USA
- 265 **C** **A Novel, Wide Angle, High Resolution Direction-of-Arrival Detector**  
*Gabor Vinci, Francesco Barbon, Robert Weigel, Alexander Koelpin,  
Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*

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- 269 **C** **A Monopulse Imaging Concept for Reliable Radar Level Measurements**  
*Hanno Rabe<sup>1</sup>, Aline Friedrich<sup>1</sup>, Eckhard Denicke<sup>1</sup>, Ilona Rolfes<sup>2</sup>*  
<sup>1</sup>Leibniz Universität Hannover, Germany; <sup>2</sup>Ruhr-Universität Bochum, Germany
- 273 **C** **Lens Based Beamforming Principles for 77GHz Automotive Radar Sensors**  
*Klaus Baur, Marcel Mayer, Andreas Stöckle, Steffen Lutz, Thomas Walter, Hochschule Ulm, Germany*
- 277 **C** **An Antenna Arrangement for Phase Comparison Monopulse DOA Estimation Using Nonuniform Planar Array**  
*Toshihiro Ito, Ryuhei Takahashi, Kazufumi Hirata, Mitsubishi Electric Corporation, Japan*
- 281 **C** **Development of a Dual-Mirror-Scan Elevation-Monopulse Antenna System**  
*David Johnson, Mark Calleija, Graham Brooker, Eric Nettleton, University of Sydney, Australia*
- 285 **C** **Digital Beam Forming and Compressive Sensing Based DOA Estimation in MIMO Arrays**  
*Francesco Belfiori<sup>1</sup>, Laura Anitori<sup>2</sup>, Wim L. van Rossum<sup>2</sup>, Matern Otten<sup>2</sup>, Peter Hoogeboom<sup>1</sup>*  
<sup>1</sup>Technische Universiteit Delft, The Netherlands; <sup>2</sup>TNO, The Netherlands
- 289 **C** **Lorenz-Based Quasi-Orthogonal Waveforms for MIMO Radar Systems**  
*Hao-wen Chen, Zhao-kun Qiu, Lei Nie, Xiang Li, Zhao-wen Zhuang, NUDT, China*
- 293 **C** **Design and Testing of Multi-Sensor Radar Microwave Curtain**  
*Vojtech Jenik, Premysl Hudec, Czech Technical University in Prague, Czech Republic*
- 297 **C** **Study of Receiver Design in a MIMO SAR Configuration**  
*Vishal Riché, Stéphane Méric, Eric Pottier, IETR, France*

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*Sanhai Ren, Wenge Chang, NUDT, China*
- 305 **C** **Real-Time Motion Compensation of an Airborne UWB SAR**  
*Shaoshi Yan, Yueli Li, Zhimin Zhou, NUDT, China*
- 309 **C** **Indoor Millimetre Wave Synthetic Aperture Radar (SAR) Imaging: Modelling and System Studies**  
*Feng Qi, Vahid Tavakol, Ilja Ocket, Dominique Schreurs, Bart Nauwelaers, Katholieke Universiteit Leuven, Belgium*
- 313 **C** **Anti-Jamming Capabilities of UWB-OFDM SAR**  
*Md Anowar Hossain<sup>1</sup>, Ibrahim Elshafiey<sup>1</sup>, Majeed A.S. Alkanhal<sup>1</sup>, Ahmed Mabrouk<sup>2</sup>*  
*<sup>1</sup>King Saud University, Saudi Arabia; <sup>2</sup>International Islamic University Malaysia, Malaysia*
- 317 **C** **Hemorrhagic Stroke Detection via Adaptive UWB Medical Imaging Radar**  
*M. Jalilvand, E. Pancera, Xuyang Li, Thomas Zwick, W. Wiesbeck, KIT, Germany*
- 321 **C** **Short Range Tracking of Moving Persons by UWB Sensor Network**  
*Jana Rovňáková, Dušan Kocur, Technical University of Košice, Slovak Republic*
- 325 **C** **A SFCW Radar for Through Wall Imaging and Motion Detection**  
*Biyang Lu, Qian Song, Zhimin Zhou, Hanning Wang, NUDT, China*
- 329 **C** **Waveform Design for Target Recognition on the Background of Clutter**  
*Meimei Fan, Dongping Liao, Xiaofeng Ding, Xiang Li, NUDT, China*
- 333 **C** **Interference Cancellation for Dynamic Range Improvement in an OFDM Joint Radar and Communication System**  
*Yoke Leen Sit, Christian Sturm, Thomas Zwick, KIT, Germany*

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- 337 **C** **Synthesizing Range Profile in Clutter for Polarimetric Stepped-Frequency Radar**  
*MianQuan Li, XueSong Wang, ZhenHai Xu, DeJun Feng, YongZhen Li, JinLiang Li, NUDT, China*
- 341 **C** **A Dual-Radar System Based Estimation Algorithm of 3D Scatterer Distribution with Micro-Motions**  
*Peng Lei, Jun Wang, Jinping Sun, BUAA, China*
- 345 **C** **Double Frequency Sounding of Rain Using Contact Measurements**  
*G. Khlopov<sup>1</sup>, A. Linkova<sup>1</sup>, O. Voitovych<sup>1</sup>, Mikhail Cherniakov<sup>2</sup>*  
*<sup>1</sup>National Academy of Sciences of Ukraine, Ukraine; <sup>2</sup>University of Birmingham, UK*
- 349 **C** **Measurement of Radar Cross-Section and Complex Dielectric Properties of Forest Fire Ash**  
*Thomas Baum, Lachlan Thompson, Kamran Ghorbani, RMIT University, Australia*
- 353 **C** **Narrow Band Doppler Selection of the Signal on Background of the Scattering from the Sea**  
*V.I. Lutsenko, I.V. Lutsenko, I.V. Popov, National Academy of Sciences of Ukraine, Ukraine*
- 357 **C** **A New Architecture to Increase Security of Air Traffic Control System**  
*Enrico Anniballi, Roberta Cardinali, SESM s.c.a.r.l., Italy*
- 361 **C** **High-Efficiency Millimeter Wave Coherent Radar for Airport Surface Movement Monitoring and Control**  
*P.N. Melezhik<sup>1</sup>, V.B. Razskazovskiy<sup>1</sup>, N.G. Reznichenko<sup>1</sup>, V.A. Zuykov<sup>1</sup>, A.V. Varavin<sup>1</sup>, Yu.B. Sidorenko<sup>1</sup>, S.V. Provalov<sup>1</sup>, F.J. Yanovsky<sup>2</sup>*  
*<sup>1</sup>National Academy of Sciences of Ukraine, Ukraine; <sup>2</sup>National Aviation University, Ukraine*
- 365 **C** **A Dual Frequency Interferometric CW Radar for Vital Signs Detection**  
*Anatol Wiesner, Wiesner Associates, Germany*

## EuMC/EuRAD01 : Medical Applications

*Chair: Peter Hoogeboom, TNO, The Netherlands — Co-Chair: Richard Ranson, Radio System Design Ltd, UK*

*Venue: Charter 4, 08:30 - 10:10, Thursday 13th October 2011*

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- 369 **C** **Huygens Principle-Based Approach for UWB Medical Imaging**  
*Navid Ghavami<sup>1</sup>, Gianluigi Tiberi<sup>2</sup>, David J. Edwards<sup>1</sup>*  
*<sup>1</sup>University of Oxford, UK; <sup>2</sup>Università di Pisa, Italy*
- 373 **C** **Glottal Doppler Radar System and its Applications to Communication and Speaker Recognition**  
*Chia-Chan Chang, Chien-San Lin, Sheng-Fuh Chang, Chun-Chi Lin, Zhen-Qiang Jiang, Sung-Nien Yu, National Chung Cheng University, Taiwan*
- 377 **C** **A Bluetooth Low Energy Implantable Glucose Monitoring System**  
*Mai Ali, Lutfi Albasha, Hasan Al-Nashash, American University of Sharjah, UAE*
- 381 **C** **Monitoring Vital Signs Using Remote Harmonic Radar Concept**  
*Lydia Chioukh<sup>1</sup>, Halim Boutayeb<sup>1</sup>, Ke Wu<sup>1</sup>, Dominic Deslandes<sup>2</sup>*  
*<sup>1</sup>École Polytechnique de Montréal, Canada; <sup>2</sup>Université du Québec à Montréal, Canada*
- 385 **C** **Lens Applicator for Localized Microwave Heating of Surface Biological Tissues**  
*Vyacheslav V. Komarov, Saratov State Technical University, Russia*

## EuMC/EuRAD02 : Novel Phased Arrays and Beam-Pointing Techniques

Chair: Bernhard Schoenlinner, EADS Innovation Works, Germany — Co-Chair: Ioan Lager, TU Delft, The Netherlands

Venue: Charter 6, 08:30 - 10:10, Thursday 13th October 2011

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- 389 **C** **THACO: A Test Facility for Characterizing the Noise Performance of Active Antenna Arrays**  
*E.E.M. Woestenburg<sup>1</sup>, L. Bakker<sup>1</sup>, M. Ruiter<sup>1</sup>, M.V. Ivashina<sup>2</sup>, R.H. Witvers<sup>1</sup>*  
<sup>1</sup>ASTRON, The Netherlands; <sup>2</sup>Chalmers University of Technology, Sweden
- 393 **C** **Phase Conjugating Circuit with Frequency Offset Beam Pointing Error Correction Facility for Precision Retrodirective Antenna Applications**  
*N.B. Buchanan<sup>1</sup>, V. Fusco<sup>1</sup>, M. van der Vorst<sup>2</sup>*  
<sup>1</sup>Queen's University Belfast, UK; <sup>2</sup>ESA, The Netherlands
- 396 **C** **Beam Pointing Hybrid Technique for Phased Arrays with Low Phase Shifter Control**  
*Matteo Ciattaglia, Marco Zucca, SELEX Sistemi Integrati S.p.A., Italy*
- 400 **C** **Novel 1-Bit Elementary Cell for Reconfigurable Reflectarray Antennas**  
*S. Montori, F. Cacciamani, C. Tomassoni, L. Marccaccioli, Roberto Vincenti Gatti, Università di Perugia, Italy*
- 404 **C** **Reconfigurable Liquid Crystal Reflectarray with Extended Tunable Phase Range**  
*Saygin Bildik<sup>1</sup>, Sabine Dieter<sup>2</sup>, Carsten Fritzsche<sup>1</sup>, Michael Frei<sup>2</sup>, Christoph Fischer<sup>2</sup>, Wolfgang Menzel<sup>2</sup>, Rolf Jakoby<sup>1</sup>*  
<sup>1</sup>Technische Universität Darmstadt, Germany; <sup>2</sup>Universität Ulm, Germany

## EuMC/EuRAD03 : Phased Arrays in Radar

Chair: Volker Ziegler, EADS, Germany — Co-Chair: Jean-Yves Dauvignac, University of Nice-Sophia Antipolis, France

Venue: Charter 4, 13:40 - 15:00, Thursday 13th October 2011

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- 408 **C** **A Silicon-Germanium Single Chip Receiver for S-Band Phased Array Radars**  
*Wim de Heij<sup>1</sup>, Lex de Boer<sup>2</sup>, Peter de Hek<sup>2</sup>, Frank E. van Vliet<sup>2</sup>*  
<sup>1</sup>Thales, The Netherlands; <sup>2</sup>TNO, The Netherlands
- 412 **C** **Measurements of Sparse and Compact Phased Array Antenna Architectures**  
*A. Gustafsson, P.O. Frörlind, L. Pettersson, B. Carlegrim, J. Svedin, FOI, Sweden*
- 416 **C** **Phased-Array Antenna Beam Squinting Related to Frequency Dependency of Delay Circuits**  
*Sayed Kasra Garakoui, Eric A.M. Klumperink, Bram Nauta, Frank E. van Vliet, University of Twente, The Netherlands*
- 420 **C** **Design of Wide-Band Dual Polarized Aperture Array Antennas**  
*Yongwei Zhang, Anthony K. Brown, University of Manchester, UK*

## EuMC/EuRAD04: Antennas for Radar Applications

Chair: Anthony Keith Brown, University of Manchester, UK — Co-Chair: Christian Person, Lab-STICC, France

Venue: Charter 6, 13:40 - 15:00, Thursday 13th October 2011

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- 424 **C** **Integrated Antennas in eWLB Packages for 77GHz and 79GHz Automotive Radar Sensors**  
*Mahmoud Al Henawy, Martin Schneider, Universität Bremen, Germany*
- 428 **C** **A 77-GHz Antenna in Package**  
*Alexander Fischer<sup>1</sup>, Ziqiang Tong<sup>1</sup>, Abouzar Hamidipour<sup>1</sup>, Linus Maurer<sup>2</sup>, Andreas Stelzer<sup>1</sup>*  
*<sup>1</sup>Johannes Kepler Universität Linz, Austria; <sup>2</sup>DICE GmbH & Co KG, Austria*
- 432 **C** **A 79GHz Differentially Fed Grid Array Antenna**  
*Michael Frei<sup>1</sup>, Frank Bauer<sup>1</sup>, Wolfgang Menzel<sup>1</sup>, Andreas Stelzer<sup>2</sup>, Linus Maurer<sup>3</sup>*  
*<sup>1</sup>Universität Ulm, Germany; <sup>2</sup>Johannes Kepler Universität Linz, Austria; <sup>3</sup>DICE GmbH & Co KG, Austria*
- 436 **C** **A Novel Deterministic Synthesis Technique for Non-Uniformly Spaced Linear Antenna Arrays**  
*Diego Caratelli<sup>1</sup>, Maria Carolina Viganó<sup>2</sup>, Alexander G. Yarovoy<sup>1</sup>*  
*<sup>1</sup>Technische Universiteit Delft, The Netherlands; <sup>2</sup>ViaSat Inc., Switzerland*