

# **2021 18th European Radar Conference (EuRAD 2021)**

**London, United Kingdom  
5-7 April 2022**



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## EuRAD01 : EuRAD Opening Session

Chair: James Watts, EuRAD 2021 Chair

Co-Chairs: Stephen Harman, EuRAD 2021 Co-Chair and Matthew Ritchie, EuRAD 2021 TPC Chair

09:00-10:40, Tuesday 5th April 2022, Room 8-11

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- (NA)  **Welcome Address: Opening of the European Radar Conference 2021**  
*James Watts, EuRAD 2021 Chair*
- (NA)  **The Evolution of RF Sensing (Convergence and Co-operation Revisited)**  
*Barry Trimmer, Thales, UK*
- (NA)  **Emerging Antenna Technologies for Millimetre and Sub-Millimetre Wave Radar Systems**  
*Eva Rajo-Iglesias, Universidad Carlos III de Madrid, Spain*











## EuRAD02 : Radar Applications

Chair: Mayazzurra Ruggiano, Thales, The Netherlands

Co-Chair: Willem A. Hol, Thales, The Netherlands

11:20-13:00, Tuesday 5th April 2022, Room 17

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- 1   **A Human-Machine Distance Control System Using Incoherent Cooperative FMCW Radar Sensors**  
*Stefan Edstaller, Dominik Mueller, Siemens, Germany*
- 5   **Polarimetric UAV-Deployed FMCW Radar for Buried People Detection in Rescue Scenarios**  
*C. Sempere Chaves, R.H. Geschke, M. Shargorodskyy, R. Brauns, Reinhold Herschel, Christian Krebs, Fraunhofer FHR, Germany*
- 9   **Ground Penetrating Capabilities of Airborne SAR System SETHI**  
*Rémi Baqué, Sébastien Angelliaume, Pascale Dubois-Fernandez, Olivier Ruault du Plessis, ONERA, France*
- (NA)   **Improved RBFNN Based Rainfall Estimation: Initial Result**  
*Hui Bi<sup>1</sup>, Jie Yin<sup>1</sup>, Zhaoqi Wei<sup>1</sup>, Yanjie Yin<sup>1</sup>, Xingmeng Lu<sup>1</sup>, Shuang Jin<sup>1</sup>, Ye Zhou<sup>2</sup>*  
*<sup>1</sup>NUAA, China; <sup>2</sup>AVIC, China*
- 17   **An Approach for Sleep Apnea Detection Based on Radar Spectrogram Envelopes**  
*Y. Han, Alexander Yarovoy, Francesco Fioranelli, Technische Universiteit Delft, The Netherlands*

## EuRAD03: Emerging Radar Applications

Chair: Pierfrancesco Lombardo, Università di Roma "La Sapienza", Italy

Co-Chair: Willem A. Hol, Thales, The Netherlands

14:20–16:00, Tuesday 5th April 2022, Room 17

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- 21  **C Heating, Ventilation, and Air Conditioning Control by Range-Doppler and Micro-Doppler Radar Sensor**  
*Emanuele Cardillo<sup>1</sup>, Changzhi Li<sup>2</sup>, Alina Caddemi<sup>1</sup>*  
<sup>1</sup>Università di Messina, Italy; <sup>2</sup>Texas Tech University, USA
- 25  **C Plasma State Supervision Utilizing 140GHz Radar Measurements**  
*Francesca Schenkel, Christian Schulz, Christoph Baer, Ilona Rolfes, Ruhr-Universität Bochum, Germany*
- 29  **C Descending Staircase Detection for Service Robots Based on M-Sequence UWB Radar**  
*Tim Erich Wegner<sup>1</sup>, Jonas Gedschold<sup>1</sup>, Gerrit Kropp<sup>2</sup>, Johannes Trabert<sup>2</sup>, Martin Kmec<sup>3</sup>, Giovanni Del Galdo<sup>1</sup>*  
<sup>1</sup>Technische Universität Ilmenau, Germany; <sup>2</sup>MetraLabs, Germany; <sup>3</sup>Ilmsens, Germany
- 33  **C Data Augmentation in Time and Doppler Frequency Domain for Radar-Based Gesture Recognition**  
*Nicolai Kern, Christian Waldschmidt, Universität Ulm, Germany*
- 37  **C Multi-User Macro Gesture Recognition Using mmWave Technology**  
*Alexandros Ninos<sup>1</sup>, Jürgen Hasch<sup>1</sup>, Thomas Zwick<sup>2</sup>*  
<sup>1</sup>Robert Bosch, Germany; <sup>2</sup>KIT, Germany






## EuRAD04: Distributed and Multistatic Radar

Chair: Matthew Ritchie, University College London, UK

Co-Chair: Stephen Harman, Aveillant, UK

09:00–10:40, Wednesday 6th April 2022, Room 4

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- (NA)  **C Digital Radar: The Data Processing Challenge**  
*Hannah Durnall, Leonardo, UK*
- 42  **C Matching Bistatic Target Responses in Radar Networks to Enable Vectorial Velocity Estimation**  
*Benedikt Meinecke, David Werbunat, Pirmin Schoeder, Christian Waldschmidt, Universität Ulm, Germany*
- 46  **C Compressive Sensing-Based Coherent Signal Integration for Multistatic Microwave Radars**  
*Paul E. Berry, Nabaraj Dahal, DSTG, Australia*
- 50  **C A Dielectric Waveguide Based Signal Distribution Network for Time Multiplexed Fixed Target Radar Measurements**  
*Christoph Baer, Juanita Fernandez, Thomas Musch, Ruhr-Universität Bochum, Germany*
- 54  **C Ghost-Target Suppression in Coherent Radar Networks**  
*David Werbunat<sup>1</sup>, Benedikt Schweizer<sup>1</sup>, Benedikt Meinecke<sup>1</sup>, Rossen Michev<sup>2</sup>, Jürgen Hasch<sup>2</sup>, Christian Waldschmidt<sup>1</sup>*  
<sup>1</sup>Universität Ulm, Germany; <sup>2</sup>Robert Bosch, Germany






## EuRAD05 : AI Methods in Automotive Signal Processing and Information Extraction

Chair: Francesco Fioranelli, Technische Universiteit Delft, The Netherlands

Co-Chair: Fatih Sezgin, Technische Hochschule Ingolstadt, Germany

09:00-10:40, Wednesday 6th April 2022, Room 7

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- 58  **C** **Enhancing Angular Resolution Using Neural Networks in Automotive Radars**  
*Ignacio Roldan, Francesco Fioranelli, Alexander Yarovoy, Technische Universiteit Delft, The Netherlands*
- 62  **C** **Drivable Free Space Detection on High-Resolution Radar Using Convolutional Neural Networks**  
*David Forino, Chetan Mara, Juan Pablo Steierl, Automotive Safety Technologies, Germany*
- 66  **C** **A Deep Learning Approach for Pedestrian Behavior Interpretation Based on Radar Point Clouds**  
*Fatih Sezgin, Daniel Vriesman, Patrick Held, Alessandro Zimmer, Thomas Brandmeier, Technische Hochschule Ingolstadt, Germany*
- 70  **C** **Weakly Supervised Semantic Segmentation for Range-Doppler Maps**  
*Konstantinos Fatseas<sup>1</sup>, Marco J.G. Bekooij<sup>2</sup>*  
*<sup>1</sup>University of Twente, The Netherlands; <sup>2</sup>NXP Semiconductors, The Netherlands*
- 74  **C** **Signal Reconstruction Using Bi-LSTM for Automotive Radar Interference Mitigation**  
*Muhammad Rameez, Saleh Javadi, Mattias Dahl, Mats I. Pettersson, BTH, Sweden*






## EuRAD06 : Radar Characteristics Measurement, Modelling and Simulation

Chair: Liam Daniel, University of Birmingham, UK

Co-Chair: Stéphane Méric, IETR (UMR 6164), France

09:00-10:40, Wednesday 6th April 2022, Room 8

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- 78  **C** **Signal Reduction Due to Layer of Water at Low-THz Frequency for Automotive Radar Applications**  
*Shahrzad Sabery, Fatemeh Norouzian, Aleksandr Bystrov, Emidio Marchetti, Peter Gardner, Marina Gashinova, University of Birmingham, UK*
- 82  **C** **Synthetic Sea-Clutter Modelling for STAP**  
*Sabrina Machhour, Stéphane Kemkemia, Thales, France*
- 86  **C** **Numerical Analysis of Radar-Plasma-Signatures of a Sphere in a Mach 10 Hypersonic Wind Tunnel Flow**  
*René Petervari<sup>1</sup>, Alexander Nekris<sup>2</sup>, Tanja Bieker<sup>1</sup>*  
*<sup>1</sup>Fraunhofer FHR, Germany; <sup>2</sup>ISL, France*
- 90  **C** **Scattering Properties of Antennas Used for Stimulating Radar Sensors**  
*Michael E. Gadringer, Michael Vorderderfler, Helmut Schreiber, Wolfgang Bösch, Technische Universität Graz, Austria*
- 94  **C** **Quasi-Monostatic Radar Cross-Section Measurement in Reverberation Chamber**  
*C. Charlo, P. Besnier, Stéphane Méric, IETR (UMR 6164), France*


## EuRAD07: Drone Detection and Recognition

Chair: Francesco Fioranelli, Technische Universiteit Delft, The Netherlands

Co-Chair: Matthew Ritchie, University College London, UK

11:20–13:00, Wednesday 6th April 2022, Room 4

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- 98  **C bladeRAD: Development of an Active and Passive, Multistatic Enabled, Radar System**  
*Piers J. Beasley, Matthew A. Ritchie, University College London, UK*
- 102  **C ARESTOR: A Multi-Role RF Sensor Based on the Xilinx RFSoc**  
*Nial Peters, Colin Horne, Matthew A. Ritchie, University College London, UK*
- 106  **C Development of a Passive Dual Channel Receiver at L-Band for the Detection of Drones**  
*Benjamin Griffin<sup>1</sup>, Alessio Balleri<sup>1</sup>, Chris J. Baker<sup>2</sup>, Mohammed Jahangir<sup>2</sup>, Stephen Harman<sup>3</sup>*  
*<sup>1</sup>Cranfield University, UK; <sup>2</sup>University of Birmingham, UK; <sup>3</sup>Aveillant, UK*
- 110  **C Receivers Placement for UAV Localization in a Surveillance Area**  
*Pierre Leba<sup>1</sup>, Jean-Yves Baudais<sup>1</sup>, Stéphane Méric<sup>1</sup>, Matthieu Crussière<sup>1</sup>, Pierre-Yves Jézéquel<sup>2</sup>*  
*<sup>1</sup>IETR (UMR 6164), France; <sup>2</sup>TDF, France*
- 114  **C Realistic Simulation of Drone Micro-Doppler Signatures**  
*Cameron Bennett<sup>1</sup>, Stephen Harman<sup>1</sup>, Ivan Petrunin<sup>2</sup>*  
*<sup>1</sup>Aveillant, UK; <sup>2</sup>Cranfield University, UK*






## EuRAD08: Radar Antennas, Arrays and Calibration

Chair: Claire Migliaccio, Université Côte d'Azur, France

Co-Chair: Benjamin Nuss, KIT, Germany

11:20–13:00, Wednesday 6th April 2022, Room 9

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- 118  **C Design of Antennas with Capacitively Coupled Patches for Enlarged Bandwidth in the 80GHz Band**  
*Jonathan Mayer, Jerzy Kowalewski, Akanksha Bhutani, Lucas Giroto de Oliveira, Thomas Zwick, KIT, Germany*
- 122  **C Phase Distortion Correction of 79GHz Frequency-Modulated Continuous Wave Radar**  
*Sungdo Choi, Seungtae Khang, Hyun-Woong Cho, Minsung Eo, Jongseok Kim, SAIT, Korea*
- 126  **C Compact, Broadband, and Highly Efficient Leaky-Wave Antenna in Air-Filled Substrate Integrated Waveguide Technology**  
*Kamil Yavuz Kapusuz, Andres Vanden Berghe, Sam Lemey, Hendrik Rogier, Ghent University, Belgium*
- 129  **C Active Ka-Band Open-Ended Waveguide Antenna with Built-In IC Cooling for Use in Large Arrays**  
*Martijn de Kok, A.B. Smolders, Cornelis J.C. Vertegaal, Ulf Johannsen, Technische Universiteit Eindhoven, The Netherlands*
- 133  **C Dual-Polarized Multilayer L-Band Asymmetric Subarray with Truncated Electric Walls Separation for Airborne SAR Applications**  
*Diego Lorente<sup>1</sup>, Markus Limbach<sup>1</sup>, Bernd Gabler<sup>1</sup>, Héctor Esteban<sup>2</sup>, Vicente E. Boria<sup>2</sup>*  
*<sup>1</sup>DLR, Germany; <sup>2</sup>Universitat Politècnica de València, Spain*





## EuRAD09: Positioning and Localization Systems

Chair: María-Pilar Jarabo-Amores, University of Alcalá, Spain

Co-Chair: Markus Steck, HENSOLDT, Germany

11:20–13:00, Wednesday 6th April 2022, Room 10

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- 137  **C** **Near Field DoA Estimation Utilizing a Large Aperture MIMO Array Radar with Tx Beamforming**  
*Kazuhiro Tsujimura, Hiroki Mori, Toshiba, Japan*
- 141  **C** **Outlier Rejection Approach for Direction of Arrival Estimation in Low SNR Conditions**  
*Andrea Quirini, Francesca Filippini, Carlo Bongioanni, Fabiola Colone, Pierfrancesco Lombardo, Università di Roma “La Sapienza”, Italy*
- 145  **C** **Concept Analysis of a Frequency-Sweeping Delta/Sigma Beam-Switching Radar Using Machine Learning**  
*Mohammad Reza Seidi Goldar<sup>1</sup>, Jamshid Hassanpour<sup>2</sup>, Joachim Oberhammer<sup>1</sup>*  
*<sup>1</sup>KTH, Sweden; <sup>2</sup>University of Tehran, Iran*
- 149  **C** **Indoor Positioning with a Six-Beam Planar Antenna Suitable for 2.45GHz Wireless Communications**  
*Alessandro Cidronali, Edoardo Ciervo, Giovanni Collodi, Stefano Maddio, Marco Passafiume, Giuseppe Pelosi, Università di Firenze, Italy*
- 153  **C** **Experimental Deep Learning Assisted Super-Resolution Radar Imaging**  
*Mostafa Alizadeh<sup>1</sup>, Mohammad Chavoshi<sup>1</sup>, Amr Samir<sup>1</sup>, Ahmed Metwally Hegazy<sup>1</sup>, Ali Bahri<sup>2</sup>, Mohamed Basha<sup>1</sup>, Safieddin Safavi-Naeini<sup>1</sup>*  
*<sup>1</sup>University of Waterloo, Canada; <sup>2</sup>University of Calgary, Canada*






## EuRAD10: Signal Processing for Automotive Radar

Chair: Mikhail Cherniakov, University of Birmingham, UK

Co-Chair: Marc Bauduin, imec, Belgium

14:20–16:00, Wednesday 6th April 2022, Room 4

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- 157  **C** **PMCW Radar Robust to Power Amplifier Non-Linearity and IQ Imbalance with Pi/K-BPSK Modulation**  
*Marc Bauduin, André Bourdoux, imec, Belgium*
- 161  **C** **PreCFAR Gridmaps for Automotive Radar**  
*Fabio Weishaupt<sup>1</sup>, Nils Appenrodt<sup>1</sup>, Julius F. Tilly<sup>1</sup>, Jürgen Dickmann<sup>1</sup>, Dirk Heberling<sup>2</sup>*  
*<sup>1</sup>Mercedes-Benz, Germany; <sup>2</sup>RWTH Aachen University, Germany*
- 165  **C** **A Radar-Oriented Approach to the Normal Distributions Transform**  
*Martijn Heller, Nikita Petrov, Alexander Yarovoy, Technische Universiteit Delft, The Netherlands*
- 169  **C** **Reduction of Sidelobe Effects in Automotive Polarimetric Radar Measurements**  
*Julius F. Tilly<sup>1</sup>, Ole Schumann<sup>1</sup>, Fabio Weishaupt<sup>1</sup>, Jürgen Dickmann<sup>1</sup>, Gerd Wanielik<sup>2</sup>*  
*<sup>1</sup>Mercedes-Benz, Germany; <sup>2</sup>Technische Universität Chemnitz, Germany*
- 173  **C** **Comparing Non-Adaptive with Adaptive Windowing Using Multi-Dimensional Spatially Variant Apodization for Automotive Radar**  
*Minh Q. Nguyen<sup>1</sup>, Reinhard Feger<sup>1</sup>, Jonathan Bechter<sup>2</sup>, Markus Pichler-Scheder<sup>3</sup>, Andreas Stelzer<sup>1</sup>*  
*<sup>1</sup>Johannes Kepler Universität Linz, Austria; <sup>2</sup>ZF Friedrichshafen, Germany; <sup>3</sup>Linz Center of Mechatronics, Austria*



## EuRAD11 : Radar Processing Techniques for Automotive and Transportation

Chair: Marina Gashinova, University of Birmingham, UK

Co-Chair: Kevin Cinglant, ZF Autocruise, France

14:20–16:00, Wednesday 6th April 2022, Room 12

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- 177  **C** **Extended Object Tracking with IMM Filter for Automotive Pre-Crash Safety Applications**  
*Anusha Hanumegowda<sup>1</sup>, Soumya Dewangan<sup>1</sup>, Srihari Bhupala<sup>1</sup>, Frank Gruson<sup>2</sup>, Dagmar Steinhauser<sup>3</sup>*  
<sup>1</sup>Continental, India; <sup>2</sup>Continental, Germany; <sup>3</sup>Technische Hochschule Ingolstadt, Germany
- 181  **C** **A Real-Time, Frame-Level Platform Vibration Compensation Approach for mmWave Radar Systems**  
*Nikhil Poole, Soheil Hor, Amin Arbabian, Stanford University, USA*
- 185  **C** **Implementation and Assessment of a Radar Based True-Speed-Over-Ground Estimation Approach Utilizing Complex-Valued Correlation**  
*Torsten Reissland<sup>1</sup>, Fabian Michler<sup>1</sup>, Robert Weigel<sup>1</sup>, Alexander Koelpin<sup>2</sup>, Fabian Lurz<sup>2</sup>*  
<sup>1</sup>FAU Erlangen-Nürnberg, Germany; <sup>2</sup>Technische Universität Hamburg, Germany
- 189  **C** **Localization and Navigation of Service Robots by Means of M-Sequence UWB Radars**  
*Carsten Smeenk<sup>1</sup>, Tim Erich Wegner<sup>1</sup>, Gerrit Kropp<sup>2</sup>, Johannes Trabert<sup>2</sup>, Giovanni Del Galdo<sup>1</sup>*  
<sup>1</sup>Technische Universität Ilmenau, Germany; <sup>2</sup>MetraLabs, Germany
- 193  **C** **Comparison of ZF and MF Filters Through PSLR and ISLR Assessment in Automotive OFDM Radar**  
*Bochra Benmeziane<sup>1</sup>, Jean-Yves Baudais<sup>1</sup>, Stéphane Méric<sup>1</sup>, Kevin Cinglant<sup>2</sup>*  
<sup>1</sup>IETR (UMR 6164), France; <sup>2</sup>ZF Autocruise, France

## EuRAD12 : EuRAD Posters

Chair: Mustafa Bakr, University of Oxford, UK




13:50–15:00, Wednesday 6th April 2022, Exhibition Hall

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- 197  **C** **Detection of Helicopters on a Single Range-Doppler Map Using LSTM Networks**  
*Deniz Orkun Eren, Fatih Pektas, ASELSAN, Turkey*
- 201  **C** **Efficient Velocity Disambiguation with Hypothetical Ambiguity Assessment**  
*Sungdo Choi, Youngrae Cho, Hyun-Woong Cho, Minsung Eo, Jongseok Kim, SAIT, Korea*
- 205  **C** **FPGA Implementation of Multiple Low-Rate Sampling Composite Detector**  
*Canisio Barth, Ric A. Romero, Douglas J. Fouts, Naval Postgraduate School, USA*
- 209  **C** **Fast 3D-CFAR for Drone Detection with MIMO Radars**  
*Siyang Wang, Reinhold Herschel, Fraunhofer FHR, Germany*
- 213  **C** **Least Squares Calibration of MIMO Radars with Collocated Arrays**  
*Nikita Petrov, Alexander Yarovoy, Technische Universiteit Delft, The Netherlands*
- 217  **C** **Joint Range-Angle Super-Resolution Estimation for Frequency Division MIMO Radar**  
*Hui Zhang<sup>1</sup>, Sida Song<sup>1</sup>, Sha Ma<sup>1</sup>, Lei Wan<sup>1</sup>, Tommi Jamsa<sup>2</sup>*  
<sup>1</sup>Huawei Technologies, China; <sup>2</sup>Huawei Technologies, Germany
- 221  **C** **Machine Learning Using Support Vector Regression in Radar Remote Sensing for Oil-Spill Thickness Estimation**  
*Charbel Bou Maroun<sup>1</sup>, Georges Daou<sup>1</sup>, Bassel Hammoud<sup>2</sup>, Bilal Hammoud<sup>1</sup>*  
<sup>1</sup>Lebanese American University, Lebanon; <sup>2</sup>American University of Beirut, Lebanon
- 225  **C** **Development of Quantum Enabled Staring Radar with Low Phase Noise**  
*Mohammed Jahangir, Jonathan M. Jones, Jithin Kannanthara, Chris J. Baker, Kai Bongs, Michail Antoniou, Yeshpal Singh, University of Birmingham, UK*



*EuRAD12 continued...*





- 229  **C** **Increased Traffic Safety by Means of Intelligent Detection and Localization Technologies**  
*R. Kulke<sup>1</sup>, M. Hägelen<sup>1</sup>, R. Jetten<sup>1</sup>, M. Schmidhammer<sup>2</sup>, F. de Ponte Müller<sup>2</sup>, I. Rashdan<sup>2</sup>*  
*<sup>1</sup>IMST, Germany; <sup>2</sup>DLR, Germany*
- 233  **C** **Cognitive Radar Tracking with Adaptation of Update Interval and Integration Time**  
*Svante Björklund, Thomas Sjögren, FOI, Sweden*
- 237  **C** **Clutter Characterization for Robust Detection of Slow Moving Targets in Ka-Band Noise Radar Images**  
*N. del-Rey-Maestre<sup>1</sup>, S. Lukin<sup>1</sup>, M.P. Jarabo-Amores<sup>1</sup>, K. Lukin<sup>2</sup>, D. Mata-Moya<sup>1</sup>, P.J. Gómez-del-Hoyo<sup>1</sup>*  
*<sup>1</sup>Universidad de Alcalá, Spain; <sup>2</sup>NASU, Ukraine*
- 241  **C** **Nonlinear Least Squares Estimation for Breathing Monitoring Using FMCW Radars**  
*Gabriel Beltrão<sup>1</sup>, Mohammad Alae-Kerahroodi<sup>1</sup>, Udo Schroeder<sup>2</sup>, Dimitri Tatarinov<sup>2</sup>, Bhavani Shankar M.R.<sup>1</sup>*  
*<sup>1</sup>Université du Luxembourg, Luxembourg; <sup>2</sup>IEE, Luxembourg*
- 245  **C** **An Inexpensive SDR System for Emitter Localization**  
*Simon Hüsges, Michael Meuleners, Christoph Degen, Hochschule Niederrhein, Germany*
- 249  **C** **2D Matched Filtering with Time-Stretching; Application to Orthogonal Matching Pursuit (OMP)**  
*Remko E. Struiksmma, Faruk Uysal, Wim L. van Rossum, TNO, The Netherlands*
- 253  **C** **Radar Calibration by Corner Reflectors with Mass-Production Errors**  
*Nikita Petrov, Erkut Yiğit, Oleg Krasnov, Alexander Yarovoy, Technische Universiteit Delft, The Netherlands*

## EuRAD13: Radar Imaging

*Chair: Matthew Ritchie, University College London, UK*

*16:40–18:20, Wednesday 6th April 2022, Room 1*

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- 257  **C** **Pulse-to-Pulse Radar-Aided Positioning Using Multibeam Autofocus**  
*Keith T.J. Klein, Faruk Uysal, Miguel Caro Cuenca, Matern P.G. Otten, Jacco J.M. de Wit, TNO, The Netherlands*
- 261  **C** **Detection of Fiber Orientation with SAR Imaging via Amplitude and Phase Filtering**  
*André Froehly, Reinhold Herschel, Fraunhofer FHR, Germany*
- 265  **C** **The End-to-End Segmentation on Automotive Radar Imagery**  
*Yang Xiao, Liam Daniel, Marina Gashinova, University of Birmingham, UK*
- 269  **C** **A Comparison of Tomographic SAR Reconstruction Methods Using Spaceborne Data**  
*Prithvi Laguduvan Thyagarajan, Holger Nies, Florian Behner, Simon Reuter, Otmar Loffeld, Universität Siegen, Germany*
- 273  **C** **Refraction Compensation via Ray Tracing Methods for Complex-Shaped Objects**  
*André Froehly, Reinhold Herschel, Fraunhofer FHR, Germany*

## EuRAD14: Target and Clutter Classification in Automotive Radar

Chair: Benjamin Nuss, KIT, Germany

16:40–18:20, Wednesday 6th April 2022, Room 4

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- 277  **C Radar-Based Classification of Automotive-Related Scenarios Using Temporal Information**  
*Karim Ishak<sup>1</sup>, Nils Appenrodt<sup>2</sup>, Jürgen Dickmann<sup>2</sup>, Christian Waldschmidt<sup>1</sup>*  
*<sup>1</sup>Universität Ulm, Germany; <sup>2</sup>Daimler, Germany*
- 281  **C Ray-Tracing-Based Micro-Doppler Simulation for 77GHz Automotive Scenarios**  
*S. Wald, Thomas Dallmann, F. Weinmann, Fraunhofer FHR, Germany*
- 285  **C Dynamic Road Surface Signatures in Automotive Scenarios**  
*Wietse Bouwmeester, Francesco Fioranelli, Alexander Yarovoy, Technische Universiteit Delft, The Netherlands*
- 289  **C Digital FIR Filtering for Static Clutter Suppression in Low Resolution MIMO Radar**  
*Ram Kishore Arumugam<sup>1</sup>, Reinhold Herschel<sup>1</sup>, Ihssen Masri<sup>2</sup>, Katharina Burger<sup>2</sup>, Willibald Reitmeier<sup>2</sup>*  
*<sup>1</sup>Fraunhofer FHR, Germany; <sup>2</sup>Vitesco Technologies, Germany*
- 293  **C Classification of Vulnerable Road Users Based on Spectrogram Autocorrelation Features**  
*Patrick Rippl, Johannes Iberle, Thomas Walter, Technische Hochschule Ulm, Germany*





## EuRAD15: Human Activity Sensing

Chair: Michail Antoniou, University of Birmingham, UK

Co-Chair: Francesco Fioranelli, Technische Universiteit Delft, The Netherlands

16:40–18:20, Wednesday 6th April 2022, Room 17

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- 297  **C Hand Gesture Recognition Using a Dual Axis Millimeter-Wave Interferometric-Doppler Radar and Convolutional Neural Networks**  
*Eric Klinefelter, Jeffrey A. Nanzer, Michigan State University, USA*
- 301  **C Distributed Radar-Based Human Activity Recognition Using Vision Transformer and CNNs**  
*Yubin Zhao, Ronny Gerhard Guendel, Alexander Yarovoy, Francesco Fioranelli, Technische Universiteit Delft, The Netherlands*
- 305  **C A Novel Micro-Doppler Coherence Loss for Deep Learning Radar Applications**  
*Mikolaj Czerkawski, Christos Ilioudis, Carmine Clemente, Craig Michie, Ivan Andonovic, Christos Tachtatzis, University of Strathclyde, UK*
- 309  **C High Resolution Human Clustering Based on Complex Signal Correlation Coefficients**  
*Manjunath Thindlu Rudrappa, Reinhold Herschel, Fraunhofer FHR, Germany*
- 313  **C Car Occupancy Detection Using Ultra-Wideband Radar**  
*Jakob Möderl, Franz Pernkopf, Klaus Witrals, Technische Universität Graz, Austria*






## EuRAD16: Waveforms

Chair: Aled Catherall, PlexTek, UK

Co-Chair: Tobias Chaloun, Universität Ulm, Germany

09:00–10:40, Thursday 7th April 2022, Room 4

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- 317  **C** **Frequency Comb Generation for High Range Resolution OFDM Radar**  
*Alexander Quint, Benjamin Nuss, Axel Diewald, Thomas Zwick, KIT, Germany*
- 321  **C** **Effects and Countermeasures at High Velocities for the Frequency Comb OFDM Radar Scheme**  
*Benjamin Nuss, Lucas Giroto de Oliveira, Thomas Zwick, KIT, Germany*
- 325  **C** **IQ-Transmitter Digital Predistortion for an OFDM Radar**  
*Rossen Michev<sup>1</sup>, David Werbunat<sup>2</sup>, Jürgen Hasch<sup>1</sup>, Christian Waldschmidt<sup>2</sup>*  
*<sup>1</sup>Robert Bosch, Germany; <sup>2</sup>Universität Ulm, Germany*
- 329  **C** **Doppler Effect in a 79-GHz Sequential Sampling Pulse Radar**  
*Alexander Leibetseder<sup>1</sup>, Andreas Stelzer<sup>2</sup>*  
*<sup>1</sup>Infineon Technologies, Austria; <sup>2</sup>Johannes Kepler Universität Linz, Austria*
- 333  **C** **Cognitive FMCW-Radar Concept for Ultrafast Spatial Mapping Using Frequency Coded Channels**  
*Nicholas Karsch, Christoph Baer, Thomas Musch, Ruhr-Universität Bochum, Germany*

## EuRAD17: Multistatic and Fusion Techniques

Chair: Krzysztof Kulpa, Warsaw University of Technology, Poland

Co-Chair: Nial Peters, University College London, UK

09:00–10:40, Thursday 7th April 2022, Room 10

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- 337  **C** **Multi-Radar Fusion for Failure-Tolerant Vulnerable Road Users Classification**  
*Maxim Rykunov<sup>1</sup>, Eddy De Greef<sup>1</sup>, Habib-Ur-Rehman Khalid<sup>2</sup>, Kheireddine Aziz<sup>2</sup>,*  
*André Bourdoux<sup>1</sup>, Hichem Sahli<sup>2</sup>*  
*<sup>1</sup>imec, Belgium; <sup>2</sup>Vrije Universiteit Brussel, Belgium*
- 341  **C** **On Two Approaches to Radar Band Fusion**  
*Sanhita Guha, Andreas Bathelt, Joachim Ender, Fraunhofer FHR, Germany*
- 345  **C** **Modelling of Extended Targets with Dual-Band MIMO Radar Networks**  
*M.M.H. Amir<sup>1</sup>, S. Maresca<sup>1</sup>, G. Serafino<sup>1</sup>, P. Ghelfi<sup>2</sup>, A. Bogoni<sup>1</sup>*  
*<sup>1</sup>Scuola Superiore Sant'Anna, Italy; <sup>2</sup>CNIT, Italy*
- 349  **C** **Contactless Inspection of Handwritten Documents with Terahertz Imaging**  
*Ingrid Ullmann, Konstantin Root, Jan Schür, Lorenz Scheuble, Martin Vossiek, FAU*  
*Erlangen-Nürnberg, Germany*
- 353  **C** **Bistatic GB-SAR with Moving Transponder**  
*Lapo Miccinesi, Luca Bigazzi, Massimiliano Pieraccini, Michele Basso, Università di Firenze,*  
*Italy*






## EuRAD18: Object Classification Techniques

Chair: TBA

Co-Chair: Jacco de Wit, TNO, The Netherlands

09:00–10:40, Thursday 7th April 2022, Room 11

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- 357  **C** **Transfer Learning-Based Fully-Polarimetric Radar Image Classification with a Rejection Option**  
*Elisa Giusti<sup>1</sup>, Selenia Ghio<sup>1</sup>, Amir Hosein Oveis<sup>1</sup>, Marco Martorella<sup>2</sup>*  
<sup>1</sup>CNIT, Italy; <sup>2</sup>Università di Pisa, Italy
- 361  **C** **Convolutional Neural Networks for Drone Model Classification**  
*H. Dale<sup>1</sup>, Michail Antoniou<sup>1</sup>, Chris J. Baker<sup>1</sup>, Mohammed Jahangir<sup>1</sup>, A. Catherall<sup>2</sup>*  
<sup>1</sup>University of Birmingham, UK; <sup>2</sup>Plextek, UK
- 365  **C** **Classification of Unmanned Aerial Vehicles (UAVs) Carrying Payloads with Polarimetric Radar**  
*H. Visvanathan Sethuraman, Alexander Yarovoy, Francesco Fioranelli, Technische Universiteit Delft, The Netherlands*
- 369  **C** **Objects Classification Based on UWB Scattered Field and SEM Data Using Machine Learning Algorithms**  
*Yasmina Zaky, Nicolas Fortino, Jean-Yves Dauvignac, Benoit Miramond, LEAT (UMR 7248), France*
- 373  **C** **Fruit Sorting with Amplitude-Only Measurements**  
*F. Zidane<sup>1</sup>, J. Lanteri<sup>1</sup>, L. Brochier<sup>1</sup>, J. Marot<sup>2</sup>, C. Migliaccio<sup>1</sup>*  
<sup>1</sup>LEAT (UMR 7248), France; <sup>2</sup>Institut Fresnel (UMR 7249), France






## EuRAD19: Short Range Radar

Chair: Marina Gashinova, University of Birmingham, UK

Co-Chair: Reinhold Herschel, Fraunhofer FHR, Germany

11:20–13:00, Thursday 7th April 2022, Room 4

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- 377  **C** **Hand-Guided Mobile Terahertz 3D Imaging Platform with Aspherical Telecentric f- $\theta$  Optics**  
*Shiva Mohammadzadeh<sup>1</sup>, Andreas Keil<sup>1</sup>, Sven Leuchs<sup>2</sup>, Christian Krebs<sup>2</sup>, Dirk Nüßler<sup>2</sup>, Jörg Seewig<sup>3</sup>, Fabian Friederich<sup>1</sup>*  
<sup>1</sup>Fraunhofer ITWM, Germany; <sup>2</sup>Fraunhofer FHR, Germany; <sup>3</sup>Technische Universität Kaiserslautern, Germany
- 381  **C** **Real Time Ultra High Resolution Microwave Imaging Curtain**  
*Harun Cetinkaya<sup>1</sup>, Rémi Baqué<sup>2</sup>, Reinhold Herschel<sup>1</sup>, Nils Pohl<sup>3</sup>*  
<sup>1</sup>Fraunhofer FHR, Germany; <sup>2</sup>ONERA, France; <sup>3</sup>Ruhr-Universität Bochum, Germany
- 385  **C** **Analysis of a Physically-Embedded Radar Sensor System**  
*Thomas Kurin<sup>1</sup>, Vadim Issakov<sup>2</sup>, Stefan Erhardt<sup>1</sup>, Robert Weigel<sup>1</sup>, Fabian Lurz<sup>3</sup>*  
<sup>1</sup>FAU Erlangen-Nürnberg, Germany; <sup>2</sup>Infineon Technologies, Germany; <sup>3</sup>Technische Universität Hamburg, Germany
- 389  **C** **Towards a Field-Ready HF-VHF Ground-Based Ice Penetrating Synthetic Aperture Radar: Forward Modelling and Validation for SAR Imaging**  
*J.D. Hawkins<sup>1</sup>, L.B. Lok<sup>1</sup>, P.V. Brennan<sup>1</sup>, K.W. Nicholls<sup>2</sup>*  
<sup>1</sup>University College London, UK; <sup>2</sup>British Antarctic Survey, UK
- 393  **C** **Comparison of Short-Range SAR Imaging Algorithms for the Detection of Landmines Using Numerical Simulations**  
*Jonas Schorlemer, Jochen Jebramcik, Ilona Rolfes, Jan Barowski, Ruhr-Universität Bochum, Germany*






## EuRAD20: Phased Array and MIMO Systems

Chair: Colin Horne, University College London, UK

Co-Chair: David Mata-Moya, Universidad de Alcalá, Spain

11:20–13:00, Thursday 7th April 2022, Room 10

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- 397  **C Architecture Considerations for AESA Antennas Providing Future Maritime Air Defence**  
*Martin Widgery, BAE Systems, UK*
- 401  **C Compressive Sensing for Direction-of-Arrival Estimation Using an Electronically Steered Multiple-Input Multiple-Output Array**  
*Max Schurwanz<sup>1</sup>, Jan Mietzner<sup>1</sup>, Peter Adam Hoeher<sup>2</sup>*  
*<sup>1</sup>HAW Hamburg, Germany; <sup>2</sup>CAU, Germany*
- 405  **C A Practical Concept for Precise Calibration of MIMO Radar Systems**  
*Johanna Geiss, Erik Sippel, Martin Vossiek, FAU Erlangen-Nürnberg, Germany*
- 409  **C Combined ISAR and MIMO Processing for Near-Field 3D Radar Imaging**  
*Seifallah Jarak<sup>1</sup>, Daiki Yoda<sup>2</sup>, Hiroki Mori<sup>2</sup>*  
*<sup>1</sup>Toshiba, UK; <sup>2</sup>Toshiba, Japan*
- 413  **C Automotive Interference Suppression in MIMO and Phased Array Radar**  
*Anum Pirkani, Fatemeh Norouzian, Edward Hoare, Mikhail Cherniakov, Marina Gashinova, University of Birmingham, UK*






## EuRAD21: Radar Signal Processing and Imaging

Chair: TBA

Co-Chair: Fatemeh Norouzian, University of Birmingham, UK

11:20–13:00, Thursday 7th April 2022, Room 11

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- 417  **C Doppler Beam Sharpening for Enhanced MIMO Imagery in the Presence of Automotive Interference**  
*Anum Pirkani, Scott Cassidy, Fatemeh Norouzian, Marina Gashinova, Mikhail Cherniakov, University of Birmingham, UK*
- 421  **C Finding Anomalies in Radar Sea Clutter Using Radon Transforms**  
*A.G. Stove, Liam Daniel, Marina Gashinova, Edward Hoare, D. Kumar, University of Birmingham, UK*
- 425  **C Images of Satellite Elements with a Space-Borne Sub-THz ISAR System**  
*Emidio Marchetti, A.G. Stove, Edward Hoare, Mikhail Cherniakov, Marina Gashinova, University of Birmingham, UK*
- 429  **C Doppler Centroid Estimation for Ocean Surface Current Retrieval from Sentinel-1 SAR Data**  
*Muhammad Amjad Iqbal<sup>1</sup>, Andrei Anghel<sup>2</sup>, Mihai Datcu<sup>2</sup>*  
*<sup>1</sup>UPB, Romania; <sup>2</sup>DLR, Germany*
- 433  **C Radar Travel Time Tomography for Subsurface Ice Exploration at Saturn's Moon Enceladus**  
*Christian Marinus Huber<sup>1</sup>, Andreas Benedikter<sup>1</sup>, Gerhard Krieger<sup>1</sup>, Marc Rodriguez-Cassola<sup>2</sup>*  
*<sup>1</sup>FAU Erlangen-Nürnberg, Germany; <sup>2</sup>DLR, Germany*




## EuRAD22 : EuRAD Closing Session

Chair: James Watts, EuRAD 2021 Chair

Co-Chairs: Stephen Harman, EuRAD 2021 Co-Chair and Matthew Ritchie, EuRAD 2021 TPC Chair

14:20–16:00, Thursday 7th April 2022, Room 7-9

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- (NA)  **The Long and Winding Road that Leads to Autonomy?**  
*Nigel Clarke, Consultant, UK*
- (NA)  **Awards Ceremony**  
*Kamal K. Samanta, EuMW 2021 Awards Chair*
- (NA)  **Closing Remarks and Invitation to EuRAD 2022 in Milan**  
*James Watts, EuRAD 2021 Chair*

## EuMC/EuRAD01 : High Resolution Methods in Range and Azimuth for Environmental Perception

Chair: Thomas Dallmann, Fraunhofer FHR, Germany

Co-Chair: Frank Gruson, Continental, Germany

11:20–13:00, Wednesday 6th April 2022, Room 7

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- 437   **Real-Time DoA Estimation for Automotive Radar**  
*Yubo Wu, Chengzhang Li, Y. Thomas Hou, Wenjing Lou, Virginia Tech, USA*
- 441   **Simultaneous Multi-Mode Automotive Imaging Radar Using Cascaded Transceivers**  
*F.G. Jansen<sup>1</sup>, F. Laghezza<sup>1</sup>, S. Alhasson<sup>2</sup>, P. Lok<sup>1</sup>, L.M.A. van Meurs<sup>1</sup>, R. Geraets<sup>1</sup>,  
Ö. Paker<sup>1</sup>, J. Overdevest<sup>1</sup>*  
*<sup>1</sup>NXP Semiconductors, The Netherlands; <sup>2</sup>NXP Semiconductors, Germany*
- 445   **Auto-Calibration of Automotive MIMO Radars Using Simultaneous Localisation and Mapping**  
*Nikita Petrov, Alexander Yarovoy, Technische Universiteit Delft, The Netherlands*
- 449   **An Approach for High-Angular Resolution Implementation in Moving Automotive MIMO Radar**  
*Sen Yuan, Francesco Fioranelli, Alexander Yarovoy, Technische Universiteit Delft, The Netherlands*
- 453   **Synthetic Aperture Radar Imaging of Moving Targets for Automotive Applications**  
*Masoud Farhadi<sup>1</sup>, Reinhard Feger<sup>1</sup>, Johannes Fink<sup>2</sup>, Thomas Wagner<sup>1</sup>, Andreas Stelzer<sup>1</sup>*  
*<sup>1</sup>Johannes Kepler Universität Linz, Austria; <sup>2</sup>Robert Bosch, Germany*

## EuMC/EuRAD02 : Channel and Radar Characterization

Chair: Dirk Plettemeier, Technische Universität Dresden, Germany

11:20–13:00, Wednesday 6th April 2022, Room 11

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- (NA)  **C** **Radio Wave Propagation Inside Buried Sewer Pipes for Infrastructure Robotics**  
*Viktor Doychinov, Ian D. Robertson, University of Leeds, UK*
- (NA)  **C** **Quantifying Modulation Quality at the Physical Layer Using Equalized Channel Capacity**  
*Jan Verspecht, Keysight Technologies, USA*
- (NA)  **C** **Impairments of Atmospheric Attenuation on a Wideband E-Band Outdoor Communication Link**  
*Laura Manoliu<sup>1</sup>, Ralf Henneberger<sup>2</sup>, Axel Tessmann<sup>3</sup>, Jochen Seidel<sup>1</sup>, Michael Eppard<sup>4</sup>, Ingmar Kallfass<sup>1</sup>*  
*<sup>1</sup>Universität Stuttgart, Germany; <sup>2</sup>Radiometer Physics, Germany; <sup>3</sup>Fraunhofer IAF, Germany; <sup>4</sup>MPI for Solid State Research, Germany*
- (NA)  **C** **Effect of Microsphere Concentration and Size in Compacts on Terahertz Scattering**  
*Keir N. Murphy<sup>1</sup>, Mira Naftaly<sup>2</sup>, Alison Nordon<sup>1</sup>, Daniel Markl<sup>1</sup>*  
*<sup>1</sup>CMAC, UK; <sup>2</sup>NPL, UK*
- (NA)  **C** **High Temporal Resolution Time-Gating for Wideband Radar Cross Section Measurements**  
*Rachel E. Jarvis, Justin G. Metcalf, Jessica E. Ruyle, Jay W. McDaniel, University of Oklahoma, USA*

## EuMC/EuRAD03 : EuMC/EuRAD Posters






Chair: Mustafa Bakr, University of Oxford, UK

10:40–13:30, Wednesday 6th April 2022, Exhibition Hall

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- (NA)  **C** **Design of Narrow Wall Slotted Waveguides Planar Array for 3D S-Band Radar with Very Low Sidelobe Level**  
*Quoc Duy Nguyen, Hoang Viet Tran, Thi Huong Ngo, Dinh Hung Pham, VHT, Vietnam*
- 481  **C** **Transmission Line Based Frequency Modulated Continuous Wave Radar for Monitoring Airbag Deployment Processes**  
*Björn Möhring<sup>1</sup>, Uwe Siart<sup>1</sup>, Sebastian Schweizer<sup>2</sup>, Thomas F. Eibert<sup>1</sup>*  
*<sup>1</sup>Technische Universität München, Germany; <sup>2</sup>Audi, Germany*
- 485  **C** **Compressed Sensing for MIMO Radar Using SIW Antennas for High Resolution Detection**  
*Cristian Alistarh<sup>1</sup>, Laura Anitori<sup>1</sup>, Wim L. van Rossum<sup>1</sup>, Symon K. Podilchak<sup>2</sup>, John Thompson<sup>2</sup>, Mathini Sellathurai<sup>3</sup>*  
*<sup>1</sup>TNO, The Netherlands; <sup>2</sup>University of Edinburgh, UK; <sup>3</sup>Heriot-Watt University, UK*
- 489  **C** **Spectrum Estimation for Very High Frequency RF Systems**  
*Mario LaManna<sup>1</sup>, Pietro Monsurrò<sup>2</sup>, Pasquale Tommasino<sup>2</sup>, Alessandro Trifiletti<sup>2</sup>*  
*<sup>1</sup>Evoelectronics, Italy; <sup>2</sup>Università di Roma “La Sapienza”, Italy*
- 493  **C** **Enhancing Unambiguous Velocity in Doppler-Division Multiplexing MIMO Radar**  
*Yuliang Sun, Marc Bauduin, André Bourdoux, imec, Belgium*
- (NA)  **C** **VBR: A S Band Tile of 16 T-R Modules for Fully Digital AESA Antennas (DAR Technology)**  
*F. Macro, M. Di Battista, B. Buccinnà, VirtuaLabs, Italy*

*EuMC/EuRAD03 continued...*

- 501  **C** **Wideband 6-Bit SiGe BiCMOS T/R Module Core-Chip for X-Band Phased-Arrays**  
*Can Çalışkan<sup>1</sup>, Abdurrahman Burak<sup>1</sup>, Melik Yazici<sup>1</sup>, Nihan Öznazlı<sup>2</sup>, Yasar Gurbuz<sup>1</sup>*  
*<sup>1</sup>Sabancı University, Turkey; <sup>2</sup>ASELSAN, Turkey*
- (NA)  **C** **Enhanced Self-Interference Cancellation by Means of Adaptively Calibrated Filters**  
*Johannes Steigert, Daniel Schwab, CommScope, Germany*
- (NA)  **C** **Dosimetric Analysis of Plane Wave Propagation in Biological Tissues: Comparison Between Planar Multilayer vs Realistic Anatomical Models**  
*Micol Colella<sup>1</sup>, Simona Di Meo<sup>2</sup>, Paolo Marracino<sup>3</sup>, Micaela Liberti<sup>1</sup>, Marco Pasian<sup>2</sup>, Francesca Apollonio<sup>1</sup>*  
*<sup>1</sup>Università di Roma "La Sapienza", Italy; <sup>2</sup>Università di Pavia, Italy; <sup>3</sup>Rise Technology, Italy*
- (NA)  **C** **Design of a Miniature Smart Pill Antenna**  
*Hubregt J. Visser<sup>1</sup>, Esmee Huismans<sup>2</sup>, Minyoung Song<sup>1</sup>, Yao-Hong Liu<sup>1</sup>*  
*<sup>1</sup>imec, The Netherlands; <sup>2</sup>Technische Universiteit Eindhoven, The Netherlands*
- (NA)  **C** **Status and Ongoing Development of a kW-Level Broadband W-Band Gyro-TWA**  
*Liang Zhang, Craig R. Donaldson, Colin G. Whyte, Adrian W. Cross, University of Strathclyde, UK*






## EuMC/EuRAD04: Radar Architectures

*Chair: David Greig, Leonardo, UK*

*Co-Chair: Nils Pohl, Ruhr-Universität Bochum, Germany*

*14:20-16:00, Wednesday 6th April 2022, Room 1*

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- 521  **C** **Efficient Calibration of Very Large mm-Wave Radars by Virtual Phase Center Analysis**  
*André Dürr, Matthias Linder, Dominik Schwarz, Thomas Frey, Christian Waldschmidt, Universität Ulm, Germany*
- 525  **C** **Impact of Channel Imbalances on Beamforming Performance in Automotive MIMO Radar**  
*Maximilian Eschbaumer, Infineon Technologies, Germany*
- 529  **C** **A Low-Power 24-GHz Radar Transceiver for Automotive Hands-Free Trunk Opener Applications in a 0.13 $\mu$ m SiGe BiCMOS Technology**  
*Abhiram Chakraborty<sup>1</sup>, Claus Lautenschlager<sup>2</sup>, Markus Ortner<sup>3</sup>, Andreas Wickmann<sup>2</sup>, Daniel Englisch<sup>1</sup>, Manfred Meindl<sup>2</sup>, Muhammad Qureshi<sup>1</sup>, Martin Frank<sup>1</sup>, Aizemaiti Yuemaier<sup>1</sup>, Hans-Peter Forstner<sup>1</sup>*  
*<sup>1</sup>Infineon Technologies, Germany; <sup>2</sup>eesy-ic, Germany; <sup>3</sup>Infineon Technologies, Austria*
- 533  **C** **D-Band FMCW Radar with Sub-cm Range Resolution Based on a BiCMOS mmWave IC**  
*Wael A. Ahmad<sup>1</sup>, M. Kucharski<sup>2</sup>, Herman Jalli Ng<sup>3</sup>, Dietmar Kissinger<sup>4</sup>*  
*<sup>1</sup>IHP, Germany; <sup>2</sup>SIRC, Poland; <sup>3</sup>Hochschule Karlsruhe, Germany; <sup>4</sup>Universität Ulm, Germany*
- 537  **C** **Surface Pressure Sensing Radar Using V-Band**  
*Rohit Gawande, Ziad Haddad, Martin Michalik, Mark Taylor, Michael Tsai, Jet Propulsion Laboratory, USA*