2010 2nd International Workshop on Cognitive Information Processing

(CIP 2010)

Elba Island, Italy
14 – 16 June 2010
## Monday, June 14

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<tr>
<td>09:10</td>
<td>KS1: Third Generation Machine Intelligence - Christopher Bishop (Microsoft Research Cambridge, UK)</td>
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<td>14:00</td>
<td>KS2: Perpetual Motion Machines, the Cramer-Rao Bound and Localization of Cognitive Radios - Marco Luise (University of Pisa, Italy)</td>
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<td>15:20</td>
<td>SS2: Bayesian Machine Learning</td>
<td>PMA1: Spectrum Sensing and Management, PMA2: Signal Estimation and Tracking</td>
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## Tuesday, June 15

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## Monday, June 14

09:10 - 10:10

**KS1: Third Generation Machine Intelligence - Christopher Bishop (Microsoft Research Cambridge, UK)**

Keynote speech

10:30 - 12:30

**PMM1: Intelligent Platform Networks**

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**Metacognition in Radar**
Gerard Capraro (Capraro Technologies, USA); Michael C Wicks (Air Force Research Laboratory, USA); Richard Schneible (Stiefvater Consultants, USA)
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**Millimeter Wave Radar Network for Foreign Object Detection**
Helmut Essen (Fraunhofer FHR, Germany); Goert Luedtke (Fraunhofer FHR, Germany); Paul Warok (Fraunhofer FHR, Germany); Wolfgang Koch (German Defence Research Establishment,
Yifan Chen (Newcastle University, United Kingdom); Wai Lok Woo (University of Newcastle upon Tyne, United Kingdom)
pp. 7-10

The Radar System and Information Flow
John A. Malas (United States Airforce Research Lab, USA); John Cortese (Massachusetts Institute of Technology, USA)
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An Electronic Warfare Meta-Model for Network Centric Systems
Andrea Sindico (Elettronica S.p.A., Italy); Sergio Tortora (Elettronica S.p.A., Italy); Alessandro Chiarini Petrelli (Elettronica S.p.A., Italy); Marco Fasano (Elettronica S.p.A., Italy)
pp. 23-28

A Data Fusion Architecture for an Electronic Warfare Multi-Sensor Suite
Sergio Tortora (Elettronica S.p.A., Italy); Andrea Sindico (Elettronica S.p.A., Italy); Gaetano Severino (ELETTRONICA SpA, Italy)
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Emerging Neuromorphic Computing Architectures & Enabling Hardware for Cognitive Information Processing Applications
Robinson E. Pino (USAF Research Laboratory, USA); Gerard Genello (USAF Research Laboratory, USA)
pp. 35-39

Vessel Detection and Classification: An Integrated Maritime Surveillance System in the Tyrrhenian Sea
Salvatore Maresca (University of Pisa, Italy); Maria S. Greco (University of Pisa, Italy); Fulvio Gini (University of Pisa, Italy); Raffaele Grasso (NURC, Italy); Stefano Coraluppi (NATO Undersea Research Centre, Italy); Jochen Horstmann (NURC, Italy)
pp. 40-45

PMM2: Adaptive Learning Algorithms

Improved Non-Parametric Sparse Recovery with Data Matched Penalties
Marco Signoretto (Katholieke Universiteit Leuven, Belgium); Kristiaan Pelckmans (Uppsala University, Sweden); Lieven De Lathauwer (K.U.Leuven, Belgium); Johan Suykens (KULeuven, Belgium)
pp. 46-51

User-driven Call Admission Control for VoIP over WLAN with a Neural Network Based Cognitive Engine
Nicola Baldo (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain); Paolo Dini (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Italy); Jaume Nin-Guerrero (Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Spain)
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Bayesian Extensions of Non-negative Matrix Factorization
Reinhard Schachtner (University of Regensburg, Germany); Gerhard Pöppel (Infineon Technologies AG, Germany); Lang (Institute of Biophysics, University of Regensburg, Germany)
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Foraging Behavior of Fish Schools via Diffusion Adaptation
Sheng-Yuan Tu (University of California Los Angeles, USA); Ali H. Sayed (University of California, Los Angeles, USA)
pp. 63-68

Maximum Likelihood Blind Deconvolution for Sparse Systems
Steffen Barembruch (Télécom ParisTech, France); Anna Scaglione (University of California, Davis, USA); Eric Moulines (Telecom ParisTech, France)
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Real-world Particle Filtering-based Speech Enhancement
Frederic Mustiere (University of Ottawa, Canada); Miodrag Bolic (University of Ottawa, Canada);
Martin Bouchard (University of Ottawa, Canada)
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Musical noise controllable algorithm of channelwise spectral subtraction and beamforming based on higher-order statistics criterion
Yohei Ishikawa (Nara Institute of Science and Technology, Japan); Hiroshi Saruwatari (Graduate School of Information Science, Nara Institute of Science and Technology, Japan); Yu Takahashi (Nara Institute of Science and Technology, Japan); Kiyohiro Shikano (Graduate School of Information Science, Nara Institute of Science and Technology, Japan); Kazunobu Kondo (Yamaha Corp., Japan)
pp. 81-86

The Widely Linear Quaternion Recursive Least Squares Filter
Cyrus Jahanchahi (Imperial College London, United Kingdom); Danilo Mandic (Imperial College, London, UK, United Kingdom); Clive Cheong Took (Imperial College London, United Kingdom)
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SS1: Cognitive radio: the NEWCOM++ vision

Special Session

QoS Support in Radio Resource Sharing with Cournot Competition
Marcin Parzy (Poznan University of Technology, Poland); Hanna Bogucka (Poznan University of Technology, Poland)
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On the Spectrum Occupancy Perception of Cognitive Radio Terminals in Realistic Scenarios
Miguel López-Benítez (Universitat Politècnica de Catalunya, Spain); Ferran Casadevall (Universitat Politècnica de Catalunya, Spain)
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MSE-based Linear Transceiver Optimization in MIMO Cognitive Radio Networks with Imperfect Channel Knowledge
Xitao Gong (RWTH Aachen University, Germany); Aamir Ishaque (RWTH, Aachen, Germany); Guido Dartmann (RWTH Aachen University, Germany); Gerd H. Ascheid (RWTH Aachen University, Germany)
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Cognitive Cooperation for the Downlink of Frequency Reuse Small Cells
Salam Akoum (The University of Texas at Austin, USA); Marie Zwingelstein-Colin (University of Valenciennes, France); Robert Heath (The University of Texas at Austin, USA); Mérouane Debbah (Supelec, France)
pp. 111-115

Graphical Approach for Multi-standards Radio Design Formalization and Global Optimization
Sufi Tabassum Gul (Pakistan Institute of Engineering and Applied Sciences, Pakistan); Christophe Moy (Supelec, France); Jacques Palicot (IETR/Supélec, France)
pp. 116-121

Automatic Computing Resource Awareness in Resource Managers for Cognitive Radios
Ismael Gomez (Polytechnical University of Catalonia, Spain); Vuk Marojevic (Polytechnic University of Catalonia, Spain); Antoni Gelonch (Polytechnical University of Catalonia, Spain)
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14:00 - 15:00

KS2: Perpetual Motion Machines, the Cramer-Rao Bound and Localization of Cognitive Radios - Marco Luise (University of Pisa, Italy)

Keynote speech

15:20 - 17:20

PMA1: Spectrum Sensing and Management

Optimal and Near-Optimal Spectrum Sensing of OFDM Signals in AWGN Channels
Erik Axell (Linköping University, Sweden); Erik G. Larsson (Linköping University, Sweden)
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Locally Optimum Detection in Heavy-Tailed Noise for Spectrum Sensing in Cognitive Radio
Fiky Suratman (TU Darmstadt, Germany); Yacine Chakhchoukh (TU Darmstadt, Germany); Abdelhak M Zoubir (Darmstadt University of Technology, Germany)
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A maximum-likelihood detector for coded OFDM transmission plagued by narrowband interference
Michele Morelli (University of Pisa, Italy); Marco Moretti (Università di Pisa, Italy)
pp. 140-144

Dynamic Frequency Allocation in Ad Hoc Networks
Lorenzo Iacobelli (Thales, France); Francois Scoubart (Thales, France); Didier Pire (Thalès communications, France); Pascale Fouillot (Thales Communications, France); Raphael Massin (Thales, France); Christophe Lefebvre (Thales, France); Christophe J. Le Martret (THALES Communications, France); Vania Conan (Thales Architecture Framework Centre, France)
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A Novel Non-Iterative Architecture for Broadcast MIMO
Ana Isabel Perez (Universitat Politècnica de Catalunya, Spain)
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Estimating the Number of Signals Observed by Multiple Sensors
Marco Chiani (University of Bologna, Italy); Moe Win (Massachusetts Institute of Technology, USA)
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Memory-efficient FFT architecture using R-LFSR based CORDIC common operator
Hongzhi Wang (SUPELEC/Ietr, France); Laurent Alaus (CEA LETI, France); Yves Louët (SUPELEC-Rennes Campus, France); Jacques Palicot (IETR/Supélec, France); Dominique Noguet (CEA LETI, France)
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A Comparison among Cooperative Spectrum Sensing Approaches for Cognitive Radios
Luca Bixio (University of Genoa, Italy); Marina Ottonello (University of Genoa, Italy); Mirco Raffetto (University of Genoa, Italy); Carlo S Regazzoni (University Of Genova, Italy); Claudio Armani (SELEX Communications, Italy)
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PMA2: Signal Estimation and Tracking

Instantaneous Frequency Detection via Ridge Neighbor Tracking
Vittoria Bruni (National Council of Researches - C.N.R, Italy); Benedetto Piccoli (C.N.R., Italy); Silvia Marconi (University of Rome La Sapienza, Italy); Domenico Vitulano (C.N.R., Italy)
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Track-before-detect Algorithms for Bistatic Sonars
Danilo Orlando (Università degli Studi di Cassino, Italy); Frank Ehlers (NURC - a NATO Research Centre, Italy); Giuseppe Ricci (University of Salento, Lecce, Italy)
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From Differential to Information Geometry
Felix Opitz (EADS Deutschland GmbH / DCS, Germany)
pp. 186-191

Robust Hyperspectral Image Segmentation Based on a Non-Gaussian Model
Tiziana Veracini (Università di Pisa, Italy); Stefania Matteoli (Università di Pisa, Italy); Marco Diani (University of Pisa, Italy); Giovanni Corsini (University of Pisa, Italy)
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SS2: Bayesian Machine Learning

Special Session

Bayesian Factor Analysis using Gaussian Mixture Sources, with Application to Separation of the Cosmic Microwave Background
Simon Wilson (Trinity College Dublin, Ireland); Ercan Engin Kuruoglu (CNR, Italy); Alicia Quirós Carretero (Universidad Rey Juan Carlos, Spain)
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Keynote speech

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PTM2: Cognitive Radar Processing

Rapid Waveform Adaptation for Nearly Optimal Detection in Colored Interference
Carl Rossler (Ohio State University, USA); Lee K Patton (Air Force Research Laboratory, USA)
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Automatic Human Motion Classification from Doppler Spectrograms
Fok Hing Chi Tivive (University of Wollongong, Australia); Abdesselam Bouzerdoum (UOW, Australia); Moeness Amin (Villanova University, USA)
pp. 237-242

Adaptive Radar Detection: a subspace identification approach
Francesco Bandiera (University of Salento, Italy); Danilo Orlando (Università degli Studi di Cassino, Italy); Giuseppe Ricci (University of Salento, Lecce, Italy); Louis Scharf (Colorado State, USA)
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Cognitive adaptive waveform technique for HF skywave radar
Anna Lisa Saverino (University of Pisa, Italy); Amerigo Capria (CNIT (National Interuniversity Consortium for Telecommunications), Italy); Fabrizio Berizzi (University of Pisa, Italy); Enzo Dalle Mese (University of Pisa, Italy)
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Software Defined RADAR a State of the Art
Thibault Debatty (Royal Military Academy, Belgium)
pp. 253-257

Radar Waveform Design for Detection of Weapons
Fauzia Ahmad (Villanova University, USA); Moeness Amin (Villanova University, USA)
Utilizing Q-Learning to allow a radar to choose its transmit frequency, adapting to its environment
Leon Wabeke (CSIR, South Africa); Willie Nel (Council for Scientific and Industrial Research, South Africa)
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PTM1: Learning from pairwise relationships: non-metric proximities, indefinite kernels, and graphs

Special Session

Predicting Relations in News-Media Content among EU Countries
Ilias Flaounas (University of Bristol, United Kingdom); Nick Fyson (University of Bristol, United Kingdom); Nello Cristianini (University of Bristol, United Kingdom)
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Brain Connectivity Analysis by Reduction to Pair Classification
Emanuele Olivetti (Fondazione Bruno Kessler, Italy); Sriharsha Veeramachaneni (Thomson Reuters Corporation, USA); Susanne Greiner (Fondazione Bruno Kessler, University of Trento, Italy); Paolo Avesani (Fondazione Bruno Kessler, University of Trento, Italy)
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The Story of A Single Cell: Peeking into the Semantics of Spikes
Roi Kliper (Hebrew University, Israel)
pp. 281-286

Bayesian and Pairwise Local Similarity Discriminant Analysis
Peter Sadowski (University of Washington, USA); Luca Cazzanti (University of Washington, USA); Maya R Gupta (University of Washington, USA)
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Dissimilarity-based Classification of Data with Missing Attributes
Monica Millan (Universitat Jaume I, Spain); Robert P. W. Duin (Delft University of Technology, The Netherlands); José Sánchez (Universitat Jaume I, Spain)
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Dissimilarity-based Representation for Local Parts
Anna Carli (University of Verona, Italy); Umberto Castellani (University of Verona, Italy); Manuele Bicego (University of Verona, Italy); Vittorio Murino (University of Verona, Italy)
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An Experimental Study on Combining Euclidean Distances
Wan-Jui Lee (Delft University of Technology, The Netherlands); Robert P. W. Duin (Delft University of Technology, The Netherlands); Alessandro Ibbá (Delft University of Technology, The Netherlands); Marco Loog (Delft University of Technology, The Netherlands)
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SS3: Spectrum Sensing for Cognitive Radio

Special Session

Multiantenna spectrum sensing for Cognitive Radio: overcoming noise uncertainty
Roberto López-Valcarce (Universidad de Vigo, Spain); Gonzalo Vazquez-Vilar (University of Vigo, Spain); Josep Sala (Technical University of Catalonia, Spain)
pp. 310-315

Reinforcement Learning-Based Multiband Sensing Policy for Cognitive Radios
Jan Oksanen (Aalto university, Finland); Jarno Lunden (Teknillinen Korkeakoulu, Finland); Visa Käävonen (HUT, Finland)
pp. 316-321

Overview of Spectrum Sensing for Cognitive Radio
Erik Axell (Linköping University, Sweden); Geert Leus (Delft University of Technology, The Netherlands); Erik G. Larsson (Linköping University, Sweden)
pp. 322-327

Performance Comparison for Low Complexity Blind Sensing Techniques in Cognitive Radio Systems
Bassem Zayen (Eurecom, France); Wael Guibène (Institut Eurécom, France); Aawatif Hayar
14:00 - 15:00

**KS4: Distributed and Sequential Sensing of Spatio-temporal Spectra for Cognitive Radios - Georgios B. Giannakis (University of Minnesota, USA)**

Keynote speech

**Wednesday, June 16**

09:10 - 10:10

**KS5: Modelling and Design of Cognitive Behaviour - Nello Cristianini (University of Bristol, UK)**

Keynote speech

10:30 - 12:30

**SS4: Waveform Agile Intelligent Adaptive Sensor Signal Processing**

Special Session

*Waveform Design with Stopband and Correlation Constraints for Cognitive Radar*

Hao He (University of Florida, USA); Petre Stoica (Uppsala University, Sweden); Jian Li (University of Florida, USA)

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*Impact of flight trajectory on the detection and selection of flowers by nectar-feeding bats*

Alessio Balleri (University College London, United Kingdom); Hugh Griffiths (University College London, United Kingdom); Karl Woodbridge (University College London (UCL), United Kingdom); Chris J Baker (Australian National University, Australia); Marc Holderied (University of Bristol, United Kingdom)

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*Adapting a MIMO/Phased-Array Radar Transmit Beampattern to Target Location*

Muralidhar Rangaswamy (Air Force Research Laboratory, USA); Daniel Fuhrmann (Michigan Technological University, USA); James Browning (Air Force Research Laboratory, USA)

pp. 354-359

*Adaptive Transmitter Weight Design for Clutter Suppression*

S. Unnikrishna Pillai (Polytechnic Inst. of NYU, NY, USA); Ke Yong Li (C & P Technologies, Inc., USA); Braham Himed (AFRL, USA)

pp. 360-363

*Evaluation of Network Effects on the Kalman Filter and Accumulated State Density Filter*

Felix Govaers (University of Bonn, Germany); Nils Aschenbruck (University of Bonn, Germany); Christoph Fuchs (University of Bonn, Germany)

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**PWM1: Collaborative Sensing Techniques**

*Sensor Fusion by Two-Layer Conflict Solving*
Volker Lohweg (Ostwestfalen-Lippe University of Applied Sciences, Germany); Uwe Mönks (Ostwestfalen-Lippe University of Applied Sciences, Germany) pp. 370-375

On Multi-Step Sensor Scheduling via Convex Optimization
Marco Huber (Fraunhofer IOSB, Germany) pp. 376-381

Bayesian Joint Recovery of Correlated Signals in Distributed Compressed Sensing
Pablo Viñuelas-Peris (Universidad Carlos III de Madrid, Spain); Antonio Artés-Rodríguez (Universidad Carlos III de Madrid, Spain) pp. 382-387

A Robust Approach for Optimization of The Measurement Matrix in Compressed Sensing
Vahid Abolghasemi (Cardiff University, United Kingdom); Delaram Jarchi (Cardiff University, United Kingdom); Saeid Sanei (Cardiff University, United Kingdom) pp. 388-392

A novel adaptive algorithm for diffusion networks using projections onto hyperslabs
Symeon Chouvardas (University of Athens, Greece); Konstantinos Slavakis (University of Peloponnese, Greece); Sergios Theodoridis (University of Athens, Greece) pp. 393-398

Node Localization and Tracking Using Distance and Acceleration Measurements
Benjamin R. Hamilton (Georgia Institute of Technology, USA); Xiaoli Ma (Georgia Institute of Technology, USA); Robert John Baxley (Georgia Tech Research Institute, USA); Brett Walkenhorst (Georgia Tech Research Institute, USA) pp. 399-404

PWM2: Learning Theory and Modelling

Finding surprising patterns in textual data streams
Tristan Snowsill (University of Bristol, United Kingdom); Florent Nicart (Rouen University, France); Marco Stefani (University of Bristol, United Kingdom); Tijl De Bie (University of Bristol, United Kingdom); Nello Cristianini (University of Bristol, United Kingdom) pp. 405-410

Tracking the flu pandemic by monitoring the Social Web
Vasileios Lampos (University of Bristol, United Kingdom); Nello Cristianini (University of Bristol, United Kingdom) pp. 411-416

Speaker-independent negative emotion recognition
Marganta Kotti (ISTI-CNR, Italy); Fabio Paterno (ISTI-CNR, Italy); Constantine Kotropoulos (Aristotle University of Thessaloniki, Greece) pp. 417-422

Mental fatigue analysis by measuring synchronization of brain rhythms incorporating enhanced empirical mode decomposition
Delaram Jarchi (Cardiff University, United Kingdom); Bahador Makkibadi (Cardiff University, United Kingdom); Saeid Sanei (Cardiff University, United Kingdom) pp. 423-427

Radioactive Threat Detection with Scattering Physics: a Model-Based Application
James V Candy (Lawrence Livermore National Laboratory, USA); David H Chambers (Lawrence Livermore National Laboratory, USA); Eric Breitfeller (Lawrence Livermore National Laboratory, USA); Brian L. Guidry (Lawrence Livermore National Laboratory, USA); Jerome Verbeke (Lawrence Livermore National Laboratory, USA); Michael Axelrod (IAP Worldwide Services, Inc, USA); Kenneth Sale (IAP Worldwide Services, Inc., USA); Alan Meyer (Self, USA) pp. 428-433

Latent Semantics as Cognitive Components
Michael Petersen (Technical University of Denmark, Denmark) pp. 434-439

Building a Bayesian Factor Tree From Examples
Francesco Palmieri (Seconda Università di Napoli, Italy); Gianmarco Romano (Seconda Università di Napoli, Italy); Pier Luigi Salvo Rossi (Second University of Naples, Italy); Davide Mattera (Università degli Studi di Napoli Federico II, Italy) pp. 440-445
Eye Fixations Identification based on Statistical Analysis - Case study
Giacomo Veneri (University of Siena, Italy); Pietro Piu (University of Siena, Italy); Pamela Federighi (University of Siena, Italy); Francesca Rosini (University of Siena, Italy); Antonio Federico (University of Siena, Italy); Alessandra Rufa (University of Siena, Italy)
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14:00 - 15:00

KS6: Spectrum Crowding and Cognitive Radar - Michael C. Wicks (AFRL Sensors Directorate, Rome Research Site, Rome, NY, USA)

Keynote speech

Spectrum Crowding and Cognitive Radar
Michael C Wicks (Air Force Research Laboratory, USA)
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15:20 - 16:40

SS5: Game-theoretic Tools for Cognitive Radios

Special Session

Game Theoretical Analysis of Cognitive Radio Networks: An NCEL Perspective
Jianwei Huang (The Chinese University of Hong Kong, Hong Kong)
pp. 458-463

Decentralized Spectrum Access via Multivariate Global Games
Vikram Krishnamurthy (University of British Columbia, Canada)
pp. 464-469

Stable matching for channel access control in cognitive radio systems
Yoav Yaffe (Bar-Ilan University, Israel); Amir Leshem (Bar-Ilan University, Israel); Ephraim Zehavi (Bar-Ilan University, Israel)
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Beamforming in Underlay Cognitive Radio: Null-Shaping Design for Efficient Nash Equilibrium
Eduard Jorswieck (Dresden University of Technology, Germany); Rami Mochaourab (Dresden University of Technology, Germany)
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