



**PSIP'2007**  
Fifth workshop on  
**Physics in Signal and Image Processing**  
Jan. 31 – Feb. 2, 2007  
University of Haute-Alsace, Mulhouse, France



**PSIP 2007: Programme**

**Wednesday 31/01/2006:**

- 08:00 – 09:20: Registration and welcome coffee
- 09:20 – 09:40: Opening Session
- 09:40 – 10:40: Invited talk by Pr. Roland Siegwart
- 10:40 – 12:00: Oral Session 1: Vehicles Applications
- 12:00 – 14:00: Lunch
- 14:00 – 16:00: Oral Session 2: Segmentation, Separation, Identification
- 16:00 – 16:30: Coffee break
- 16:30 – 18:00: Poster Session

**Thursday 01/02/2006:**

- 08:30 – 10:30: Oral Session 3: Polarimetry and Holography
- 10:30 – 11:00: Coffee break
- 11:00 – 12:00: Invited talk by Carl Paterson
- 12:00 – 14:00: Lunch
- 14:00 – 16:00: Oral Session 4: Noise management
- 16:00 – 16:30: Coffee break
- 16:30 – 18:00: Poster Session

**Friday 02/02/2006:**

- 08:30 – 10:30: Oral Session 5: Biological applications
- 10:30 – 11:00: Coffee break
- 11:00 – 12:00: Invited talk by Laurent Larger
- 12:00 – 14:00: Lunch
- 14:00 – 15:40: Oral Session 6: Probing Techniques (Radar, SAR, Lidar, Seismology)
- 15:40 – 16:00: Closing Remarks

**INVITED SPEAKERS**

**Invited talk 1:**

***"From Signals to Autonomous Robot Navigation"***

Pr Roland Siegwart, Autonomous Systems Lab, ETH Zürich, Switzerland

**Invited talk 2:**

***"Fundamental limits for wavefront sensing: how much information can we get from a single photon?"***

Dr Carl Paterson, The Blackett Laboratory, Imperial College, London

**Invited talk 3:**

***"Demonstrations and perspectives for optical chaos communications using optoelectronic nonlinear delay dynamics"***

Pr Laurent Larger, FEMTO-ST, Université de Franche-Comté, Besançon

**Wednesday 31 January, 2006**

## **Oral Session 1: Vehicles Applications**

**09:20-09:40 OPENING SESSION**

**09:40-10:40 FROM SIGNALS TO AUTONOMOUS ROBOT NAVIGATION**

Pr Roland Siegwart, *Autonomous Systems Lab, ETH Zürich, Switzerland*

**10:40-11:00 REAL TIME KNOCK DETECTION WITH DFT-BASED TIME-FREQUENCY ANALYSIS**

S. Ker, L. Duval, *IFP, Rueil-Malmaison, France*

**11:00-11:20 HOMOGRAPHS BASED REGIONS TRACKING FOR DRIVER'S GAZE ANALYZE SYSTEM**

V. Georges, C. Cudel, M. Basset, J. P. Lauffenburger, *Laboratory MIPS, University of Haute-Alsace, Mulhouse, France*

**11:20-11:40 MOBILE ROBOT LOCALIZATION AND MAPPING IN EXTENSIVE OUTDOOR ENVIRONMENT BASED ON RADAR SENSOR - FIRST RESULTS**

R. Rouveure, P. Faure, M. O. Monod, *Cemagref, Aubière, France*  
P. Checchin, *LASMEA/CNRS, Montluçon, France*

**11:40-12:00 LOCALIZATION OF A LAND VEHICLE COMBINING KALMAN AND SHAPING FILTERS**

J.-P. Lauffenburger, M. Basset, G.-L. Gissingier, *Université de Haute Alsace, Mulhouse, France*

## **Oral Session 2: Segmentation, Separation, Identification**

**14:00-14:20 OPTIMIZATION OF REMOTE SENSING IMAGE SUPERVISED CLASSIFICATION PROCEDURES : INFLUENCE OF TRAINING SAMPLING PROTOCOL AND OF FEATURE SPACE OPTIMISATION METHODS ON RESULTS**

C. Golden, *UMR G-EAU Cemagref, Montpellier, France*  
S. Durrieu, *UMR TETIS Cemagref-Cirad-ENGREF, Montpellier, France*

**14:20-14:40 EFFICIENT MULTISCALE DETECTION OF SMALL OBJECTS IN IMAGES WITH NATURAL TEXTURED BACKGROUNDS**

C. Hennequin, D. Monnin, A. Schneider, *French-German Research Institute of Saint-Louis, Saint-Louis, France*  
M. Paindavoine, *LE2I, Dijon, France*

**14:40-15:00 TEM IMAGES OF MEMBRANES: A MULTIREOLUTION EDGE-DETECTION APPROACH FOR WATERSHED SEGMENTATION**

N. Coudray, J. L. Buessler, H. Kihl, J. P. Urban, *MIPS Laboratory - University of Haute Alsace, Mulhouse, France*

**15:00-15:20 DETECTION OF VEHICLES USING COLOR AND LOGIC SEGMENTATION**

H. Arsenault, A. Jouan, *Université Laval, Québec, Canada*

**15:20-15:40 ON THE USE OF SPECIFIC REACTION DIFFUSION EQUATIONS FOR IMAGE PROCESSING**

S. Morfu, P. Marquie, B. Nofiele, *Université de Bourgogne LE2I UMR CNRS 5158, Dijon, France*

**15:40-16:00 AUTOMATIC BLOB FITTING IN COMPREHENSIVE TWO-DIMENSIONAL GAS CHROMATOGRAPHY IMAGES**

B. Celse, F. Adam, F. Bertoncini, *IFP, Vernaison, France*  
S. Bres, *LIRIS, Lyon, France*  
L. Duval, *IFP, Rueil-Malmaison, France*

## Oral Session 3: Polarimetry and Holography

- 08:30-08:50**    **SIMULTANEOUS REDUCTION-SEGMENTATION FOR MULTI-COMPONENT STOKESMUELLER IMAGING**  
C. Collet, F. Flitti, J. Zallat, C. Heinrich, *University Strasbourg 1 ULP, Strasbourg, France*
- 08:50-09:10**    **NON-LINEAR CONSTRAINED POLARIMETRIC DATA REDUCTION**  
R. Roux, J. Zallat, A. Lallement, E. Hirsch, *LSIIT, ILLKIRCH, France*
- 09:10-09:30**    **HIGH-SPEED IMAGING POLARIMETER USING A FERROELECTRIC LIQUID CRYSTAL MODULATOR**  
N. Cheney, L. Bigué, *Laboratoire MIPS, Université de Haute Alsace, Mulhouse, France*
- 09:30-09:50**    **WAVEFIELD FILTER WITH POLARIZATION AND DOA ESTIMATIONS FOR VECTOR-SENSOR ARRAY**  
C. Paulus, J. Mars, *Institut National Polytechnique de Grenoble, GRENOBLE, France*
- 09:50-10:10**    **INVERSE PROBLEM APPROACH FOR PARTICLE DIGITAL HOLOGRAPHY: PARTICLE DETECTION AND ACCURATE LOCATION**  
F. Soulez, L. Denis, C. Fournier, *Laboratoire Hubert Curien (CNRS/UMR 5516), St Etienne, France*  
E. Thiébaud, *Centre de Recherche Astronomique (CNRS/UMR 5574), Université Lyon 1, ENS Lyon, France*  
C. Goepfert, *Laboratoire de Mécanique des Fluides et d'Acoustique (UMR CNRS 5509), Ecole Centrale de Lyon, France*
- 10:10-10:30**    **COMBINATION OF SCANNING ACOUSTIC TRANSMISSION MICROSCOPY WITH SCANNING HOLOGRAPHY FOR BOND IMAGING**  
E. Twerdowski, W. Grill, *University of Leipzig, Leipzig, Germany*
- 11:00-12:00**    **FUNDAMENTAL LIMITS FOR WAVEFRONT SENSING: HOW MUCH INFORMATION CAN WE GET FROM A SINGLE PHOTON?**  
Dr Carl Paterson, *The Blackett Laboratory, Imperial College, London, UK*

## Oral session 4: Noise management

- 14:00-14:20**    **NOISE-ASSISTED IMAGE TRANSMISSION WITH SPECKLE NOISE**  
S. Blanchard, D. Rousseau, F. Chapeau-Blondeau, *Université d'Angers, Angers, France*
- 14:20-14:40**    **ON THE MICRO-SACCADES IN THE RETINA AS A NOISE-ENHANCED PROCESSING**  
S. Zozor, P. O. Amblard, C. Duchêne, *Laboratoire des Images et des Signaux, Grenoble, France*
- 14:40-15:00**    **NOISES STUDY IN SUPER-RESOLUTION**  
J. F. Goudou, S. Ladjal, *GET Telecom Paris, PARIS, France*
- 15:00-15:20**    **INFLUENCE OF NOISE LEVEL ON THE DETECTABILITY OF A TUMOR ENCLOSED IN BIOLOGICAL SLAB MEDIA USING TIME RESOLVED LASER TRANSILLUMINATION**  
V. Piron, J. P. L'Huillier, *ENSAM, Angers, France*
- 15:20-15:40**    **WTSOM: A ROBUST STILL-IMAGE TRANSMISSION SCHEME SUITABLE FOR FADING CHANNELS**  
H. Boeglen, O. Haeberlé, *Laboratory MIPS, University of Haute-Alsace, Mulhouse, France*  
P. Bourdon, C. Chatellier, *Laboratory SIC, University of Poitiers, Poitiers, France*
- 15:40-16:00**    **NOISE INDUCES SOLITONS PROPAGATION IN A NONLINEAR DISCRETE LC TRANSMISSION LINE**  
S. B. Yamgoue, S. Morfu, P. Marquie, *Laboratoire LE2I UMR Cnrs 5158, Dijon, France*

## Oral session 5: Biological applications

- 08:30-08:50 DEVELOPMENT OF A BRAIN MODEL FOR ELECTROMAGNETIC SIMULATION**  
J. Billoue, D. Magnon, *University of Tours, Tours, France*
- 08:50-09:10 COMPARISON BETWEEN SYNCHRONIZATION ESTIMATION METHODS ON SCALP EEG**  
H. Vélez-Pérez, M. Caparos, V. Louis-Dorr, R. Ranta, *INPL, Vandoeuvre, France*
- 09:10-09:30 THREE-DIMENSIONAL RECONSTRUCTION OF TRANSPARENT SPECIMENS USING COHERENT OPTICAL DIFFRACTION MICROTOMOGRAPHY**  
B. Simon, M. Debailleul, V. Georges, O. Haeberlé, *Laboratory MIPS, University of Haute-Alsace, Mulhouse, France*  
V. Lauer, *Lauer Optique et Traitement du Signal, Nogent sur Marne, France*
- 09:30-09:50 RECONSTRUCTION PROCEDURES IN STRUCTURED ILLUMINATION FLUORESCENT MICROSCOPY**  
A. Sentenac, K. Belkebir, P. Chaumet, *Institut Fresnel, Marseille, France*
- 09:50-10:10 WAVELET FILTERING APPLIED TO 3-D WIDE FIELD FLUORESCENCE MICROSCOPY DECONVOLUTION**  
B. Colicchio, O. Haeberlé, A. Dieterlen, *Laboratory MIPS, University of Haute-Alsace, Mulhouse, France*
- 10:10-10:30 SCATTERED GAMMA RAY IMAGING WITHOUT COLLIMATION**  
C. Driol, T. T. Truong, *CNRS UMR 8089/Université de Cergy-Pontoise, Cergy-Pontoise, France*  
M. K. Nguyen, *CNRS UMR 8051/ENSEA/Université de Cergy-Pontoise, Cergy-Pontoise, France*
- 11:00-12:00 DEMONSTRATIONS AND PERSPECTIVES FOR OPTICAL CHAOS COMMUNICATIONS USING OPTOELECTRONIC NONLINEAR DELAY DYNAMICS**  
Pr Laurent Larger, *FEMTO-ST, Université de Franche-Comté, Besançon*

## Oral session 6: Probing Techniques (Radar, SAR, Lidar, Seismology)

- 14:00-14:20 APPLICATION OF INFORMATION THEORY MEASURES TO POLARIMETRIC AND INTERFEROMETRIC SAR IMAGES**  
J. Morio, P. Dubois-Fernandez, X. Dupuis, *ONERA, Salon de Provence, France*  
P. Réfrégier, *Fresnel Institute, Marseille, France*  
F. Goudail, *Institut d'Optique, Orsay, France*
- 14:20-14:40 A FULL ELECTROMAGNETIC SAR IMAGE SIMULATOR FOR URBAN STRUCTURES**  
J. Delliére, A. Maruani, H. Maitre, P. Benjamin, *EADS CCR, Suresnes, France*
- 14:40-15:00 QUANTIFYING ACCURACY & UNCERTAINTY AND MODELLING NOISE & ERROR OF SATELLITE RADAR ALTIMETRY MEASUREMENT OF INLAND WATER LEVELS**  
N. Bercher, P. Kosuth, *Cemagref, Montpellier, France*
- 15:00-15:20 DETECTION OF BURIED TARGETS USING AVERAGED WIGNER DISTRIBUTIONS**  
N. Morelle, M. Saillard, *LSEET, Université du Sud Toulon - Var, La Garde, France*  
N. Thirion-Moreau, *PPF STIC, Université du Sud Toulon Var, La Valette du Var, France*
- 15:20-15:40 WAVELET ESTIMATION IN HOMOMORPHIC DOMAIN BY SPECTRAL AVERAGING, FOR DECONVOLUTION OF SEISMIC DATA**  
M. Tria, A. Larue, J. Mars, *ENSIEG-INPG, GRENOBLE, France*  
M. Van Der Baan, *UNIVERSITY OF LEEDS, LEEDS, United Kingdom*

## POSTERS SESSIONS

**Wednesday 31 January 16:30-18:00**

**Thursday 1 February 16:30-18:00**

### **OBSERVERS BASED SYNCHRONIZATION AND INPUT RECOVERY FOR A CLASS OF CHAOTIC SYSTEMS. APPLICATION TO IMAGE TRANSMISSION**

E. Cherrier, J. Ragot, *CRAN, Nancy, France*  
M. Boutayeb, *LSIIT, Illkirch, France*

### **WHEN GLACIERS BREAK THE ICE BETWEEN SEVERAL SCIENTIFIC HORIZONS**

T. Landes, P. Grussenmeyer, M. Koehl, *INSA de Strasbourg, Strasbourg, France*

### **BISTABILITY IN A DISCRETE LC ELECTRICAL LINE**

K. Tse Ve Koon, P. Tchofo-Dinda, *Laboratoire de Physique de l'Université de Bourgogne, Dijon, France*  
P. Marquie, *LEll, Dijon, France*

### **DATA MATRIX RECOVERY USING RADON TRANSFORM**

J.-M. Becker, T. Fournel, L. Fayolle, T. Lépine, *LTSI, Saint Etienne, France*

### **ENGINE NOISE SEPARATION BASED ON CYCLOSTATIONARY SIGNAL MODELLING**

J. Antoni, R. Boustany, *University of Technology of Compiègne, Compiègne, France*  
F. Gautier, S. Wang, *Renault, Rueil-Malmaison, France*

### **IMPROVEMENT OF THE VISUAL RENDERING OF A MOSAIC**

C. Simler, C. Cudel, *Laboratory MIPS, University of Haute-Alsace, Mulhouse, France*  
D. Monnin, *ISL, Saint Louis, France*

### **BAYESIAN MODELING AND MONTE CARLO LOCALIZATION IN VISION-AIDED INERTIAL UAV NAVIGATION**

G. Ruckebusch, *IC3i, Aufargis, France*  
C. Louis, R. Fest, *Thales Communications, Massy, France*

### **COMPARISON OF THREE SEGMENTATION METHODS FOR GROVES RECOGNITION IN VERY HIGH RESOLUTION SATELLITE IMAGES**

B. Mougel, C. Lelong, A. Begue, *UMR TETIS - CIRAD, Montpellier, France*  
J. M. Nicolas, *TSI - ENST, Paris, France*

### **SEPARABILITY OF CONVOLUTIVE MIXTURES USING HIGH-ORDER STATISTICS AND WIENER FILTERING**

M. Akil, C. Servièrè, *Laboratoire des Images et des Signaux, Saint Martin d'Hères, France*  
R. B. Randall, *Acoustics and Vibrations Laboratory, Sydney NSW, Australia*

### **TRANSIENT TURBULENT PRESSURE SIGNAL PROCESSING USING EMPIRICAL MODE DECOMPOSITION**

S. Benramdane, A. O. Boudraa, J. A. Astolfi, *Ecole navale, Brest, France*  
J. C. Cexus, *ENSIETA, Brest, France*

### **CLASSIFICATION BASED ON THE POLARIMETRIC DISPERSIVE AND ANISOTROPIC BEHAVIOR OF SCATTERERS**

M. Duquenoy, J. P. Ovarlez, L. Vignaud, *ONERA, Palaiseau, France*  
L. Ferro-Famil, E. Pottier, *IETR, Rennes, France*

### **SCANNING CONTACT IMAGING FOR ACOUSTIC HOLOGRAPHY OF PIEZOELECTRIC MATERIALS**

A. Habib, E. Twerdowski, M. V. Buttlar, R. Wannemacher, W. Grill, *University of Leipzig, Leipzig, Germany*  
M. Pluta, *Wroclaw University of Technology, Wroclaw, Poland*

### **RECONSTRUCTION OF HOLOGRAM RECORDED BY AN ULTRASHORT LASER PULSE**

F. Nicolas, S. Coëtmelec, V. Messenger, D. Lebrun, M. Brunel, *Université de Rouen, Rouen, France*

### **DESIGN OF ROUGH SURFACES IMAGING SYSTEM BASED ON POLARIZATION MEASUREMENT**

P. Terrier, V. Devlaminck, J. M. Charbois, *USTL LAGIS, Villeneuve d'Ascq, France*

**ESTIMATION OF PHYSICALLY REALIZABLE MUELLER MATRICES FROM REGULARIZED CONSTRAINT OPTIMIZATION**

J. Elsayed Ahmad, Y. Takakura, *Louis Pasteur University, Strasbourg, France*

**NEYMAN-PEARSON DETECTION ON SU(2): AN APPLICATION TO POLARIZED SIGNALS**

S. Said, N. Le Bihan, *Laboratoire des Images et des Signaux, Saint Martin d'Heres, France*

J. Manton, *Department of Information Engineering, Australian National University, Canberra, Australia*

**APPLICATION OF NUMERICAL HOLOGRAPHY FOR THE DETECTION OF DEFORMATION**

B. Boudjema, D. Abdi, *University of August 20, Skikda, Algeria*

**NOISE-ENHANCED ANISOTROPIC DIFFUSION FOR SCALAR IMAGE RESTORATION**

A. Histace, *Université de Cergy, Cergy, France*

D. Rousseau, *Université d'Angers, Angers, France*

**OCULAR ARTIFACTS REMOVAL IN SCALP EEG: COMBINING ICA AND WAVELET DENOISING**

R. Romo-Vazquez, R. Ranta, V. Louis-Dorr, D. Maquin, *Institut National Polytechnique de Lorraine, Vandoeuvre les Nancy, France*

**MULTIKERNEL DECONVOLUTION APPLIED TO CONFOCAL FLUORESCENCE MICROSCOPY WITH ENGINEERED POINT SPREAD FUNCTION**

B. Simon, O. Haeberlé, *Laboratory MIPS, University of Haute-Alsace, Mulhouse, France*

**PSF ANALYSIS WITH ZERNIKE MOMENTS, A TOOL TOWARD CHARACTERIZATION IN 3D MICROSCOPY**

A. De Meyer, A. Dieterlen, *Laboratory MIPS, University of Haute-Alsace, Mulhouse, France*

C. Turck, D. Loughnot, *DPG-CNRS UMR 7525, ENSCMu, Mulhouse, France*

**INFLUENCE OF MULTIPLE SCATTERING ON THE RESOLUTION OF AN IMAGING SYSTEM, A CRAMÉRAO ANALYSIS**

A. Sentenac, C. A. Guérin, P. Chaumet, F. Drsek, N. Bertaux, H. Giovannini, *Institut Fresnel, Marseille, France*

M. Holschneider, *Potsdam University, Potsdam, Germany*

**SAR IMAGING USING MULTIDIMENSIONAL TIME-FREQUENCY ANALYSIS**

M. Duquenoy, J. P. Ovarlez, L. Vignaud, *ONERA, Palaiseau, France*

L. Ferro-Famil, E. Pottier, *IETR, Rennes, France*

**SMALL WATER DEPTH DETECTION FROM GREEN LIDAR SIMULATED FULL WAVEFORMS: APPLICATION TO GRAVEL-BED RIVER BATHYMETRY**

A. Lesaignoux, J. S. Bailly, D. Feurer, *UMR TETIS, Engref-Cemagref-Cirad, Montpellier, France*

**ADEQUACY OF THE GAMMA STATISTICAL DISTRIBUTION FOR LOW AND HIGH RESOLUTION SAR IMAGES, USING THE KULLBACK RELATIVE ENTROPY**

F. Galland, P. Réfrégier, *Institut Fresnel (UMR 6133), Marseille, France*

G. Pons Bernard, *Thales Communication, Massy, France*

**3D SEISMIC DATA PROCESSING WITH COMPLEX NON SEPARABLE MULTIDIMENSIONAL LAPPED TRANSFORMS**

J. Gauthier, L. Duval, *IFP, Rueil-Malmaison, France*