

CURRICULUM VITAE: Dr Jean Louchet

updated June 2013



A: GENERAL

- Full name: Jean LOUCHET
- Date of birth: 13th September 1952
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- Main fields of research: Evolutionary computation, image processing and robot vision.
- Present position:
- Senior Research Scientist, University of Gent (Belgium), TELIN/IPI (Image Processing and Interpretation Research Group), 2013. **Motion detection and tracking.**
 - Associate professor at EFREI (Ecole Française d'Ingénieurs en Electronique et Informatique), Villejuif (France) , 2007–. Lecture series on **image analysis, computer vision, evolutionary computation applied to vision.**
- Previous positions:
- 2012: Senior Research Scientist, Hogeschool Gent (Belgium), Laboratory of Image Processing. **Smart camera architecture and single-lens range detection algorithms.**
 - Manager, ARTENIA (2009-2011), a start-up company dedicated to the **applications of evolutionary computing.**
 - 2002-2010: INRIA (Institut National de Recherche en Automatique et Informatique), COMPLEX (Rocquencourt) then APIS teams (Orsay). Research on *Artificial Evolution and applications to robot vision, medical imaging and virtual reality.*
 - 1993-2002: ENSTA, Professor, Electronics and Computer Science Laboratory. Research on *Image*

Animation and evolutionary identification of physical motion models from image sequences. Lectures on Computer Vision, Evolutionary Computing, Artificial Evolution, Robotics, Image Analysis & Pattern Recognition.

- 1991-1992: University of Exeter (UK), Honorary Research Fellow: *physical modelling for molecule image animation.*
- 1988-1991: ENSTA (Ecole Nationale Supérieure de Techniques Avancées, Paris), vice-Dean of studies.
- 1986-1988: DGA (French Procurement Agency), Defence Research Agency, coordinator of the “Vision and Image Processing” domain.
- 1977-1986: ETCA (Etablissement Technique Central de l’Armement), research in *infrared image processing, motion analysis and tracking* (NATO RSG contract), *electro-optical systems design, detection systems and countermeasures.* then vice-head of the Perception Systems Laboratory.

Qualifications and titles:

- ‘Habilitation à Diriger des Recherches’ thesis (April 2002), Université Paris-Descartes: “*Des Modèles pour la Vision*”, April 2002 (*Models for Vision*).
- Ph.D. Thesis, Université Paris-Descartes: “*Identification de modèles physiques pour la synthèse d’images animées*”, July 1996 (Evolutionary identification of physical models for image animation).
- Ingénieur ENSTA (Ecole Nationale Supérieure de Techniques Avancées) (1977).
- Ingénieur Ecole Polytechnique (1974) - specialisation in Functional Analysis and Galois Theory.
- Chevalier de la Légion d’Honneur; chevalier de l’Ordre National du Mérite.
- Finaliste aux Olympiades Internationales de Mathématiques, Bucarest 1969.

Recent scientific activities:

In 2012 I was employed as a part-time research scientist at INWE Image Processing Group, University College Gent, where I participated to the 3-SIS micro-camera project. The massively parallel architecture of the BLIP processor integrated into the camera calls for a non-conventional approach of image processing algorithms. My main contribution to the project is extracting 3-D information in real time from a single-lens camera. To this end, I developed two approaches. The first one consists of using pixel-size microlenses on the sensor and exploiting the width of the lens pupil in order to get a chess-like interlaced stereo pair. The chessboard-like interlacing allows fast depth estimation by comparison of neighbouring pixels. The second approach is less invasive, exploiting *bokeh* patterns resulting from defocussing using specific diaphragm shapes. Both approaches aim at providing 3D information that hopefully

will help the following region segmentation process.

Before this, until late 2010, my activities with the INRIA/APIS team into the applications of artificial evolution to image processing have been mainly focussed on three applications:

- Development of the *mainstream Fly Algorithm*. My previous work had shown it was possible to *represent visible objects in a scene as an evolving set of 3-D points* (the 'flies') whose evolution is controlled by a fitness function based on the consistency of the flies' projections into each camera. This representation can be built and maintained in real time with moving scenes even using small computing resources. Following this in his PhD thesis, Boumaza [2002, 2004] developed matching controllers applicable to *obstacle avoidance* in mobile robotics, allowing full exploitation of the *anytime* (asynchronous) properties of the algorithm for faster processing, and of its multicriterion capabilities to ensure sensor fusion. In order to better explore the potential applications of the Fly technique, we have moved one step further and laid the first milestones to *fly-based SLAM* (Self Localisation And Mapping). To this end, E. Sapin (a post-doctoral fellow) and J. Louchet have been developing a tool to spatially correlate fly populations derived from different camera positions, in order to derive the camera's self displacement, based on a pseudo-distance between fly populations. This research was partially funded by the XVISION contract.
- The second research topic addressed the problem of *3-D image reconstruction from noisy projections in SPECT tomography*. J. Louchet, E. Lutton and J.-M. Rocchisani devised a technique using a variation of the original Fly algorithm, which allows the fly population to gather in priority into the regions with high concentrations of emissive elements. It involves intensive physical simulation of random particle emission and trajectories. This research is now part of the TOMO-EA program, with the participation of Franck Vidal, beginning in December 2008, who successfully extended the method to PET tomography. New features have been introduced allowing to speed up the algorithm several orders of magnitude, including mitosis (for population growth), marginal evaluation which allows both more accurate results and a faster selection process, and hollow matrix processing.
- Third, we have been participating to the **REVES project** with the Cité des Sciences, Paris and several industrial partners. This project aimed at giving the general public an interactive, virtual-reality (VR) based presentation of the Earth and its satellites. While the other participants were developing the general scenario and custom VR

googles, I was involved jointly with the SIP laboratory at Paris-Descartes University, into the image processing parts. B. Kaufmann joined the team in November 2008 as a post-doctoral fellow to work on the *detection and interpretation of user's hand gestures using a real-time evolution technique* combined with fast image segmentation operators. We also benefited from the collaboration of Sergio Mota-Gutierrez, a graduate student from Universidad de Guanajuato (Mexico). Similarly I participated, with Nicolas Loménie (senior lecturer at Université Paris-Descartes) and Sandy Rihana, to the design of the *head localisation system*.

In early 2009 I was invited to a 3 month stay as an associate professor at Universidad de Guanajuato, Salamanca (Mexico) to give a *lecture series on Evolutionary Computation* and participate to the mobile robotics research at LAVIRIA, supervising student projects dealing with the *introduction of real-time evolutionary techniques into robot vision*.

Similarly I was invited by KTH (Royal Technology Institute), Image and Signal Processing Laboratory, Stockholm (Sweden) in 2004 to give a lecture series on *Computer Vision as an Inverse Problem*, and supervise several graduate student research projects.

B: PUBLICATIONS (SINCE 2000)

Journal Articles

- Jean Louchet, Peter Veelaert, *Single-lens low-disparity stereo using microprisms*, Journal of Systems Architecture, special issue on Smart Camera Architecture, 2013.
- Jean Louchet, [*The Young's modulus made easy*](#), FomRHi quarterly, journal of the British Lute Society, July 2009.
- Roger Trias-Sanz, Georges Stamon, Jean Louchet, [*Using colour, texture and hierarchical segmentation for high-resolution remote sensing*](#), ISPRS Journal of Photogrammetry & Remote Sensing 63 (2008) 156-168
- Jean Louchet: *Évolution artificielle, optimisation et analyse d'images*. Technique et Science Informatiques 25(8-9): 1049-1078 (2006).
- Olivier Pauplin, Jean Louchet, Evelyne Lutton, Arnaud de la Fortelle, [*Evolutionary Optimisation for Obstacle Detection and Avoidance in Mobile Robotics*](#), Journal of Advanced Computational Intelligence and Intelligent Informatics (JACIII), Special Issue on ISCIIA'04, vol. 9, no. 6: pp. 622-629, 2005.
- Jean Louchet, Maud Guyon, Marie-Jeanne Lesot, Amine Boumaza, [*L'algorithme des mouches dynamiques: guider un robot par évolution artificielle en temps réel*](#), Extraction des connaissances et apprentissage (Hermès, éd.), January 2002.
- Jean Louchet, Maud Guyon, Marie-Jeanne Lesot, Amine

Boumaza, [*Dynamic Flies : a new pattern recognition tool applied to stereo sequence processing*](#), Pattern Recognition Letters, Elsevier Science B.V., March 2001, revised June 2001.

- J. Louchet, *Using an Individual Evolution Strategy for Stereovision*, Genetic Programming and Evolvable Machines, Vol. 2, No. 2, March 2001, Kluwer Academic Publishers, 101-109.

Books and book chapters

- Jean Louchet, *Les familles d'appareils photo numériques*, Artenia, décembre 2011.
- Jean Louchet, *Choisir et comprendre mon appareil photo*, Artenia, avril 2011, ISBN 978-1-4477-3997-5.
- Pierre Collet, Jean Louchet, *Artificial evolution and the Parisian approach: applications in the processing of signals and images*, Chapter 2 in *Optimization in Signal and Image Processing*, edited by Patrick Siarry, University of Paris 12, France, ISBN: 9781848210448, June 2009.
- Jean Louchet, [*The Stringing guide – for the restoration of pianos, harpsichords and clavichords*](#), Artenia, October 2009, ISBN 978-1-4457-1033-4.
- Jean Louchet, *Modelling and optimization in image analysis*, Chapter 1 in *Optimization in Signal and Image Processing*, edited by Patrick Siarry, University of Paris 12, France, ISBN: 9781848210448, June 2009.
- Jean Louchet, *Le guide du cordage, manuel technique pour la restauration des pianos, clavecins et clavichords*, Lulu publications, May 2009, ISBN 978-1-40928158-0.
- Jean Louchet, *Modélisation et optimisation en analyse d'images*, in *Modélisation et traitement du signal*, Patrick Siarry (ed.), Hermès, 2006.
- Jean Louchet, Pierre Collet, *Evolution artificielle et évolution parisienne: applications en traitement de signal et d'images*, in *Modélisation et traitement du signal*, Patrick Siarry (ed.), Hermès, 2006.

International conference papers:

- Jean Louchet, *From individual string calculations to global instrument stringing*, ANIMUSIC Conference, Evora (Portugal), 2013.
- Evelyne Lutton, Julie Fouquier, Nathalie Perrot, Jean Louchet, and Jean-Daniel Fekete. [*Visual analysis of population scatterplots*](#). In 10th Biannual International Conference on Artificial Evolution (EA-2011), Angers, France, 2011.
- F. P. Vidal, E. Lutton, J. Louchet, and J.-M. Rocchisani. [*Threshold selection, mitosis and dual mutation in cooperative co-evolution: application to medical 3D tomography*](#). In PPSN 2010, 11th International Conference on Parallel Problem Solving From Nature. Springer-Verlag, September 2010. Krakow, Poland.

- F. P. Vidal, J. Louchet, J.-M. Rocchisani, and E. Lutton, [*Flies for PET: an Artificial Evolution Strategy for Image Reconstruction in Nuclear Medicine*](#). In AAPM Annual Meeting, Philadelphia, PA, July 2010.
- Franck P. Vidal, Jean Louchet, Jean-Marie Rocchisani, and Evelyne Lutton. [*New genetic operators in the fly algorithm: application to medical PET image reconstruction*](#). In Evolutionary Computation in Image Analysis and Signal Processing, EvoApplications 2010, Part I, LNCS 6024,C. Di Chio et al. (Eds.). Springer, April 2010. 7th - 9th April, Istanbul Technical University, Istanbul, Turkey.
- Benoit Kaufmann, Jean Louchet, and Evelyne Lutton. [*Hand posture recognition using real-time artificial evolution*](#). In Evolutionary Computation in Image Analysis and Signal Processing, EvoApplications 2010, Part I, LNCS 6024,C. Di Chio et al. (Eds.), pages 251-260. Springer, April 2010. 7th - 9th April, Istanbul Technical University, Istanbul, Turkey.
- Emmanuel Sapin, Jean Louchet: [*The Fly algorithm revisited: adaptation to CMOS image sensors*](#), ICEC International Conference on Evolutionary Computation, Madeira (Portugal), October 2009.
- F.P. Vidal, D. Lazaro-Ponthus, S. Legoupil, J. Louchet, E. Lutton, J.-M. Rocchisani: [*Artificial Evolution for 3D PET Reconstruction*](#). In Artificial Evolution 2009 (EA 2009), Strasbourg, France, 26 - 28 October 2009. To be published.
- Franck P. Vidal, Delphine Lazaro-Ponthus, Samuel Legoupil, Jean Louchet, Évelyne Lutton, and Jean-Marie Rocchisani. *PET reconstruction using a cooperative coevolution strategy*. In Proceedings of the IEEE Medical Imaging Conference 2009, Orlando, Florida, October 2009. IEEE.
- Franck P. Vidal, Jean Louchet, Evelyne Lutton, and Jean-Marie Rocchisani. [*PET reconstruction using a cooperative coevolution strategy in LOR space*](#). In IEEE Nuclear Science Symposium Conference Record, pages 3363-3366, Orlando, Florida, October 2009. IEEE.
- Jean Louchet, Emmanuel Sapin: [*Flies Open a Door to SLAM*](#). EvoWorkshops 2009, Tübingen (Germany): 385-394 (**Best paper award**).
- Aurélie Bousquet, Jean Louchet, Jean-Marie Rocchisani: [*Fully Three-Dimensional Tomographic Evolutionary Reconstruction in Nuclear Medicine*](#). Artificial Evolution 2007: 231-242.
- Roger Trias-Sanz, Marc Pierrot Deseilligny, Jean Louchet, Georges Stamon: [*Methods for Fine Registration of Cadastre Graphs to Images*](#). IEEE Trans. Pattern Anal. Mach. Intell. 29(11), 2007: pp. 1990-2000.

- Jean Louchet, *Model-based Image Analysis using Evolutionary Strategies*, Genetic and Evolutionary Computation in Image Processing and Computer Vision, Stefano Cagnoni, Evelyne Lutton and Gustavo Olague (Eds), EURASIP book series on signal processing and communications, Hindawi, 2006, pp. 283-308.
- Olivier Pauplin, Jean Louchet, Evelyne Lutton, Michel Parent, [*Obstacle detection by evolutionary algorithm: The Fly Algorithm*](#), Second International Conference on Autonomous Robots and Agents ICARA 2004, December 2004, Palmerston North, New Zealand.
- Olivier Pauplin, Jean Louchet, Evelyne Lutton, and Michel Parent. *Applying evolutionary optimisation to robot obstacle avoidance*. In ISCIIA, 2004. December 20-24, 2004, Haikou, China.
- Amine Boumaza, Jean Louchet, [*Mobile robot sensor fusion using flies*](#), EuroGP2003, European Conference on Genetic Programming, Essex, UK, April 2003, Springer Lecture Notes on Computer Science LNCS 2611, 357-367.
- Philippe Guermeur, Jean Louchet, [*An evolutionary algorithm for camera calibration*](#), ICRODIC 2003, pp. 799-804, Rethymnon, Crete, October 2003.
- Pierre Collet, Evelyne Lutton, Jean Louchet, [*Issues on the Optimisation of Evolutionary Algorithm Code*](#), CEC2002 conference on Evolutionary Computation, Honolulu, May 2002.
- Amine Boumaza, Jean Louchet, [*Dynamic Flies: Using Real-time evolution in Robotics*](#), EVOIASP2001, Artificial Evolution in Image Analysis and Signal Processing, April 2001, Como, Italy (*best paper award*), Springer Lecture Notes on Computer Science LNCS 2037, Applications of Evolutionary Computing, 288-297.
- Bogdan Stanciulescu, Jean-Loup Florens, Jean Louchet, Annie Luciani, *Evolving Motricity in Particle-Based Models*, Advanced Concepts for Intelligent Vision Systems ACIVS2001, Baden-Baden, August 2001, 6-12.
- Evelyne Lutton, Pierre Collet, Jean Louchet, [*EASEA comparisons on test functions : GALib versus EO*](#), EA01 Conference on Artificial Evolution, Le Creusot, October 2001.
- Enzo Bolis, Christian Zerbi, Pierre Collet, Jean Louchet, Evelyne Lutton, [*A GP artificial ant for image processing : preliminary experiments with EASEA*](#), EuroGP, European Conference on Genetic Programming, April 2001, Como, Italy, Springer Lecture Notes on Computer Science LNCS 2038, Genetic Programming, 246-255.
- Bogdan Stanciulescu, Jean Louchet, [*Evolving Physical Models to Understand Motion in Image Sequences*](#),

European Symposium on Intelligent Techniques ESIT'2000, 14-15 September 2000, Aachen, Germany.

- J. Louchet, L. Castillon, J.M. Rocchisani, *Evolving Flies for Stereovision and 3-D Reconstruction*, ACIVS2000, Baden-Baden, Germany, August 2000.
- J. Louchet, [Stereo Analysis Using Individual Evolution Strategy](#), ICPR2000, Barcelona, Spain, septembre 2000.
- Pierre Collet, Evelyne Lutton, Marc Schoenauer, Jean Louchet, [Take it EASEA](#), PPSN2000 Conference on Parallel Problem Solving From Nature, September 2000.
- B. Stanciulescu, J. Louchet, [Evolutionary Identification of Active Particle Systems](#), WSCG2000, International Conference in Central Europe on Computer Graphics, Visualization and Interactive Digital Media, Plzen, Czech Republic, February 2000.
- Jean Louchet, Xavier Provot, David Crochemore, [Evolutionary identification of cloth animation models](#), Eurographics95, Maastricht, 1995.
- Jean Louchet, Michael Boccara, David Crochemore, Xavier Provot, [Building new tools for synthetic image animation by using evolutionary techniques](#), Artificial Evolution AE95 workshop, Springer Verlag 1996.

French conference papers:

- J. Louchet, [Capteurs et dimensionnement physique en vision](#), RFIA 2012 (Reconnaissance des Formes et Intelligence Artificielle), January 2012, tutorial.
- J. Louchet, [L'algorithme des mouches : une stratégie d'évolution individuelle appliquée en stéréovision](#), RFIA2000 (Reconnaissance des Formes et Intelligence Artificielle), February 2000.

Invited papers:

- Jean Louchet, *Du clavecin au piano 1710-1860: 150 ans d'innovations*, conférences du Cercle de l'Oasis, Paris, mars 2010.
- J. Louchet, *Is vision an inverse problem?* invited conference, CIMAT, Universidad de Guanajuato (Mexico), March 2009.
- J. Louchet, *An introduction to optics and photography*, invited conference, LAVIRIA, Salamanca (Mexico), February 2009.
- J. Louchet, *Why are there twelve tones in a gamut?* , invited conference, LAVIRIA, Salamanca (Mexico), February 2009.
- J. Louchet, [Du calcul des cordes au plan de cordes](#), Conférence annuelle EUROPIANO, Marseille, avril 2008.
- J. Louchet, *Optimisation Strategies for Modelling and Simulation*, tutorial, 8th Intl. Workshop on Data Analysis in Astronomy, Erice, Italy, April 2007.
- J. Louchet, E. Lutton, *Parametric and Evolutionary*

Methods in Image Processing, tutorial, SITIS conference, Hammamet, Tunisia, February 2006.

Technical reports and
lecture notes:

- J. Louchet, *introduction to musical acoustics: towards a solfegist robot*, INRIA invited conference (Fractales seminar), 27th April 2000, Rocquencourt.
- Jean Louchet, *Single camera range estimation with 3-SIS*, Activity Report 2012, Hogeschool Gent, January 2013.
- Jean Louchet, Amine Boumaza, Baudoin Coppieters, *Détection d'attitude d'un hélicoptère en phase d'appontage par évolution artificielle*, DGA technical report, 2002.
- Pierre Collet, Marc Schoenauer, Evelyne Lutton, Jean Louchet, [EASEA : un langage de spécification pour les algorithmes évolutionnaires](#), RR-4218, INRIA Rocquencourt, June 2001.
- E. Lutton, P. Collet, J. Louchet, M. Sebag, C. Fonlupt, *Evolution Artificielle*, ENSTA lecture notes, mars 2000.
- J. Louchet, *Introduction à la vision artificielle*, ENSTA lecture notes, 2000.

D.Phil students supervision

- Olivier Pauplin, *Contrôle d'un robot par vision et évolution artificielle [Robot control using vision and artificial evolution]* (ended December 2006).
- Julien Richefeu, *Détection et analyse du mouvement sur un système de vision à base de rétine numérique [Motion detection and analysis on a digital retina-based vision system]* (ended June 2006).
- Roger Trias-Sanz, *Recalage du cadastre par segmentation d'images aériennes [cadastral survey fitting using automatic aerial image segmentation]* (ended October 2005).
- Amine Boumaza, *Vision et contrôle d'un robot par l'algorithme des mouches [Robot vision and control using the Fly algorithm]*, joint supervision with Prof. G. Stamon, Université René Descartes - Paris5, May 2004.
- Philippe Guermeur, *Détermination de l'orientation de facettes par stéréovision axiale, [Determining planar facet orientation using axial monocular stereovision]*, joint supervision with Pr. E. Pissaloux, Université de Rouen, 2002.
- Eric Dumont, *Synthèse d'images pour l'évaluation de performance de la vision dans le brouillard [Quantitative image synthesis methods to evaluate driver's vision performance in fog]*, joint supervision with Pr. G. Stamon, April 2002, Université Paris5 - René Descartes.
- René Mathurin, *Modélisation et prévision d'événements pluvieux sur séquences d'images radar [Modelling and predicting rain events on radar image sequences]* Université Paris5 - René Descartes, 2002.
- Bogdan Stanciulescu, *modèles particuliers actifs pour la*

synthèse d'images animées [Active particle-based models for image animation], joint supervision with Dr J.L. Florens, Université Joseph Fourier, Grenoble, March 2002.

C: Other

Other activities

- harpsichordist (solo and consort baroque and renaissance music), organ, *continuo*. Member of the *Sorbonne Scholars* (English Renaissance music, vocal and instrument consorts), continuist of the *Ensemble Bach Cantus*, and founder of the baroque chamber ensemble *Les Resjouissances Baroques*.
- musical instrument building (mainly harpsichords), studying, collecting and restoring early keyboards. Main present project is the design and building of a double harpsichord in North-German style. Also a 1853 Broadwood concert grand in restoration, and a ca. 1815 Clementi cabinet piano on the waiting list. Member of the *Galpin Society*.
- development of *StringIt*, a commercial tool to help restorers in re-stringing musical instruments. This also uses a (simple) evolutionary algorithm in order to optimise sound volume, quality and homogeneity over the instrument's compass.
- writing technical books – emphasis on the (often overlooked) mathematical/physical/engineering aspects of arts and their tools.
- Sports: cycle touring, mountain hiking/scrambling.
- Photography (portrait, natural light - landscape, medium format).

Languages:

French (native)
English (fluent)
Spanish (good)

References

Prof. Georges Stamon, Université René Descartes, Paris,
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