
Personal Details

Name : Iuri Frosio
Date / place of birth : 25th August, 1978 – Bergamo - Italy
Address : XXX
Phone : XXX
E-Mail : frosio.iuri@gmail.com
Linkedin : <http://it.linkedin.com/pub/iuri-frosio/40/378/396/en>

Education

May 2006 : **Ph.D.**, biomedical engineering, Politecnico of Milan, Italy;
July 2002 : **Master's degree** (95/100), biomedical engineering, Politecnico of Milan, Italy;
June 1997 : **Diploma** (48/60), Liceo Scientifico F. Lussana, Bergamo, Italy.

Work experience

2006 – today : **Assistant professor**, Computer Science Dept., University of Milan, Italy.
Research: *principal investigator for projects in the following fields: inertial sensors; pose estimation; SIDS prevention.*
R&D: *industrial projects in the following fields: digital radiography; tomography; computer vision systems.*
Teaching: *digital signal processing; basic computer science; computer architecture (lecturer); Java programming (lecturer).*

2012 : **Consultant**, Lyrical Labs, Iowa, United States.
C / C++ SW developer: *speed up of image segmentation algorithm.*

2007 – today : **Consultant**, Altalab srl, Italy, and Cefla Dental Division, Italy.
C / C++ SW developer: *image processing digital filters; iterative tomographic reconstruction algorithms.*
Patent inventor: *dental radiographic apparatuses; computer vision methods for patient positioning; SIDS prevention systems.*

2003 – 2006 : **Research fellow**, Computer Science Dept., University of Milan, Italy.
R&D: *industrial projects in the following fields: digital radiography; tomosynthesis; vision system for surgery simulation.*
Teaching: *basic computer science; intelligent systems (lecturer).*

2003 – 2006 : **Consultant**, Gendex Dental Systems, Italy.
C / C++ SW developer: *image processing digital filters.*
Patent inventor: *dental radiographic apparatuses and acquisition methods.*

2002 : **Stagist**, Gendex Dental System, Cusano Milanino (MI), Italy.
Research and development: *industrial project on analysis of digital radiographies.*

Achievements

Medical image processing & tomography

- *The following projects have been financed by Altalab srl (<http://www.altalab.it/>) and Cefla Dental Division (<http://www.cefla.com/it/business-units/dental>). The algorithms I developed in these projects have been included in the software packages worldwide distributed by My-Ray (www.my-ray.com). Prototypes were developed using Matlab; filters and other algorithms were then implemented in C/C++.*
 - ▶ 2012 - 2013, **study of different acquisition strategies for local tomography** with a TDI sensor.
 - ▶ 2011 - 2012, **parallel implementation (CUDA) of tomographic algorithm** (limited angle + artifacts correction).
 - ▶ 2009 - 2011, **artifact correction in limited angle tomography**.
 - ▶ 2007 - 2009, **limited angle tomography** based on **iterative reconstruction** and **regularization**.
 - ▶ 2008, **total variation denoising** filter for digital radiography.
 - ▶ 2007, **information-based** filter for **automatic contrast enhancement** in digital radiography.
 - ▶ 2007, filter for **impulsive noise removal** based on **statistics** and **mixture model**.

- *The following projects have been financed by the Italian Minister of University and Instruction. Filter development and their evaluation were performed using Matlab.*
 - ▶ 2009-2011, methods and **optimization** software for **inverse problems** (PRIN 2008)
 - ▶ 2007-2009, real time, **total variation denoising** in digital radiography (PRIN 2006, “Inverse Problems in Medicine and Astronomy”)

- *The following project has been financed by Gendex Dental Systems (www.gendex.com). The algorithms were written in C/C++ and the graphical user interface was developed using MFC.*
 - ▶ 2006, **tomosynthesis** in dental radiography (**tomographic reconstruction** and **graphical user interface**).

- *The following projects have been financed by Gendex Dental Systems (www.gendex.com). The algorithms I developed in these projects have been included in the software packages worldwide distributed by Gendex Dental Systems. Prototypes were developed using Matlab; the filters were then implemented in C/C++.*
 - ▶ 2005, **sensor response calibration** in intra-oral radiography.
 - ▶ 2005, filter for blemish correction (**signal restoration**) in intra-oral radiography.
 - ▶ 2004 - 2005, filter for **impulsive noise removal** in digital radiography based on **perceptive criteria**.
 - ▶ 2004, filter for **exposure correction** in panoramic radiography.
 - ▶ 2003, **real time** filter based on mixture model for **adaptive contrast enhancement** in cephalometry (patented).

- *The following project has been developed during a three-month stage at Gendex Dental Systems (www.gendex.com). The algorithms and the graphical user interface were developed using Matlab.*
 - ▶ 2002, software for **automatic analysis** of ortopantomographic radiographies for **geometric calibration**.

Inertial sensors

- *The following project has been fully developed in the academy:*
 - ▶ 2012-2013: IMU based **tracking of dystonic patients**.
 - ▶ 2012-2013: Combined **calibration** of multiple **accelerometers and magnetometers** in a IMU.

- *The following project has been partially supported by Altalab srl (<http://www.altalab.it/>).*
- ▶ 2010-2012: accelerometer based **system for SIDS and plagiocephaly prevention** (patented).

- *The algorithms described in the following section were developed using Matlab and C/C++. The graphical user interfaces were developed using QT.*
- ▶ 2011-2012: accelerometer based **keystone and horizon correction** in **digital photography**.
- ▶ 2010-2011, **autocalibration** of **MEMS accelerometers** with **automatic** choice of the sensor **model**.
- ▶ 2006, **autocalibration** of **MEMS accelerometers**.

Computer vision, motion capture & motion analysis

- *The following project has been financed by Lyrical Labs (Iowa, US). The algorithms in the following project were developed using C++.*
- ▶ 2012, **speed-up** of **image segmentation** algorithm through a multi-resolution approach.

- *The algorithms in the following project were developed using Matlab. The acquisition architecture was based on Pylon libraries.*
- ▶ 2010-2011, **conic-based** linear **pose estimation** for a trinocular vision system.

- *The following project has been financed by Altalab srl (<http://www.altalab.it/>). The algorithms were first developed using Matlab and then implemented in C/C++. Pylon libraries were employed for image acquisition, whereas QT libraries were used for the graphical user interface.*
- ▶ 2010-2011, development of a flexible, low-cost, **laser linear scanner** with graphical user interface.

- *The following project has been financed by Gendex Dental System (www.gendex.com).*
- ▶ 2005-2008, **vision-based automatic patient positioning** in digital radiography (patented).

- *The following projects have been financed by Dies Group srl (<http://www.diesgroup.com/>). The algorithms I developed in these projects have been included in the simulation system distributed by Dies Group srl. Prototypes were developed using Matlab; the algorithms were then implemented in C/C++. MIL libraries were employed for image acquisition.*
- ▶ 2005-2006, **acquisition architecture** for a surgery simulation system based on **multiple Firewire cameras**.
- ▶ 2005-2006, **circle fitting** algorithm in presence of partial **occlusion** for a surgery simulation system based on **multiple Firewire cameras**.

- *The following project has been carried out in collaboration with Cebism (<http://www.form.unitn.it/cebism/>). Algorithms for movement analysis were written in Matlab.*
- ▶ 2004-2007, **rock climbing movement analysis** based on **motion capture** data.

Editorial / reviewer / project evaluator activity

2006 – today : **Reviewer** for the following international journals: IEEE Trans. Pattern Analysis and Machine Intelligence, IEEE Trans. Neural Networks, IEEE Trans. Signal Processing, IEEE Trans. Image Processing, Pattern Recognition, Mathematics and Computers in Simulation, IEEE Trans. on Electronics Packaging Manufacturing, Journal of Modern Optics, Measurement, International Journal of Pattern Recognition and Artificial Intelligence, Signal Image and Video, Inverse Problems, Journal of Artificial Intelligence Research.

2012 – today : **Foreign project evaluator** for the Romanian National Council for Scientific Research.

Awards

2011 : NVIDIA academic partnership.

2002 : I.S.U. degree scholarship – graduation award for completing degree in 5 years.

1997 / 2002 : I.S.U. university scholarships (4x), based on performance (number of exams, average mark).

General skills

Programming and OS

C/C++, Matlab : professional.

Java : basic knowledge.

SSE, OpenMP : basic knowledge.

CUDA : discrete knowledge.

MFC, QT : discrete knowledge.

OpenGL : basic knowledge.

OpenCV, MIL, Phylon : discrete knowledge.

Microsoft Visual Studio: professional.

Windows : professional.

Linux : basic knowledge.

Languages

Italian : mother tongue.

English : fluent.

German : basic.

Other

Driving license : class B.

Extra-curricular activities and interests

Photography; hiking & climbing; european literature.

Publications

International patents

- p1. N. A. Borghese, I. Frosio, Soft Tissue Filtering in Medical Images, Patent EP 1624411 (A2), Feb. 8, 2006.
- p2. N. A. Borghese, I. Frosio, Soft Tissue Filtering, Patent US 20060029183 (A1), Feb. 9, 2006.
- p3. G. Rotondo, G. Rinaldi, N. A. Borghese, I. Frosio, Dental X ray apparatus and method of positioning patient therein, Patent EP 1815794 (A1), Aug. 8, 2007.
- p4. G. Rotondo, G. Rinaldi, N. A. Borghese, I. Frosio, Dental X ray apparatus and method of positioning patient therein, Patent US 2007183567 (A1), Aug. 9, 2007.
- p5. N.A. Borghese, I. Frosio, E. Nanni, G. Rinaldi, G. Rotondo, Method And Apparatus For Simplified Patient Positioning In Dental Tomographic X-Ray Imaging, Patent EP 2123223 (A1), Nov. 11, 2009.
- p6. N.A. Borghese, I. Frosio, E. Nanni, G. Rinaldi, G. Rotondo, Method And Apparatus For Radiographic Imaging, Patent EP 2130491 (A1), Dec. 9, 2009.
- p7. N.A. Borghese, I. Frosio, E. Nanni, G. Rinaldi, G. Rotondo, Method And Apparatus For Radiographic Imaging, Patent US 2009310741 (A1), Dec. 17, 2009.
- p8. N.A. Borghese, I. Frosio, E. Nanni, G. Rinaldi, G. Rotondo, Method And Apparatus For Simplified Patient Positioning In Dental Tomographic X-Ray Imaging, Patent US 2009323891 (A1), Dec. 31, 2009.
- p9. I. Frosio, G. Rotondo, Method and device for monitoring the risks for sudden infant death syndrome and for positional plagiocephaly, Patent EP 2425771 (A3), Apr. 18, 2012.
- p10. I. Frosio, G. Rotondo, Method and device for monitoring the risks for sudden infant death syndrome and for positional plagiocephaly, Patent US2012083670 (A1), Apr. 5, 2012.

Italian patents

- ip1. I. Frosio, G. Rotondo, Apparato e metodo per il monitoraggio del rischio di insorgenza della sindrome di morte in culla (SIDS) e della plagiocefalia posizionale, Italian patent MI2010A001613, filled: 7th september, 2010.

International journals

- j1. S. Ferrari, I. Frosio, V. Piuri and N. A. Borghese, "Automatic Multiscale Meshing through HRBF Networks", IEEE Transactions on Instrumentation and Measurement, August 2005, pp. 1463-1470.
- j2. I. Frosio, G. Ferrigno, N. A. Borghese, "Enhancing Digital Cephalic Radiography with Mixture Model and Local Gamma Correction," IEEE Transaction on Medical Imaging, Vol. 25, No. 1, Jan. 2006, pp. 113-121.
- j3. I. Frosio, M. Spadea, E. De Momi, M. Riboldi, G. Baroni, G. Ferrigno, R. Orecchia, A. Pedotti, "A Neural Network Based Method for Optical Patient Set-up Registration in Breast Radiotherapy," Annals of Biomedical Engineering, Feb. 2006, pp. 1-10.
- j4. I. Frosio, N. A. Borghese, "A New Real Time Filter for Local Exposure Correction in Panoramic Radiography," Medical Physics, Vol. 33, No. 9, Sep. 2006, pp. 3478-88 .
- j5. F. Sibella, I. Frosio, F. Schena, N. A. Borghese, "3D analysis of the body centre of mass in rock climbing," Human Movement Science, Vol. 6, No. 6, Dec. 2007, pp. 841-52.
- j6. I. Frosio, N. A. Borghese, "Real-time accurate circle fitting with occlusions," Pattern Recognition, Vol. 41, No. 3, March 2008, pp. 1041-55.
- j7. I. Frosio, N. A. Borghese, "An expectation maximization approach to impulsive noise removal in digital radiography," International Journal of Computer Assisted Radiology and Surgery, Vol. 3, No. 1-2, June 2008, pp. 91-6.
- j8. I. Frosio, N. A. Borghese, "Statistical Based Impulsive Noise Removal in Digital Radiography," IEEE Transactions on Medical Imaging, Vol.28, No.1, Jan. 2009, pp.3-16.
- j9. I. Frosio, N. A. Borghese, "Compression and smart coding of offset and gain maps for intraoral digital x-ray sensors," Med. Phys, Vol. 36, No. 2, Feb. 2009, pp. 464-79.

- j10. I. Frosio, F. Pedersini, N. A. Borghese, "Autocalibration of MEMS Accelerometers," IEEE Transactions on Instrumentation and Measurements, Vol. 58, No. 6, Jun. 2009, pp. 2034-41.
- j11. I. Frosio, F. Pedersini, N. A. Borghese, "Autocalibration of triaxial MEMS accelerometers with automatic sensor model selection," IEEE Sensors Journal, 12(6), pp. 2100-8, Jun. 2012.
- j12. I. Frosio, A. Alzati, M. Bertolini, C. Turrini, N. A. Borghese, Linear Pose Estimate from Corresponding Conics, Pattern Recognition, 45(12), pp. 4169-81, Dec. 2012.
- j13. I. Frosio, M. Lucchese, C. Olivieri, N. A. Borghese, P. Boccacci, Bayesian Denoising of Medical Radiographs, Computerized Medical Imaging and Graphics, in press (Jan. 2013).
- j14. N. A. Borghese, I. Frosio, Compact tracking of surgical instruments through structured markers, Medical & Biological Engineering & Computing, in press (Jan. 2013).

Book chapters

- bc1. N. A. Borghese, I. Frosio, Denoising and Contrast Enhancement in Dental Radiography, in "Dental Computing and Applications: Advanced Techniques for Clinical Dentistry, edited by Edited by: Andriani Daskalaki, Max Planck Institute for Molecular Genetics, Germany, Jan. 2010.
- bc2. I. Frosio, F. Pedersini, N. A. Borghese, Autocalibration of MEMS accelerometers, Advanced Mechatronics and MEMS Device, Edited by: Dan Zhang, Springer, Sept. 2012.

Proceedings of international conferences

- ic1. De Momi E., Frosio I., Baroni G., Ferrigno G., FNNVM, a new fast neurocomputational approach to surfaces alignment in image guided knee replacement, in Proc. CAOS 2003, Marbella, Spain, June 18-21, 2003.
- ic2. Frosio I., Lanzarotti R., Campadelli P., Ferrigno G., Borghese N.A., Real time positioning system based on active stereo and facial features identification, in Proc. Eurographics 2003, Granada, Spain, 1-6 September 2003.
- ic3. Ferrari S., Frosio I., Piuri V. and Borghese A., Real.time, Multi-scale meshing from range data, in Proc. 6th Conference on Optical 3-D Measurement Techniques, Zurich, Switzerland, September 22-25, 2003.
- ic4. Ferrari S., Frosio I., Piuri V., Borghese N. A., The Accuracy of the HRBF networks, in Proc. IEEE Instrumentation and Measurement, Technology Conference, Lake Como, Italy, May 18-22, 2004.
- ic5. Ferrari S., Frosio I., Piuri V., Borghese N. A., Enhanced Vector Quantization for clouds of points reduction and filtering, in Proc. Second International Symposium on 3D Data Processing, Visualization & Transmission, Thessaloniki, Greece, September 6-9, 2004.
- ic6. Frosio I., Borghese N. A., A new switching median filter for digital radiography, in Proc. MIC 2004, Rome, Italy, 19-22 October 2004.
- ic7. Borghese N. A., Frosio I., M.I.S.S. (Micro Surgery Simulator), in Proc. 7th Conference on Optical 3-D Measurement Techniques, Wien, Austria, October 3-5, 2005.
- ic8. M. F. Spadea, I. Frosio, E. De Momi, M. Riboldi, G. Baroni, G. Ferrigno, R. Orecchia, A. Pedotti, An artificial neural networks algorithm for patient positioning in breast cancer radiotherapy, in Proc. MBEC 2005, Prague, Czech Republic, November 20-25, 2005.
- ic9. F. Sibella, I. Frosio, B. Zappa, N. A. Borghese, Experimental protocol for the analysis of basic rock climbing movements, in Proc. Mountain & Sport International Congress, Rovereto (Tn), Italy, 11-12 November 2005, pp. 55.
- ic10. I. Frosio, N. A. Borghese, Real time enhancement of cephalometric radiographies, in Proc. ISBI 2006, Arlington (USA), 5-11 April 2006.
- ic11. I. Frosio, S. Stuani, N. A. Borghese, Autocalibration of MEMS accelerometer, in Proc. IMTC 2006, Sorrento (Italy), 25-27 April 2006.
- ic12. I. Frosio, N. A. Borghese, Offset and gain maps compression for digital radiographic sensors, in Proc. CARS 2006, Osaka (Japan), June 2006.
- ic13. I. Frosio, N. A. Borghese, Local defect correction using a priori information in digital radiography, in Proc. CARS 2006, Osaka (Japan), June 2006.
- ic14. F. Sibella, I. Frosio, N. A. Borghese, F. Schena, 3D analysis of the body center of mass in rock climbing, in Proc. ISBS 2006, Innsbruck, Austria.

- ic15. I. Frosio, M. Girlanda, C. Botton, F. Sibella, N. A. Borghese, Quantitative analysis of high jump styles, in Proc. ISBS 2006, Innsbruck, Austria.
- ic16. I. Frosio, N. A. Borghese, A new filter for local exposure correction in panoramic radiography, in Proc. CARS 2007, Berlin (Germany), Jun. 2007.
- ic17. I. Frosio, N. A. Borghese, A high accuracy system for virtual eye surgery, in Proc. CARS 2007, Berlin (Germany), Jun. 2007.
- ic18. I. Frosio, M. Lucchese, N. A. Borghese, A new and reliable Poisson noise estimator for radiographic images, in Proc. ICIAP 2007, Modena (Italy), Sept. 2007.
- ic19. I. Frosio, N. A. Borghese, Tomosynthesis through a time delay integration sensor, in Proc. MIC 2007, Honolulu (USA), 30 October - 3 November 2007.
- ic20. I. Frosio, S. Abati, N. A. Borghese, Bayesian approach to impulsive noise removal in digital radiography, in Proc. CARS 2008, Barcellona (Spain), June 25-28 2008.
- ic21. I. Frosio, M. Lucchese, F. Lissandrello, N. A. Borghese, Automatic Contrast Enhancement in Digital Radiography, in Proc. MIC 2008, Dresden (Germany), October 20-26 2008.
- ic22. D. Imperati, I. Frosio, M. Tittgemeyer, N. A. Borghese, Prediction Correction Tractography Through Statistical Tracking, in Proc. NSS 2008, Dresden (Germany), October 19-25 2008.
- ic23. I. Frosio, F. Pedersini, A. Pasini, D. Bianconi, N. A. Borghese, Algebraic reconstruction methods for GPU cone beam tomography, in Proc. CARS 2009, Berlin (Germany), June 2009.
- ic24. I. Frosio, M. Lucchese, N. A. Borghese, Total variation approach for denoising digital radiographs, in Proc. CARS 2009, Berlin (Germany), June 2009.
- ic25. I. Frosio, P. Tirelli, G. Venturino, G. Rotondo, N. A. Borghese, Flexible and Low Cost Laser Scanner for Automatic Tyre Inspection, in Proc. IMTC 2011, Hangzhou (China), May 2011.
- ic26. I. Frosio, F. Lissandrello, G. Venturino, G. Rotondo, N. A. Borghese, Optimized Acquisition Geometry for X-Ray Inspection, in Proc. IMTC 2011, Hangzhou (China), May 2011.
- ic27. I. Frosio, N. A. Borghese, Semi-automatic geometric calibration of an ortopantomograph, in proc. CARS 2011, Berlin (Germany), June 2011.
- ic28. M. Lucchese, I. Frosio, N. A. Borghese, Optimal Choice of Regularization Parameter in Image Denoising, in proc. ICIAP 2011, Ravenna (Italy), Sept. 2011.
- ic29. E. Calore, F. Pedersini, I. Frosio, Accelerometer based horizon and keystone perspective correction, in Proc. IMTC 2012, Graz (Austria), Maj 2012.

Proceedings of italian conferences

- nc1. Frosio I., Borghese N. A., Human visual system modeling for real-time salt and pepper noise removal, in Proc. WIRN 2004, Perugia, Italy, 15-17 September 2004.
- nc2. Frosio I., Ferrigno G., Borghese N. A., A neural algorithm for object positioning in 3d space using optoelectronic system, in Proc. WIRN 2004, Perugia, Italy, 15-17 September 2004.
- nc3. I. Frosio, N. A. Borghese, Local exposure correction in panoramic radiography, in Proc. CISI 2006, Ancona (Italy), Sep. 2006.
- nc4. I. Frosio, N. A. Borghese, Digital tomosynthesis: a review, in Proc. CISI 2006, Ancona (Italy), Sep. 2006.
- nc5. I. Frosio, N. A. Borghese, Optimized Algebraic Local Tomography, in Proc. GIRPR 2010, Ascea (SA, Italy), Jun. 2010.
- nc6. I. Frosio, N. A. Borghese, Virtual Training System for Tracking Surgery Instruments, in Proc. MIMOS 2010: La Medicina Incontra la Realtà Virtuale, Applicazioni in Italia della Realtà Virtuale in Medicina e Chirurgia, Pisa, Dec. 2010.
- nc7. I. Frosio, R. Mainetti, S. Palazzo, N. A. Borghese, Robust Kinect for rehabilitation, in Proc. GIRPR 2012.

Thesis

- t1 I. Frosio, Filters for image correction and enhancement in digital dental radiography, PhD thesis in bioengineering, Politecnico of Milan, Milan, Italy, May 2006.
- t2 I. Frosio, Algoritmi per il controllo assistito del paziente in radioterapia, Master thesis in bioengineering, Politecnico of Milan, Milan, Italy, July 2002.