

# Oscar Acosta-Tamayo

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RESEARCH INTERESTS	Medical Image Analysis, Neurodegenerative Diseases, Magnetic Resonance Imaging, Computer Assisted Medical Interventions, Virtual Reality, Segmentation and 3D Modeling.
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MAIN RESEARCH ACTIVITIES	<b>Research Scientist (Alzheimer's Disease project).</b> e-Health Research Centre - CSIRO ICT Centre. Australia	Currently
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- The aim of the Alzheimer's Disease project is to research algorithms and software to process and analyse MRI and PET scans both qualitatively and quantitatively. It is part of a larger CSIRO and Federal Government project aimed at Lifestyle and Aging. My current research covers mainly the development of techniques for automatically extracting information from MRI. Particularly I'm interested in cortical thickness estimation in Alzheimer's data.

## Postdoctoral Research Fellow.

e-Health Research Centre - CSIRO ICT Centre. Australia	2006-2007
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- The research during this postdoctoral position was mainly focused on the restoration of Trans-rectal Ultrasound Images for the planning and computer-assisted treatment of Prostate Cancer and MR processing for the study of Alzheimer's Disease.

## Postdoctoral Research Fellow.

Westmead Hospital-Department of Medical Physics. Australia	2005-2006
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- Position funded through a collaborative agreement between Westmead Hospital and CSIRO ICT Centre, BioMedIA Lab. The main area of research involved medical image processing, contributing to the activities of the Department of Medical Physics and CSIRO. The first projects were : i) the segmentation of paediatric CT images for the *Paediatric Radiation Dosimetry Project* and ii) the *Segmentation and Restoration of Transrectal Ultra Sound Images -TRUS-* for the planning and computer assisted treatment of cancer in Prostate.

## PhD. LTSI (Laboratoire de Traitement du Signal et de l'Image).

University of Rennes 1. France.	1999-2004
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- Within the general scope of computer-assisted interventions, my work was focused on the planning of minimally invasive treatment of vascular lesions (percutaneous transluminal angioplasty -PTA-, aortic endograft placement for Aortic Abdominal Aneurysms -AAA- and intravascular brachytherapy -IVB-). Using the concept of virtual exploratory navigation, the surface description of complex structures as well as the determination of parameters characterizing the vascular structures are achieved. *Supervisor:* Dr. Pascal Haigron. *Key-words:* Medical Image Analysis, Minimally Invasive Surgery, Computer Assisted Surgery, Virtual Environments, Virtual angiосcopy, Transluminal Angioplasty, Abdominal Aortic Aneurysm, Brachytherapy, Geometrical Modeling of Vascular Structures, Surgical Simulation.
- Co-direction of students working on simulation of tool/tissue interactions for endovascular interventions.

## Industrial trainee (MSc.). ENSTB

(Ecole Nationale Supérieure de Télécommunications de Bretagne). Brest. France.	1997-1998
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- *Main:* Reconstruction of a complete image of retina based on rigid registration. Study and development using C++. *Supervisor:* Dr. Guy Cazuguel.

## ACADEMIC EXPERIENCE

**ATER (Teaching and Research Assistant).** University of Rennes 1, France  
Shared responsibility for lectures, exams, and laboratory work.  
Main areas: Control Systems, Electronics, Computer Architecture,  
Signal and Image Processing 2002-2004

**Teaching Assistant.** IUT GEII (Universitary Institute of Technology)  
Rennes. France.  
Laboratory courses of digital electronics 1999-2000

**Teaching Assistant.** Central University. Bogota. Colombia.  
Digital Circuits 1995-1998

**Teaching and Research Assistant.** University of Andes  
Bogota. Colombia.  
Electronics circuits, microprocessors.  
Shared responsibilities in research/consulting projects. 1995-1997

## EDUCATION

**Ph.D. in Signal Processing and Telecommunications**  
"From virtual exploratory navigation to planning of endovascular procedures"  
LTSI INSERM U642 - University of Rennes 1, France. 1999-2004

**M.Sc. in Electronic engineering**  
Major in informatics and biomedical engineering  
University of Andes, Colombia. 1995-1997

**Electrical engineering**  
University of Andes, Colombia, 1989-1994

## OTHER WORK EXPERIENCE

**Computer, network and systems engineer.**  
Santafe de Bogota Town Council. Colombia. 1999

- *Duties:* Belonging to the Informatics and Telecommunications Team, our main responsibilities included troubleshooting of hardware and software problems for different kind of users (Network, Power Supply) and providing technical assistance when new material were purchased.

**Administrative Assistant.**  
IEEE Editor in chef Office EMBS Engineering in Medicine and Biology Society.  
Rennes. France. 2001

- *Duties:* Assistant for the reception of papers, classification and actualization of databases. My task included communication between authors and reviewers previous to the publication of scientific papers in the journal of IEEE-EMBS. *Supervisor:* Dr. Jean-Louis Coatrieux.

**Technical and Sales engineer**  
SAGA Importation LTDA 1994-1995

- Sales representative of ISKRA (Slovenia) for electrical instrumentation. *Duties:* Technical consulting in different projects.

## SKILLS

- *Computer*: Comfortable working with different Operating Systems, UNIX/Linux, Windows (98/NT/2000/XP). Experience in programming with Matlab, Pascal and C/C++. Familiarity with VTK, ITK and Image Processing libraries.
- *Electronics*: Digital circuits, microprocessors and computer architecture, programming FPGA ALTERA.
- *Languages*: Spanish (Mother tongue), French, English.

## PUBLICATIONS

- *PhD*:
  - Oscar Acosta, *De la navigation exploratoire virtuelle à la planification d'interventions endovasculaires.*, Thèse de sciences, LTSI. University of Rennes 1., July 2004, Thesis in French directed by Dr. Pascal Haigron. Title Translation : From Virtual Exploratory Navigation to Planning of Endovascular Interventions.
- *International journals*:
  - Pascal Haigron, Marc E. Bellemare, Oscar Acosta, Cemil Goksu, Carine Kulik, Kristell Rioual, and Antoine Lucas, "Virtual angioscopy : from interactive to active navigation," *IEEE Transactions on Medical Imaging*, vol. 23, pp. 1380–1390, 2004.
- *Peer reviewed International Conferences* :
  - Maria Zuluaga, Oscar Acosta, Pierrick Bourgeat, Olivier Salvado, Marcela Hernandez, and Sebastien Ourselin, "Cortical thickness measurement from magnetic resonance images using partial volume estimation," in *Proceedings of SPIE: Image Processing*, San Diego, USA, February 2008, Accepted for publication.
  - Oscar Acosta, Hans Frimmel, Olivier Salvado, and Sebastien Ourselin, "Pyramidal flux in an anisotropic diffusion scheme for enhancing structures in 3d images," in *Proceedings of SPIE: Image Processing*, San Diego, USA, February 2008, Accepted for publication.
  - Oscar Acosta, Hans Frimmel, Aaron Fenster, and Sebastien Ourselin, "Filtering and restoration of structures in 3D ultrasound images," in *2007 IEEE International Symposium on Biomedical Imaging: From Nano to Macro*, Washington D.C. USA, 12-15 April, pp. 888–891.
  - Tanguy Le Fol, Oscar Acosta, Antoine Lucas, and Pascal Haigron, "Angioplasty simulation using chainmail method," in *Proceedings of Spie: visualization, image-guided procedures and display*, San Diego, USA, February 2007, vol. 6509, p. 65092X.
  - Oscar Acosta, Ron Li, Hans Frimmel, Martin Caon, Lee Collins, Ian Mc Lean, and Sebastien Ourselin, "Creation of voxel-based models for paediatric dosimetry from automatic segmentation methods," in *EPSM06. Engineering and Physical Sciences in Medicine 2006.*, Noosa, Queensland - Australia, sep 2006.
  - Z Zhengdong, P. Haigron, O. Acosta, S. Huazhong, Y. Wenxue, L Liming, J. Manens, and A. Lucas, "A study of intravascular brachytherapy treatment planning in peripheral arteries," in *Engineering in Medicine and Biology Society, 2005. IEEE-EMBS 2005. 27th Annual International Conference of the*, Shanghai, China, 1-4 September, pp. 2316–2318.
  - Oscar Acosta, Cemil Göksu, Antoine Lucas, Carine Kulik, Rolland Yan, and Pascal Haigron, "Description of Anatomical Structures Based on Virtual Exploratory Navigation," in *SURGETICA 2005. Gestes médico-chirurgicaux assistés par ordinateur.*, Trocaz and Merloz, Ed., Chambery, France, 2005.
  - Cemil Goksu, Pascal Haigron, Oscar Acosta, and Antoine Lucas, "Endovascular navigation based on real/virtual environments cooperation for computer assisted team procedures," in *Proceedings of spie: visualization, image-guided procedures and dis-*

play, San Diego, USA, 2004, vol. 5367, pp. 257–266.

- Oscar Acosta, Cecile Moisan, Pascal Haigron, and Antoine Lucas, “Evaluation of virtual endoscopy for the characterization of stenosis in the planning of endovascular interventions,” in *Proceedings of spie: physiology and function from multidimensional images.*, San Diego, USA, vol. 4683, pp. 42–53.
- Pascal Haigron, Cécile Moisan, Yu Wenxue, Oscar Acosta, J.P. Manens, and Jean-Louis Coatrieux, “Planning of intravascular brachytherapy based on virtual exploratory navigation,” in *Proceedings of SPIE: visualization, image-guided procedures and display*, San Diego, USA, 2002, vol. 4681, pp. 148–158.
- Oscar Acosta, Pascal Haigron, Antoine Lucas, and Marc E. Bellemare, “Application of virtual endoscopy to the patient-specific planning of endovascular surgical procedures,” in *Proceedings of SPIE: physiology and function from multidimensional images.*, San Diego, USA, 2001, vol. 4321-2, pp. 58–69.
- *National Conferences (France):*
  - Oscar Acosta, Cécile Moisan, Pascal Haigron, and Antoine Lucas, “Planning d’une angioplastie transluminale par navigation exploratoire virtuelle,” in *11 eme forum de jeunes chercheurs en gbm*, Compiègne, France, 2001, pp. 6–7.
  - Oscar Acosta, Cemil Göksu, Pascal Haigron, Cecile Moisan, and Antoine Lucas, “Analyse quantitative d’un volume image par angioscopie virtuelle,” in *Oral presentation. GRETSI’03*, Paris, France, september 8-11 2003, pp. 225–228.
  - Cemil Goksu, Pascal Haigron, Oscar Acosta, Yan Rolland, and Antoine Lucas, “Endovascular navigation guidance to assist the minimal invasive treatment of abdominal aortic aneurysms,” in *12 ème forum de jeunes chercheurs en GBM*, Nantes, France, 2003, pp. 88–89.
- *Under Review/Submission:*
  - Oscar Acosta, Pierrick Bourgeat, Maria Zuluaga, Jorgen Fripp, Olivier Salvado, Sébastien Ourselin and the Alzheimer’s Disease Neuroimaging Initiative ADNI, “Accurate cortical thickness measurement using a combined Lagrangian-Eulerian PDE approach and partial volume maps. Application to regional analysis in mild cognitive impairment and Alzheimer’s disease,” in *Neuroimage*