

Curriculum Vitæ

Ignacio Larrabide

Personal Details

Name	Ignacio Larrabide.
Nationality	Argentinean.
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E-mail	nacho@lncc.br, nacholarrabide@gmail.com.
Date of Birth	24 th of April 1978.
Spoken Languages	Spanish: spoken, readen, written fluidly (native language). English: spoken, readen, written fluidly. Portuguese: spoken, readen, written fluidly.
Fields of Interest	Medical image processing, image enhancement, image restoration, image segmentation, image reconstruction from projections, geometry reconstruction, mesh generation, finite element and finite difference method, calculus of variations and partial differential equations, topological and shape sensitivity analysis, computational fluid dynamics, hemodynamic 3D and 1D models, multidimensional coupling, scientific visualization, parallel computing, high performance computing, software development, object-oriented programming.

Education

Post-Graduate Studies

March 2003-Present

Actually working on my PhD degree in Computational Modelling at the *Laboratório Nacional de Computação Científica (National Laboratory of Scientific Computation)- LNCC/MCT - www.lncc.br*, Petrópolis, RJ, BRAZIL. My PhD Thesis title is "*From Medical Images to Modelling the Human Cardiovascular System*". In this work the process of modelling the Human Cardiovascular System (HCVS) for a specific patient, from its imagery data, is studied. Concerning to Image Processing, the most widely model based Image Restoration and Image Segmentation methods are explored and quantitatively compared. In this area, the main contribution of this work, is the application of Topological Derivative as a tool for Image Processing (specifically used for Image Restoration and Image Segmentation). Using this information, 3D patient specific geometries are obtained, which coupled with proper 1D simplified models of the rest of the arterial tree, provide useful patient specific information to medicine specialists. I'm intended to end my PhD till the end of 2006/begining of 2007.

Graduate Studies

March 1997-December 2002

Complete graduate studies at the *Universidad Nacional del Centro de la Provincia de Buenos Aires - UNICEN*, Tandil, Buenos Aires, ARGENTINA, from March 1997 to December 2002. As final project, the software SkullyDoo (detailed bellow) was developed.

December 2002

Degree Awarded: Systems Engineer - Specialized in Software Engineering.

May 2000

Degree Awarded: Software analyst and programmer, Intermediate College Degree.

Skills

Extensive experience in Object Oriented software development techniques, different software development platforms, languages and frameworks. Experience in UML and RUP.

Mathematics and Models

Experience with Variational Calculus, PDE's, Topological and Shape Sensitivity Analysis. Wide experience with numerical methods like Finite Element and Finite Difference.

Experience with model based methods for image enhancement, image restoration, image segmentation and reconstruction from projections.

Concerning to the HCVS modelling, experience with geometry reconstruction from images, computation of numerical solutions for mathematical models, analysis of mathematical models, development and analysis of simplified models for blood flow in major arteries.

Development Languages

Computer language and application development proficiency includes C/C++, Java, Fortran77/90, TCL/Tk, XML, Delphi, Visual Basic.

Web based software development proficiency includes J2EE, C#, JavaScript, Macromedia Flash ActionScripts, HTML.

Scientific text editors like L^AT_EX, SWP and Lyx.

Mathematical Software Languages

Extensive experience with mathematical software languages: Matlab 6.5, Mathematica 5, Octave.

Frameworks and Libraries

Experience with OpenGL, Visualization Toolkit (VTK), Insight Toolkit (ITK), Fast Light Toolkit (FLTK), CMake, Intel Open CV, Microsoft Foundation Classes (MFC), Message Passing Interface (MPI), Portable, Extensible Toolkit for Scientific Computation (PETSc).

Development Platforms

Development experience under heterogeneous platforms. Microsoft (DOS, Windows 3.1, 95, 98, NT, 2000, XP), SunOS (Solaris 2.6-2.9) and Linux (Fedora, Debian, SuSe, Ubuntu).

Work Experience

Team management, software development and teaching experience.

Team management

PrjHemo-HeMoLab

This project is intended to study and develop models and software to simulate the HCVS. HeMoLab is a software based on Kitware's ParaView Visualization software, that adds special functionality for designing, simulating and visualizing digital models of the HCVS. The whole process, including image processing and segmentation, 3D surface reconstruction, 3D mesh generation, 1D model and mesh design, coupling between 3D and 1D models, simulation and visualization, is addressed. In order to accomplish this, an interdisciplinary (mathematicians, engineers, physicians, software developers among others) group of specialists was gathered to work together.

I'm currently leading the development team, in charge of the architectural design, configuration management, task assignment and human resource administration. Different Software development tools and techniques are being used. An agile software development technique is implemented (X-treme Programming). This project was started in January 2006 and is intended to be extended for at least 2 years. www.lncc.br/prjhemo.

Software Development

HeMoLab

Hemodynamics Modeling Laboratory (Under development)- Hemodynamic Modeling parallel software based on VTK and ParaView (www.ParaView.org). This software development project (involving 13 people) is intended to be a tool for simulating the HCVS under different circumstances. Coupling simplified 1D and full 3D Partial Differential Equation models of the blood flow in mayor body arteries, this software intends to help medicine specialists in understanding the development of descasses related to the HCVS, and aid in surgery planning. HeMoLab is developed using C++, TCL/Tk, XML, under the build environment CMake. DotProject is used for flow control and task management. Bugzilla is used for team communication and bug tracking. SVN (new generation CVS) is used for version control. Eclipse with CDT plugin is the development tool used to produce source code. *Laboratório Nacional de Computação Científica - LNCC/MCT*. January 2006-Present.

- Arquitectural design,
- setup, support and administration of internal Linux based network,
- active participation in the development process.

GSIP

General purpose Software for Image Processing. Image processing software based on MFC and Intel Open CV. Project (involving 4 people) developed at the *National Laboratory of Scientific Computation - LNCC/MCT*, 2004.

- Full design and implementation,

Work Experience (continued)

- SkullyDoo Medical Image Processing, Segmentation and 3D reconstruction software. Project (involving 2 people) fully designed and implemented in ANSI C++. Based on the Visualization Toolkit (VTK), Insight Toolkit (ITK). The interface was implemented using Fast Light Toolkit (FLTK), and TCL/Tk. Facultad de Ciencias Exactas, *Universidad Nacional del Centro de la Provincia de Buenos Aires - UNICEN*, 2001-Present. www.skullydoo.com.ar
- Full design and implementation,
- SAVER eLearning web based Java application (Servlets). Project (involving 40 people) developed at the Facultad de Ciencias Exactas, *Universidad Nacional del Centro de la Provincia de Buenos Aires - UNICEN*, 2001-2002.
- Arquitectural design,
 - setup, support and administration of internal Linux based network,
 - participation in the development process.
- Mercurio eCommerce web based Java application (Servlets and RMI). Project (involving 2 people) developed at the Facultad de Ciencias Exactas, *Universidad Nacional del Centro de la Provincia de Buenos Aires - UNICEN*, 2000.
- Full design and implementation,

College Teaching Assistant

- 2002 **Compilers Design I** - Facultad de Ciencias Exactas, *Universidad Nacional del Centro de la Provincia de Buenos Aires - UNICEN*
- 2002 **Logistics** - Facultad de Ciencias Exactas, *Universidad Nacional del Centro de la Provincia de Buenos Aires - UNICEN*
- 2000-2002 **Computer Science II** - Facultad de Ciencias Exactas, *Universidad Nacional del Centro de la Provincia de Buenos Aires - UNICEN*
- 1999-2002 **Algorithms I** - Facultad de Ciencias Exactas, *Universidad Nacional del Centro de la Provincia de Buenos Aires - UNICEN*

Scientific Production

Publications in congresses, annals and journals.

Congress Submissions

I. Larrabide, R. Feijóo, E. Taroco, A. Novotny. Configurational Derivative As a Tool for Image Segmentation. In press. Proceedings of the ECCM 2006. LNEC - Lisbon, Portugal 5th-9th June 2006.

P. Blanco, I. Larrabide, S. Urquiza, R. Feijóo. Sensitivity of Blood Flow Patterns to the Constitutive Law of the Fluid. In press. Proceedings of the ECCM 2006. LNEC - Lisbon, Portugal 5th-9th June 2006.

I. Larrabide, A. A. Novotny, R. A. Feijóo and E. Taroco. A Medical Image Enhancement Algorithm Based on Topological Derivative and Anisotropic Diffusion. Proceedings of the XXVI Iberian Latin-American Congress on Computational Methods in Engineering (CILAMCE). Guarapari, Espírito Santo, Brazil, 19th-21st October 2005.

I. Larrabide, P.J. Blanco, S.A. Urquiza and R.A. Feijóo. Sensitivity of Blood Flow in Stenosed Carotid Bifurcation. II International Conference on Computational. Bioengineering H. Rodrigues et al. (Eds.). pp:663-674. Lisbon, Portugal, 14th-16th September, 2005.

I. Larrabide, R.A. Feijóo, A.A. Novotny, E. Taroco and M. Masmoudi. An Image Segmentation Method Based on a Discrete Version of the Topological Derivative. www.wcsmo6.org. WCSMO6 - 6th World Congress on Structural and Multidisciplinary Optimization, Rio de Janeiro, Brazil, 30th May-03rd June 2005.

I. Larrabide and S. Fiorentini. Voxel Grow: A Region Growing Segmentation Technique. Proceedings of International Conference on Computer Science, Software Engineering, Information Technology, e-Business, and Applications 2003(CSITEA03), Rio de Janeiro, Brazil, 2003.

Journals

Working on it.