

Name: Rubén I. Cárdenes Almeida
Date prepared: 27/03/2007
Address: ETSI Telecomunicacion,
Campus Miguel Delibes s/n
47011, Valladolid
Spain
E-mail address: ruben@lpi.tel.uva.es
ruben@bwh.harvard.edu

Education

- June 2004. PhD. at the Department of Informatics and Systems. University of Las Palmas de Gran Canaria (ULPGC), Spain.
- 1998-2000. Courses at the Superior Technical School of Telecommunications Engineers (ETSIT), University of Las Palmas de Gran Canaria, from first to third course.
- 1993-1998: Physics graduate at the University of Zaragoza, Spain.

Professional Positions and Academic Appointments

- March 15th 2006 - present. Research contract at the Image Processing Laboratory, University of Valladolid.
- October 10th, 2006 - December 10th 2006. Assistant Professor, partial time, at the Signal Theory and Communications and Telematics Engineer Department of the University of Valladolid.
- March 9th 2005 - March 9th 2006. Assistant Professor, partial time, at the Telematics Engineers Department of the ULPGC.
- July 16th 2004 - March 8th 2005. Research contract at the ULPGC for local coordination of the European network of excellence SIMILAR.

Other Professional Activities

- Reviewer in journal *Computer Vision and Image Understanding*.
- Reviewer in journal *Signal Processing*.
- Reviewer in the *Insight Journal*.

Research Fellowships

- September 1st 1999 - January 31th 2001. Research fellow within a spanish national grant (FEDER 1FD97-0881-C02), at the Signals and Communications Department, ULPGC, Spain.
- February 1st 2001- July 15th 2004. Research fellow for PhD thesis development at the Telematics Engineers Department, ULPGC, Spain.

Teaching

- 2006/2007. Assistant Professor.
 1. Circuits Analysis and Synthesis. ETSIT, 2nd Course. Theory: 32h., practice: 80h. University of Valladolid.
- 2005/2006. Assistant Professor.
 1. Planning and Management of Communication Networks. ETSIT. 5^o course. Optative. Theory: 40 h., practice: 15 h. ULPGC.
 2. Network Planning and Enterprise Communications, EUITT. Optative. 3rd course. Theory 40 h., Practice 15 h. ULPGC.
 3. Artificial Intelligence, EUITT. 3rd course. Practice 15 h. ULPGC.
- 2004/2005. Assistant Professor.
 1. Fundamentals of Programming. EUITT. Practice: 30 h. ULPGC.
 2. Network Planning and Enterprise Communications, EUITT. Theory: 40 h. practice: 15 h. ULPGC.
 3. Transmission Systems II. EUITT. Theory: 40 h., Practice: 15 h. ULPGC.
- 2003/2004. In the research fellowship..
 1. Fundamentals of Programming, EUITT. Practice: 45 h. ULPGC.
- 2002/2003. In the research fellowship.
 1. Fundamentals of Programming, EUITT. Practice: 60 h. ULPGC.
- 2001/2002. In the research fellowship.
 1. Computer Architecture II (EUITT) Practice: 10 h.. ULPGC.
 2. Parallel Architectures (ETSIT). Practice: 30 h., theory: 5h. ULPGC.

Master Thesis advised

- May 2003. Author: J. Pablo Benítez. *"Navegador para Endoscopia Virtual"*. ETSIT, ULPGC. Advisors: José Aurelio Santana, **Rubén Cárdenes**.
- July 2003. Author: Octavio José Rodríguez Sánchez. Title: *"Integración de algoritmos para Procesado Digital de Imágenes Médicas en una Interfaz para la Plataforma Win32"*. EUITT, ULPGC. Advisors: Eduardo Rovaris Romero, **Rubén Cárdenes**.

Research Stays

- July 1st 2000 – September 25th 2000. Three months staying in the Surgical Planning Laboratory, Brigham & Women's Hospital (Harvard Medical School), Boston, USA, to carry out the development of a parallel segmentation algorithm based on the k-nearest neighbors.
- October 2000. One week staying in the Surgical Planning Laboratory, Brigham & Women's Hospital (Harvard Medical School), Boston (USA), as a continuation of the collaboration projects carried out jointly by the SPL and the ULPGC.
- February 2001. One week staying in the Image Processing Laboratory, Superior Technical School of Telecommunication Engineers, of the University of Valladolid, for the coordination of a joint project.
- March 9th 2004 - June 2nd 2004. Three months staying in the Surgical Planning Laboratory, Brigham & Women's Hospital (Harvard Medical School), Boston (USA), to carry out a development of computation geometry algorithms.

Publications

Journals

1. Carlos Alberola, **Rubén Cárdenes**, Marcos Martín, Miguel Martín, Miguel A. Rodríguez, Juan Ruiz Alzola. *"disNEi: A Collaborative Environment for Medical Images Analysis and Visualization"*. Medical Image Computing and Computer-Assisted Intervention. Springer-Verlag, Berlin, Heidelberg, New York, 2000, pp. 814-823. ISSN 0302-9743.
2. **Rubén Cárdenes**, Simon K. Warfield, Elsa M. Macías, José Aurelio Santana, Juan Ruiz-Alzola, *"An Efficient Algorithm for Multiple Sclerosis Lesion Segmentation from Brain MRI"*, Computer Aided Systems Theory - EUROCAST 2003; Vol 2809. pp 542-551. Lecture Notes in Computer Science (LNCS). ISSN 0302-9743. Volume Editors: Roberto Moreno-Díaz, Franz R. Pichler. 2003.
3. M.A. Rodríguez-Flrido, **Rubén Cárdenes**, C.F. Westin, C. Alberola, J. Ruiz-Alzola, *"Anisotropic Regularization of Posterior Probability Maps Using Vector Spaces Projections. Application on MRI Segmentation"*, Computer Aided Systems Theory – EUROCAST 2003; Vol 2809. pp 597-606. Lecture Notes in Computer Science (LNCS). Editors: Roberto Moreno-Díaz, Franz R. Pichler. ISSN 0302-9743. 2003.
4. S. Alayón, L. Moreno, C.S. González, **Rubén Cárdenes**, E. Suárez, J. Ruiz-Alzola, *"Detection of anatomical point landmarks in medical images using fuzzy logic"*, WSEAS Transactions on Computers. Vol 6(3), pp. 1927-1932. ISSN 1109-2750. Dic. 2004.
5. **Rubén Cárdenes**, J. Ruiz-Alzola, *"Skeleton Extraction of 2D Objects Using Shock Wavefront Detection"*, Computer Aided Systems Theory – EUROCAST 2005. Vol. 3643 / 2005, pp.392–397. Lecture Notes in Computer Science (LNCS). Editors: Roberto Moreno Díaz, Franz Pichler, Alexis Quesada Arencibia. Oct 2005. ISSN: 0302-9743.
6. Emma Muñoz-Moreno, **Rubén Cárdenes**, Rodrigo De Luis-García, Miguel Ángel Martín-Fernández, Carlos Alberola-López. *"Image Registration Based on Automatic Detection of Anatomical Landmarks for Bone Age Assessment"*, WSEAS Transactions on Computers. Vol. 4 (11), pp1596-1603. Nov 2005. ISSN 1109-2750.
7. **Rubén Cárdenes**, Manuel René Sánchez, Juan Ruiz-Alzola. *"Computational Geometry Computation and KNN Segmentation in ITK"*. Insight Journal. ISC/NA-MIC Workshop on Open Science at MICCAI 2006. Oct. 2006.

Conferences

1. **Rubén Cárdenes**, Juan Ruiz, R. Kikinis, S. Warfield *"Medical Image Segmentation Using High Performance Computers Clusters"*. En *Visualization, Display and Image-Guided Procedures*, S. K. Mun, Ed., *Proc. SPIE*. Vol. 4319, pp. 88-96. San Diego, CA, 2001.
2. Eduardo Suárez, **Rubén Cárdenes**, Carlos Alberola, C-F Westin, Juan Ruiz-Alzola. *"A General approach to nonrigid registration: decoupled optimization."* Proc. 23rd IEEE Engineering in Medicine and Biology Conference, pp. 2422-2425, Estambul, Turquía. Octubre, 25-28. 2001.

3. **Rubén Cárdenes**, Simon K. Warfield, José Aurelio Santana, Juan Ruiz Alzola, "*Fast MRI Segmentation of Multiple Sclerosis Lesions*", In Proceedings of IX International Conference on Computer Aided Systems, EUROCAST 2003, pp. 52-56. Las Palmas de Gran Canaria. Feb. 2003.
4. **Rubén Cárdenes**, Simon K. Warfield, Elsa Macías, Juan Ruiz Alzola, "*High performance supervised and unsupervised MRI brain segmentation*", In Proceedings of IX International Conference on Computer Aided Systems, EUROCAST 2003, pp. 57-60. Las Palmas de Gran Canaria. Feb. 2003.
5. Miguel Angel Rodríguez-Flrido, **Rubén Cárdenes**, Carl Fredrik Westin, Carlos Alberola, Juan Ruiz Alzola, "*MRI segmentation by anisotropic regularization of posterior probability maps*", In Proceedings of IX International Conference on Computer Aided Systems, EUROCAST 2003, pp. 83-88. Las Palmas de Gran Canaria. Feb. 2003.
6. **Rubén Cárdenes**, Simon K. Warfield, Andrea J.U. Mewes, Juan Ruiz Alzola, "*K-Voronoi Diagrams computing in arbitrary domains*", In Proceedings of IEEE Internacional Conference on Image Processing, ICIP 2003, vol II, pp 941-944, Barcelona. Sept. 2003.
7. **Rubén Cárdenes**, Simon K. Warfield, Elsa Macías, Juan Ruiz Alzola, "*Occlusion points propagation geodesic distance transformation*", In Proceedings of IEEE Internacional Conference on Image Processing, ICIP 2003, vol I, pp 361-364. Barcelona, Sept. 2003.
8. S. Alayón, L. Moreno, C.S. González, **Rubén Cárdenes**, E. Suárez, Ruiz-Alzola "Detección de puntos anatómicos de referencia en imágenes médicas usando lógica borrosa", In Proceedings of XXV Jornadas de Automática, Ciudad Real, España. 2004.
9. **Rubén Cárdenes**, Juan Ruiz-Alzola, "*Medial axis Transform Computation Using Shock Wavefront Detection*", In proceedings of X International Conference on Computer Aided Systems, (EUROCAST), pp 209-211. Las Palmas de Gran Canaria, Spain. February 2005.
10. Emma Muñoz-Moreno, **Rubén Cárdenes**, Rodrigo De Luis-García, Miguel Ángel Martín-Fernández, Carlos Alberola-López. "*Automatic Detection of Landmarks for Image Registration Applied to Bone Age Assessment*", In Proceedings of 5th WSEAS *International* Conference ISCGAV, pp 117-122. Malta. Sept. 2005.
11. **Rubén Cárdenes**, Juan Ruiz-Alzola, "Segmentación de Tejidos Cerebrales Mediante Transformadas de Distancias con la Métrica de Mahalanobis", in Proceedings of CASEIB 2005. pp 65-68. Madrid, Nov. 2005.
12. David Macías, **Rubén Cárdenes**, R. Martín-Oliva, Juan Ruiz-Alzola. "*Ultrasonido 3D: Reconstrucción y Visualización*", Revista de Física Médica. Vol. 6, num. 2, pp. 114-115. 2005. Pamplona, Spain.
13. David Macías, **Rubén Cárdenes**, R. Martín Oliva, Bernardino Clavo, Juan Ruiz Alzola. "*Registrado de Imágenes Portales con Imágenes de Planificación en Pacientes con Cáncer de Próstata*" Revista de Física Médica. Vol. 6, num. 2, pp. 163. 2005. Pamplona, Spain.

Open Source Software Development

See: <http://ipi.tel.uva.es/~ruben/software.html>

- 2D and 3D distance transforms by ordered propagation and Voronoi diagrams of order K, 2D and 3D.
- Geodesic Distance Transform 2D and 3D.
- Geodesic Voronoi Diagrams of order K, 2D and 3D.
- 2D morphological skeletons.
- EM Segmentation.
- Thickness computation based on Laplace equation 2D and 3D.
- ITK k-nearest neighbor segmentation.
- Fast Non linear Filtering 2D and 3D.
- Relaxation labeling 2D and 3D.