CARLOS VÁZQUEZ, Ph.D.

Associate professor
Department of software engineering and IT
École de technologie supérieure (ÉTS)
Montréal, Québec, Canada

SUMMARY

Prof. Vázquez, received the B. Eng. degree in Electronic Engineering with the highest honors in 1992 and the M.A.Sc. degree in Computer Sciences in 1997 from the Higher Polytechnic Institute José Antonio Echeverría (ISPJAE) in Havana, Cuba. He worked as a lecturer and assistant professor in the Telecommunications Department of ISPJAE from 1992 to 1997 when he joined the INRS-EMT in Montréal as a PhD candidate and recipient of an excellence scholarship from the Government of Québec. He received the Ph.D. degree in Telecommunications from the INRS-EMT, Montréal, Canada, in 2003.

Prof. Vázquez spent two years as a Post-Doctoral Fellow at the INRS-EMT until 2004 when he became Research Associate at Concordia University, Montréal, Canada. In August of 2005 he joined the Communications Research Centre Canada (CRC) as research scientist in the Advanced Video Systems group. He is currently associate professor at the Software Engineering department of the École de technologie supérieure in Montréal since August 2013.

Dr. Vázquez is currently involved in 3D-TV, Multi-View video and 3D object detection and reconstruction research. He is the author of numerous peer-reviewed journal and conference articles and co-recipient of the Scott Helt best paper award from the IEEE Broadcast Technology Society in 2011. His research interests are in the areas of 3D-TV; 2D-to-3D video conversion; stereo and multi-view vision systems; 3D object extraction and reconstruction; image/video representation, sampling and interpolation; image and video coding; and motion/disparity/depth estimation and compensation.

Languages: English (fluent), French (fluent) and Spanish (native).

EDUCATION

09/2002–08/2004   **Post-doctoral Fellow** *(Image and Video Processing)*
Institut National de la Recherche Scientifique (INRS), Center EMT, Montréal

Project: *Application of Level Set methods to image segmentation, motion estimation and video super-resolution.*

Supervisor: Prof. Amar Mitiche

09/1997–04/2003   **Ph.D.** in Telecommunications *(Image and Video Processing)*
Institut National de la Recherche Scientifique (INRS), Center EMT, Montréal

Thesis: *Image reconstruction from irregularly spaced samples*

Supervisors: Prof. Eric Dubois and Prof. Janusz Konrad

09/1995–07/1997   **M.Sc.** in Applied Informatics *(Signal and Image Processing)*
CREPIAI, ISPJAE, Havana, Cuba

Thesis: *Development of a Spread-Spectrum simulation system*

Supervisor: Prof. Francisco Marante

09/1987–07/1992   **Eng.** in Electronics *(Electronic Components and Devices)*
Electrical Engineering Faculty, ISPJAE, Havana, Cuba

Thesis: *Design and implementation of an asynchronous concentrator*

Supervisor: Prof. Carmen Moliner

WORK HISTORY

08/2013–present   **Associate professor**
Department of Software Engineering and IT,
École de Technologie Supérieure (ÉTS),   Montréal, QC, Canada

Research   3D video systems; 3D object extraction and reconstruction; Medical imaging applications; 3D cinema and TV applications.

Teaching   Parallel programming; Multimedia systems; Digital imaging and computer graphics; 3D Vision Systems; Operating systems.

HQP training   Currently supervising or co-supervising 2 Post-doctoral fellows, 3 PhD candidates, 6 Master students.

Research grants

- MITACS cluster (PI: professor Jacques de Guise) $ 160,000 CAD.
- FRQNT – New researcher program: $ 20,000 CAD per year for 2 years.
- MITACS accelerate scholarship in collaboration with an industry partner: $ 45,000 CAD for one year.
- ÉTS grants for $ 45,000 CAD.

08/2005–06/2013   **Research Scientist**
Advanced Video Systems,
Communications Research Centre (CRC),   Ottawa, ON, Canada

3D–TV Systems: Development of algorithms and applications to help advance the 3D–TV industry. 2D-to-3D video conversion, novel displays, S3D video processing.

Multi-View Video Coding: 4D wavelet-based multi-view video coding, 2D + Depth + Occlusion multi-view video coding and representation, View synthesis and occlusions removal.

Depth-Image-Based Rendering: Real-time image-based rendering techniques, parallel programming, GP-GPU..

09/2004–07/2005	**Research Associate**
	Electrical and Computer Engineering Department,
	Concordia University, Montréal, QC, Canada

Supervisor: Prof. Aishy Amer

Project: Event detection for video surveillance.

01/1998–08/2004	**Research assistant**
	Institut National de la Recherche Scientifique (INRS-EMT),
	University of Québec Montréal, QC, Canada

Software development: C/C++/Matlab programming to build tools; Maintenance of C/C++/Matlab video libraries and utilities; maintained the Visual Communications Lab WEB site.

Hardware installation and administration: Linux and Windows workstations; Video equipment; Stereoscopic video equipment.

09/1992–08/1997	**Assistant Professor**
	CEBIO: Bio-Engineering center, Telecommunications Department,
	ISPJAE, Havana, Cuba

Teach courses: *Programming languages* (C/C++, Assembler); *Embedded systems* (Architecture and programming, micro-controllers); *General purpose computers* (Architecture and programming); *Signal acquisition and processing.*

Research Projects: Bio-medical signal acquisition and processing; Signal processing for measurement equipment (MCS-51 micro-controller).

HQP training: Telecommunication engineering final year projects (5 projects)

SCHOLARSHIPS AND HONORS

07/2012	**Senior member** IEEE
06/2012	**2012 Journal Certificate of Merit** SMPTE Motion Imaging Journal.
06/2012	**Scott Helt Best Paper Award in 2011** IEEE Broadcast Technology Society.
04/2011	**NAB Technology Innovation Award** (co-inventor of one of the technologies supporting the award: 2D to 3D video conversion)
09/1997–08/2002	**Excellence Scholarship** from the Québec Ministry of Education.
07/1992	*Summa cum laude* **(highest mark 5.1/5)** from ISPJAE (University wide).

RESEARCH INTERESTS KEYWORDS

3D–TV Systems: 2D-to-3D Video Conversion; 3D Video Representation; Depth adjustment; Novel 3D Displays; Adaptation of S-3D content to viewing conditions.

Multi-View imaging: Depth Image-Based Rendering (DIBR); Disparity estimation and compensation; Intermediate view reconstruction; Multi-View video coding (MVC).

Image and Video Processing: Motion estimation and compensation; sampling, interpolation, reconstruction and enhancement; spatial and temporal resolution enhancement, super-resolution; coding; splines and wavelets.

Computer Vision: Variational and level set methods; image and motion segmentation; object identification and tracking; event detection.

Real-Time Video Systems: Real-Time video processing; Multimedia programming; Hardware acceleration; CUDA–Based Programming; GP–GPU Programming for Video and Image Processing..

SELECTED PUBLICATIONS

Book chapters

Carlos Vázquez, L. Zhang, F. Speranza, S. Knorr, and N. Plath, "2D to 3D video conversion - overview and perspectives," in *Emerging Technologies for 3D Video: Creation, Coding, Transmission and Rendering*, F. Dufaux, B. Pesquet-Popescu, and M. Cagnazzo, Eds.   Wiley, 2013, pp. 37–61.

L. Zhang, Carlos Vázquez, G. Huchet, and W. Tam, "DIBR-based conversion from monoscopic to stereoscopic and multiview video," in *3D-TV System with Depth-Image-Based Rendering: Architectures, Techniques and Challenges*. Springer New York, 2013, pp. 107–143.

Journal Papers

W. Tam, F. Speranza, and Carlos Vázquez, "Problem-driven three-dimensional television research involving human visual perception studies," *Japanese Psychological Research*, vol. 54, no. 1, pp. 89–104, 2012.

Carlos Vázquez and W. Tam, "A nonconventional approach to the conversion of 2D video and film content to stereoscopic 3D," *SMPTE Motion Imaging Journal*, vol. 120, no. 4, pp. 41–48, May 2011.

L. Zhang, Carlos Vázquez, and S. Knorr, "3D–TV content creation: Automatic 2D–to–3D video conversion," *IEEE Trans. Broadcast.*, vol. 57, no. 2, pp. 372–383, June 2011.

Carlos Vázquez, M. Ghazal, and A. Amer, "Feature-based detection and correction of occlusions and split of video objects," *Journal of Signal, Image and Video Processing*, vol. 3, no. 1, pp. 13–25, Feb. 2009.

A.-R. Mansouri, A. Mitiche, and Carlos Vázquez, "Multiregion competition: A level set extension of region competition to multiple region image partitioning," *Comput. Vis. and Image Underst.*, vol. 101, no. 3, pp. 137–150, Mar. 2006.

Carlos Vázquez, A. Mitiche, and R. Laganière, "Joint multiregion segmentation and parametric estimation of image motion by basis function representation and

level set evolution." *IEEE Trans. Pattern Anal. Machine Intell.*, vol. 28, no. 5, pp. 782–793, May 2006.

Carlos Vázquez, E. Dubois, and J. Konrad, "Reconstruction of non-uniformly-sampled images in spline spaces," *IEEE Trans. Image Processing*, vol. 14, no. 6, pp. 713–725, June 2005.

M. Ghazal, Carlos Vázquez, and A. Amer, "Real-time vandalism detection by monitoring object activities," *Multimedia Tools and Applications*, vol. 58, no. 3, pp. 1–27, 2012.

Carlos Vázquez and A. Mantilla, "Algoritmos de linearización por software," *Revista de Ingeniería Eléctrica, Electrónica y Automática*, pp. 35–43, Oct. 1995, in Spanish.

Conference Papers

M. Kharboutly, C. Vazquez, S. Coulombe, and J. De Guise, "Geometrically constrained sub-pixel disparity estimation from stereo images of the retinal fundus," in *Stereoscopic Displays and Applications XXVII*, San Francisco, CA, Feb. 2016.

F. Ouertani, C. Vazquez, T. Cresson, and J. de Guise, "Simultaneous extraction of two adjacent bony structures in x-ray images: Application to hip joint segmentation," in *Proc. IEEE Int. Conf. Image Processing.* Québec, QC: IEEE, Sept. 2015.

B. Aubert, B. Godbout, S. Parent, T. Cresson, C. Vazquez, and J. D. Guise, "Towards automatic spine 3d reconstruction from bi-planar radiographs," in *Computer Methods in Biomechanics and Biomedical Engineering*, Montréal, Sept. 2015.

P. Laurent, T. Cresson, J. Dadour, J. Clment, N. Bureau, N. Hagemeister, C. Vazquez, and J. D. Guise, "A framework to evaluate and validate 2d segmentation algorithms on lower-limb x-rays," in *Computer Methods in Biomechanics and Biomedical Engineering*, Montréal, Sept. 2015.

W. J. Tam, F. Speranza, Carlos Vázquez, R. Renaud, and N. Hur, "Visual comfort: stereoscopic objects moving in the horizontal and mid-sagittal planes," in *Proc. SPIE Stereoscopic Displays and Applications*, vol. 8288, no. 13, Burlingame, CA, USA, Jan. 2012.

F. Speranza, W. Tam, Carlos Vázquez, A. Vincent, R. Renaud, and R. Klepko, "Image quality of up-converted 2D video from frame-compatible 3D video," in *Proc. SPIE Stereoscopic Displays and Applications*, vol. 7863, no. 2D, San Francisco, CA, USA, Jan. 2011.

W. Tam and Carlos Vázquez, "Development of a novel virtual reality 3D display: the 'J-Display'," in *Proc. Int. Display Workshops*, Fukuoka, Japan, Dec. 2010, pp. 1313–1316.

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