

# IVANA TOŠIĆ, PhD

## Address:

236 27th Street  
San Francisco, CA-94131  
United States

**Tel:** 1 (510) 213 9579  
dr.ivana.tosic@ieee.org  
ivanatosic.net

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## RESEARCH INTERESTS

Image processing; 3D/Plenoptic imaging; Machine learning, Medical imaging; Computational neuroscience; Binocular vision; Sparse representations; Omnidirectional imaging; Distributed signal processing and coding; Information theory.

## EDUCATION

- **PhD degree in Computer and Communication Sciences (May 1, 2009)** 2004-2009  
EPFL/IEL/LTS4, Switzerland  
Thesis title: On unifying sparsity and geometry for image-based 3D scene representation  
Thesis advisor: Prof. Pascal Frossard
- **Doctoral School in Computer and Communication Sciences at I&C** 2003-2004  
EPFL, Switzerland  
main courses: Information theory, Wavelets and applications, Image Processing
- **Electrical Engineer Diploma (Dipl.Ing. in EE)** 1997-2003  
Faculty of Electronic Engineering/Department of telecommunications  
University of Niš, Serbia, GPA 9.80 (max 10), best graduate award

## WORK EXPERIENCE

- **Ricoh Innovations, Corp., Menlo Park, US** November 2011 - present  
Research group leader 04/2015 - present  
Senior research scientist 04/2014 - 03/2015  
Advisory research scientist 11/2012 - 04/2014  
Research scientist 11/2011 - 11/2012
- **Redwood Center for Theoretical Neuroscience** November 2009 - November 2011  
**University of California, Berkeley, US**  
Postdoctoral researcher 11/2009 - 11/2011  
Research visitor 01/2008 - 04/2008
- **EPFL/IEL/LTS4, Switzerland** September 2004 - November 2009  
Postdoctoral researcher 04/2009 - 10/2009  
Research and teaching assistant 09/2004 - 04/2009
- **EUPMT, Mataró, Spain** October 2001 - December 2001  
Student intern

## RESEARCH PROJECTS

- Invented a method for scale-depth space representation of light fields (with K. Berkner)
- Invented a method for sparse representation of light fields (with K. Berkner, Ricoh Innovations, and Y. Lin)
- Invented a method for resolution enhancement in plenoptic cameras based on sparsity (jointly with K. Berkner and S. Shroff, Ricoh Innovations)
- Developed a method for joint sparse representation of depth and intensity, with application to depth inpainting for hybrid sensors (with S. Drewes, Mathworks)
- Built a mobile binocular eye tracker with a synchronized stereo camera rig for studying natural disparity statistics (with E. Cooper, W. Spargue and M. Banks, UC Berkeley)
- Developed a computational model for binocular disparity inference based on sparse representations (with B. A. Olshausen, UC Berkeley)
- Designed a method for sparse approximation of multi-view images (collaboration with P. Frossard, EPFL, and A. Ortega, USC)
- Designed a method for ultrasound tomography image reconstruction for breast cancer screening (collaboration with LCAV, EPFL and Karmanos Cancer Institute, Detroit, USA)
- Developed a method for learning overcomplete dictionaries for representing stereo images
- Developed an occlusion-resilient distributed coder for omnidirectional camera networks based on a novel geometric multi-view correlation model
- Designed and implemented a 3D objects coder based on the Spherical Matching Pursuit and the dictionary on the  $SO(3)$  group. Spherical shape representation exploited additionally for 3D face recognition
- Developed a mammogram image analysis method for diagnosing breast cancer (at EUPMT, Mataró, Spain)

## PROGRAMMING SKILLS

**Languages:** Matlab, Python, C++

## PROFESSIONAL ACTIVITIES

- Associate Editor for IEEE Transactions on Image Processing, 2014-2016
- Member of the Image, Video, and Multidimensional Signal Processing Technical Committee (IEEE Signal Processing Society), 2014-2016
- Publicity Chair for the Picture Coding Symposium 2013, San Jose, California.
- Organized a special session on Dictionary learning for sparse representation at ICASSP 2010 (jointly with P. Frossard, EPFL).
- Finance Chair for the 16<sup>th</sup> Packet Video Workshop, Lausanne, 2007.

- Technical Program Committee member for: MMM 2009, 3DTV-CON 2009, Hot3D 2013, ICASSP 2014, ICIP 2014
- Reviewer for journals: IEEE Transactions on Image Processing, IEEE Transactions on Signal Processing, IEEE Transactions on Multimedia, IEEE Transaction on Medical Imaging, EURASIP Journal on Advances in Signal Processing, Computer Vision and Image Understanding, EURASIP Journal on Image and Video Processing, Neurocomputing, Journal of Computational Neuroscience, SIAM Journal on Imaging Sciences, Pattern Recognition Letters, Applied Optics and Optics Express
- Reviewer for conferences: ICIP, ICASSP, EUSIPCO, NIPS, ICME, MMSP, ISCAS, Eurographics, MMM, 3DTV-CON, GlobeCom, PCS, Cosyne, Hot3D

## GRANTS, AWARDS, ACHIEVEMENTS

- **Best paper award at ICIP 2014** 2014  
For the paper "3d keypoint detection by light field scale-depth space analysis"
- **Swiss National Science Foundation Fellowship** 2009 - 2011  
Advanced researcher post-doctoral fellowship for 2011-2012  
Prospective researcher post-doctoral fellowship for 2009-2010
- **IBM T.J. Watson Research Center Workshop** 2008  
selected for the "Emerging Leaders in Multimedia 2008" workshop, top 12 students world-wide
- **The Certificate of Recognition of the University of Niš** 2003  
Faculty of Electronic Engineering Best Graduate Award
- **Royal Family Karadjordjevic Award** 2002  
for the 100 best students in Serbia
- **Norway Government Award** 2001  
for the 1000 best students in Serbia

## INVITED TALKS

- Invited talks at international conferences
  1. Stereo dictionary learning for multiview scene representation, joint work with P. Frossard, invited to APSIPA Annual Summit and Conference, Sapporo (Japan), 2009
  2. Distributed coding in camera networks with learned dictionaries, joint work with P. Frossard, invited to MobiMedia, International Mobile Multimedia Communications Conference, London (UK), 2009
  3. Balanced Distributed Coding of Omnidirectional Images, joint work with V.Thirumalai and P. Frossard, invited at the SPIE - Visual Communication and Image Processing Conference, San Jose (US), 2008
  4. A Geometrical Framework for Distributed Coding of Multiview Images, joint work with P. Frossard, invited at the DISCOVER workshop, Lisbon (Portugal), 2007

5. Coarse scene geometry estimation from sparse approximations of multi-view omnidirectional images, joint work with P. Frossard, invited at the European Signal Processing Conference, Poznan (Poland), 2007
6. Wyner-Ziv coding of multi-view omnidirectional images with overcomplete decompositions, joint work with P. Frossard, invited at the IEEE International Conference on Image Processing, Atlanta (US), 2007

- Invited talks at institutes and companies

1. Dictionary learning for 3D scene representation, joint work with B. A. Olshausen, S. Drewes and B.J. Culpepper, invited at Microsoft Research center at Redmond (US), May 2013.
2. Learning sparse codes adapted to natural scene statistics, joint work with B. A. Olshausen, S. Drewes and B.J. Culpepper, invited at IBM research center at Almaden (US), September 2012.
3. Geometry-based sparse representation of multi-view images, joint work with P. Frossard, invited at The Max Planck Institute for Biological Cybernetics, Tuebingen (Germany), May 2011
4. Sparse approximations in signal processing and neuroscience, joint work with P. Frossard and B. A. Olshausen, invited at the Faculty of Electrical Engineering, University of Nis, Serbia, July 2010
5. Geometry-based representation of multi-view omnidirectional images, joint work with P. Frossard and A. Ortega, invited at Hewlett Packard Research Labs, Palo Alto (US), April 2010
6. Geometry-based distributed coding of multi-view images with sparse approximations, joint work with P. Frossard, invited at the Net/Comm/DSP Seminar Series, UC Berkeley (US), 2008
7. Coarse scene geometry estimation from multi-view omnidirectional images, joint work with P. Frossard, invited at the Heterogeneous Sensor Networks (HSN) Seminar Series, UC Berkeley (US), 2008
8. Geometry-based distributed coding of multi-view images with sparse approximations, joint work with P. Frossard, invited at the Emerging Leaders in Multimedia workshop, IBM Watson Research Center (US), 2008

**LANGUAGES:** **English:** fluent, **French:** fluent, **Spanish:** basic, **Serbian:** mother tongue

## REFERENCES

Available upon request.