

# PAOLO FAVARO

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## EDUCATION

Ph.D.	Dept. of Electrical Eng., Washington University in St.Louis, USA	August 2003
M.Sc.	Dept. of Electrical Eng., Washington University in St.Louis, USA	June 2002
Laurea degree	Dept. of Computer Eng., Università degli Studi di Padova, Padua, Italy	June 1999

## PROFESSIONAL AND RESEARCH EXPERIENCE

READER, *Heriot-Watt University*, Riccarton, EH14 4AS, Edinburgh, UK (04/2006 - present)

HONORARY FELLOW, *University of Edinburgh*, Mayfield Road, EH9 3JL, Edinburgh, UK (04/2006 - present)

- Teaching: Numerical Computation and Statistics; Image Processing; Digital Signal Processing; Multimedia Applications;
- Administration:
  - Programme Director in 3 MScs: Embedded Systems and IT (Applied and Embedded Systems);
- Student supervision:
  - 1 Research Assistant: Dr. Tom Bishop;
  - 4 PhD Students: Qingxu Dou (thesis to be submitted in April 2011); Manuel Martinello (writing up); Thoma Papadimitri; Daniele Perrone;
  - MSc students and visiting students;

Research Areas:

- Inverse problems: image restoration, image denoising, image deblurring, blind deconvolution, superresolution, shape from defocus
- Computational photography, coded/compressed sensing
- 3D surface reconstruction from images and videos
- Filtering and stochastic processing
- Machine learning: Supervised and unsupervised classification

MEMBER OF TECHNICAL STAFF – RESEARCHER, *Siemens Corporate Research* Princeton, USA (11/2004 - 03/2006)

POSTDOCTORAL RESEARCHER, *University of Cambridge*, UK (08/2004 - 11/2004)

POSTDOCTORAL RESEARCHER, *UCLA* Los Angeles, USA (08/2003-08/2004)

PHD STUDENT, *UCLA* Los Angeles and *Washington University* in St.Louis, USA (08/1999-08/2003)

INTERNSHIP, *INTEL Corp.* located in Santa Clara, CA, USA (06/2002-08/2002)

## PROFESSIONAL SERVICES - ESTEEM

- Invited Talk at the International Conference on Computational Photography (ICCP) 2011;
- Finance Chair of the International Conference on Computational Photography (ICCP) 2011;
- Co-organizer with Prof. Martin Burger (Münster University) and Prof. Simon Arridge (UCL) of the ICMS Workshop in Mathematical Imaging in Biomedicine 2011;
- Invited chair on Photometric Analysis for Computer Vision at the International Conference on Computer Vision (ICCV) 2007;
- Member of the Panel Committee of: International Conference on Computational Photography (ICCP) 2009-2011, European Conference on Computer Vision (ECCV) 2000-2010, Computer Vision and Pattern Recognition (CVPR) 2000-2011, International Conference on Computer Vision (ICCV) 2001-2011, Special Interest Group: Graphics (SIGGRAPH) 2005-2007, Conference on Decision and Control (CDC) 2004, British Machine

Vision Conference (BMVC) 2005-2011, Energy Minimization Methods in Computer Vision and Pattern Recognition (EMMCVPR) 2007-2011, Beyond Multiview Geometry in Computer Vision and Pattern Recognition (BMGCVPR) 2007, Pacific-Rim Symposium on Image, Video, and Technology (PSIVT) 2007; Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP) 2010; Asian Conference on Computer Vision (ACCV) 2010;

- Reviewer for the following Journals: International Journal on Computer Vision (IJCV), Pattern Analysis and Machine Intelligence (PAMI), Journal of the Optical Society of America - A (JOSA-A), Society of Photo-Optical Instrumentation Engineers (SPIE), Journal of Electronic Imaging (JEI), Journal of Modern Optics (JMO), International Journal of Pattern Recognition and Artificial Intelligence (IJPRAI), Transactions on Image Processing (TIP), Medical Image Computing and Computer-Assisted Intervention (MICCAI), Pattern Analysis & Applications (PAA), Transactions on Circuits and Systems for Video Technology (TCVST), Computer Vision and Image Understanding (CVIU), Journal of Mathematical Imaging and Vision (JMIV);
- International Collaboration/Visits with Johns Hopkins University (Prof. René Vidal) and with Google Inc. (Dr. Alessandro Bissacco);
- IEEE member.

## FELLOWSHIPS AND AWARDS

“Borsa di studio per studenti all'estero”, Università di Padova, Padua, Italy (08/1999)

“CVPR 2004 Best (Poster) Paper Award”, for the paper “A Variational Approach to Scene Reconstruction and Image Segmentation from Motion-Blur Cues”, co-authored with S. Soatto at the IEEE Computer Society Conference on Computer Vision and Pattern Recognition, Washington, DC (07/2004)

**PUBLICATIONS**

All of Dr. Favaro's work has been published in refereed journals and conferences.

**BOOKS**

1. P. Favaro and S. Soatto "3-d Shape Estimation and Image Restoration: Exploiting Defocus and Motion-blur", Springer-Verlag, December 2006.

**THESES**

1. P. Favaro "Shape from Defocus in Computer Vision", Ph.D., Washington University in St. Louis, Missouri, USA, July 2003
2. P. Favaro "The Accommodation Cue in Computer Vision", M.Sc., Washington University in St. Louis, Missouri, USA, May 2002

**JOURNALS**

1. L. Giancardo, F. Meriaudeau, T. P. Karnowski, K. W. Tobin Jr., E. Grisan, P. Favaro, A. Ruggeri and E. Chaum "Textureless Macula Swelling Detection with Multiple Retinal Fundus Images" *IEEE Transactions on Biomedical Engineering*, 2010.
2. P. Favaro, M. Burger, S. Osher and S. Soatto "Shape from Defocus via Diffusion" *IEEE Trans. on Pattern Analysis and Machine Intelligence*, vol. 30, no. 3, pp. 518-531, March 2008.
3. P. Favaro and S. Soatto "A Geometric Approach to Shape from Defocus" *IEEE Trans. on Pattern Analysis and Machine Intelligence*, vol. 27, no. 3, pp. 406-417, March 2005.
4. P. Favaro, A. Mennucci and S. Soatto "Observing Shape from Defocused Images" *International Journal of Computer Vision*, 52(1), pp. 25-43, April 2003.
5. H. Jin, P. Favaro and S. Soatto "A Semi-direct Approach to Structure From Motion" *The Visual Computer*, 19, pp. 1-18, 2003.
6. A. Chiuso, P. Favaro, H. Jin and S. Soatto "Structure from Motion Causally Integrated over Time" *IEEE Trans. on Pattern Analysis and Machine Intelligence*, vol.24, no.4, pp.523-35, April 2002.

**CONFERENCES**

1. M. Martinello and P. Favaro "Fragmented Aperture Imaging for Motion and Defocus Deblurring" *ICIP*, 2011.
2. P. Favaro, R. Vidal and A. Ravichandran "A Closed Form Solution to Robust Subspace Estimation and Clustering" *CVPR*, 2011.
3. Q. Dou and P. Favaro "A Convex Multi-View Stereo Formulation with Robustness to Occlusions and Time-Varying Clutter" *ICVGIP*, 2010.
4. A. Ravichandran, P. Favaro, and R. Vidal "A Unified Approach to Segmentation and Categorization of Dynamic Textures" *Asian Conference on Computer Vision*, 2010.
5. T. E. Bishop and P. Favaro "Full-Resolution Depth Map Estimation from an Aliased Plenoptic Light Field" *Asian Conference on Computer Vision*, 2010.
6. M. Martinello, T. E. Bishop and P. Favaro "A Bayesian Approach to Shape From Coded Aperture", *International Conference of Image Processing*, 2010
7. P. Favaro "Recovering Thin Structures via Nonlocal-Means Regularization with Application to Depth from Defocus", *Proc. of the IEEE Intl. Computer Vision and Pattern Recognition*, 2010
8. T. E. Bishop and P. Favaro "Plenoptic Depth Estimation From Multiple Aliased Views", *International Workshop on 3-D Digital Imaging and Modeling at ICCV*, 2009
9. Y. Lou, P. Favaro, S. Soatto, and A. Bertozzi "Nonlocal Similarity Image Filtering", *International Conference on Image Analysis and Processing*, 2009

10. T. Bishop, S. Zanetti, P. Favaro “Light Field Superresolution”, *International Conference on Computational Photography*, 2009
11. P. Favaro and A. Duci “A theory of defocus via Fourier analysis”, *Proc. of the IEEE Computer Vision and Pattern Recognition*, pp. 1-7, 2008
12. Q. Dou and P. Favaro “Off-Axis Aperture Camera: 3D Shape Reconstruction and Image Restoration”, *Proc. of the IEEE Computer Vision and Pattern Recognition*, pp. 1-7, 2008
13. P. Favaro “Shape from Focus and Defocus: Convexity, Quasiconvexity, and Defocus-Invariant Textures” *International Conference on Computer Vision*, pp. 1-7, 2007
14. A. Vedaldi, P. Favaro, E. Grisan “Boosting Invariance and Efficiency in Supervised Learning” *International Conference on Computer Vision*, pp. 1-8, 2007
15. R. Vidal and P. Favaro “DynamicBoost: Boosting Time Series Generated by Dynamical Systems” *International Conference on Computer Vision*, pp. 1-6, 2007
16. Y. Lou, P. Favaro, A. Bertozzi and S. Soatto “Autocalibration and Uncalibrated Reconstruction of Shape from Defocus” *Proc. of the IEEE Computer Vision and Pattern Recognition*, pp. 1-8, 2007
17. M. Martinello, P. Favaro, G. M. Nieto, A. Harvey, E. Grisan, F. Scarpa, A. Ruggeri, “3-D Retinal Surface Inference: Stereo or Monocular Fundus Camera?” *Proc. of the IEEE Engineering in Medicine and Biology Society*, 2007
18. P. Favaro and E. Grisan “Defocus Inpainting” *Proc. of the IEEE European Conference on Computer Vision*, pp. 349-359, May 2006
19. G. Vogiatzis, P. Favaro and R. Cipolla “Using Frontier Points to Recover Shape, Reflectance and Illumination” *Proc. of the IEEE Int. Conf. on Computer Vision*, pp. 228-235, October 2005
20. A. Vedaldi, H. Jin, P. Favaro and S. Soatto, “KALMANSAC: Causal Inference of Dynamic Processes in the Presence of Outliers” *Proc. of the IEEE Int. Conf. on Computer Vision*, pp. 633-640, October 2005
21. H. Jin, P. Favaro and R. Cipolla “Visual Tracking in the Presence of Motion Blur” *Proc. of the IEEE Intl. Conf. on Computer Vision and Pattern Recognition, II: pp. 18-25, June-July 2005*
22. P. Favaro and S. Soatto “A Variational Approach to Scene Reconstruction and Image Segmentation from Motion-Blur Cues” *Proc. of the IEEE Intl. Conf. on Computer Vision and Pattern Recognition, I: pp. 631- 637, June-July 2004*, winner of Best Poster Award.
23. P. Favaro, M. Burger, and S. Soatto “Scene and Motion Reconstruction from Defocused and Motion-Blurred Images via Anisotropic Diffusion” *Proc. of the European Conference on Computer Vision, Part I, pp.257 - 269, April 2004*.
24. P. Favaro, A. Duci, Y. Ma, and S. Soatto “Exploiting T-junctions in multiple view geometry” *Proc. of the Intl. Conf. on Comp. Vision*, pp. 479-86, 2003.
25. G. Doretto, D. Cremers, P. Favaro, and S. Soatto “Dynamic texture segmentation” *Proc. of the Intl. Conf. on Comp. Vision*, pp. 1236-42, 2003.
26. P. Favaro, S. J. Osher, S. Soatto and L. A. Vese “3D Shape from Anisotropic Diffusion” *Proc. of the IEEE Intl. Conf. on Computer Vision and Pattern Recognition, I: pp. 179-86, 2003*.
27. P. Favaro and S. Soatto “Seeing Beyond Occlusions (and other marvels of a finite lens aperture)” *Proc. of the IEEE Intl. Conf. on Computer Vision and Pattern Recognition, II: pp. 579-86, 2003*.
28. P. Favaro and S. Soatto “Learning shape from defocus” *Proc. of the European Conference on Computer Vision, Part II, pp.735-45, May 2002*
29. H. Jin and P. Favaro “A Variational Approach to Shape from Defocus” *Proc. of the Eur. Conf. on Computer Vision, Part II, pp.18-30, May 2002*.

30. P. Favaro, H. Jin and S. Soatto "Semidirect Structure from Motion" *Proc. of Int. Conf. on Image Analysis and Processing*, pp.250-5, September 2001.
31. P. Favaro, H. Jin and S. Soatto "Real-time Virtual Object Insertion" *Proc. of the Int. Conf. on Computer Vision*, p.749, July 2001.
32. H. Jin, P. Favaro and S. Soatto "Real-time Feature Tracking and Outlier Rejection with Changes in Illumination" *Proc. of the Int. Conf. on Computer Vision*, vol.1, pp.684-9, July 2001.
33. A. Chiuso, P. Favaro, H. Jin and S. Soatto "Mfm: 3-D Motion and Structure Causally Integrated over Time Part II: Implementation" *Proc. of the Eur. Conf. on Computer Vision*, vol.2, pp. 734-750, June 2000.
34. P. Favaro and S. Soatto "Shape and Radiance Estimation under Positivity Constraints From the Information Divergence of Blurred Images" *Proc. of the Eur. Conf. on Computer Vision*, vol.1, pp.755-768, June 2000.
35. S. Soatto and P. Favaro "A Geometric Approach to Blind Deconvolution with Application to Shape from Defocus" *Proc. of the IEEE Intl. Conf. on Computer Vision and Pattern Recognition*, vol.2, pp.10-17, June 2000.
36. H. Jin, P. Favaro and S. Soatto "Real-time 3-D Motion and Structure from Point Features: a Front-end System for Vision-based Control and Interaction", *Proc. of the IEEE Intl. Conf. on Computer Vision and Pattern Recognition*, vol.2, pp.778-9, June 2000.

## PATENTS

1. US Docket 2005P16866US01, A. Chackraborty, B. Georgescu, N. Petrovich, P. Favaro, and D. Comaniciu "System and Method for Semantic Indexing and Navigation of Volumetric Images", 2005 (Provisional Patent)
2. US Docket 2005P14550US01, G. Carneiro, S. Good, B. Georgescu, P. Favaro, and D. Comaniciu "System and Method for Fetal Biometric Measurements from Ultrasound Data and Fusion of Same for Estimation of Fetal Gestational Age", 2005 (Provisional Patent)
3. UK Patent Application No. 0520829.3, PCT/GB2006/050325, R. Cipolla, G. Vogiatzis, and P. Favaro, "Image Processing Methods and Apparatus", 2005 (Provisional Patent)