

Marco Zuliani, Ph.D.
Computer Vision Research Manager
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Objective

To work in the field of computer vision and machine learning, where I can apply my technical knowledge, my creative abilities and my leadership skills to achieve scientific and technological excellence, with a concrete social impact.

Research Interests

Computer vision: face detection, face analysis, face recognition, object detection, scene classification, object tracking, feature extraction and description, image registration, geo-registration, image/video stabilization, panorama creation, 3D reconstruction, optimization and robust estimation for vision, etc.

Machine Learning: deep learning, boosting, metric learning, random forests, continuous data integration, etc.

RANSAC: Author and maintainer of [RANSAC toolbox](#) for Matlab, an open source package widely used by the scientific community to perform robust parameter estimation in presence of outliers.

Skills

Programming: C, C++, Objective C, Python, Matlab. Extensive experience in coding for embedded platforms.

Software: Apple Frameworks, numpy/scipy/scikit-learn, BLAS and LAPACK, \LaTeX_ϵ , Xcode, lldb, Intel Libraries (IPP, MKL, TBB), OpenCV.

Operating Systems: Mac OS X, iOS, Linux.

Languages: Italian (mother tongue), English (fluent).

Other: Strong leadership skills. Excellent oral presentation skills. Visa status: Permanent Resident (Green Card).

Work Experience

Apple

Computer Vision Research Manager

Cupertino, USA
Jul 2013 – Present

- As a member of the Imaging & Vision Technologies Group, I lead a team that performs R&D in the field of computer vision and machine learning, to build core technologies to understand the content of videos and images in a privacy preserving manner.

Algorithm Engineer

May 2011 – Jun 2013

- As a member of the Interactive Media Group, I designed, developed and integrated algorithms for the cameras of mobile devices. [Say cheeeeeese!](#)

Santa Barbara City College

Adjunct Professor

Santa Barbara, USA
January 2011 – May 2011

- I taught CS 143, a computer science course about Discrete Math. I designed the course from the ground up, including the exercises. The topics I covered included: fundamentals of mathematical logic, mathematical proofs, set theory, fundamentals of number theory, cryptography, algorithm complexity, graph theory, shortest path problems, etc.

Mayachitra, Inc.

Research Staff Member

Santa Barbara, USA
October 2006 – May 2011

- I developed software tools and libraries for image registration, video registration/stabilization and mosaicking, geo-referencing, panorama creation.
- I was the principal researcher, architect and developer of:
 - [AIPR](#) and [AIPR Lite](#), software for image registration and panorama creation.
 - [VideoReg](#), a video registration and stabilization software.

Mitsubishi Electric ITE-VIL

Internship

Guildford, UK
Winter 2005

- I worked on problems related to motion segmentation.

FriulROBOT S.r.l.

Internship

Udine, Italy
Summer 2000

- I designed and implemented a calibration algorithm for a robotic arm used to acquire high precision 3D measurements.

Education

University of California, Santa Barbara

Ph.D. in Electrical Engineering

Santa Barbara, USA

October 2006

- Ph.D. in Electrical Engineering with emphasis in computer vision.
- Thesis title: "*Computational Methods for Automatic Image Registration.*".
Advisor: prof. B.S. Manjunath
- I was a teaching assistant for a variety of upper division and graduate classes (including computer vision, image processing, digital control, digital signal processing, etc.). My tasks included preparing lab projects, homeworks, midterm and finals, leading office hours and discussion sessions. I also gave a short graduate course on image registration and related topics.

University of California, Santa Barbara

M.S. in Electrical Engineering

Santa Barbara, USA

June 2003

- Major Area: Signal Processing
- Minor Area: Controls
- Relevant graduate courses: Stochastic Processes, Advanced Digital Signal Processing, Digital Image Processing, Patter Recognition, Neural Networks, Matrix Analysis, Linear Systems I, Nonlinear Optimization, Optimal Estimation, Kalman Filtering, Finite Difference Methods for Partial Differential Equations, Level Set Methods and Their Applications.
- GPA 3.9

University of California, Santa Barbara

Exchange Student

Santa Barbara, USA

Sep 2000, June 2001

- Exchange student within the Education Abroad Program (EAP).

University of Padova

Laurea in Ingegneria Informatica

Padova, Italy

June 2001

- Major: Systems and Controls
- Thesis title: "*A Vision Based System to Recover the Trajectory of a Human Head*"
Advisors: prof. R. Frezza and prof. B.S. Manjunath
- Equivalent GPA 3.7

Patents

- Image Blending Operations – United States 20130329071
- Motion–Based Image Stitching – United States 20130329072
- Projection–Based Image Registration – United States 20130329070

Publications

- C. Kenney, B. Manjunath, M. Zuliani, G. Hewer, and A. Van Nevel. A condition number for point matching with application to registration and post-registration error estimation. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 25(11):1437–1454, November 2003
- M. Zuliani, C. Kenney, and B.S. Manjunath. A mathematical comparison of point detectors. In *Proc. of the 2nd IEEE Workshop on Image and Video Registration*, 2004
- M. Zuliani, S. Bhagavathy, C. S. Kenney, and B. S. Manjunath. Affine-invariant curve matching. In *IEEE International Conference on Image Processing*, October 2004
- M. Zuliani, C. S. Kenney, S. Bhagavathy, and B. S. Manjunath. Drums and curve descriptors. In *British Machine Vision Conference*, September 2004
- C. Kenney, M. Zuliani, and B.S. Manjunath. An axiomatic approach to corner detection. In *Proc. of IEEE Conference on Computer Vision and Pattern Recognition*, pages 191–197, San Diego, California, June 2005
- M. Zuliani, C. S. Kenney, and B. S. Manjunath. The MultiRANSAC algorithm and its application to detect planar homographies. In *IEEE International Conference on Image Processing*, September 2005
- M. Zuliani. *Computational Methods for Automatic Image Registration*. PhD thesis, Department of Engineering and Computer Engineering, University of California, Santa Barbara, October 2006
- M. Zuliani, L. Bertelli, C. S. Kenney, S. Chandrasekarnan, and B. S. Manjunath. Drums, curve descriptors and affine invariant region matching. *Image and Vision Computing Journal*, 2007. In press. Preprint available online <http://dx.doi.org/10.1016/j.imavis.2006.12.001>
- L. Bertelli, M. Zuliani, and B.S. Manjunath. Pairwise similarities across images for multiple view rigid/non-rigid segmentation and registration. In *Proceedings of the International Conference on Computer Vision (ICCV07)*, Oct 2007

- Marco Zuliani, Luca Bertelli, and B. S. Manjunath. An automatic method to learn and transfer the photometric appearance of partially overlapping images. In *Proc. IEEE International Conference on Image Processing*, October 2008
- C. Kenney, M. Zuliani, B. S. Manjunath, and K. Solanki. Condition theory for image registration and post-registration error estimation. In J. LeMoigne, N. Netanyahu, and R. Eastman, editors, *Image Registration for Remote Sensing*. Cambridge University Press, 2011

Invited Talks & Lectures

- M. Zuliani, C. S. Kenney, S. Bhagavathy, B. S. Manjunath, “Drums, Curve Descriptors and Image Correspondences,” Mitsubishi Electric ITE-VIL, Guildford, UK, Sep. 2004. (Host: Dr. M. Bober)
- M. Zuliani, C. S. Kenney, D. Fedorov, S. Bhagavathy, B. S. Manjunath, “Robust Techniques for Image Registration,” at:
 - Signal Processing Institute at EPFL, Switzerland, Jun. 2005 (Host: prof. T. Ebrahimi)
 - Laboratorio di Visione Computazionale e Navigazione Autonoma at University of Padova, Italy, Jun. 2005 (Host: prof. R. Frezza)
 - Vision, Image Processing & Sound Laboratory at University of Verona, Italy, Jun. 2005 (Host: prof. A. Fusiello)
- M. Zuliani, “Fundamentals of Image Registration”
A set of lectures for the graduate Image Processing course at the University of California, Santa Barbara. (Host: prof. B. S. Manjunath)
- M. Zuliani, “RANSAC: Estimating Parameters in Presence of Outliers”
Center for Control, Dynamical Systems, and Computation, University of California, Santa Barbara, Feb. 2009. (Host: prof. F. Bullo)

Reviewer Activity

- Conferences: CVPR, ICCV, ICIP, Siggraph, SPCOM.
- Journals: PERS – Photogrammetric Engineering & Remote Sensing, IEEE Transactions on Multimedia, IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE Transactions on Image Processing, International Journal of Image and Graphics, Image and Vision Computing Journal, Journal of Mathematical Imaging and Vision, Pattern Recognition.

References

Available upon request.