



**UNIVERSITY OF CENTRAL FLORIDA**  
**CENTER FOR RESEARCH IN COMPUTER VISION**

**FINAL ORAL EXAMINATION**

*OF*

OMAR OREIFEJ  
B.S., UNIVERSITY OF JORDAN, 2006  
M.S., UNIVERSITY OF CENTRAL FLORIDA, 2009

*FOR THE DEGREE OF*

**DOCTOR OF PHILOSOPHY**  
(COMPUTER ENGINEERING)

Thursday, March 21, 2013, 10:30 A.M.  
101 Harris Corporation Engineering Center

DISSERTATION COMMITTEE

Professor Mubarak Shah, *Chairman*  
Professor Niels da Vitoria Lobo, *Co-Chairman*  
Professor Xin Li  
Professor Mingjie Lin  
Professor Kenneth Stanley

# OUTLINE OF GRADUATE STUDIES

*Major:* Computer Engineering

Computer Vision Systems	Shah
Computer Vision	Tappen
Advanced Computer Vision	Shah
3D Computer Vision	Foroosh
Design and Analysis of Algorithms	Wocjan
Software Engineering	Turgut

## SELECTED PUBLICATIONS

“Simultaneous Video Stabilization and Moving Object Detection in Turbulence”, Omar Oreifej, Xin Li, and Mubarak Shah, *PAMI 2012*.

“A Two-Stage Reconstruction Approach for Seeing Through Water”, Omar Oreifej, Guang Shu, Teresa Pace, and Mubarak Shah, *CVPR 2011*.

“Action Recognition in Videos Acquired by a Moving Camera Using Motion Decomposition of Lagrangian Particle Trajectories”, Shandong Wu, Omar Oreifej, and Mubarak Shah, *ICCV 2011*.

“Horizon Constraint for Unambiguous UAV Navigation in Planar Scenes”, Omar Oreifej, Niels Lobo, and Mubarak Shah, *ICRA 2011*.

“Human Identity Recognition in Aerial Images”, Omar Oreifej, Ramin Mehran, and Mubarak Shah, *CVPR 2010*.

“Part-based Multiple-Person Tracking with Partial Occlusion Handling”, Guang Shu, Afshin Dehghan, Omar Oreifej, Emily Hand, and Mubarak Shah, *CVPR 2012*.

“A General Framework for Trajectory Optimization with Respect to Multiple Measures”, David Diel, Robert Smith, Jimmy Touma, Niels Lobo, and Omar Oreifej, *JNC 2011*.

“HON4D: Histogram of Oriented 4D Normals for Activity Recognition from Depth Sequences”, Omar Oreifej and Zicheng Liu, *CVPR 2013*.

# DISSERTATION

## ROBUST SUBSPACE ESTIMATION USING LOW-RANK OPTIMIZATION THEORY AND APPLICATIONS IN SCENE RECONSTRUCTION, VIDEO DE- NOISING, AND ACTIVITY RECOGNITION

Recovering the low-rank structure of a linear subspace using a small set of corrupted examples has been recently made feasible through substantial advances in the area of matrix completion and nuclear-norm minimization. Such low-rank structures appear heavily in computer vision, for instance, the frames of a video, the camera motion, and a picture of a building façade, all may contain low-rank structures in certain conditions. In this dissertation, we propose several formulations and extensions of low-rank optimization, and demonstrate how recovering the underlying basis and detecting the corresponding outliers allow us to solve fundamental computer vision problems, including video denoising, background subtraction, action detection, and complex event recognition. Through extensive experiments, we demonstrate that the proposed methods outperform the state-of-the-art on several benchmark datasets.



## OMAR OREIFEJ

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|---------|---|
| 1984    | Born in Amman, Jordan   |
| 2002-06 | B.S., University of Jordan, Amman, Jordan                               |
| 2006    | Intern at the University of Magdeburg, Magdeburg, Germany               |
| 2006-08 | Software Developer, Systems and Electronics Development, Amman, Jordan  |
| 2008-09 | M.S., University of Central Florida, Orlando, FL                        |
| 2008    | Software Developer, SAGE, University of Central Florida, Orlando, FL    |
| 2012    | Research Intern, Microsoft Research, Redmond, WA                        |
| 2008-13 | Ph.D., University of Central Florida, Orlando, FL                       |
| 2013    | Post-Doctoral Researcher, Department of EECS, UC Berkeley, Berkeley, CA |