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Microsoft Research  
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Citizenships: USA, Israel

## Research Interests

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Computer vision, image and video processing, computational photography and video.

## Education

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**PhD Electrical Engineering and Computer Science** 2009–2013

Massachusetts Institute of Technology  
Thesis: Analysis and Visualization of Temporal Variations in Video  
Committee: Prof. William T. Freeman (advisor), Prof. Fredo Durand, Dr. Ce Liu, Dr. Richard Szeliski  
GPA: 4.8/5

**MSc Computer Science, Summa Cum Laude** 2006–2009

Tel Aviv University and The Interdisciplinary Center, Israel  
Thesis: Discrete Approaches to Content-aware Image and Video Retargeting  
Committee: Prof. Ariel Shamir (advisor), Prof. Shmuel Peleg, Prof. Yacov Hel-Or  
GPA: 99.2/100

**BSc Computer Science, Magna Cum Laude** 2001–2004

The Interdisciplinary Center, Israel  
GPA: 94.2/100

## Experience and Appointments

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### Microsoft Research

Postdoctoral Researcher (MSR New England, Cambridge MA) 2014–Present  
Intern (MSR Redmond, Redmond WA). Host: Johannes Kopf Summer 2012  
Intern (MSR New England, Cambridge MA). Host: Ce Liu Summer 2011

### Massachusetts Institute of Technology, Cambridge MA

Research Assistant. Advisor: Prof. William T. Freeman 2009–2013  
Teaching Assistant 2011

### The Interdisciplinary Center, Herzeliya, Israel

Research assistant. Advisor: Prof. Ariel Shamir 2008–2009  
Teaching Assistant 2003

### Disney Research Los Angeles, Glendale CA

Intern. Host: Joe Marks Summer 2008

### Mitsubishi Electric Research Labs, Cambridge MA

Consultant. Host: Dr. Jay Thornton 2007–2008  
Intern. Host: Dr. Shai Avidan Summer 2007

### Aternity Inc., Hod Hasharon, Israel

Consultant 2008  
Algorithms Developer 2005–2008

## Publications

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Tianfan Xue, Michael Rubinstein, Neal Wadhwa, Anat Levin, Frédo Durand, and William T. Freeman. “Refraction Wiggles for Measuring Fluid Depth and Velocity from Video”. In: *Proc. of the European Conference on Computer Vision (ECCV)*. To appear. 2014.

Abe Davis, Michael Rubinstein, Neal Wadhwa, Gautham Mysore, Frédo Durand, and William T. Freeman. “The Visual Microphone: Passive Recovery of Sound from Video”. In: *ACM Transactions on Graphics (Proc. SIGGRAPH)* 33.4 (2014). To appear.

Neal Wadhwa, Michael Rubinstein, Frédo Durand, and William T. Freeman. “Riesz Pyramids for Fast Phase-Based Video Magnification”. In: *IEEE Conf. on Computational Photography (ICCP)*. Mar. 2014.

Michael Rubinstein. “Analysis and Visualization of Temporal Variations in Video”. PhD thesis. Massachusetts Institute of Technology, Feb. 2014.

Neal Wadhwa, Michael Rubinstein, Frédo Durand, and William T. Freeman. “Phase-Based Video Motion Processing”. In: *ACM Transactions on Graphics (Proc. SIGGRAPH)* 32.4 (2013).

Michael Rubinstein, Armand Joulin, Johannes Kopf, and Ce Liu. “Unsupervised Joint Object Discovery and Segmentation in Internet Images”. In: *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*. June 2013.

Michael Rubinstein, Neal Wadhwa, Fredo Durand, and William T. Freeman. “Revealing Invisible Changes in the World”. In: *Science* 339.6119 (2013), pp. 519–519.

Michael Rubinstein, Ce Liu, and William T. Freeman. “Annotation Propagation in Large Image Databases via Dense Image Correspondence”. In: *Proc. of the European Conference on Computer Vision (ECCV)*. 2012.

Michael Rubinstein, Ce Liu, and William T. Freeman. “Towards Longer Long-Range Motion Trajectories”. In: *Proc. of the British Machine Vision Conference (BMVC)*. 2012, pp. 53.1–53.11.

Hao-Yu Wu, Michael Rubinstein, Eugene Shih, John Guttag, Frédo Durand, and William T. Freeman. “Eulerian Video Magnification for Revealing Subtle Changes in the World”. In: *ACM Transactions on Graphics (Proc. SIGGRAPH)* 31.4 (2012).

Michael Rubinstein, Ce Liu, Peter Sand, Fredo Durand, and William T. Freeman. “Motion Denoising with Application to Time-lapse Photography”. In: *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*. 2011, pp. 313–320.

Michael Rubinstein, Diego Gutierrez, Olga Sorkine, and Ariel Shamir. “A Comparative Study of Image Retargeting”. In: *ACM Transactions on Graphics (Proc. SIGGRAPH Asia)* 29.5 (2010), 160:1–160:10.

Michael Rubinstein. “Discrete Approaches to Content-aware Image and Video Retargeting”. MA thesis. Efi Arazi School of Computer Science, The Interdisciplinary Center, May 2009.

Michael Rubinstein, Ariel Shamir, and Shai Avidan. “Multi-operator Media Retargeting”. In: *ACM Transactions on Graphics (Proc. SIGGRAPH)* 28.3 (2009), pp. 1–11.

Michael Rubinstein, Ariel Shamir, and Shai Avidan. “Improved Seam Carving for Video Retargeting”. In: *ACM Transactions on Graphics (Proc. SIGGRAPH)* 27.3 (2008), pp. 1–9.

Ariel Shamir, Michael Rubinstein, and Tomer Levinboim. “Generating Comics From 3D Interactive Computer Graphics”. In: *IEEE Computer Graphics and Applications* 26.3 (2006), pp. 30–38.

## Patents

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Neal Wadhwa, Michael Rubinstein, Frederic Durand, William T. Freeman, Hao-Yu Wu, Eugen Inghaw Shih, and John V. Guttag. “Complex-Valued Phase-Based Eulerian Motion Modulation”. US 13/707,451 (pending). 2012.

Ce Liu and Michael Rubinstein. “System and method for semantically annotating images”. US 13/367,139 (pending). 2012.

Michael Rubinstein, Neal Wadhwa, Fredo Durand, and William T. Freeman. “Complex-Valued Eulerian Motion Modulation”. US 13/607,173 (pending). 2012.

Hao-Yu Wu, Michael Rubinstein, Eugene Inghaw Shih, John V Guttag, Frederic Durand, and William T Freeman. “Linear-Based Eulerian Motion Modulation”. US 13/850,717 (pending). 2012.

Ariel Shamir and Michael Rubinstein. “Image comparison by asymmetric dynamic warping”. US 8,405,681. 2009.

Ariel Shamir and Michael Rubinstein. “Multi-operator media retargeting”. US 8,400,473. 2009.

Michael Rubinstein, Ariel Shamir, Shai Avidan, and Matthew E. Brand. “Content aware resizing of images and videos”. US 8,380,010. 2008.

Lenny Ridel, Shlomo Lahav, Michael Rubinstein, Boris Freydin, Eden Shochat, and Orit Kislev Kapon. “System for monitoring computer systems and alerting users of faults”. US 8,352,589. 2005.

## Awards

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Microsoft PhD Fellowship	2012–2013
NVIDIA Graduate Fellowship	2011
Mathworks Fellowship	2009
Msc Summa Cum Laude	2009
IDC Excellence Scholarship for MSc Studies	2008
BSc Magna Cum Laude	2004
IDC President Award for outstanding academic achievements	2004
Chais Award for excellence in computer science studies	2003
Dean’s List of Excellence	2001–2004

## Professional Activities

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### Program Committee

ECCV Media Retargeting Workshop 2010

### Journal Reviewer

2009–Present

Transaction on Graphics (TOG), Transactions on Pattern Analysis and Machine Intelligence (TPAMI), Transactions on Visualization and Computer Graphics (TVCG), International Journal of Computer Vision (IJCV), The Visual Computer, Computer Graphics Forum, Transactions on Image Processing (TIP), Transactions on Multimedia (TMM), Signal Processing Systems (VLSI)

### Conference Reviewer

2009–Present

SIGGRAPH, SIGGRAPH Asia, CVPR, ECCV, ICCV, Eurographics, Pacific Graphics

## Press

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Yedioth Ahronoth (03/2013): “The Hidden Secrets of Video” (Hebrew)

Daily Mail (02/2013): “How to spot a liar (and cheat at poker)”

NYTimes (02/2013): “Scientists Uncover Invisible Motion in Video”

Txchnologist (02/2013): “New Video Process Reveals Heart Rate, Invisible Movement”

MIT News (02/2013): “MIT researchers honored for ‘Revealing Invisible Changes’”

NSF (02/2013): “Revealing Invisible Changes in the World” (honorable mention in SciVis 2012)

Wired UK (07/2012): “MIT algorithm measures your pulse by looking at your face”

Technology Review (Jul 24 2012): “Software Detects Motion that the Human Eye Can’t See”

BBC Radio (07/2012): “MIT Video colour amplification”

Der Spiegel (06/2012): “Video software can make pulse visible” (German)

MIT News (06/2012): “Researchers amplify variations in video, making the invisible visible”

PetaPixel (06/2012): “Magnifying the Subtle Changes in Video to Reveal the Invisible”

Huffington Post (06/2012): “MIT’s New Video Technology Could Give You Superhuman Sight”

Gizmodo (06/2012): “New X-Ray Vision-Style Video Can Show a Pulse Beating Through Skin”

PhotoshopDaily (07/2009): “Insider Info: Content-Aware Scaling”

ZDNet (10/2008): “Best new feature for photographers in Adobe Photoshop CS4”

CNET (11/2007): “Seam carving photo resizing now for video”

## Invited Talks and Conference Presentations

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- 06/2014 IEEE CVPR, Columbus OH. Tutorial: “Dense Image Correspondences for Computer Vision”.
- 12/2013 Weizmann Institute of Science, Israel (invited talk). “A Big World of Small Motions”.
- 12/2013 The Interdisciplinary Center, Israel (invited talk). “A Big World of Small Motions”.
- 12/2013 Tel Aviv University, Israel (invited talk). “A Big World of Small Motions”.
- 12/2013 IEEE ICCV, Sydney Australia. Tutorial: “Dense Image Correspondences for Computer Vision”.
- 11/2013 BigData@CSAIL, MIT, Cambridge MA (invited talk). “Joint Inference in Image Databases via Dense Correspondence”.
- 10/2013 Google[x], Mountain View CA (invited talk). “A Big World of Small Motions”.
- 10/2013 Adobe Research, Seattle WA (invited talk). “A Big World of Small Motions”.
- 10/2013 Microsoft Research New England (invited talk), Cambridge MA. “A Big World of Small Motions”.
- 07/2013 ACM SIGGRAPH, Anaheim CA. “Phase-based Video Motion Processing”.
- 04/2013 IEEE ICCP, Harvard University, Cambridge MA (invited talk). “A Big World of Small Motions”.
- 03/2013 AAAI Spring Symposium on Weakly Supervised Learning from Multimedia (invited talk). “Joint Inference in Image Databases via Dense Correspondence”.
- 08/2012 ACM SIGGRAPH, Los Angeles CA. “Eulerian Video Magnification for Revealing Subtle Changes in the World”.
- 11/2011 MIT 6.865 Computational Photography (guest lecturer). “Seam Carving and Content-driven Retargeting of Images and Video”.
- 12/2010 ACM SIGGRAPH Asia, Seoul, S. Korea. “A Comparative Study of Image Retargeting”.
- 10/2010 MIT 6.865 Computational Photography (guest lecturer). “Seam Carving and Content-driven Retargeting of Images and Video”.
- 08/2009 ACM SIGGRAPH, New Orleans LA. “Multi-operator Media Retargeting”.