

# Elli Angelopoulou

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Computer Science Department  
Stevens Institute of Technology  
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## EDUCATION

- 1997 **Ph.D.** Computer Science, *The Johns Hopkins University*, Baltimore, MD  
Thesis Advisors: Lawrence B. Wolff and Russell H. Taylor
- 1992 **M.S.E.** Computer Science, *The Johns Hopkins University*, Baltimore, MD
- 1990 **M.S.** Computer Science, *The American University*, Washington, D.C.
- 1988 **B.S.** Computer Information Systems, *The American College of Greece*, Athens, Greece

## PROFESSIONAL EMPLOYMENT

- 1999 - **Assistant Professor**  
Department of Computer Science, Stevens Institute of Technology
- 2006- **Visiting Professor**  
Institute for Pattern Recognition, University of Erlangen-Nuremberg, Germany
- 2000 - 2006 **Adjunct Assistant Professor**  
Department of Computer and Information Science, University of Pennsylvania
- 1998 - 1999 **Post Doctoral Fellow**  
GRASP Laboratory, University of Pennsylvania
- 1997 - 1998 **Lecturer**  
Department of Computer Science, The Johns Hopkins University
- 1990 - 1991 **Software Engineer**  
Bell Atlantic (now Verizon), Silver Spring, MD

## RESEARCH INTERESTS

My research focuses on what information can be extracted from images based on the amount of light reflected from a surface. This involves both the development of algorithms as well as the design of new sensors. Recently, I concentrated on the following topics:

- Multispectral sensors.
- Multispectral scene analysis software.
- Analysis of reflectance functions in a multispectral setup.
- Modeling of skin color.
- High dimensional data analysis

## AWARDS

- 2004      **Research Recognition Award**  
Stevens Institute of Technology, Hoboken, NJ
- 2002      **NSF CAREER Award**  
National Science Foundation, Washington, DC
- 1992 - 1995 **Onassis Foundation Graduate Studies Fellowship**  
Alexander S. Onassis Public Benefit Foundation, Vaduz, Liechtenstein
- 1988      **Best Graduating Senior in the School of Science**  
The American College of Greece, Athens, Greece
- 1988      **Best Computer Lab Assistant**  
The American College of Greece, Athens, Greece
- 1987      **Best Starting Senior**  
The American College of Greece, Athens, Greece
- 1981-1983 **National High-School Scholarship**  
Greek Ministry of Education, Athens, Greece

## RESEARCH GRANTS

- [1] WiNSeC: *Large Networks of Wireless Agents and Sensors: Monitoring, Visualization, Simulation and Control*  
Agency: US Army TACOM-ARDEC  
Duration: 2004-2007  
Amount: \$130,848  
Involvement: co-PI with George Kamberov
- [2] CAREER: *Exploring the Multispectral Frontier in Computer Vision*  
Agency: National Science Foundation  
Duration: 2002-2007  
Amount: \$394,000  
Involvement: PI
- [3] *Computer Assisted System for Patient's Pre-Operative Analysis*  
Agency: Stevens Institute of Technology  
Duration: 2001-2003  
Amount: \$75,000  
Involvement: co-PI with George Kamberov et al.
- [4] *Reflectance Properties of the Human Face*  
Agency: NEC Research Institute  
Duration: 2001  
Amount: \$16,500  
Involvement: PI

- [5] ITR: *Interacting with the Visual World: Capturing, Understanding and Predicting Appearance*  
 Agency: National Science Foundation  
 Duration: 2000-2005  
 Amount: \$458,900  
 Involvement: co-PI with Shree Nayar et al.
- [6] *Equipment Grant*  
 Agency: Siemens Corporate Research  
 Duration: 2000  
 Amount: \$20,000  
 Involvement: PI

## PATENTS

- Daniilidis, Kostas, Angelopoulou, Elli and Kumar, Vijay. “Multispectral Omnidirectional Optical Sensor and Methods Therefor.” *US Patent Nr. 6,982,743*. January 2006.

## INVITED TALKS

- 2004 “Multispectral Imaging: From Airborne Sensors to Mainstream Computer Vision to the Classroom.” *Imaging and Optics: Research and Education*. Montclair State University, Montclair, NJ.
- 2004 “Beyond Tri-chromatic Imaging”. *Imaging Beyond the Pinhole Camera. 12th Seminar on Theoretical Foundation of Computer Vision*. Schloss Dagstuhl, Germany.
- 2001 “The Color of Human Skin.” NEC Research Institute, Princeton, NJ.
- 2001 “Extracting Albedo from Lambertian Surfaces.” NEC Research Institute, Princeton, NJ.
- 2000 “Dense Spectral Sampling in the Visible Range and its Application in Invariant Color Identification.” Conference on Information Sciences and Systems, Princeton, NJ.
- 1999 “Photometric Invariance in Visual Perception”. Polytechnic University, New York, NY.
- 1998 “Photometric Invariance in Shape Analysis”. LG Electronics Research Center, Princeton, NJ.
- 1998 “Photometric Invariance in Shape Analysis and Particularly in Object Representation”. *NECI Vision Talks Series*. NEC Research Institute, Princeton, NJ.
- 1997 “Photometric Invariance in Shape Analysis”. Philips Research, NY.
- 1997 “Photometric Invariance in Shape Analysis”. Siemens Corporate Research, Princeton, NJ.

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## PUBLICATIONS

### Book Chapters

- [1] Angelopoulou, Elli. "Beyond Tri-Chromatic Imaging." Book chapter in *Imaging Beyond the Pinhole Camera*. Daniilidis, Kostas and Klette, Reinhard eds. Springer, 2006.

### Refereed Journal Articles

- [1] Wang, Hongzhi and Angelopoulou, Elli. "Spectral Band Selection for Multispectral Imaging via Average Normalized Information." *Journal of Real-Time Image Processing*, (to appear).
- [2] Angelopoulou, Elli, Shi, Dongmei, Molana, Rana and Daniilidis, Kostas. "Multispectral Skin Modeling." submitted to *IEEE Computer Vision and Image Understanding*, 2006.
- [3] Angelopoulou, Elli and Wolff, Lawrence B. "Sign of Gaussian Curvature from Curve Orientation in Photometric Space." *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 20, No. 10, October 1998. pp. 1056-1066.
- [4] Wolff, Lawrence B. and Angelopoulou, Elli. "Three Dimensional Stereo by Photometric Ratios." *Journal of the Optical Society of America A: Optics, Image Science, and Vision*, Vol. 11, No. 11, November 1994. pp. 3069-3078.

### Articles in Refereed Conferences

- [1] Wang, Hongzhi and Angelopoulou, Elli. "Sensor Band Selection for Multispectral Imaging via Average Normalized Information." *ECCV International Workshop on Spectral Imaging*. May 2006. pp 5-13.
- [2] Dragnea Viorel and Angelopoulou, Elli. "Direct Shape from Isophotes." *ICCV Workshop Towards Benchmarking Automated Calibration, Orientation and Surface Reconstruction from Images*. October 2005.
- [3] Angelopoulou, Elli and Poger, Sofya. "Specular Highlights of Plastic Surfaces and the Fresnel Coefficient" *SPIE Conference on Imaging, Displays and Detectors*. SPIE Vol. 5578. SPIE Press, December 2004. pp. 465-475.
- [4] Angelopoulou, Elli and Poger, Sofya. "The Color of Specular Highlights." *SPIE Conference on Human Vision and Electronic Imaging VIII*. SPIE Vol. 5007. SPIE Press, May 2003. pp. 298-309.
- [5] Angelopoulou, Elli, Molana, Rana and Daniilidis, Kostas. "Multispectral Skin Color Modeling." *IEEE Conference on Computer Vision and Pattern Recognition 2001*. IEEE Computer Society Press, December 2001. pp. 635-642.
- [6] Poger, Sofya and Angelopoulou, Elli. "Selecting Components for Building Multispectral Sensors." *IEEE CVPR Technical Sketches*. IEEE Computer Society Press, December 2001.
- [7] Angelopoulou, Elli. "Understanding the Color of Human Skin." *Proceedings of the 2001*

- SPIE Conference on Human Vision and Electronic Imaging VI*. SPIE Vol. 4299. SPIE Press, May 2001. pp. 243-251.
- [8] Angelopoulou, Elli. "Objective Colour from Multispectral Imaging." *Proceedings of 6th European Conference in Computer Vision 1994*, Lecture Notes in Computer Science. Springer-Verlag, 2000. pp. 359-374.
- [9] Angelopoulou, Elli, Lee, Sang W. and Bajcsy, Ruzena. "Spectral Gradients: A Material Descriptor Invariant to Geometry and Incident Illumination." *IEEE International Conference on Computer Vision 1999*. IEEE Computer Society Press, September 1999, pp. 861-867.
- [10] Angelopoulou, Elli and Williams, James P. "Photometric Surface Analysis in a Tri-Luminal Environment." *IEEE International Conference on Computer Vision 1999*. IEEE Computer Society Press, September 1999, pp. 442-449.
- [11] Angelopoulou, Elli. "Gaussian Curvature from Photometric Scatter Plots." *IEEE Workshop on Photometric Modeling for Computer Vision and Graphics 1999*. IEEE Computer Society Press, June 1999.
- [12] Angelopoulou, Elli and Wolff, Lawrence B. "Photometric Computation of the Sign of Gaussian Curvature Using a Curve Orientation Invariant." *IEEE Conference on Computer Vision and Pattern Recognition 1997*. IEEE Computer Society Press, June 1997. pp. 432-437.
- [13] Angelopoulou, Elli, Williams, James P. and Wolff, Lawrence B. "A Curvature Based Descriptor Invariant to Pose and Albedo Derived from Photometric Data." *IEEE Conference on Computer Vision and Pattern Recognition 1997*. IEEE Computer Society Press, June 1997. pp. 165-171.
- [14] Angelopoulou, Elli, Williams, James P. and Wolff, Lawrence B. "Curvature Based Signatures for Object Description and Recognition." *Proceedings of the 1996 SPIE Conference on Three-Dimensional Imaging and Laser-Based Systems for Metrology and Inspection II*. SPIE Vol. 2909. SPIE Press, January 1997. pp. 192-203.
- [15] Angelopoulou, Elli, Williams, James P. and Wolff, Lawrence B. "Curvature Based Signatures for Object Description and Recognition." *Proceedings of 4th ECCV Workshop on Object Representation in Computer Vision II*. Springer-Verlag, 1996. pp. 109-132.
- [16] Wolff, Lawrence B. and Angelopoulou, Elli. "3-D Stereo Using Photometric Ratios." *Proceedings of 3rd European Conference in Computer Vision 1994*, Lecture Notes in Computer Science, Vol. 801. Springer-Verlag, 1994. pp. 247-258.
- [17] Wolff, Lawrence B. and Angelopoulou, Elli. "3-D Stereo Using Photometric Ratios." *Proceedings of the 1993 SPIE Conference on Optics, Illumination, and Image Sensing for Machine Vision VIII*. SPIE Vol. 2065. SPIE Press, March 1994. pp. 194-210.
- [18] Angelopoulou, Elli, Tsai-Hong, Hong, and Wu, Angela. "World Model Representation." *Proceedings IEEE Intelligent Vehicles 92*.

## Publicly Available Software

- [1] Paranjape, Maithili and Angelopoulou, Elli. “MultiSFAMS: MultiSpectral Fast Adaptive Mean Shift” [http://www.cs.stevens.edu/Research\\_labs/ComputerVision\\_Lab/MultiSSA](http://www.cs.stevens.edu/Research_labs/ComputerVision_Lab/MultiSSA)
- [2] Angelopoulou, Elli, Paranjape, Maithili and Kothavade, Tanuja. “MultiSSA: MultiSpectral Scene Analysis Software.” [http://www.cs.stevens.edu/Research\\_labs/ComputerVision\\_Lab/MultiSSA](http://www.cs.stevens.edu/Research_labs/ComputerVision_Lab/MultiSSA)

## Invited Papers

- [1] Angelopoulou, Elli. “The Uniqueness of the Color of Human Skin.” *Electronic Imaging*, Vol. 11, No. 2. SPIE Press, June 2001. p. 5
- [2] Angelopoulou, Elli. “Dense Spectral Sampling in the Visible Range and its Application in Invariant Color Identification.” *Proceedings of the 2000 Conference on Information Sciences and Systems. March 2000. pp. WP5-1 - WP5-7.*

## Non-Refereed Publications

- [1] Wang, Hongzhi and Angelopoulou, Elli. “Average Normalized Information: a Novel Entropy-Based Band Selection Method.” *Stevens Institute of Technology Technical Report, CS-2004-13*. November 2004.
- [2] Shi, Dongmei and Angelopoulou, Elli. “Dimensionality Reduction for Multispectral Skin Data.” *Stevens Institute of Technology Technical Report, CS-2004-9*. July 2004.
- [3] Poger, Sofya and Angelopoulou, Elli. “Multispectral Sensors in Computer Vision.” *Stevens Institute of Technology Technical Report, CS Report 2001-3*. August 2001.
- [4] Angelopoulou, Elli, Molana, Rana and Daniilidis, Kostas. “Multispectral Skin Color Modeling.” *University of Pennsylvania Technical Report MS-CIS-01-22*. June 2001.
- [5] Angelopoulou, Elli. “The Reflectance Spectrum of Human Skin.” *University of Pennsylvania Technical Report MS-CIS-99-29*. December 1999.
- [6] Angelopoulou, Elli and Wright, John R. Jr. “Laser Scanner Technology.” *University of Pennsylvania Technical Report MS-CIS-99-16*. June 1999.
- [7] Angelopoulou, Elli, Lee, Sang W. and Bajcsy, Ruzena. “Spectral Gradient: A Surface Reflectance Measurement Invariant to Geometry and Incident Illumination.” *University of Pennsylvania Technical Report MS-CIS-99-02*. January 1999.
- [8] Angelopoulou, Elli, and Wolff, Lawrence B. “Photometric Computation of the Sign of Gaussian Curvature Using a Curve Orientation Invariant.” *Proceedings of Image Understanding Workshop (IUW) 1997*. Morgan Kaufmann Publishers, May 1997.
- [9] Angelopoulou, Elli, Williams, James P. and Wolff, Lawrence B. “Curvature Based Signatures for Object Description and Recognition.” *Proceedings of Image Understanding Workshop (IUW) 1996*. Morgan Kaufmann Publishers, February 1996, pp. 973-980.

- [10] Wolff, Lawrence B. and Angelopoulou, Elli. "3-D Stereo Using Photometric Ratios." *Proceedings of Image Understanding Workshop (IUW) 1993*. Morgan Kaufmann Publishers, April 1993. pp. 987-992.

## MEDIA COVERAGE

My research on Gaussian curvature has been featured in the following media:

### Periodicals

- **Technology Silicon Valley**, January 1998  
"Robots getting well-rounded education at Johns Hopkins," p. 77
- **Discover Magazine**, August 1997  
Breakthroughs, "Chocolate Tech (Imaging Chocolates)," p. 24
- **Laser Focus World**, October 1996  
World News, "Object Recognition: Video-based Technique Identifies Smooth Surfaces"

### Newspapers

- **USA Today**, June 1997  
The World of Science, "Teaching machines to recognize objects," p. 6
- **Baltimore Business Journal**, June 30, 1997  
Special Report: Technology, "Hopkins Grad Helps Robot See," p. 17
- **London Times, Engineering Magazine, UK**, June 1997  
Periscope, "Sweet Pickings," p. 88

### Web News

- SPIE, Industry News Bytes
- Johns Hopkins University, The Gazette

### Radio Channels

- **Société Radio-Canada: Les Anées lumière**, March 1997  
Le Petit Journal de la Science, "Un robot amateur de chocolat"

## TEACHING

### **Undergraduate Courses at Stevens Institute of Technology**

- CS 105 Introduction to Scientific Computing, Fall 2004, Spring 2006
- CS 385 Data Structures and Algorithms II, Fall 2003, Fall 2002,
- CS 437 Interactive Computer Graphics, Fall 2003, Fall 2002, Fall 2001, Fall 2000, Fall 1999

### **Graduate Courses at Stevens Institute of Technology**

- CS 558 Computer Vision, Spring 2005, Spring 2004, Spring 2003, Spring 2002, Spring 2001, Spring 2000
- CS 590 Introduction to Data Structures and Algorithms, Spring 2001
- CS 600 Data Structures and Algorithms, Fall 2000, Fall 2004

### **Undergraduate Courses at Johns Hopkins University**

- 600.461 Computer Vision, Fall 1997

## RESEARCH SUPERVISION

### **Postdoctoral Research Supervision**

1. Sofya Poger (2001 - 2002, now Assistant Professor at Iona College)

### **Current Ph.D. Students**

1. Viorel Dragnea (2000 -, works full time at Syncsort)
2. Dongmei Shi (2004 -)
3. Hongzhi Wang (2004 -)

### **Ph.D. Thesis Committees**

1. Bogumila Lai, Dual Approach to Optimization Problems with Probabilistic Constraints, 2003
2. Seongah Chin, Image Text Segmentation, 1999.

### **Graduated Masters Students**

1. Kiran Chintalapati (2005)
2. Maithili Paranjape (2004)
3. Ramesh Vanapathy (2003)
4. Tanuja Kothavade (2002)
5. Romain Moreau-Gobard (2001)

**Undergraduate Students**

1. Rob Bader (2004)
2. Tom Kennedy (2003)
3. Emily Schlipf (2003)
4. Suma Sreepada (2003)

**UNIVERSITY SERVICE****Advising**

- Approximately 40 undergraduate Computer Science students.
- 8 incoming freshmen every year.

**Committees**

- Computer Science Curriculum Committee (2003 -)
- Supervisory Committee of Computational Science Program (2002 -)
- Stanley Fellowship Committee (2000 -)
- Non-Academic Disciplinary Appeals Committee (2003 - 2005)
- Committee on Committees (2001-2003)
- Computer Science Career Forum Committee (2001)
- Director Search Committee (2001)
- Course Scheduling Committee (2000- 2001)
- Technogenesis Implementation Task Force (TITF) committee (2000- 2001)
- Wireless Initiative Working Group (2000)
- ECE Faculty Search Committee (1999 - 2000)
- Graduate Curriculum Committee (1999 - 2000)
- President's Task Force on the Recruitment and Retention of Female Faculty (1999 - 2001)

**Other**

- Maintenance of the Frequently Asked Question (FAQ) for Computer Science undergraduates <http://www.cs.stevens.edu/~elli/CSFAQ.html> (2002 -)
- Revised and maintained an orientation pamphlet for new CS faculty (1999 - 2001)

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## PROFESSIONAL ACTIVITIES

### Program Committee Member at a Conference

- 2006 IEEE Pacific-Rim Symposium on Image and Video Technology
- 2006 European Conference on Computer Vision
- 2005 IEEE Conference on Computer Vision and Pattern Recognition
- 2005 IEEE International Conference on Computer Vision
- 2004 European Conference on Computer Vision
- 2004 IEEE Conference on Computer Vision and Pattern Recognition
- 2003 IEEE International Conference on Computer Vision
- 2003 IEEE Workshop on Color and Photometric Methods on Computer Vision
- 2001 Vision Interface Conference
- 2001 IEEE Conference on Computer Vision and Pattern Recognition

### Conference Reviewer

- 2006 IEEE Conference on Computer Vision and Pattern Recognition
- 2003 IEEE Conference on Computer Vision and Pattern Recognition
- 2003 European Conference on Computer Vision
- 2003 IEEE International Conference on Computer Vision
- 2003 IEEE Workshop on Color and Photometric Models in Computer Vision
- 2001 IEEE Conference on Computer Vision and Pattern Recognition
- 2001 Vision Interface Conference
- 2000 IEEE International Conference on Pattern Recognition
- 1996 IEEE International Conference on Pattern Recognition
- 1995 IEEE Conference on Computer Vision and Pattern Recognition

### Journal Reviewer

- Applied Optics
- Computer Vision and Image Understanding
- IEEE Computer Graphics and Applications
- IEEE Transactions on Image Processing
- IEEE Transactions on Pattern Analysis and Machine Intelligence
- IEEE Transactions on Signal Processing
- Image and Vision Computing
- International Journal of Computer Vision
- Journal of Electronic Imaging

OSA Optics Letters

**Proposal Reviewer**

2004 National Science Foundation

2003 National Science Foundation

2002 National Science Foundation

**Professional Memberships**

IEEE Computer Science Society

IEEE Technical Committee on Pattern Analysis and Machine Intelligence

Optical Society of America