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## Steven Zucker

David & Lucile Packard Professor of Biomedical Engineering, Electrical Engineering & Comp. Science



Ph.D., Drexel University

### RESPONSIBILITIES

Director of the Program in Applied Mathematics

### INTERESTS

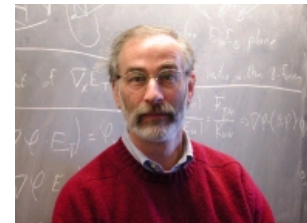
Computational vision is at the heart of robotics and biomedicine, but it is primitive when compared with the human visual sense. Humans demonstrate, effortlessly, enormous visual flexibility and generality, unaware of human vision's staggering complexity. But more than one-third of the primate brain is dedicated to processing visual information.

How do we characterize the function of billions of neurons in algorithmic terms?

Zucker is putting the requirements of vision systems together with insights from neurophysiology and applied mathematics to develop an abstract theory of computational vision. Based on differential geometry, his approach leads to methods of curve detection, shading and texture analyses, stereo, color, and generic shape description. The key to studying and modeling vision is an interdisciplinary perspective, integrating computation, neuroscience, and mathematics.

### REPRESENTATIVE PUBLICATIONS

- Geometrical Computations Explain Projection Patterns of Long-range Horizontal Connections in Visual Cortex, O. Ben-Shahar, Steven Zucker, 2003, *Neural Computation*, 16(3), 445-476.
- Sketches with curvature: The curve indicator random field and Markov processes, J. August, Steven Zucker, 2003, *IEEE Trans. Pattern Analysis and Machine Intelligence*, 25(4), 387-401.
- Hamilton-Jacobi Skeletons, K. Siddiqi, S. Bouix, A.R. Tannenbaum, Steven Zucker, 2002, *Int'l. J. of Computer Vision*, 48(3), 215-232.
- Complexity, Confusion, and Perceptual Grouping. Part I: The curve-like representation, B. Dubuc, Steven Zucker, 2001, *Int'l. J. of Computer Vision*, 42(1/2), 55-82.



### +News & Events

#### Links

– [Zucker Computational Vision Group](#)

#### Phone

(203) 432-6434

#### Email

– [steven.zucker \[at\] yale.edu](mailto:steven.zucker@yale.edu)

#### Fax

(203) 432-0030

#### Mailing Address

P.O. Box 208260  
New Haven, CT 06520

#### Office Address

51 Prospect Street  
AKW 507  
New Haven, CT 06511

- Complexity, Confusion, and Perceptual Grouping. Part II: Mapping Complexity, B. Dubuc, Steven Zucker, 2001, *Int'l. J. of Computer Vision*, 42 (1/2), 83-115.

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School of Engineering & Applied Science | Yale University | Dunham Laboratory | Room 222 | 10 Hillhouse Avenue | U.S. Mail: P.O. Box 208267 | New Haven, CT 06520-8267 | Phone 203-432-4200