More than meets the eye: Cameras for Capturing Patterns

Kristin Dana
Associate Professor, Electrical and Computer Engineering

CURRENT RESEARCH

Using computational photography combined with machine learning to sense and interpret patterns

Computational Photography and Intelligent Cameras comprise a subfield of computer vision that leverages the physics of image formation to create advanced methods of sensing light and analyzing images in order to reveal scene properties. Another term for this field is *computational sensing*. Cameras are often thought of as simple consumer devices useful for taking a snapshot for viewing. However, a camera can quantitatively sense light and measure scenes in ways that extends human vision. The traditional camera is analogous to the human eye, but computational photography takes computer vision a step further by *redesigning* the camera in order to capture scene information that the human eye is not capable of seeing. The form and function of the camera is malleable and creative research transforms the camera to a collection of optical, mechanical and electrical components that send, sense, and interpret light.

Dr. Dana and her team innovate with a unique style and have introduced the first texture camera and reflectance sensor of its kind as well as novel material estimation work that models objects not only by color and geometry but also by complex material properties such as iridescence. Research in computational photography and computer vision augments human vision and allows interaction and understanding of our physical world and environment. One of the most exciting aspects of Dr. Dana's work is its interdisciplinary nature. In her career, she has developed intelligent camera systems for medical diagnostics, civil engineering, microbiology and communications. Computational photography enables us to see in a scientific manner, creating diagnostic imagery, and using light and...

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AFFILIATION

Rutgers University

EDUCATION

- Ph.D. in Electrical Engineering 1999,Columbia University

AWARDS

- Charles Pankow National Award for Engineering Innovation- American Society of Civil Engineering (ASCE), 2014
- Department Service Award, 2011
- NSF Faculty Early Career (CAREER) Surface Science for Vision and Graphics, 2001
- Sarnoff Corporation Team Award, 1995
- Sarnoff Corporation Technical Achievement Award, 1994

RESEARCH AREAS

Technology, Computational Sciences / Mathematics, Robotics, Electronics / Sensors

FUNDING REQUEST

Your contributions will support the continued research of Dr. Kristin Dana, of Rutgers University, as she develops computational photography systems that are potentially transformative while crossing the boundaries of communications, civil engineering, and medicine. Donations will fund the necessary $100K/year required for each research project and include supporting personnel and equipment. Help continue to make computational photography an important part of the scientific discovery process; fund Dr. Dana.