Research with Dr. Karen Panetta
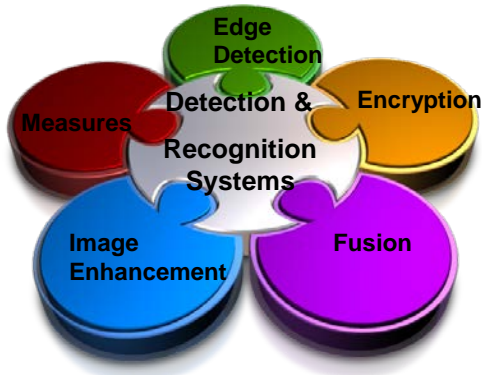
Hello Prospective Tufts University Students! I am Dr. Karen Panetta, the Associate Dean for Graduate Research and a researcher in the Department of Computer & Electrical Engineering.
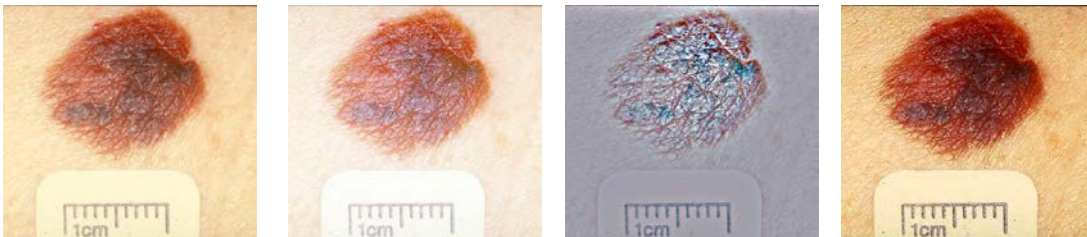
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Some of my Research Areas:

My team develops algorithms for robot vision applications and imaging applications such as detection of tumors, detection of threat objects, and recognition systems such as facial recognition. My laboratory uses the concept of "Human Visual System Modeling" as the foundation for many of our applications. For instance, if an image is enhanced, how do you know what enhancement method resulted in the best visual image? Usually, we use human subjective evaluation. This is not feasible in real time or robot vision applications that need to work autonomously. Our algorithms allow computers to "see" and evaluate images as a human does. Below are a few examples. We have color enhancement algorithms that allow us to recover color from images, such as those taken under water too.

Original Skin Cancer   Wang   MSRCR   Panetta Lab results
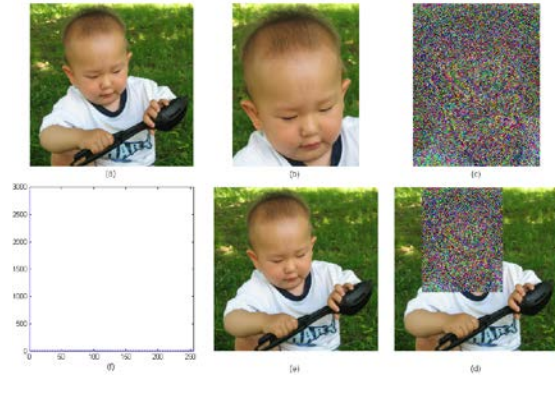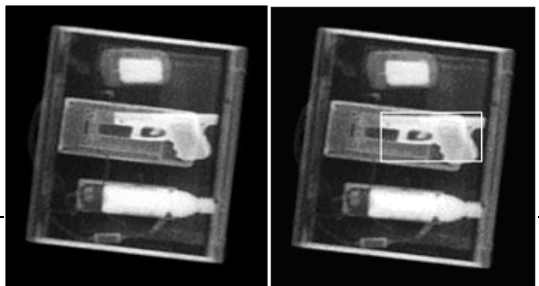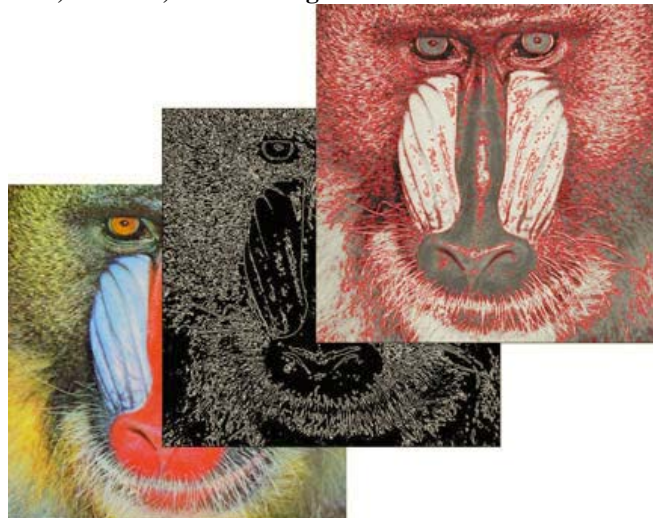Image results from other algorithms

Images from the Air Asia Disaster: the middle image is taken from the wreckage; the rightmost image uses our algorithms to see the real colors of the object under water.

Original Image that is too dark and the right image shows the results after our algorithms enhance the image.

Our lab also does Encryption algorithms for information security, Edge Detection for real time applications, Recognition systems for facial recognition and detection of threat objects, Image Restoration, Qualitative measures for evaluating image enhancement, Performance metrics for automatic algorithm parameter selection, Non-reference measures for image reconstruction.

Below are some examples of our results

Selective Image Encryption using Recursive Sequences.	Multimedia Scrambling and image reconstruction using recursive sequences.
Feature Extraction of Threat Objects.	Fast, efficient, low cost Edge Detection Methods.

Robotic Unmanned Aerial Vehicles (UAV):
My lab has some of the most advanced UAVs where were investigate methods of incorporating many types of sensors and data fusion for exploration and disaster recovery missions.

Modeling and Simulation: Fault Simulation and VLSI Test**,** Multi-Domain Simulation for catastrophic system analysis and detection and avoidance techniques for counterfeiting of integrated circuits
Multimedia: Animation and modeling

Teaching : I teach many courses and am an expert in microprocessor design and computer architecture since this is what I did in industry before becoming a Professor. Some of the courses I have taught: Digital Logic, VLSI Design, Microprocessor design, Robotics, Analog Electronics, Simulation and Test, Computer Architecture, Operating systems.

I hope that you will consider joining me at Tufts University, where you will have the opportunity to work on real world projects and collaborate with our industry partners on exciting projects that change the world!