



**THE SIGNALS AND SYSTEMS AREA SEMINAR  
(EE 500 GRADUATE COLLOQUIUM)  
Fall 2009**

*You are cordially invited to  
The Signals and Systems Area Seminar  
Entitled*

**“Robust Signal Hashing: Theory and Applications”**

*By*

**Prof. Vishal Monga**

**Department of Electrical Engineering  
Penn State University Park Campus**

*The talk will take place on*

**September 3, 2009  
4:00 pm**

*At*

**225 EE West Building**

**Talk Abstract:**

The talk will summarize research themes in the newly established Information Processing and Algorithms Laboratory (iPAL) directed by Prof. Vishal Monga. The central topic covered in the talk will be robust signal hashing but I will also discuss work in non-separable or vectorized signal processing for color halftoning and communication theoretic approaches to hardcopy data hiding and extraction.

Robust signal hashing, particularly image hashing has recently emerged as an active research area. The goal of robust image hashing is to map an image to a short binary string based on its content. The term "hash" in image hashing derives from classical database and cryptographic hashes which also map very large digital messages to much smaller binary strings. The distinguishing factor is the "robust" qualifier, which requires that the hash be robust to small manipulations on the image, e.g. compression and enhancement, and change significantly only under content changes. This is unlike classical hashes which respond to even one bit changes. This talk will define the mathematical properties desired for perceptual hashes, and survey algorithmic approaches that try to achieve those properties. Both deterministic and randomized hash algorithms will be discussed, following which, I will present selected theoretical results and outline open theoretic problems in the area. Finally, I will conclude with a discussion of the growing list of areas where robust image hashing is finding applications, ranging from the familiar problem of image search to new frontiers in multimedia security and management.

**Speaker's Bio:**

Dr. Vishal Monga recently moved to Penn State after a 4 year stint with Xerox Research Labs. He has also been a visiting researcher at Microsoft Research and a visiting faculty at the University of Rochester. Prior to that he received his PhDEE from the department of Electrical and Computer Engineering at the University of Texas, Austin.

Prof. Monga's interests are in statistical signal and image processing. Research topics of interest include detection theory, lattice theory, optimization and their applications to multimedia security and mining, color image processing and statistical learning for multimedia, document processing and genomics. His research group at Penn State is the newly established Information Processing and Algorithms Laboratory (iPAL) - <http://signal.ee.psu.edu>

Dr. Monga currently serves on the editorial board of IEEE Transactions on Image Processing and SPIE Journal of Electronic Imaging.