

# Signal Processing Seminar

**Title:** Network Forensics: A Timing Approach

**Speaker:** Professor Negar Kiyavash  
Dept. of Industrial and Enterprise Systems Eng.  
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**Date:** Wednesday, October 28, 2009

**Time:** 4:00 - 5:00 pm

**Where:** 4269 Beckman Institute

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**Abstract:** Packet networks are designed with the goal of communicating through packet contents and their headers; the information in the inter packet timings can be utilized for communication or inference over networks. While historically, timing channels are synonymous with covert channels, utilizing timings for forensic inference is quite recent. In some forensics applications such a flow linking, characteristics of packet timings of an incoming flow are either observed or actively perturbed as they traverse some router to infer or create distinct signatures, which can later be recognized in outgoing flows. Flow watermarking is an example of active perturbation which significantly reduces the computation and communication costs of traffic analysis.

In this talk we present practical steganography codes for covert communication via packet timings across interactive traffic relayed over network queuing systems as well as a timing-based watermarking scheme for traffic analysis which withstands the newly introduced multi-flow attack that defeats the state-of-the-art interval-based network flow watermarking schemes.

**Speaker Bio:** Negar Kiyavash is an Assistant Professor of the Department of Industrial and Enterprise Systems Engineering (IESE) at the University of Illinois at Urbana-Champaign (UIUC). She received a B.S. degree in Electrical and Computer Engineering from the Sharif University of Technology, Tehran, in 1999, M.S. and Ph.D. degrees, also in Electrical and Computer Engineering, both from UIUC in 2003 and 2006, respectively. From 2006 through 2008, she was a Research Faculty at Department of Computer Science and a Research Scientist at Information Trust Institute both at the University of Illinois at Urbana-Champaign. Her research interests are in statistical signal processing and information theory with applications to computer, communication and multimedia security.