# Vignesh Sethuraman

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## Objective

*Seeking a full-time position in the area of wireless communication and networks.*

## Academic Background

**Ph.D. in Electrical Engineering** *expected graduation: August 2006*
University of Illinois at Urbana-Champaign GPA: 4.00/4.00
Advisor: Prof. Bruce Hajek
Passed Prelim (May 2005). Title: On communication over fading channels.

**M.S. in Electrical Engineering** *October 2003*
University of Illinois at Urbana-Champaign GPA: 3.96/4.00
Thesis: Capacity per Unit Energy of Fading Channels with a Peak Constraint

**B.Tech. in Electrical Engineering** *July 2001*
Indian Institute of Technology (IIT)-Madras, India GPA: 9.0/10
Thesis: Channel acquisition algorithms for TETRA-ETSI wireless systems.

## Work Experience

**Graduate Research Assistant:** *Fall '01 – current*
Graduate Advisor: Prof. Bruce Hajek, ECE Dept., UIUC.

- Calculated the capacity per unit energy of wireless channels with correlated fading, in the presence of a peak constraint, and identified an optimal input signaling scheme. Studied the impact of correlation in fading on channel capacity.
- Derived upper bounds on capacity of wireless channels with correlated fading in the presence of an average and a peak power constraint.
- Collaborated with K. Narayanan, ECE Dept., TAMU, and derived lower bounds to complement the upper bounds.
- Investigated performance bounds on Bit-Interleaved Coded Modulation systems for fading channels in the high SNR regime through analysis and simulations.
- Implemented various coding and modulation schemes for a fading channel environment and studied the performance at moderate to high SNR.

**Interim Engineering Intern, QUALCOMM** *May '05 – Aug '05*

- Designed equalization algorithms enabling time tracking and channel estimation at the mobile unit in a 3G WCDMA system.

**Interim Engineering Intern, QUALCOMM** *May '03 – Aug '03*

- Worked on symbol metric scaling at the receiver for enabling High Speed Downlink Packet Access (HSDPA) in a 3G WCDMA system.

**Research Assistant:** *Summer '00*
Research Advisor: Prof. Vinod Sharma, ECE Dept., Indian Institute of Science.

- Worked on capacity issues of wireless channels in a cellular network setup.

## Journal Publications

- V. Sethuraman and B. Hajek, "Capacity per Unit Energy of Fading Channels with a Peak Constraint," *IEEE Transactions on Information Theory*, Sept. 05.
- V. Sethuraman and B. Hajek, "Comments on 'Bit Interleaved Coded Modulation'," in review with *IEEE Transactions on Information Theory*.

## Conference Publications

- V. Sethuraman, B. Hajek and K. Narayanan, "Capacity Bounds for noncoherent fading channels with a peak constraint," *Proc. of the IEEE International Symposium of Information Theory*, 2005, Adelaide.
- V. Sethuraman and B. Hajek, "Capacity per unit energy of fading channels with a peak constraint," *Proc. of the IEEE International Symposium of Information Theory*, June 2003, Yokohama.

## Related Projects

- Simulated a wireless channel with correlated fading to study the optimality of a discrete input symbol set at different SNR levels using Monte Carlo routines.
- Designed channel acquisition and synchronization algorithms for the wireless standard Terrestrial Trunked Radio (TETRA) (recognized by European Telecommunications Standards Institute).
- Investigated performance of algorithms by simulating the system in a fading environment (Clarke's fading).
- Simulated Distance Vector Routing and Link State Routing using posix threads (in C) to study the relative merits of the popular routing protocols used in the Internet.
- Implemented a data transfer protocol optimized for reliability with the feature of establishing multiple connections to achieve rate gains.
- Determined an upper bound on the energy efficiency of digital gates with Deep sub-Micron Noise channels (CMOS Technology), by modeling the on-chip / bus signal behavior in a communication system setting and applying existing results from communication theory.

## Related coursework

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|---|---|
| Wireless communication I & II | Information theory |
| Communication network analysis | Coding theory, Advanced coding theory |

## Computer Skills

*Languages:* C (socket programming), Perl

*Packages:* Mathematica, Matlab, Cadence and Synopsys CAD tools

*Platforms:* Windows, Linux, Solaris, OpenBSD

## Achievements

- Recipient of **Motorola Center for Communication** Graduate Fellowship 2005-2006 towards research in wireless communication.
- Recipient of **Vodafone - U.S. Foundation** Graduate Fellowship 2003-2005 towards research and education in wireless communication.
- **All India Rank of 108** in the 1997 entrance examinations (IIT-JEE) for Indian Institutes of Technology.
- Successfully completed the **LaSalle Chicago Marathon 2005**.