Sanket S Kalamkar

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PROFILE

- Expertise in modeling and analyzing wireless networks such as cellular and vehicular networks
- 7-year experience in designing and simulating wireless and signal processing algorithms
- 8-year experience in PHY and MAC layer simulation using MATLAB and C
- Hands-on experience in designing a radio-frequency interference (RFI) cancellation technique
- Author of 22 technical papers published in reputed journals and conferences

TECHNICAL SKILLS

- Wireless PHY design and algorithms: MIMO, OFDMA, IEEE 802.11 standards, 3GPP standards (3G, 4G, 5G NR), vehicular standards
- Wireless communications, Digital signal processing, Digital communications, Information theory, Detection and estimation theory, Stochastic processes
- Mathematical tools: Stochastic geometry, Probability, Optimization, Game theory
- Programming skills: MATLAB, C, and R, Link- and system-level simulations

EDUCATION

- **Indian Institute of Technology Kanpur (IIT Kanpur)**   Kanpur, India
  Doctor of Philosophy (PhD) in Electrical Engineering   *July 2009 – January 2017*
  Thesis title: On Cooperation, Energy Harvesting, and Security in Cognitive Radio Networks
  Advisor: Prof. Adrish Banerjee

- **College of Engineering Pune**   Pune, India
  Bachelor of Technology (BTech) in Electronics and Telecommunications   *July 2005 – May 2009*

EXPERIENCE

- **The University of Texas at Austin**   Austin, TX, USA
  Simons Postdoctoral Fellow (Host: Prof. Francois Baccelli)   *October 2018 - December 2018*
  - *Responsibility*: Modeling and analysis of vehicular networks using queuing theory and stochastic geometry.

- **University of Notre Dame**   Notre Dame, IN, USA
  Postdoctoral Research Associate (Host: Prof. Martin Haenggi)   *August 2016 - September 2018*
  - Modeled and analyzed large-scale wireless and cellular networks using mathematical tools from probability and stochastic geometry
  - Addressed a fundamental question in wireless networks: what is the maximum density of concurrently active links that satisfy a certain outage constraint? It has applications in cellular, D2D, mm-wave, and vehicular networks.
  - Modeled and analyzed vehicular networks while taking into account the street geometry and uncertainty in locations of vehicles and infrastructure nodes

- **Indian Institute of Technology Kanpur**   Kanpur, India
  Tutor and Teaching Assistant   *July 2009 - May 2013*
  - **Tutor**: Took one lecture per week to teach different numerical examples that helped undergraduate students understand the theory taught in the class. Graded final exams
    - Introduction to Electronics; number of students: 40
    - Principles of Communication; number of students: 20

- ○ **Teaching Assistant (Courses)**: Prepared assignments and graded quizzes
  - Information and Coding Theory (Graduate course); number of students: 16
  - Applied Game Theory (Graduate course); number of students: 53
  - Photonics Networks and Switching (Graduate course); number of students: 21
- ○ **Teaching Assistant (Laboratory)**: Designed experiments and conducted laboratories
  - Developed Brihaspati laboratory, a web-based E-learning system at IIT Kanpur
  - Taught basic Electronics experiments to sophomores
  - Designed new experiments for the instrumentation laboratory

PUBLICATIONS

Journal papers:

1. **S. S. Kalamkar** and M. Haenggi, "Per-link reliability and rate control: Two facets of the SIR meta distribution," IEEE Wireless Communications Letters, to appear.
2. **S. S. Kalamkar** and M. Haenggi, "Simple approximations of the SIR meta distribution in general cellular networks," IEEE Transactions on Communications, to appear.
3. K. Pathak, **S. S. Kalamkar**, and A. Banerjee, "Optimal user scheduling in energy harvesting wireless networks," IEEE Transactions on Communications, to appear.
4. **S. S. Kalamkar** and M. Haenggi, "The spatial outage capacity of wireless networks," *IEEE Transactions on Wireless Communications*, vol. 17, no. 6, pp. 3709-3722, June 2018.
5. **S. S. Kalamkar** and A. Banerjee, "Interference-aided energy harvesting: Cognitive relaying with multiple primary transceivers," *IEEE Transactions on Cognitive Communications and Networking*, vol. 3, no. 3, pp. 313-327, September 2017.
6. **S. S. Kalamkar** and A. Banerjee, "Secure communication via a wireless energy harvesting untrusted relay," *IEEE Transactions on Vehicular Technology*, vol. 66, no. 3, pp. 2199-2213, March 2017.
7. **S. S. Kalamkar**, J. P. Jeyaraj, A. Banerjee, and K. Rajawat, "Resource allocation and fairness in wireless powered cooperative cognitive radio networks," *IEEE Transactions on Communications*, vol. 64, no. 8, pp. 3246-3261, August 2016.
8. **S. S. Kalamkar**, A. K. Gupta, and A. Banerjee, "Impact of antenna correlation on optimum improved energy detector in cognitive radio," *IEICE Transactions on Communications*, vol. E98-B, no. 8, pp. 1690-1699, August 2015.
9. H. Pradhan, **S. S. Kalamkar**, and A. Banerjee, "Sensing-throughput tradeoff in cognitive radio with random arrivals and departures of multiple primary users," *IEEE Communications Letters*, vol. 19, no. 3, pp. 415-418, March 2015.
10. J. P. Jeyaraj, **S. S. Kalamkar**, and A. Banerjee, "Energy harvesting cognitive radio with channel-aware sensing strategy," *IEEE Communications Letters*, vol. 18, no. 7, pp. 1171-1174, July 2014.
11. **S. S. Kalamkar** and A. Banerjee, "Improved double threshold energy detection for cooperative spectrum sensing in cognitive Radio," *Defence Science Journal (Special Issue on Communication Systems and Image Processing Technologies)*, vol. 63, no.1, pp. 34-40, January 2013.

Conference papers:

1. **S. S. Kalamkar** and M. Haenggi, "A simple approximation of the meta distribution for non-Poisson cellular networks," in 2018 *IEEE International Conference on Communications* (ICC'18), (Kansas City, MO), May 2018.
2. **S. S. Kalamkar** and M. Haenggi, "Distributed rate control for high reliability in Poisson bipolar networks," in 2017 *IEEE Global Communications Conference* (GLOBECOM'17), (Singapore), December 2017.

3. V. Gupta, **S. S. Kalamkar**, and A. Banerjee, "On secure communication using RF energy harvesting two-way untrusted relay," in 2017 *IEEE Global Communications Conference* (GLOBECOM'17), (Singapore), December 2017.

4. **S. S. Kalamkar** and M. Haenggi, "Spatial outage capacity of Poisson bipolar networks," in 2017 *IEEE International Conference on Communications* (ICC'17), (Paris, France), May 2017.

5. **S. S. Kalamkar** and A. Banerjee, "Interference-assisted wireless energy harvesting in cognitive relay network with multiple primary transceivers," in 2015 *IEEE Global Communications Conference* (GLOBECOM'15), (San Diego, CA), December 2015.

6. **S. S. Kalamkar**, S. Majhi, and A. Banerjee, "Outage analysis of spectrum sharing energy harvesting cognitive relays in Nakagami-m channels," in 2015 *IEEE Global Communications Conference* (GLOBECOM'15), (San Diego, CA), December 2015.

7. J. P. Jeyaraj, **S. S. Kalamkar**, and A. Banerjee, "On information and energy cooperation in energy harvesting cognitive radio," in 2015 *IEEE International Symposium on Personal, Indoor and Mobile Radio Communications* (PIMRC'15), (Hong Kong), August 2015.

8. S. Majhi, **S. S. Kalamkar**, and A. Banerjee, "Secondary outage analysis of amplify-and-forward cognitive relays with direct link and primary interference," in 2015 *National Conference on Communications* (NCC'15), (Mumbai, India), February 2015.

9. **S. S. Kalamkar** and A. Banerjee, "On the effect of primary user traffic on secondary throughput and outage probability under Rayleigh flat fading channel," in 2014 *International Conference on Signal Processing and Communications* (SPCOM'14), (Bangalore, India), July 2014.

10. **S. S. Kalamkar**, P. K. Singh, and A. Banerjee, "Block outlier methods for malicious user detection in cooperative spectrum sensing," in 2014 *IEEE Vehicular Technology Conference* (VTC-Spring'14), (Seoul, South Korea), May 2014.

11. **S. S. Kalamkar**, A. Banerjee, and A. K. Gupta, "SNR wall for generalized energy detection under noise uncertainty in cognitive radio," in 2013 *Asia-Pacific Conference on Communications* (APCC'13), (Bali, Indonesia), August 2013.

12. **S. S. Kalamkar** and A. Banerjee, "On the performance of generalized energy detector under noise uncertainty in cognitive radio," in 2013 *National Conference on Communications* (NCC'13), (New Delhi, India), February 2013.

13. **S. S. Kalamkar**, A. Banerjee, and A. Roychowdhury, "Malicious user suppression for cooperative spectrum sensing in cognitive radio networks using Dixon's outlier detection method," in 2012 *National Conference on Communications* (NCC'12), (Kharagpur, India), February 2012.

Conference papers (under review):

1. K. Pathak, **S. S. Kalamkar**, and A. Banerjee, "Energy-efficient user scheduling in energy harvesting wireless networks."

KEY PROJECTS

Indian Institute of Technology Kanpur   Kanpur, India
Implementation of Physical Downlink Layer in LTE   *January 2010 - May 2010*

   ○ Investigated the downlink transmitter and receiver structures

   ○ Implemented the transmitter in MATLAB

   ○ Generated transmit frames defined in the standard 3GPP TS 36.211 Release 8

Giant Metrewave Radio Telescope (GMRT)   Pune, India
Detection and Mitigation of Radio Frequency Interference   *July 2008 - May 2009*

   ○ Designed a low-cost operational amplifier based noise detector and clipper to counteract radio frequency interference due to high voltage power lines passing near GMRT

- ○ Implemented the design by constructing the hardware such as AM detector, filters, and noise clipper—all working at 70 MHz

- **College of Engineering Pune** — Pune, India
  Wireless Data Communication using CC1100 — *July 2007 - May 2008*
  - ○ Programmed IC CC1100 using C and transferred data over the wireless medium
  - ○ Two ICs were used—one for transmission and another for reception. The communication was one-way for the simplicity.

Awards

- Tata Consultancy Services (TCS) Research Fellowship — 2013 - 2016
- Government of India PhD Scholarship — 2009 - 2012
- Dhirubhai Ambani Undergraduate Scholarship — 2005 - 2009
- National Talent Search Examination (NTSE) Scholarship — 2003 - 2009
- All India Rank 151 out of 41,945 students in Graduate Aptitude Test in Engineering — 2009
- Ranked 13th among 200,000 candidates in Higher Secondary Examination — 2005
- Top 1% in National Chemistry Olympiad — 2005
- IEEE ComSoc Student Travel Grant for IEEE GLOBECOM — 2015
- International Travel Grant from the Government of India for IEEE GLOBECOM — 2015

Languages

- English • Hindi • Marathi • German (elementary) • Tamil (elementary)

Student Mentoring

- Student: Jeya Pradha Jeyaraj - Mentored Jeya on her Master's thesis at IIT Kanpur, which resulted in a journal paper and a conference paper.

- Student: Hrusikesha Pradhan - Mentored Hrusikesha on his Master's thesis at IIT Kanpur, which resulted in a journal paper.

- Student: Praveen Kumar Singh - Mentored Praveen on his Master's thesis at IIT Kanpur, which resulted in a conference paper.

- Student: Vipul Gupta - Mentored Vipul on his Master's thesis at IIT Kanpur, which resulted in a conference paper.

- Student: Sudhakar Reddy Sirigireddy - Mentored Sudhakar on his Master's thesis at IIT Kanpur. The work is to be submitted to a journal.

- Student: Ananya Roychowdhury - Mentored Ananya's internship at IIT Kanpur, which resulted in a conference paper

Relevant Courses

Representation and Analysis of Random Signals	Information and Coding Theory
Wireless Communications	Photonics Networks and Switching
Mathematical Structures of Signals and Systems	Smart Antennas for Mobile Communications
Topics in Cryptography and Coding Theory	Computer Networks
Digital Communications	Simulations of Communication Systems

Professional Activities

Technical Program Committee (TPC) Member:

- IEEE Global Communications Conference (GLOBECOM), 2017
- IEEE Vehicular Technology Conference (VTC-Spring), 2018
- International Conference on Wireless Personal Multimedia Communications (WPMC), 2017
- IEEE 5G World Forum (WF-5G), 2018

Reviewer (Journals):

• IEEE Journal on Selected Areas in Communications • IEEE Transactions on Wireless Communications • IEEE Transactions on Communications • IEEE Transactions on Signal Processing • IEEE Transactions on Cognitive Communications and Networking • IEEE Transactions on Vehicular Technology • IEEE Transactions on Information Forensics and Security • IEEE Wireless Communications Letters • IEEE Communications Letters • IEEE Signal Processing Letters • IET Communications • Physical Communication • Transactions on Emerging Telecommunications Technologies • Wireless Communications and Mobile Computing

Reviewer (Conferences):

• IEEE GLOBECOM • IEEE ICC • IEEE ISIT • IEEE WCNC • IEEE MILCOM • IEEE PIMRC • SPCOM • National Conference on Communications

References

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