Shamik Sengupta

Assistant Professor

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Educational Background

- **Ph.D. (Fall 2003 - Fall 2007) (CGPA 3.95/4.0)**
  School of Electrical Engineering and Computer Science, University of Central Florida
  Dissertation title: *An Economic Framework for Resource Management and Pricing in Wireless Networks with Competitive Service Providers* (Advisor: Prof. Mainak Chatterjee)

- **B.E. (First class/Hons.) (June 2002)**
  Department of Computer Science & Engineering, Jadavpur University, Calcutta, India

Professional Experience

- **Assistant Professor, (September 2009 - Present)**
  Department of Mathematics and Computer Science, John Jay College of Criminal Justice of the City University of New York
  Computer Science PhD Program, The Graduate Center, City University of New York
  New York, NY

- **Postdoctoral Researcher**, (Jan. 2008 - Aug. 2009)
  Department of Electrical and Computer Engineering, Stevens Institute of Technology
  Hoboken, NJ

- **Summer Research Intern**, Broadband Systems Solutions, OSS R&D (Summer 2007)
  C-COR, Beaverton, Oregon

- **Summer Research Intern**, Broadband and Mobile Networking Group (Summer 2005)
  NEC Research Labs, America Inc., Princeton, New Jersey

- **Graduate Research & Teaching Assistant**, (Fall 2003 - Fall 2007)
  School of Electrical Engineering & Computer Science, University of Central Florida, USA

Research Grants (Funded)

- **National Science Foundation (NSF) CAREER Research Award**, "Survivability and Self-coexistence in the Battle of Cognitive Radio Network Societies", Amount: $400,000; 2012 - 2017.

- **PSC-CUNY Research Award**, "Investigating The Threats and Vulnerabilities in Cognitive Radio Enabled Dynamic Spectrum Access Networks", Amount: $11,980.40; 2011 - 2012.

- **National Institute of Justice (NIJ) Research Subaward**, "Cognitive Radio Protocols & Platforms for Dynamic Spectrum Access in Public Safety Bands", (Prime Recipient: Stevens Institute of Technology), Award Amount for John Jay College: $10,000; 2010 - 2011.

- **PSC-CUNY Research Award**, "Potential Vulnerabilities and Countermeasures in Dynamic Spectrum Access based Wireless Cognitive Radio Networks", Amount: $4,907.93; 2010 - 2011.

- **NY State Graduate Research Technology Initiative Grant**, "Security and Inter-operability in Cognitive Wireless Networks", Amount: $14,940; 2009 - 2010.

Research Grants (Pending)

- **Air Force Office of Scientific Research (AFOSR) Young Investigator Program (YIP)**, "Investigating Vulnerabilities and Sustenance of Cognitive Radio Networks amidst Malicious spectrum-agile Adversaries", Amount: $359,899; duration: 3 yrs. (submitted)

- **National Science Foundation (NSF) NeTS Research Award**, "NeTS: Medium: Collaborative Research: Evolutionary Dynamics of Cognitive Radio Networks under Heterogeneous and Hostile Environments", Amount: $1.04 M; duration: 4 yrs. (submitted)

Research Interests

- **Wireless Networking & Mobile Computing** – Cognitive radio, Dynamic spectrum access (DSA), Interoperable Tactical networks, Testbed implementation, Network design and performance analysis, DSA security, Cross-layer protocol optimization, Wireless mesh, sensor networks;

- **Cybersecurity** – Network security, Covert communications, Malicious node sensing/detection, Wireless Honeypot, Spectrum fingerprinting, Sybil attacks, keyless security;

- **Network economics** – Heterogeneous wireless networking systems, Differentiated service pricing, auction theory, resource management and QoS provisioning;

- **Telecommunications and networking** – VoIP over WiMax, Video and audio quality assessment, fault diagnosis in access networks, set top box (STB), streaming media surveillance;

- **Cross-disciplinary Research** – Applied game theory, Economic theory, Probability, Stochastic process, Anthropology & human-society inspired evolutionary models, Behavioral dynamics;

Courses Taught

- *Graduate Courses*

  - Wireless Networking and Mobile Computing

  - Network Security

  - Forensic Management of Digital Evidence

  - Architecture of Secure Operating Systems

  - Multimedia Network Security (at Stevens Institute of Technology)

- *Undergraduate Courses*

  - Computer Networking

  - Data Communications and the Internet

  - Introduction to Multimedia Networking (at Stevens Institute of Technology)

Honors and Awards

- **NSF CAREER** Research Award Grant (2012 - 2017)

- **"Salute to Scholars"** Honor, CUNY Chancellor's annual fall reception, 2011, 2012

- **Vice-Chair of Mobile Wireless Network (MobIG) special interest group** of the IEEE COMSOC Multimedia Communications Technical Committee

- Invited to **National Science Foundation (NSF) proposal review panel**

- **Best Research Paper Award**, "A game theoretic framework for distributed self-coexistence among IEEE 802.22 networks", IEEE GLOBECOM 2008

- **National Science Foundation (NSF) Student Travel Award** (2007) in the IEEE Dynamic Spectrum Access Networks (DySPAN) conference

- Nominated for Order of Pegasus award (2007) from School of Electrical Engineering & Computer Science, University of Central Florida

- **Graduate International Travel Award** (2004-2005, 2006-2007) from University of Central Florida

- **Summer Research Fellowship** (2006) from University of Central Florida

- **First-Class Honors** in B.E. from Jadavpur University, India

- **National Scholarship** Under National Talent search in India

Patent Invention Disclosure

- **"A Method and Apparatus for Dynamic Spectrum Access"**, United States Patent and Trademark Office, **Patent pending**. (With K. Hong and R. Chandramouli)

Testbed Development and Demonstration

- **"DSA enabled Cognitive Radio Networking for First Responders' Critical Networks"**, *The Christian Regenhard Center for Emergency Response Studies*, 2012, New York.

- **"A Software Driven Dynamic Spectrum Access Radio Prototype"**, *IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN)*, 2008, Chicago.

- **"Cognitive Radio Protocols and Platform for Dynamic Spectrum Access in Public Safety Bands"**, *National Institute of Justice (NIJ)*, 2008, Colorado. (Joint work with Stevens Institute of Technology)

Invited Talks

- **"Tutorial on Wireless Cognitive Radio Networks"**, *2013 CMOS Emerging Technologies Conference*, Canada.

- **"DSA enabled Cognitive Radio Networking for First Responders' Critical Networks"**, *The Christian Regenhard Center for Emergency Response Studies*, 2012, New York.

- **Tutorial on security in Cognitive Radio Networks: Inter-disciplinary Approach**, *Department of Electrical and Computer Engineering*, Rutgers University, The State University of New Jersey, 2009.

- **Timing covert communications: a method for keyless security**, *IEEE Communications Society*, North Jersey Chapter & *Department of Electrical and Computer Engineering*, New Jersey Institute of Technology, 2008.

- **A game theoretic approach for modeling defense strategies in timing covert channels**, *Department of Electrical and Computer Engineering*, Stevens Institute of Technology, 2008.

University Committee Services

- Major Program Coordinator for Undergraduate Computer & Information Systems (CIS) Major, Math. & Comp. Sc. Department, (Spring 2010 - Present)

- Department Curriculum Committee member, Math. & Comp. Sc. Department, (2011 - Present)

Synergistic Professional Activities

Vice-Chair of Mobile Wireless Network (MobIG)

- Served as Vice-Chair of Mobile Wireless Network (MobIG) special interest group of the IEEE COMSOC Multimedia Communications Technical Committee

Symposium Co-Chair

- Served as Symposium Co-Chair for the Cooperative and Cognitive Networks Symposium in the 6th International Wireless Communications & Mobile Computing Conference (IWCMC 2010), Caen, France.

Workshop Co-Chair

- First IEEE International Workshop on Cognitive Radio and Networks (CRNETS), 2008 in conjunction with IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), Sep. 2008, Cannes, France (With Prof. Ekram Hossain, University of Manitoba and Dr. Soodesh Buljore, Motorola, France)

NSF Panel

- Serve in NSF proposal review panel

Journal Editor

- Serving as Guest Editor for Eurasip Journal on Wireless Communications and Networking, Special Issue on Advances in 4G Wireless and Beyond

Selected Technical Program Committee

- IEEE International Conference on Communications (ICC), 2009, 2010, 2011, 2012
- IEEE Global Communications Conference (GLOBECOM), 2008, 2009, 2010, 2011, 2012
- IEEE Military Communications Conference (MILCOM), 2008, 2010, 2011, 2012
- IEEE WoWMoM, 2011, 2012, 2013
- International Wireless Communications and Mobile Computing Conference (IWCMC), 2012
- IEEE 71st Vehicular Technology Conference: VTC2010-Spring, 2010
- IEEE Intl. Symp. on Personal, Indoor and Mobile Radio Communications (PIMRC), 2008, 2011
- International Conference on Computer Communications and Networks (ICCCN), 2008

Publicity Chair

- IEEE Workshop on Mobile Video Delivery (MoViD) 2008, 2009, 2010

Selected Journal/Conference Reviewer

- IEEE Transactions on Mobile Computing, IEEE Transactions on Wireless Communications, IEEE Transactions on Multimedia, IEEE Transactions on Communications, IEEE Transactions on Vehicular Technology
- IEEE Journal on Selected Areas
- IEEE INFOCOM; IEEE WoWMoM, IEEE DySPAN, IEEE GLOBECOM, IEEE ICC, IEEE MASS, IEEE PIMRC, IEEE WCNC

K-12 Outreach

- Collaborated with NY City Science and Engineering Fair program (NYCSEF) - a summer internship opportunity for high school students to work in the research lab with undergraduate and graduate students

Research Publications (Peer-Reviewed)

Journal Papers Accepted/Published

1. K. Hong, **S. Sengupta** and R. Chandramouli, "SpiderRadio: A Cognitive Radio Implementation using IEEE 802.11 Components", *IEEE Transactions on Mobile Computing.* (To appear)

2. **S. Sengupta** and K.P. Subbalakshmi, "Open Research Issues in Multi-hop Cognitive Radio Networks", *IEEE Communications Magazine.* (To appear)

3. **Shamik Sengupta**, Swastik Brahma, Mainak Chatterjee and Sai Shankar N, "Self-coexistence Among Interference-aware IEEE 802.22 Networks with Enhanced Air-interface", *Elsevier Pervasive and Mobile Computing.* (To appear).

4. S. Anand, **S. Sengupta**, K. Hong and R. Chandramouli, "Power Control Game in Multi-Terminal Covert Timing Channels", *IEEE Journal on Selected Areas in Communications - Game Theory in Wireless Communications*, vol. 30, issue 1, pp. 44-53, 2012.

5. Yi Tan, **Shamik Sengupta** and K. P. Subbalakshmi, "The Primary User Emulation Attack in Dynamic Spectrum Access Networks: A Game Theoretic Approach", *IET Communications*, vol. 6, issue 8, pp. 964-973, May 2012.

6. Santhanakrishnan Anand, **Shamik Sengupta**, and Rajarathnam Chandramouli, "MASPECT: A Distributed Opportunistic Channel Acquisition Mechanism in Dynamic Spectrum Access Networks" *IET Communications Special Issue on Cognitive Communications*, vol. 6, issue 8, pp. 872-882, May 2012.

7. Mukundan Venkataraman, **Shamik Sengupta**, Mainak Chatterjee, and Raja Neogi, "Designing a Collector Overlay Architecture for Fault Diagnosis in Video Networks", *Elsevier Computer Communications*, vol. 35, issue 4, pp. 418-430, Feb 2012.

8. Yi Tan, **Shamik Sengupta**, and K.P. Subbalakshmi, "Analysis of Coordinated Denial-of-Service Attacks in IEEE 802.22 Networks", *IEEE JSAC Special Issue on Cognitive radio Networking and Communications*, vol. 29, issue 4, pp. 890-902, 2011.

9. **Shamik Sengupta**, Kai Hong, R. Chandramouli and K. P. Subbalakshmi, "SpiderRadio: A Cognitive Radio Network with Commodity Hardware and Open Source Software", *IEEE Communications Magazine*, vol. 49, issue 3, pp. 101-109, 2011.

10. **Shamik Sengupta**, Mainak Chatterjee and Kevin Kwiat, "A Game Theoretic Framework for Power Control in Wireless Sensor Networks", *IEEE Transactions on Computers*, Feb. 2010, Vol. 59, No. 2, pp. 231-242.

11. **Shamik Sengupta** and Mainak Chatterjee, "An economic framework for dynamic spectrum access and service pricing", *ACM/IEEE Transactions on Networking*, Aug. 2009, Vol. 17, No. 4, pp. 1200-1213.

12. **Shamik Sengupta**, Santhanakrishnan Anand, Kai Hong and Rajarathnam Chandramouli, "On Adversarial Games in Dynamic Spectrum Access Networking based Covert Timing Channels", *ACM Mobile Computing and Communications Review (MC2R)*, Special Issue on Cognitive Radio Technologies and Systems, 2009.

13. **Shamik Sengupta**, Santhanakrishnan Anand, Mainak Chatterjee and Rajarathnam Chandramouli, "Dynamic Pricing for Service Provisioning and Network Selection in Heterogeneous Networks", *Elsevier Physical Communication (PHYCOM) Journal*, Special issue on Cognitive Radio: Algorithms & System Design, vol. 2, pp. 138-150, 2009.

14. Wenjing Wang, **Shamik Sengupta** and Mainak Chatterjee, "Scheduling for End-to-End Performance in Multirate CDMA/HDR Systems", *Elsevier Physical Communication (PHYCOM) Journal*, vol. 1, issue 4, pp. 277-287, Dec. 2008.

15. **Shamik Sengupta**, Mainak Chatterjee and Samrat Ganguly, "Improving quality of VoIP streams over WiMax", *IEEE Transactions on Computers*, vol. 57, pp. 145-156, Feb. 2008.

16. **Shamik Sengupta** and Mainak Chatterjee, "Designing Auction Mechanisms for Dynamic Spectrum Access", *ACM/Springer Mobile Networks and Applications (MONET)*, Special issue on Cognitive Radio Oriented Wireless Networks and Communications, 2008.

17. Mainak Chatterjee, **Shamik Sengupta**, and Samrat Ganguly, "Feedback based Real-time Streaming over WiMax", *IEEE Wireless Communications Magazine*, vol. 14, no. 1, pp. 64-71, Feb. 2007.

18. Jaideep Sarkar, **Shamik Sengupta**, Mainak Chatterjee and Samrat Ganguly, "Differential FEC and ARQ for Radio Link Protocols", *IEEE Transactions on Computers*, vol. 55, no. 11, pp. 1458-1472, Nov. 2006.

Conference Papers Accepted/Published

1. K. Ezirim, **S. Sengupta** and E. Troja, "(Multiple) Channel Acquisition and Contention Handling Mechanisms for Dynamic Spectrum Access in a Distributed System of Cognitive Radio Networks", To appear in *2013 International Conference on Computing, Networking and Communications (ICNC) Workshop on Computing, Networking and Communications*.

2. E. Troja, K. Ezirim, **S. Sengupta** and M. Hannon, "Performance evaluation of RODEO: ROute DEgradation Optimization for the Multi-Hop Dynamic Spectrum Access Networks", To appear in *2013 International Conference on Computing, Networking and Communications (ICNC) Workshop on Computing, Networking and Communications*.

3. Yi Tan, Kai Hong, **Shamik Sengupta**, and K.P. Subbalakshmi, "Using Sybil Identities for Primary User Emulation and Byzantine Attacks in DSA Networks", *IEEE GLOBECOM*, 2011.

4. Yi Tan, **Shamik Sengupta**, and K.P. Subbalakshmi, "Human Society Inspired Dynamic Spectrum Access Networks: The Effect of Parochialism", *IEEE GLOBECOM*, 2011.

5. S. Anand, K. Hong, R. Chandramouli, **S. Sengupta** and K.P. Subbalakshmi, "Security Vulnerability due to Channel Aggregation/Bonding in LTE and HSPA+ Networks", *IEEE GLOBECOM*, 2011.

6. Yi Tan, Kai Hong, **Shamik Sengupta**, and K.P. Subbalakshmi, "Spectrum Stealing via Sybil Attacks in DSA Networks: Implementation and Defense", *IEEE ICC*, 2011.

7. Santhanakrishnan Anand, Kai Hong, **Shamik Sengupta** and Rajarathnam Chandramouli, "Is Channel Fragmentation/Bonding in IEEE 802.22 Networks Secure?" *IEEE ICC*, 2011.

8. Yi Tan, **Shamik Sengupta** and K. P. Subbalakshmi, "Competitive Spectrum Trading in Dynamic Spectrum Access Markets: A Price War", *IEEE Globecom*, pp. 1-5, Dec. 2010.

9. Santhanakrishnan Anand, **Shamik Sengupta**, and Rajarathnam Chandramouli, "An Attack-Defense Game Theoretic Analysis of Multi-Band Wireless Covert Timing Networks", *IEEE INFOCOM*, San Diego, CA, 2010.

10. Kai Hong, **Shamik Sengupta**, and Rajarathnam Chandramouli, "Cross-layer MAC enabling virtual link for multi-hop routing in wireless ad hoc networks", *IEEE International Conference on Communications (ICC)* 2010.

11. Kai Hong, **Shamik Sengupta**, and Rajarathnam Chandramouli, "SpiderRadio: An incumbent sensing implementation for cognitive radio networking using IEEE 802.11 devices", *IEEE International Conference on Communications (ICC)* 2010.

12. Yi Tan, **Shamik Sengupta**, and K.P. Subbalakshmi, "Coordinated Denial-of-Service Attacks in IEEE 802.22 Networks", *IEEE International Conference on Communications (ICC)* 2010.

13. **Shamik Sengupta**, Mainak Chatterjee and Kevin Kwiat, "Dynamic Spectrum Access in Cognitive Radio based Tactical Networks", *IEEE Wireless Communications and Networking Conference (WCNC)*, 2009.

14. Mukundan Venkataraman, **Shamik Sengupta**, Mainak Chatterjee and Raja Neogi, "A Collector Overlay Architecture for Fault Diagnosis in Access Networks", *IEEE Consumer Communications and Networking Conference (CCNC)*, 2009.

15. **Shamik Sengupta**, Rajarathnam Chandramouli, Swastik Brahma and Mainak Chatterjee, "A game theoretic framework for distributed self-coexistence among IEEE 802.22 networks", *IEEE Global Communications Conference (GLOBECOM)*, 2008.
(Best Paper Award)

16. **Shamik Sengupta**, Mainak Chatterjee and Rajarathnam Chandramouli, "A coordinated distributed scheme for cognitive radio based IEEE 802.22 wireless mesh networks", *IEEE CogNet*, 2008, pp. 461-465.

17. **Shamik Sengupta**, Mainak Chatterjee and Kevin Kwiat, "Interference aware spectrum allocation in IEEE 802.22 wireless mesh networks", *International Conferences on Wireless and Optical Communications (WOC)*, 2008.

18. **Shamik Sengupta**, Mainak Chatterjee and Samrat Ganguly, "An economic framework for spectrum allocation and service pricing with competitive wireless service providers", *IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN)*, 2007, pp. 89-98.

19. **Shamik Sengupta**, Mainak Chatterjee and Kevin Kwiat, "Pricing-based service and network selection in overlaid access networks", *International Conference on Information, Communications and Signal Processing (ICICS)*, 2007.

20. **Shamik Sengupta** and Mainak Chatterjee, "Sequential and Concurrent Auction Mechanisms for Dynamic Spectrum Access", *IEEE/CreateNet Cognitive Radio Oriented Wireless Networks and Communications (CrownCom)*, 2007, pp. 448-455.

21. **Shamik Sengupta**, Mohammad Z. Ahmad, and Mainak Chatterjee, "Initializing mesh architecture for cognitive radio based IEEE 802.22", *IEEE/CreateNet Cognitive Radio Oriented Wireless Networks and Communications (CrownCom)*, 2007, pp. 519-523.

22. **Shamik Sengupta**, Swastik Brahma, Mainak Chatterjee and Sai Shankar N, "Enhancements to cognitive radio based IEEE 802.22 air-interface", *IEEE International Conference on Communications (ICC)*, 2007, pp. 5155-5160.

23. Wenjing Wang, **Shamik Sengupta** and Mainak Chatterjee, "Performance modeling of multi-rate HDR and its effect on TCP throughput", *IEEE International Conference on Communications (ICC)*, 2007, pp. 5206-5211.

24. Mukundan Venkataraman, **Shamik Sengupta**, Mainak Chatterjee and Raja Neogi, "Towards a Video QoE Definition in Converged Networks", *International Conference on Digital Telecommunications (ICDT)*, 2007.

25. Mukundan Venkataraman, **Shamik Sengupta**, Mainak Chatterjee and Raja Neogi, "Resource Management considerations in Collector Overlay Networks", *International Conference on Networking and Services (ICNS)*, 2007.

26. **Shamik Sengupta** and Mainak Chatterjee, "Synchronous and Asynchronous Auction Models for Dynamic Spectrum Access", *International Conference on Distributed Computing and Networking (ICDCN)*, 2006, pp. 558-569.

27. **Shamik Sengupta**, Mainak Chatterjee and Kevin Kwiat, "Finding Threshold Conditions for Different Objectives in Sensor Networks Using Game Theory", *International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS)*, 2006, pp. 73-79.

28. **Shamik Sengupta**, Mainak Chatterjee, Samrat Ganguly, and Rauf Izmailov, "Improving R-Score of VoIP Streams over WiMax" *IEEE International Conference on Communications (ICC)*, 2006, vol. 2, pp. 866-871.

29. **Shamik Sengupta**, Mainak Chatterjee, Samrat Ganguly, and Rauf Izmailov, "Exploiting MAC Flexibility in WiMAX for Media Streaming", *IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM)*, 2005, pp. 338-343.

30. **Shamik Sengupta**, Mainak Chatterjee, Samrat Ganguly and Rauf Izmailov, "WRN: Improving System Performance in 3G Networks Through Fixed Multi-hop Relay Nodes", *IEEE Wireless Communications and Networking Conference (WCNC)*, 2005, vol. 3, pp. 1708-1713.

31. **Shamik Sengupta** and Mainak Chatterjee, "Distributed Power Control in Sensor Networks: A Game Theoretic Approach", *6th International Workshop on Distributed Computing (IWDC)*, Springer-Verlag LNCS series 3226, 2004, pp. 508-519.

Book Chapters (invited)

1. Ziqian Dong, **Shamik Sengupta**, S. Anand, Kai Hong, Rajarathnam Chandramouli, and K.P. Subbalakshmi "Cognitive Radio Mobile Ad Hoc Networks in Healthcare", Book title: Cognitive Radio Mobile Ad Hoc Networks, Eds: F. Richard Yu, Springer, 2010.

2. **Shamik Sengupta**, Santhanakrishnan Anand and Rajarathnam Chandramouli, "Self-coexistence and Security in Cognitive Radio Networks", Book title: Convergence of Wireless, Wireline, and Photonics Next Generation Networks, Eds: Krzysztof (Kris) Iniewski, John Wiley & Sons, 2010.

3. **Shamik Sengupta** and Mainak Chatterjee, "Differentiated Pricing Policies in Heterogeneous Wireless Networks", Book title: Heterogeneous Wireless Access Networks: Architectures and Protocols, Eds: E. Hossain, Springer, 2008, pp. 393-417.

4. **Shamik Sengupta**, Santhanakrishnan Anand and Rajarathnam Chandramouli, "Pricing for Security and QoS in Cognitive Radio Networks", Book title: Cognitive Radio Networks: Architectures, Protocols and Standards, Eds: Yan Zhang, Jun Zheng, Hsiao-Hwa Chen, Auerbach Publications, CRC Press.

5. Mainak Chatterjee and **Shamik Sengupta**, "VoIP over WiMax", Book title: Handbook of WiMAX, Eds: Syed Ahson and Mohammad Ilyas, CRC Press, 2007.

References

1. **Prof. Mainak Chatterjee**
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2. **Prof. Rajarathnam Chandramouli**
   Professor
   Department of Electrical and Computer Engineering
   Stevens Institute of Technology, Hoboken, NJ 07030
   Office Phone: (201) 216 8642
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   E-mail: mouli@stevens.edu
   Webpage: http://www.ece.stevens-tech.edu/~mouli/

3. **Dr. Kevin Kwiat**
   Information Directorate
   Air Force Research Laboratory
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4. **Prof. K.P. Subbalakshmi**
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