

Ranjan Pal

CONTACT INFORMATION

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RESEARCH INTERESTS

Communication Networks, Network Economics, Network Game Theory, Applied Game Theory, Network Finance, Reliability Theory, Network Optimization, Electric Power Networks

DOCTORAL RESEARCH ADVISORS

Professor Konstantinos Psounis, Electrical Engineering, University of Southern California, USA
Professor Leana Golubchik, Computer Science, University of Southern California, USA

EDUCATION

University of Southern California, Los Angeles, California, USA

Provost Ph.D. Fellow, Computer Science, (expected graduation date: June 2012)

- Research Domain: Computer Networks
- Thesis Topic: Presently working on few problems related to network economics and network game theory

University of California, Davis, California, USA

M.S., Computer Science, June, 2007

- Major: Computer Networks

Singapore-MIT Alliance (National University of Singapore and MIT, Cambridge, USA)

S.M., Computer Science, June, 2005

- Major: Computational Biology

Birla Institute of Technology, Ranchi, India

B.E., Computer Science, June, 2002

- Honors: First Class with Distinction
- Rank: Amongst the top 2% in the university

RELEVANT GRADUATE COURSES

Algorithms (MIT), Computer Networks (UC Davis), Wireless Networks (UC Davis), Random Processes (UC Davis), Engineering Optimization (UC Davis), Theory of Optimization(USC), Optimization: Theory and Algorithms (USC) Game Theory (USC), Probabilistic Modeling (USC), and Real Analysis (USC)

FELLOWSHIPS

Provost Doctoral Fellowship, University of Southern California, USA, 2008 (the highest doctoral honor at USC)

Doctoral Fellowship, Carnegie Mellon University, USA, 2008

Doctoral Fellowship, University of California Irvine, USA, 2008

SMA Fellowship, Massachusetts Institute of Technology and National University of Singapore, 2004

Doctoral Fellowship, Indian Institute of Management Calcutta, India, 2004

Doctoral Fellowship, Indian Institute of Management Ahmedabad, India, 2004

AWARDS AND
HONORS

Nominated as 'Marquis' Who's Who of America in Science and Engineering', 2009

Invited by Nokia-Siemens Networks, Portugal to give a talk on future trends in Internet security, December 2009

Invited by Instituto Superior Tecnico, Technical University of Lisbon, to give a talk on electric power grid security, December, 2009

Full scholarship for PhD studies, Department of Computer Science, Pennsylvania State University, USA, 2008

Full scholarship for PhD studies, Department of Electrical and Computer Engineering, Rutgers University, USA, 2008

Invited by the European Science Foundation to give a talk on "Epidemiology in Wireless Networks". Lappentranta, Finland, 2008

Invited by the Government of Japan for guest lecture, Third Japan-India Seminar on Productivity/Quality Control and Micro/Nano Manufacturing Science, Tokyo, 2008

Graduate scholarship for pursuing Master of Science, Department of Computer Science, University of California, Davis, USA, 2005

Graduate scholarship for pursuing PhD studies, Department of Electrical and Computer Engineering, University of Maryland College Park, USA, 2004

Invited to attend summer school in wireless communications, Lund University, Sweden, 2002

Several travel grants during undergraduate and graduate studies to attend prestigious international conferences

Winner of several national and state-level technical awards in research competitions at undergraduate level

INVITED TALKS

Nokia-Siemens Networks, Portugal - Talk on future trends in Internet security, December 2009

Instituto Superior Tecnico, Technical University of Lisbon - Talk on electric power grid security, December, 2009

ACADEMIC AND
INDUSTRIAL
EXPERIENCE

Viterbi School of Engineering, University of Southern California, USA

Provost PhD Fellow, Computer Science **August, 2008 - Present**
Pursuing research on few problems related to network economics and network game theory.

Nokia-Siemens Networks, Lisbon, Portugal

Guest Researcher **December, 2009**
Worked on security aspects in electric power grids in collaboration with researchers at Nokia-Siemens and Technical University of Lisbon.

Center for TeleInfrastruktur, Aalborg University, Aalborg, Denmark

Guest Researcher **June, 2009 - July, 2009**
Worked on medium access control mechanisms in body sensor networks in collaboration with researchers at University of Rome, Tor-Vergata.

Guest Researcher **December, 2008 - January, 2009**
Worked on Lexicographic scheduling in WiMAX mesh networks.

Research Assistant **April - July, 2008**

Researched on reliability, routing and scheduling aspects of cognitive radio networks and wireless body area networks. Mentored graduate students at Aalborg university and visiting undergraduate students from India. Took active part in writing proposals for the European Commission.

Adhoc Networks Research and Applications Group, Indian Institute of Management, Calcutta, India

Research Associate **June, 2007 - February, 2008**
Researched on lexicographic algorithms for load-balanced routing in wireless mesh networks.

Computer Science Department, University of California, Davis, USA

Teaching Assistant **March - June, 2006**
Taught C and UNIX programming to undergraduates, conducted tutorial sessions, evaluated exam scripts, and evaluated lab assignments.

Graduate Student Researcher **October 2005 - February, 2006**
Worked on efficient data dissemination algorithms for static multi-hop wireless networks.

Cadence Design Systems, India

Software Engineer **June, 2002- April, 2004**
Developed performance evaluation tools for formal verification systems.

Computer Science Department, Indian Institute of Technology, Kharagpur, India

Research Intern **June - July, 2001**
Developed an adaptive connection management system for ATM networks.

Operations Management Group, Indian Institute of Management, Calcutta, India

Research Intern **May - July, 2000**
Worked on fuzzy optimization methods for engineering systems.

STUDENTS MENTORED IN RESEARCH
Amit Pal *PhD student in Computer Science, University of Southern California, USA*
Dua Idris *Research Assistant, Aalborg University, Denmark*
Kirti Pasari *Research Assistant, Aalborg University, Denmark*
Satya Ardhy Wardana *Engineer, Motorola, Copenhagen, Denmark*
Anish Sengupta *MBA student, NITIE, Mumbai, India*
Bharat Gupta *PhD student in Electrical Engineering, University of Rome, Tor-Vergata, Italy*
Gursimran Rooprai *M.S student in Energy Engineering, University of Southern California, USA*
Bodhisattwa Ganguly *Engineer at Nokia-Siemens, Portugal*

PROFESSIONAL MEMBERSHIPS AND ACTIVITIES
Student Member, IEEE and the ACM
Reviewed papers for *IEEE Transactions on Communications, European Journal of Operational Research, Wiley Journal on Wireless Networks, IEEE INFOCOM, IEEE ICC, IEEE GLOBECOM, IEEE CDC, IEEE DySPAN, IEEE WCNC, IEEE PIMRC, WPMC, Wireless Vitae, and ACM HotMetrics*

CURRENT PH.D PROJECTS
On optimal self-defense investments in Internet security (2009-2010)
Sponsor: USC Provost Fellowship. Faculty: L. Golubchik

Analyzing self-defense investment frameworks in Internet security (2009 - 2010)

Sponsor: USC Provost Fellowship. *Faculty:* L.Golubchik

Optimal cyber-insurance contracts for Internet security (2009 - 2010)

Sponsor: USC Provost Fellowship. *Faculty:* L.Golubchik

Robust cyber-insurance markets for Internet Security (2009-2010)

Sponsor: USC Provost Fellowship. *Faculty:* L.Golubchik and K.Psounis

Efficient resource allocation mechanisms for wireless body area networks (2009 - 2010)

Sponsor: USC Provost Fellowship. *Single student project*

Efficient operation of wireless social community networks (2009 - 2011)

Sponsor: USC Provost Fellowship. *Faculty:* R.Jain

A security perspective to efficient electric power usage (2009 - 2011)

Sponsor: USC Provost Fellowship. *Inter-University project*

Power Grid Tomography (2010 - 2011)

Sponsor: USC Provost Fellowship. *Single student project*

HOBBIES

Cricket
Soccer
Swimming
Squash
Blackjack
Vedic astrology
Philosophic readings
Listening to music of all genres
International traveling (20 countries visited till date)
Watching Bollywood movies and Bengali classics
Solving math riddles and puzzles

VISITING
COUNTRIES

I have a special interest in visiting foreign countries. I love the various cultures, the food, and the people. Presently, I have a personal inclination towards western and northern European countries. However, I have enjoyed all the countries, I have visited till date. Here are the following countries I have visited.

USA, Singapore, Malaysia, Hong Kong, Germany, Austria, Italy, France, Belgium, Switzerland, Vatican City, Holland, United Kingdom, Denmark, Sweden, Norway, Finland, Japan, Spain, and Portugal

PUBLICATIONS
DURING PH.D
STUDIES

- R.Pal** and L.Golubchik: Analyzing Self-Defense Investments in Internet Security, *Submitted*
- R.Pal** and L.Golubchik: Optimal Cyber-Insurance Contracts in Internet Security, *Submitted*
- R.Pal**: On Wireless Social Community Network Routers: The Design and Cost-Sharing Problem for Better Deployment, *Manuscript Under Preparation*
- R.Pal**: Reliability Optimization in Multi-Hop On-Body Sensor Networks, *Manuscript Under Preparation*

PUBLICATIONS
DURING M.S
STUDIES

- R.Pal**: Alluvion and Cascade: Fast Data Dissemination Schemes in Multi-Hop Wireless Networks. *In Proceedings of ACM Mobishare, 2006*, Los Angeles, USA (In Conjunction with ACM MobiCom)
- R.Pal**: On the Reliability of Multi-Hop Dynamic Spectrum Access Networks Supporting QoS-Driven Applications. *In the Proceedings of IEEE International Conference on Communications) 2007*, Glasgow, Scotland
- R.Pal**: Efficient Routing Algorithms for Multi-Channel Dynamic Spectrum Access Networks. *In the Proceedings of IEEE Dynamic Spectrum Access Networks (DySPAN) 2007*, Dublin, Ireland
- R.Pal** and R.Prasad: Characterizing Link Importance in Multi-Rate Cognitive Radio Networks. *In the Proceedings of Wireless Personal and Multimedia Communications (WPMC) 2007*, Jaipur India
- R.Pal** and C.-N.Chuah: Characterizing Link Importance in Multi-Channel, Multi-Radio, Multi-Rate Wireless Mesh Networks. *In the Proceedings of IEEE Wireless Communications and Networking Conference (WCNC) 2008*, Las Vegas, USA
- R.Pal**: A Lexicographic Load-Balanced Routing Scheme for Wireless Mesh Networks. *In the Proceedings of IEEE International Conference on Communications (ICC) 2008*, Beijing, China
- R.Pal**, A.Sengupta, D.Idris, and R.Prasad: A Mathematical Framework for Routing and Scheduling Flows in Cognitive Radio Networks. *In the Proceedings of Wireless Personal and Multimedia Communications (WPMC) 2008*, Saariselka, Finland
- R.Pal**, D.Idris, and R.Prasad: Characterizing Reliability in Wireless Body Area Networks. *In the Proceedings of International Workshop on Future Wellness and Medical ICT Systems, 2008*, Saariselka, Finland. (In conjunction with WPMC 2008)
- R.Pal**, D.Idris, K.Pasari, N.Prasad: Characterizing Reliability in Multi-Channel, Multi-Radio, Multi-Rate Dynamic Spectrum Access Networks. *In the Proceedings of IEEE International Symposium on Applied Sciences in Biomedical and Communication Technologies (ISABEL) 2008*, Aalborg, Denmark
- R.Pal**, N.Prasad, and R.Prasad: A Reliability Constrained Model for Maximizing the Capacity of Opportunistic Mesh Networks. *In the Proceedings of Wireless Vitae, 2009*, Aalborg, Denmark
- R.Pal**, N.Prasad, and R.Prasad: Characterizing Delay Bounds for Broadcasting Applications in Opportunistic Wireless Networks. *In the Proceedings of Wireless Vitae, 2009*, Aalborg, Denmark
- R.Pal**, A.Pal, N.Prasad, and R.Prasad: A Lexicographic Bandwidth Allocation Scheme for Broadcasting in WiMAX Mesh Networks. *In the Proceedings of Wireless Vitae, 2009*, Aalborg, Denmark
- R.Pal**, S.A.Wardana, N.Prasad, and R.Prasad: Reliable Broadcasting in Opportunistic Wireless Networks. *In the Proceedings of Wireless Personal Multimedia Communications (WPMC), 2009*,

Sendai, Japan

S.A.Wardana and **R.Pal**: Fast and Secure Authentication in Heterogenous Wireless Networks. *In the Proceedings of Wireless Personal Multimedia Communications (WPMC), 2009*, Sendai, Japan

R.Pal, B.Gupta, and R.Prasad: Efficient Information Processing in Ultra-Low Power Wireless Networks: Ideas from Compressed Sensing. *In the Proceedings of IEEE International Symposium on Applied Sciences in Biomedical and Communication Technologies (ISABEL) 2009*, Bratislava, Slovakia

PUBLICATIONS
DURING B.E
STUDIES

T.Bhasker, **R.Pal**, and M.N.Pal: Resource Time Exponent Technique (RETIREXT): A Non-Recursive Heuristic for Project Scheduling under Multiple Resource Constraints. *In Proceedings of the Ninth International Workshop on Project Management and Scheduling 2004*, Nancy, France

T.Bhasker, **R.Pal**, and M.N.Pal: A Time-Efficient Non-Recursive Heuristic for Resource Constrained Project Scheduling Problems. *In Proceedings of the Second World Conference on Productions and Operations Management Society (POMS) 2004*, Cancun, Mexico

S. Bandyopadhyay, K.Hasuike, **R.Pal**, and M.N.Pal: System Performance Analysis of Wireless Ad-Hoc Networks with Directional Antennas. *In Proceedings of IEEE International Conference on Communications (ICC) 2003*, Anchorage, Alaska

R.Pal and M.N.Pal: Analyzing System Performance in Wireless Ad-Hoc Networks Using Directional Antennas. *In Proceedings of IASTED International Conference on Computer and Communication Networks (CCN) 2002*, MIT, Cambridge, USA

R.Pal, J.Mitra, and M.N.Pal: A Fuzzy DEA Approach on Quality Function Deployment for Evaluation of Relative Performance of Product Designs. *In Proceedings of 11th Latin-Iberian American Congress of Operations Research (CLAIO) 2002*, Concepcion, Chile

Zoramthanga, **R.Pal**, and R.Mall: An Adaptive Connection Management Scheme for ATM with Explicit Support for Real-Time and Mission Critical Applications. *In Proceedings of the Ninth International Conference on Advanced Computing and Communications (ADCOM) 2001*, Bhubaneswar, India

R.Pal, J.Mitra, and M.N.Pal: Efficiency of Software Development Projects: A Fuzzy DEA Approach. *In Proceedings of the Annual Meeting of Institute for Operations Research and Management Sciences (INFORMS), 2001*, Miami, USA

R.Pal, J.Mitra, and M.N.Pal: Relative Performance Evaluation of Engineering Designs: A Fuzzy DEA Approach. *In Proceedings of the Annual Meeting of Institute for Operations Research and Management Sciences (INFORMS), 2001*, Miami, USA

R.Pal, J.Mitra, and M.N.Pal: Evaluation of Relative Performance of Product Designs: A Fuzzy DEA Approach to Quality Function Deployment *Opsearch, Journal of the Operations Research Society of India*, December 2007, Vol 44, No.4, pp 322-336

R.Pal, J.Mitra, and M.N.Pal: A Fuzzy DEA Approach on Quality Function Deployment for Evaluation of Relative Performance of Product Designs. Book Chapter in *Theory of Productivity and Efficiency: Econometric and DEA Approach*, Macmillan, 2005, Ed. R.Ghosh and C.Neogi, Pgs(111 - 122)