

Ranjan Pal

CONTACT INFORMATION	Ronald Tutor Hall Building Room No. 419 3710, McClintock Avenue University of Southern California Los Angeles, California 90089 USA	<i>Voice:</i> (213) 268-1203 <i>E-mail:</i> rpal@usc.edu <i>Webpage:</i> http://www-scf.usc.edu/~rpal
RESEARCH INTERESTS	Economics of Distributed Systems Security, Economics of Societal Networks, Network Economics	
RESEARCH OBJECTIVE	To conduct fundamental research in areas of research interests by modeling, analyzing, and providing insights on important practical problems	
DOCTORAL RESEARCH ADVISORS	Professor Leana Golubchik, Computer Science, University of Southern California, USA Professor Konstantinos Psounis, Electrical Engineering, 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) <ul style="list-style-type: none">• Research Domain (Major): Economics of Distributed Systems Security• Research Domain (Minor): Economics of Societal Networks University of California , Davis, California, USA M.S., Computer Science, June, 2007 <ul style="list-style-type: none">• Major: Computer Networks Singapore-MIT Alliance (National University of Singapore and MIT, Cambridge, USA) S.M., Computer Science, June, 2005 <ul style="list-style-type: none">• Major: Computational Biology Birla Institute of Technology , Ranchi, India B.E., Computer Science, June, 2002 <ul style="list-style-type: none">• Honors: First Class with Distinction• Rank: Amongst the top 2% in the university	
RELEVANT GRADUATE COURSES	<i>Courses at MIT</i> - Algorithms, Artificial Intelligence <i>Courses at UC Davis</i> - Computer Networks, Wireless Networks, Random Processes, Engineering Optimization, Engineering Management <i>Courses at USC</i> - Theory of Optimization, Convex Optimization, Network Economics and Network Game Theory, Probability Theory, Mathematical Analysis, Database Systems	
TEACHING	<i>Courses at UC Davis</i> - Teaching Assistant for Unix and C Programming, 2006 <i>Courses at USC</i> - Teaching Assistant for Analysis of Algorithms (Graduate Level), Fall 2010, Fall 2011	

FELLOWSHIPS	<p>Provost Doctoral Fellowship, University of Southern California, USA, 2008 (the highest doctoral honor at USC)</p> <p>Doctoral Fellowship, Carnegie Mellon University, USA, 2008</p> <p>Doctoral Fellowship, University of California Irvine, USA, 2008</p> <p>SMA Fellowship, Massachusetts Institute of Technology and National University of Singapore, 2004</p> <p>Doctoral Fellowship, Indian Institute of Management Calcutta, India, 2004</p> <p>Doctoral Fellowship, Indian Institute of Management Ahmedabad, India, 2004</p>
AWARDS AND HONORS	<p>Awarded Travel funding by IEEE ICDCS to attend IEEE ICDCS 2010</p> <p>Selected as a Visiting Student Research Collaborator, Princeton University, USA, 2010</p> <p>Selected in 'Marquis' Who's Who of America in Science and Engineering', 2011</p> <p>Invited by Nokia-Siemens Networks, Portugal to give a talk on future trends in Internet security, December 2009</p> <p>Invited by Instituto Superior Tecnico, Technical University of Lisbon, to give a talk on electric power grid security, December, 2009</p> <p>Full scholarship for PhD studies, Department of Computer Science, Pennsylvania State University, USA, 2008</p> <p>Full scholarship for PhD studies, Department of Electrical and Computer Engineering, Rutgers University, USA, 2008</p> <p>Invited by the European Science Foundation to give a talk on "Epidemiology in Wireless Networks". Lappenranta, Finland, 2008</p> <p>Invited by the Government of Japan for guest lecture, Third Japan-India Seminar on Productivity/Quality Control and Micro/Nano Manufacturing Science, Tokyo, 2008</p> <p>Graduate scholarship for pursuing Master of Science, Department of Computer Science, University of California, Davis, USA, 2005</p> <p>Graduate scholarship for pursuing PhD studies, Department of Electrical and Computer Engineering, University of Maryland College Park, USA, 2004</p> <p>Invited to attend summer school in wireless communications, Lund University, Sweden, 2002</p> <p>Several travel grants during undergraduate and graduate studies to attend prestigious international conferences</p> <p>Winner of several national and state-level technical awards in research competitions at undergraduate level</p>
INVITED TALKS ON INTRODUCTORY IDEAS	<p>Nokia-Siemens Networks, Lisbon, Portugal - <i>Future Trends in Internet Security Economics</i>, December 2009</p> <p>Instituto Superior Tecnico, Technical University of Lisbon - <i>Future Trends in Internet Security Economics</i>, December, 2009</p> <p>Ecole Polytechnic Federal De Lausanne (EPFL), Lausanne, Switzerland - <i>Real-Time Pricing in Power Grids</i>, 2011</p>
ACADEMIC AND INDUSTRIAL EXPERIENCE	<p>Viterbi School of Engineering, University of Southern California, USA</p> <p><i>Provost Fellow, Computer Science</i> August, 2008 - Present</p> <p>Pursuing research in the economics of distributed systems security and economics of societal networks</p>

Teaching Assistant, Computer Science **Fall 2010, Fall 2011**
Conducting a graduate level course in analysis of algorithms - Duties: developing course structure, designing exams and quizzes, grading exams and quizzes, and holding office hours.

Deutsch-Telekom Laboratories, Berlin, Germany

Visiting Researcher **April-June, 2011**
Pursuing research on investment models in Internet security and economic aspects of opportunistic mobile networks

Department of Electrical Engineering, Princeton University, USA

Visiting Student Research Collaborator **June, 2010 - June 2011**
Pursuing research on monetized file sharing systems.

Nokia-Siemens Networks, Lisbon, Portugal

Guest Researcher **December, 2009**
Worked on reliability aspects in body sensor networks 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 reliability aspects 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.

Department Electrical Engineering and Computer Science, Massachusetts Institute of Technology, USA

SMA Masters Fellow, Computer Science **July, 2004 - May 2005**
Pursued research on computational protein docking in proteins.

Computer Science Department, National University of Singapore, Singapore

SMA Masters Fellow, Computer Science **July, 2004 - May 2005**
Pursued research on computational protein docking in proteins.

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.

PROFESSIONAL MEMBERSHIPS AND ACTIVITIES *Student Member, IEEE and the ACM*
Member, PiMuEpsilon (National Mathematical Honor Society of USA)
Official Technical Journal Reviewer for IEEE Transactions on Communications
Technical Conference Reviewer for IEEE INFOCOM, IEEE ICC, IEEE GLOBECOM, IEEE MASS, IEEE CDC, IEEE DySPAN, IEEE WCNC, IEEE PIMRC, WPMC, Wireless Vitae, ACM HotMetrics

HOBBIES Cricket, Soccer, Swimming, Blackjack, Vedic astrology, Philosophic readings, Listening to music of all genres, International traveling (22 countries visited till date), Watching Bollywood movies and Bengali classics, Solving math riddles and puzzles

PUBLICATIONS
DURING PH.D
STUDIES (MAJOR
AREA)

R. Pal, L. Golubchik, and K. Psounis: Aegis: A Novel Cyber-Insurance Model. *To Appear in Proceedings of IEEE/ACM GameSec, 2011, Maryland, USA*

R. Pal and P. Hui: Modeling Investments in Internet Security - Tackling Topological Information Uncertainty. *To Appear in Proceedings of IEEE/ACM GameSec, 2011, Maryland, USA*

R. Pal and L. Golubchik: Analyzing Self-Defense Investments in Internet Security Under Cyber-Insurance Coverage, *In Proceedings of IEEE International Conference on Distributed Computing Systems (ICDCS) 2010, Genoa, Italy*

R. Pal and L. Golubchik: Optimal Cyber-Insurance Contracts in Internet Security, *In Proceedings of ACM MAMA 2010, in conjunction with ACM SIGMETRICS 2010, New York, USA*

R. Pal and L. Golubchik: Optimal Cyber-Insurance Contracts in Internet Security, *Appeared in Performance Evaluation Review, 2010*

PUBLICATIONS
DURING PH.D
STUDIES (MINOR
AREA)

R. Pal and P. Hui: Economic Models for Cloud Service Markets, *To Appear in Proceedings of ICDCN 2011, Hong Kong.*

R. Pal, S. Kosta, and P. Hui: Settling for Less - A QoS Compromise Mechanism for Mobile Social Networks *In Proceedings of ACM SIGMETRICS MAMA, 2011, San Jose, USA*

R. Pal, S. Kosta, and P. Hui: Settling for Less - A QoS Compromise Mechanism for Mobile Social Networks *To Appear in ACM SIGMETRICS Performance Evaluation Review 2011*

R. Pal, C. Leberknight, M. Chiang, and H. V. Poor: The Sharing-Mart System: Online Digital Content Trading, Online Auctions, and Incentives *In Proceedings of GameNets, 2011, Shanghai, China*

R. Pal: On Wireless Social Community Network Routers: The Design and Cost-Sharing Problem for Better Deployment, *In proceedings of IEEE GLOBECOM 2010, Miami, USA*

R. Pal, B. Gupta, E. Cianca, A. Gogar, S. A. Wardana, A. Patel, L-V. The, S. Kaligotla, B. Ganguly: Playing Games with Human Health: The Role of Game Theory in Optimizing Reliability in Wireless Health Networks, *In Proceedings of ISABEL 2010, Rome, Italy*

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)