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Nirmalya Roy

Clinical Assistant Professor Jan 2012 -- Current
School of Electrical Engineering and Computer Science
Director of Mobile, Pervasive and Sensor Computing Lab
<http://eecs.wsu.edu/~nroy/mpsc.html>
Washington State University

Research Scientist and Technical Advisor April 2010 – Dec 2011
Networking Protocols Department
Institute for Infocomm Research (I2R), Singapore

Postdoctoral Research Fellow Sept. 2008 – March 2010
Dept. of Electrical & Computer Engineering,
University of Texas at Austin, Texas
Advisor: Prof. Christine Julien

Ph. D, Dept. of Computer Science & Engineering, Aug. 2008
University of Texas at Arlington, Texas
Dissertation: “A Context-aware Learning, Prediction and Mediation Framework for Resource Management in Smart Pervasive Environments”
Advisor: Prof. Sajal K. Das

MS, Dept. of Computer Science & Engineering, Aug. 2004
University of Texas at Arlington, Texas
Thesis Title: “Providing Better QoS Assurance to Next Generation Ubiquitous Grid Users”
Advisor: Prof. Sajal K. Das

BE, Dept. of Computer Science & Engineering, Aug. 2001
Jadavpur University, India

Recent Grants: Design and Implementation of a Fine-Grained Appliance Energy Profiling System for Green Building (NSF CNS-1255965, \$265,292; 01/01/2013--12/31/2014):
NSF Weblink: <http://nsf.gov/awardsearch/showAward.do?AwardNumber=1255965>

Project Summary: Investigating advanced machine learning and data analytics algorithms that capture the measurement based approach and circuit level NILM with the autonomous profiling and prediction logic to enable the deployment of flexible and fungible smart plug and the evolvability of future DR model in green building applications.

- Coordinator of NSF REU Program 2013 at WSU in Smart Environments
<http://reu.eecs.wsu.edu/>

- Invited to serve on NSF CISE/CSR 2013 Panel

Areas of Interest Pervasive Computing, Middleware and Sensor Networks, Intelligent Systems, Smart Environments (Pervasive Healthcare & Smart Buildings)

Research Focus **Pervasive Computing, Middleware and Sensor Networks**

- Sensor Data stream processing for Pervasive Healthcare
- Characterizing uncertainty/ambiguity/error in sensor-driven decision process
- Context Modeling & Context-Aware Resource Management
- Activity Recognition, Learning and Prediction Algorithms

Smart Environments

- Sensor-driven Smart Healthcare and Rehabilitation
- Multi-Scale Energy Efficient Smart Buildings

Secondary Research Focus

Processor and Network Level Sustainable Architecture

- Data analytic algorithms and modeling for multi-scale power efficient system-on-chip.

Mobile, Distributed and Grid Computing

- Wireless Mobile Communication and Services
- Mobility Management and Location based Services
- Application of Game Theory in Pervasive & Mobile Grid

Experience

Teaching:

Spring 2012:

- CptS 223: Advanced Data Structures (60 students)
<http://eecs.wsu.edu/~nroy/courses/CptS223/>

Fall 2012:

- CptS 122: Data Structures (130 students)
<http://eecs.wsu.edu/~nroy/courses/cpts122/>

Spring 2013:

- CptS 223: Advanced Data Structures (60 students)
- CptS 555/EE 555: Computer Communication Networks (30 students)

Internship at Motorola Research Labs, USA, 2007

- Developed a Semantic Web Engine to enhance the user experience for complementing DLNA
- Investigated Motorola Faultline Tool, MAML, SVG, CSS, CVS, XML, OCAP, TV Guide, TiVo, SemanticWorks Toolkit, OWL/RDF, Jena

Internship at Sun Microsystem, USA, 2006

- Worked at OEM Platform group as an Integration Engineering to develop IPP (Integrated Platform Product) using Solaris s10u2, SunCluster, Lockhart, Cacao, N1SM (Service Management) and N1SPS (Service Provisioning) software.
- Investigated the open source middleware OpenClovis and SAForum Specification for High Availability Services.

Internship at D & J Technologies Inc. USA, 2005

- Designed and implemented an address book database. The platform used was Visual Studio.NET.

Teaching Assistant at UT-Arlington (2002 - 2007)

- Assisted the instructor in courses such as Computer Network, Operating System and in Lab assignment using Java and Visual Studio.NET.

Honors and Awards

- **Best Research Paper 2011, Institute for Infocomm Research (I2R), Singapore**
 - **PerCom 2011 Best Paper Nomination**
 - **QShine 2009 Best Paper Award**
 - NSF Travel Grant Recipient: MobiHoc 2009, MobiSys 2008, PerCom 2008, PETRA 2008
 - IBM PhD Fellowship 2008 Finalist
 - Motorola Best Intern Apprentice Award, 2007
 - Outstanding GTA award 2007
 - **Mark Weiser Best Paper Award** – IEEE PerCom 2006
 - 1st place at UTA Graduate Research Competition – IDEAZ 2005
 - STEM Doctoral Fellowship, 2007
 - Dean's Fellowship, 2004-2007
 - TexTec Scholarship, 2004-2006
 - Nokia Scholarship, 2003
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Invited Talks & Presentation

- IEEE Calcutta Section, India October 2011
 - University of Texas El Paso, ECE Dept, March 2011
 - PerCom 2011, Seattle, USA
 - Michigan Technological University, May 2009
 - Korean Advanced Institute of Science and Technology (KAIST), April 2009
 - University of Southern Mississippi, April 2009
 - PerCom 2009, Galveston, USA
 - University of Alberta, Feb 2009
 - ExxonMobil Research & Engineering, New Jersey, Aug 2008
 - University of Texas at Austin ECE Dept, June 2008
 - Kansas State University (KSU), May 2008
 - MobiSys 2008, Colorado, USA
 - PerCom 2008, Hong Kong, China
 - Motorola Labs (Lowell, MA), Aug 2007
 - Sun Microsystem (Santa Clara, CA), Dec 2007
 - PerCom 2006, Pisa, Italy
 - ICOST 2005, Quebec, Canada
 - Ubiquitous 2005, San Diego, CA
 - IPDPS 2005, Denver, CO
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List of Publications:

Pervasive Computing and Smart Environments

Refereed Journals

1. **Nirmalya Roy**, Archan Misra, Sajal K. Das, Christine Julien and Diane Cook, "Quality- and Energy-Sensitive Determination of Multiple Contexts in Pervasive Computing Environments", ACM Transactions on Sensor Networks (TOSN) 2013, major revision
2. **Nirmalya Roy**, Sajal K. Das and Christine Julien "Resource-Optimized Quality - Assured Ambiguous Context Mediation in Pervasive Environments," IEEE Transaction on Mobile Computing (TMC 2012), pp. 218 – 229, Vol. 11, Issue 2, Feb. 2012
3. **Nirmalya Roy**, Gu Tao and Sajal K. Das, "Supporting Pervasive Computing Applications with Active Context Fusion and Semantic Context Delivery", Pervasive and Mobile Computing (PMC) Journal, pp. 21-42, Vol. 6, Issue 1, Feb. 2010 Citation

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4. Sajal K. Das, **Nirmalya Roy**, and Abhishek Roy “Context-Aware Resource Management in Multi-Inhabitant Smart Homes: A Framework based on Nash H-Learning”, Pervasive and Mobile Computing (PMC) Journal, pp. 372-404, Vol. 2, Issue 4, Nov. 2006 Citation 47

Book Chapters

5. **Nirmalya Roy**, Sajal K. Das and Christine Julien, “Resolving and Mediating Ambiguous Context in Pervasive Healthcare Environments”, Smart Healthcare Applications and Services, Carsten Röcker et al (editors), Idea Group Publishing, IRM Press, 2010

6. **Nirmalya Roy** and Sajal K. Das, “Managing Context Uncertainty in Smart Pervasive Environments”, Designing Solutions-Based Ubiquitous and Pervasive Computing: New Issues and Trends, Milton Mendes et al (editors), Idea Group Publishing, IRM Press, 2009

7. Sajal K. Das and **Nirmalya Roy**, “Learning, Prediction and Mediation of Context Uncertainty in Smart Pervasive Environments”, OnTheMove to the Meaningful Internet Systems, R. Meersman et al (editors), Lecture Notes in Computer Science 5333, Nov. 2008, pp. 820-829

8. **Nirmalya Roy**, Abhishek Roy, Kalyan Basu and Sajal K. Das “A Reinforcement Learning Framework for Location-Aware Resource Management in Multi-Inhabitant Smart Homes”, From Smart Homes to Smart Care, Sylvain Giroux et al(editors), IOS Press, July 2005, pp.180-187

Refereed Conferences

9. **Nirmalya Roy**, Archan Misra, and Diane Cook, “Infrastructure-Assisted Smartphone-based ADL Recognition in Multi-Inhabitant Smart Environments”, accepted in IEEE Int’l Conf. on Pervasive Computing (PerCom 2013) [acceptance rate: ~ 11%]

10. Neda Edalat, Wendong Xiao, **Nirmalya Roy**, Sajal K. Das and Mehul Motani “Combinatorial Auction-Based Task Allocation in Multi-Application Wireless Sensor Networks”, Proc. of IEEE/IFIP Int’l Conf. on Embedded and Ubiquitous Computing (EUC), Oct. 2011

11. **Nirmalya Roy**, Archan Misra, Christine Julien, Sajal K. Das and Jit Biswas, “An Energy Efficient Quality Adaptive Multi-Modal Sensor Framework for Context

Recognition”, Proc. of IEEE Int’l Conf. on Pervasive Computing (PerCom 2011), Seattle, USA, Mar 2011 [acceptance rate: ~ 11%] (**Nominated for Best Paper Award**)

12. **Nirmalya Roy**, Vasanth Rajamani and Christine Julien, “Supporting Multi-Fidelity-Aware Concurrent Applications in Dynamic Sensor Networks,” Proc. of the 2nd International Workshop on Information Quality and Quality of Service for Pervasive Computing (IQ2S 2010) in conjunction with PerCom 2010

13. **Nirmalya Roy**, Christine Julien, Archan Misra and Sajal K. Das, "A Prototype for Resource Optimized Context Determination in Pervasive Care Environments" Proc. of International Conference on Mobile Computing, Applications, and Services (MobiCASE 2009, Demonstrations Track), Oct. 2009

14. **Nirmalya Roy**, Christine Julien and Sajal K. Das, "Resource-Optimized Quality - Assured Ambiguous Context Mediation in Pervasive Environments," Proc. of International Conference on Heterogeneous Networking for Quality, Reliability, Security and Robustness (QShine 2009), pp 232-248, Vol. 22, Nov. 2009 (**Best Paper Award**)

15. **Nirmalya Roy**, Christine Julien and Sajal K. Das, “Resolving and Mediating Ambiguous Contexts for Pervasive Care Environments,” IEEE International Conference on Mobile and Ubiquitous Systems: Networking and Services (MobiQuitous 2009, Poster Paper), July 2009

16. **Nirmalya Roy**, Archan Misra, Sajal K. Das & Christine Julien, “Quality-of-Inference (QoINF)-Aware Context Determination in Assisted Living Environments”, Proc. of ACM SIGMOBILE Workshop on Medical-Grade Wireless Networks (WiMD 2009) in conjunction with MobiHoc, May 2009

17. **Nirmalya Roy** and Sajal K. Das, “Quality-Assured Ambiguous Contexts Mediation Framework for Smart Healthcare Applications”, Proc. of ACM SIGMOBILE USENIX Int’l Conference on Mobile Systems, Applications, and Services (MobiSys 2008: WIP Session), Colorado, June 2008

18. **Nirmalya Roy** and Sajal K. Das, “A Context-Aware Learning, Prediction and Mediation Framework for Resource Management in Pervasive Environments”, Proc. of ACM SIGMOBILE USENIX Int’l Conference on Mobile Systems, Applications and Services (MobiSys 2008: PhD Forum), Colorado, June 2008

19. **Nirmalya Roy**, Archan Misra and Sajal K. Das, “Efficient Long-Term Quality-of-Inference (QoINF)-Aware Context Determination in Pervasive Care Environments”, Proc. of ACM SIGMOBILE Workshop on Systems and Networking Support for

Healthcare and Assisted Living Environments (HealthNet 2008) in conjunction with MobiSys, Colorado, June 2008

20. **Nirmalya Roy**, Gautham Pallapa and Sajal K. Das, “An Ontology-Driven Ambiguous Contexts Mediation Framework for Smart Healthcare Applications”, Proc. of Int’l Conf. on Pervasive Technologies Related to Assistive Environments (PETRA 2008), Greece, July 2008 Citation: 9

21. Gautham Pallapa, **Nirmalya Roy** and Sajal K. Das, “A Scheme for Quantizing Context Privacy in Context-aware Ubiquitous Computing”, Proc. of IET Int’l Conference on Intelligent Environments (IE 08) July 2008 Citation: 5

22. **Nirmalya Roy** and Sajal K. Das, “Context-aware Learning, Prediction and Resource Management in Smart Pervasive Environments”, Proc. of IEEE Int’l Conf. on Pervasive Computing (PerCom 2008: Google PhD Forum), Mar 2008

23. **Nirmalya Roy**, Gautham Pallapa and Sajal K. Das, “A Middleware Framework for Ambiguous Context Mediation in Smart Home Healthcare Application” Proc. of IEEE Int’l Conf. on Wireless and Mobile Computing, Networking and Communications (WiMob 2007) [acceptance rate: ~ 26%] Citation: 21

24. Gautham Pallapa, **Nirmalya Roy** and Sajal K. Das, “Precision: Privacy Enhanced Context-Aware Information Fusion in Ubiquitous Healthcare” Proceeding of the First Workshop on Software Engineering of Pervasive Computing Applications, Systems and Environments (SEPCASE '07) in conjunction with ICSE 2007 [acceptance rate: ~ 29%] Citation: 6

25. **Nirmalya Roy**, Abhishek Roy and Sajal K. Das “Context-Aware Resource Management in Multi Inhabitant Smart Homes: A Nash H-learning based Approach”, Proc. of IEEE Int’l Conf. on Pervasive Computing (PerCom 2006), Pisa, Italy, Mar 2006 (**Mark Weiser Best Paper Award**) [acceptance rate: ~ 8%] Citation: 47

26. **Nirmalya Roy**, Abhishek Roy, Kalyan Basu and Sajal K. Das “A Cooperative Learning Framework for Mobility-Aware Resource Management in Multi-Inhabitant Smart Homes”, IEEE International Conference on Mobile and Ubiquitous Systems: Networking and Services (MobiQuitous 2005), San Diego, California, USA, pp. 393-403, July 2005 [acceptance rate: ~ 35%] Citation:19

High-Performance and Distributed Computing

Refereed Journals

27. **Nirmalya Roy** and Sajal K. Das, “Enhancing Availability of Grid Computational Services to Ubiquitous Computing Applications”, IEEE Transactions on Parallel and Distributed Systems, vol. 20, no. 7, pp. 953-967, July. 2009

28. Preetam Ghosh, **Nirmalya Roy**, Sajal K. Das, and Kalyan Basu, "A Pricing Strategy for Job Allocation in Mobile Grids Using a Non-cooperative Bargaining Theory Framework," Journal of Parallel and Distributed Computing (Special Issue on Design and Performance of Networks for Super-, Cluster-, and Grid-Computing, Guest Eds: A. Zomaya, M. Ould-Khaoua and H. Sarbazi-Azad), pp. 1366-1383, vol. 65, issue 11, Nov 2005 Citation: 40

Refereed Conferences

29. **Nirmalya Roy**, Sajal K. Das , Kalyan Basu and Mohan Kumar "Enhancing Availability of Grid Computational Services to Ubiquitous Computing Applications", IEEE International Conference on Parallel and Distributed Processing Symposium (IPDPS'2005), Denver, Colorado, USA, April 2005 [acceptance rate: ~ 12%]
Citation: 20

30. Preetam Ghosh, **Nirmalya Roy** and Sajal K. Das "Mobility-based Cost-effective Job Scheduling in an IEEE 802.11 Mobile Grid Architecture" Proceeding of the First Int'l Workshop on Context-Awareness and Mobility in Grid Computing (WCAMG'07) in conjunction with CCGrid'2007 [acceptance rate: ~ 34%] Citation: 22

31. Preetam Ghosh, **Nirmalya Roy**, Sajal K.Das and Kalyan Basu "A Game Theory based Pricing Strategy For Job Allocation in Mobile Grid", IEEE International Conference on Parallel and Distributed Processing Symposium (IPDPS'2004), Santa Fe, New Mexico, USA, April 2004 [acceptance rate: ~ 32%] Citation: 67

Mobile Computing and Wireless Communication

Refereed Conferences

32. Agoston Petz, Taesoo Jun, **Nirmalya Roy**, Chien-Liang Fok and Christine Julien "Passive Network-Awareness for Dynamic Resource-Constrained Networks", Proc. Of 11th IFIP International Conference on Distributed Applications and Interoperable Systems, (DAIS 2011), pp. 106-121, June 2011

33. Taesoo Jun, **Nirmalya Roy** and Christine Julien, "Modeling Delivery Delay for Flooding in Mobile Ad Hoc Networks," Proceedings of the IEEE International Conference on Communications (ICC) 2010

34. Prateek Shah, **Nirmalya Roy**, Abhishek Roy, Kalyan Basu, and Sajal K Das "Design of PON using VQ - Based Fiber Optimization", Telecommunications and Networking - ICT 2004, 11th IEEE International Conference on Telecommunications, Fortaleza, Brazil, pp. 1303-1309, vol. 3124, Aug 2004 [acceptance rate: ~ 25%]

35. Preetam Ghosh, **Nirmalya Roy**, Kalyan Basu, Sajal K. Das, Paul. Wilson and Prabir Das “A Case Study-based Performance Evaluation Framework for CSCF Processes on a Blade-Server” Proc. of IEEE Int’l Conf. on Networking and Services (ICNS 2007) [acceptance rate: ~ 38%] Citation: 7

Human Computer Interaction

36. **Nirmalya Roy** and Kevin Brooks “Usability of Semantic Web for Enhancing Digital Living Experience” Motorola Technical Report 2007

37. **Nirmalya Roy**, Kevin Brooks and Christine Julien “Usability of Semantic Web for Enhancing Digital Living Experience” Proc of IEEE Consumer Communications and Networking Conference (CCNC) 2010, Las Vegas, USA

Pending Patent

1.**Nirmalya Roy**, Abhishek Bakshi, Nick Devonshire, Gavin Fernandes, George Huang and Manish Sinha, “MOTOSRFR: a software application that combines the fun of social networking and the utility of contact and media management”, in submission with Motorola

2.**Nirmalya Roy** and Archan Misra “An Energy Efficient Quality Adaptive Multi-Modal Sensor Framework for Context Recognition”, in submission with A*STAR 2011

Recent Grant Proposal Involvement:

Current:

- NSF SHB 2012:TYPE II (INT): Collaborative Research: QHealth: Quality-Adaptive Models and Middleware for Situation Recognition in Pervasive Healthcare; Amount: \$699,698.00; PI: Nirmalya Roy (under review)
- WSU Seed Grant 2012: Improving the Physiotherapy Treatment with Fine Grained Information and Tele-consultation; Amount: \$24,983.00; PI: Nirmalya Roy (under review)
- NSF BIGDATA 2012: Mid-Scale: DCM: DA: Scaling Behavior Modeling with a Community of Smart Home Datasets; Amount: \$999,938.00; Co-PI: Nirmalya Roy (under review)
- Samsung GRO 2012: Mobile Phone and Sensor Based Remote Physiotherapy System; Amount: \$106,142.00; PI: Nirmalya Roy (under review)

- WSU Research Advancement Challenge Grant: Sensor-based Remote Physiotherapy System; Amount: \$63,194.00 PI: Nirmalya Roy (under review)
- US Army: ARO & NSA: Design of a Power-Thermal-Reliability Evaluation Framework for Massive Multicore-based Computing Platforms; \$1,150,152.00; Co-PI: Nirmalya Roy (under review)
- NSF CSR: SC: Medium: Collaborative Research: Analytical Models and Experimental Frameworks for Optimizing Power-Thermal-Performance Trade-offs of Massive Multicore Processors; \$834,940.00; Co-PI: Nirmalya Roy (under review)
- NSF ENG/ECCS/CCSS: QACM: Quality-adaptive Ambiguous Context Mediation Middleware for Pervasive Computing; \$374,148.00; PI: Nirmalya Roy (under review)
- NSF CSR: Large: Collaborative Research: PETCore: A Resource Management and Performance Prediction System for Performance-Energy-Temperature Optimization of the Next Generation Multicore Processors; \$742,328.00; Co-PI: Nirmalya Roy (under review)
- WSU International Travel Grant Award; Amount: \$4523.00 PI: Nirmalya Roy (under review)
- NSF: TWC: Small: Collaborative Research: MeDSWin: Multicore enabled Dependable and Secure Wireless Networks; \$169,010; Co-PI: Nirmalya Roy

Professional Activities

- NSF CISE CSR Panel, January 2013
- Reviewer for IEEE Transaction on Mobile Computing, Parallel and Distributed Systems, Networking, Elsevier Ad Hoc Networks, Pervasive and Mobile Computing, JSAC, JPDS, WiNET etc.
- Reviewer for ACM Mobicom, IEEE VTC, ICDCS, ICON, ICPP, GlobeCom, HiPC, MSWiM, SECON, WoWMoM, PerCom
- IEEE and ACM member
- Publicity Co-Chair: IEEE WoWMoM 2011
- Publicity Co-Chair: ICDCN 2013
- TPC member of
 - IEEE ICDCS 2011, 2012, 2013
 - IEEE HiPC 2011
 - ACM COMSNETS 2011
 - IEEE PerCom 2010
 - IEEE IQ2S 2010, 2011, 2012
 - IEEE SmartE 2010
 - IEEE CCNC 2009, 2010 (Session Chair), 2011
 - IEEE ICPADS 2009

- ACM WiMD 2009 with MobiHoc 2009 (Session Chair)
- IEEE SENSORCOMM 2009
- IEEE ICFIN 2009
- IEEE ICLAN 2009
- IEEE UBICOMM 2008

External Project Collaborators

- Dr. Archan Misra, Singapore Management University (SMU)
- Dr. Christine Julien, University of Texas at Austin
- Dr. Sajal K. Das, University of Texas at Arlington

References Available upon request
