

# Lu Ruan

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## EDUCATION

2001 Ph.D. in Computer Science, University of Minnesota-Twin Cities.  
1999 M.S. in Computer Science, University of Minnesota-Twin Cities.  
1996 B.E. in Computer Science, Tsinghua University, Beijing, China.

## RESEARCH INTERESTS

WDM optical networks, wireless networks.

## PROFESSIONAL EXPERIENCE

Aug 2009 – present Associate Professor  
Department of Computer Science, Iowa State University, Ames, IA.

Aug 2001 – Aug 2009 Assistant Professor  
Department of Computer Science, Iowa State University, Ames, IA.

Aug 1997 – May 2001 Teaching Assistant  
Department of Computer Science & Engineering  
University of Minnesota-Twin Cities, MN.

May 2000 – Aug 2000 Software Design Engineer in Test Intern  
Microsoft Corporation, Redmond, WA.

Aug 1996 – Jun 1997 Software Design Engineer  
Beijing EPSON Electronics Corporation, Beijing, China.

## AWARDS

Faculty Early Career Development (CAREER) Award, National Science Foundation, 2003.

Graduate School Fellowship, University of Minnesota-Twin Cities, 2001.

Excellent Student Scholarship, Tsinghua University, Beijing China, 1993.

Zhong Shimo Scholarship, Tsinghua University, Beijing, China, 1992.

## **GRANTS**

- Aug 2003 – Jul 2009 National Science Foundation (CNS-0237592), “CAREER: Resilience Schemes for Survivable IP over WDM Networks”, \$447,403.

## **PROFESSIONAL SERVICE**

### **Proposal Review Panel**

- National Science Foundation, 2003.

### **Conference Organization**

- Track Co-Chair, Optical and Backbone Networks Track, the 19th IEEE International Conference on Computer Communications and Networks (ICCCN 2010).
- Financial Chair, the 9<sup>th</sup> International Symposium on Applications and the Internet (SAINT 2010).
- Financial Chair, the 10<sup>th</sup> International Symposium on Applications and the Internet (SAINT 2011).

### **Conference Program Committee**

- 2010 IEEE International Conference on Communications (ICC)
- 2010 IEEE Global Communications Conference (Globecom)
- 2009 International Conference on Combinatorial Optimization and Application (COCOA)
- 2009 International Conference on Computer Communications and Networks (ICCCN)
- 2008 IEEE International Conference on Advanced Networks and Telecommunication Systems (ANTS)
- 2008 IEEE International Conference on Communications (ICC)
- 2008 International Conference on Computer Communications and Networks (ICCCN)
- 2007 International Conference on Computer Communications and Networks (ICCCN)
- 2007 IEEE Global Communications Conference (Globecom)
- 2007 International Conference on Communications and Networking in China (CHINACOM)
- 2006 International Conference on Broadband Communications, Networks, and Systems (Broadnets)
- 2006 International Conference on Communications and Networking in China (CHINACOM)
- 2005 International Conference on Broadband Communications, Networks, and Systems (Broadnets)
- 2005 International Conference on Computer Communications and Networks (ICCCN)
- 2004 International Conference on Computer Communications and Networks (ICCCN)
- 2004 International Conference on Broadband Communications, Networks, and Systems (Broadnets)
- 2003 IEEE International Conference on Communications (ICC)
- 2003 Optical Networking and Communications Conference (OptiComm)
- 2001 Optical Networking and Communications Conference (OptiComm)

## Referee for Journals

- IEEE/ACM Transactions on Networking
- Journal of Optical Communications and Networking
- IEEE Journal on Selected Areas in Communications
- International Journal of Sensor Networks
- IEEE Communications Magazine
- Computer Networks
- Journal of Wireless Communications and Mobile Computing
- Theoretical Computer Science
- ACM Baltzer Wireless Networks Journal
- IEEE Communications Letters
- OSA Journal of Optical Networking

## COURSES TAUGHT

1. Com S 228 Introduction to Data Structures (Spring 2003, Fall 2003)
2. Com S 330 Discrete Computational Structures (Spring 2008)
3. Com S 352 Introduction to Operating Systems (Fall 2004, Fall 2005, Spring 2011)
4. Com S 454/554 Distributed and Network Operating Systems (Spring 2011)
5. Com S 586 Computer Network Architectures (Fall 2001, Fall 2002, Fall 2003, Fall 2006, Fall 2007, Fall 2008, Fall 2009, Fall 2010)
6. Com S 652 Advanced Topics in Distributed Operating Systems (Fall 2009)
7. Com S 686 Advanced Topics in High-Speed Networks (Spring 2005, Spring 2009)

## GRADUATE STUDENTS

1. Taiming Feng, PhD, Fall 2010 (Co-Major Professor: Wensheng Zhang).
2. Chang Liu, PhD, Spring 2007.
3. Bharat Kumar Addagada, MS, Fall 2010 (Co-Major Professor: Johnny Wong)
4. Vineeth Kisara, MS, Fall 2010.
5. Sangil Choi, MS, Summer 2009.
6. Ronnie Koshy, MS, Spring 2009.
7. Varun Srinivas, MS, Spring 2009.
8. Aditya Dhananjay, MS, Spring 2008.
9. Zhi Liu, MS, Spring 2005.
10. Fangcheng Tang, MS, Spring 2005.
11. Haibo Luo, MS, Spring 2003.
12. Kiran Desai, MS, in progress (Co-Major Professor: Masha Sosonkina)
13. Sai Kiran Talamudupula, MS, in progress (Co-Major Professor: Masha Sosonkina)
14. Nan Xiao, MS, in progress

## **PH.D. COMMITTEES**

1. Zakhia Abichar, Computer Engineering, Fall 2010
2. Long Long, Computer Engineering, Spring 2010
3. Mohammad Saleh, Computer Engineering, Spring 2010
4. Haithem Al-Mefleh, Computer Engineering, Fall 2009
5. Bin Tong, Computer Science, Fall 2009
6. Srivatsan Balasubramanian, Computer Engineering, Spring 2007
7. Wensheng He, Computer Engineering, Summer 2006
8. Jing Fang, Computer Engineering, Fall 2004
9. Cien Shen, Computer Engineering, Summer 2004
10. Haoli Wang, Computer Engineering, Spring 2004
11. Chang-Ling Huang, Computer Engineering, in progress
12. Jinsook Kim, Computer Science, in progress
13. Zi Li, Computer Science, in progress
14. Ye Lin, Computer Science, in progress
15. Tamer Omar, Computer Engineering, in progress
16. Hua Qin, Computer Science, in progress
17. Nalin Subramanian, Computer Science, in progress

## **M.S. COMMITTEES**

1. Yihcheng Lee, Computer Science, Fall 2009
2. Yana Ong, Computer Engineering, Summer 2005
3. Yanmei Wang, Computer Science, Summer 2005
4. Chen Yu, Engineering Mechanics, Spring 2004
5. Weiyi Chen, Computer Science, Fall 2001
6. Enruo Guo, Computer Science, in progress
7. Swaroop Rajendra Dhulpet, Computer Science, in progress
8. Yanfei Wang, Computer Science, in progress
9. Liyuan Xiao, Computer Science, in progress

## **UNIVERSITY SERVICE**

Chair, Colloquium Committee, Department of Computer Science, 2009-2011.  
Member, Graduate Committee, Department of Computer Science, 2007-2011.  
Member, Promotion and Tenure Committee, Department of Computer Science, 2009-2011.  
Member, Scholarship/Awards Committee, Department of Computer Science, 2005-2011.  
Member, Graduate Admissions Committee, Department of Computer Science, 2002-2005.  
Member, Faculty Search Committee, Department of Computer Science, 2003-2004.  
Member, Grievance Committee, Department of Computer Science, 2002-2003, 2006-2008.  
Upsilon Pi Epsilon (UPE) Advisor, Department of Computer Science, 2004-2010.  
Liaison for Women in Science and Engineering, Department of Computer Science, 2007-2011.

## PUBLICATIONS

### Books

1. **L. Ruan** and D-Z. Du (Editors). *Optical Networks-Recent Advances*. Kluwer Academic Publishers, 2001.

### Journal Articles

1. T. Feng and **L. Ruan**. Design of Survivable Hybrid Wireless-Optical Broadband-Access Network. *Journal of Optical Communications and Networking*, 3(5): 458-464, May 2011.
2. T. Feng, L. Long, A. E. Kamal, and **L. Ruan**. Two-Link Failure Protection in WDM Mesh Networks with p-Cycles. *Elsevier Computer Networks*, 54(17):3068-3080, December 2010.
3. T. Feng, **L. Ruan**, and W. Zhang. Intelligent p-Cycle Protection for Dynamic Multicast Sessions in WDM Networks. *Journal of Optical Communications and Networking*, 2(7): 389-399, July 2010.
4. M. X. Cheng, **L. Ruan**, and W. Wu. Coverage Breach Problems in Bandwidth Constrained Sensor Networks. *ACM Transactions on Sensor Networks*, 3(2): Article 12, June 2007.
5. C. Liu and **L. Ruan**. A New Survivable Mapping Problem in IP-over-WDM Networks. *IEEE Journal on Selected Areas in Communications*, 25(4):25-34, April 2007.
6. **L. Ruan**, F. Tang, and C. Liu. Dynamic Establishment of Restorable Connections Using p-Cycle Protection in WDM Networks. *Optical Switching and Networking*, 3(3+4):191-201, 2006.
7. **L. Ruan** and F. Tang. Survivable IP Network Realization in IP-over-WDM Networks under Overlay Model. *Computer Communications*, 29(10):1772-1779, June 2006.
8. C. Liu and **L. Ruan**. p-Cycle Design in Survivable WDM Networks with Shared Risk Link Groups (SRLGs). *Photonic Network Communications*, 11(3):301-311, May 2006.
9. **L. Ruan** and W. Wu. Broadcast Routing with Minimum Wavelength Conversion in WDM Optical Networks. *Journal of Combinatorial Optimization*, 9(2):223-235, March 2005.
10. **L. Ruan**, S. Han, D. Li, Hung Q. Ngo, and S. Huang. Transmission Fault-Tolerance of Iterated Line Digraphs. *Journal of Interconnection Networks*, 5(4):475-487, December 2004.
11. **L. Ruan**, H. Du, X. Jia, W. Wu, Y. Li, and K. Ko. A Greedy Approximation for Minimum Connected Dominating Sets. *Theoretical Computer Science*, 329(1-3):325-330, December 2004.
12. **L. Ruan**, H. Luo, and C. Liu. A Dynamic Routing Algorithm with Load Balancing Heuristics for Restorable Connections in WDM Networks. *IEEE Journal on Selected Areas in Communications*, 22(9):1823-1829, November 2004.
13. X. Cheng, X. Du, M. Min, H. Q. Ngo, **L. Ruan**, J. Sun, and W. Wu. Super Link-Connectivity of Iterated Line Digraphs. *Theoretical Computer Science*, 304(1-3):461-469, July 2003.

14. X. Jia, X. Hu, **L. Ruan**, and J. Sun. Multicast Routing, Load Balancing and Wavelength Assignment on Tree of Rings. *IEEE Communications Letters*, 6(2):79-81, February 2002.
15. **L. Ruan**, D-Z. Du, X. Hu, X. Jia, D. Li, and Z. Sun. Converter Placement Supporting Broadcast in WDM Optical Networks. *IEEE Transactions on Computers*, 50(7):750-758, July 2001.
16. B. Lu and **L. Ruan**. Polynomial Time Approximation Scheme for the Rectilinear Steiner Arborescence Problem. *Journal of Combinatorial Optimization*, 4(3):357-363, September 2000.
17. D. Li, X. Du, X. Hu, **L. Ruan**, and X. Jia. Minimizing Number of Wavelengths in Multicast Routing Trees in WDM Networks. *Networks*, 35(4):260-265, July 2000.

### Refereed Conference and Workshop Papers

18. **L. Ruan** and T. Feng. A Hybrid Protection/Restoration Scheme for Two-Link Failure in WDM Mesh Networks, in *Proc. of Globecom 2010*, Miami, FL, December, 2010.
19. T. Feng and **L. Ruan**. p-Cycle-based Path Protection for Multicast Sessions in WDM Networks, in *Proc. of Chinacom 2010*, Beijing, China, August 2010.
20. T. Feng, **L. Ruan**, C. Wang, and H. Qin. PXT-based Path Protection for Multicast Sessions in WDM Networks, in *Proc. of 33<sup>rd</sup> IEEE Sarnoff Symposium*, Princeton, NJ, April 2010.
21. R. Koshy and **L. Ruan**. A Joint Radio and Channel Assignment (JRCA) Scheme for 802.11-based Wireless Mesh Networks, in *5th IEEE Broadband Wireless Access Workshop*, Honolulu, Hawaii, December 2009.
22. V. Srinivas and **L. Ruan**. An Efficient Reliable Multicast Protocol for 802.11-based Wireless LANs, in *Proc. of 10<sup>th</sup> IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM)*, Kos Greece, June 2009.
23. T. Feng and **L. Ruan**, A Multi-layer Adaptive Protection Scheme for IP-over-WDM networks, in *Proc. of 4<sup>th</sup> International Conference on Communications and Networking in China (CHINACOM)*, Xi'an China, Aug 2009.
24. T. Feng and **L. Ruan**. Design of Survivable Hybrid Wireless-Optical Broadband-Access Network, in *Proc. of the IEEE International Conference on Communications 2009 (ICC'09)*, Dresden, Germany, June 2009.
25. A. Dhananjay and **L. Ruan**. PigWin: Meaningful Load Estimation in IEEE 802.11 Based Wireless LANs. In *Proc. of the IEEE International Conference on Communications 2008 (ICC'08)*, pages 2541-2546, Beijing, China, May 2008.
26. T. Feng, **L. Ruan**, W. Zhang. Intelligent p-Cycle Protection for Multicast Sessions in WDM Networks. In *Proc. of the IEEE International Conference on Communications 2008 (ICC'08)*, pages 5165-5169, Beijing, China, May 2008.
27. T. Feng, C. Wang, W. Zhang, and **L. Ruan**. Confidentiality Protection Schemes for Data Aggregation in Sensor Networks. In *Proc. of the 27<sup>th</sup> IEEE Conference on Computer Communications (INFOCOM'08)*, pages 475-483, Phoenix, AZ, April 2008.

28. **L. Ruan** and Z. Liu. A Capacity Efficient Local Protection Scheme for Bandwidth Guaranteed Connections. In *Proc. of the IEEE International Conference on Communications 2007 (ICC'07)*, pages 6368-6373, Glasgow, Scotland, June 2007.
29. C. Liu and **L. Ruan**. Dynamic Provisioning of Survivable Services Using Path-Segment Protecting p-Cycles in WDM Networks. In *Proc. of 15<sup>th</sup> Int'l Conf. on Computer Communications and Networks (ICCCN'06)*, pages 275-280, Arlington, VA, October 2006. **Best paper candidate.**
30. C. Liu and **L. Ruan**. Logical Topology Augmentation for Survivable Mapping in IP-over-WDM Networks. In *Proc. of IEEE Global Communications Conference 2005 (Globecom'05)*, volume 4, pages 1885-1889, St. Louis, MO, November/December 2005.
31. **L. Ruan** and Chang Liu. A Heuristic Algorithm for Survivable Mapping in IP-over-WDM Networks. In *Proc. of 3<sup>rd</sup> IASTED Int'l Conf. on Communications and Computer Networks*, pages 164-170, Marina del Rey, CA, October 2005.
32. Z. Liu and **L. Ruan**. Reducing Restoration Blocking in WDM Optical Networks. In *Proc. of 14<sup>th</sup> Int'l Conf. on Computer Communications and Networks (ICCCN'05)*, pages 323-330, San Diego, CA, October 2005.
33. C. Liu and **L. Ruan**. p-Cycle Design in Survivable Networks with Shared Risk Link Groups (SRLGs). In *Proc. of 5<sup>th</sup> Int'l Workshop on Design of Reliable Communication Networks (DRCN'05)*, pages 207-212, Island of Ischia, Italy, October 2005.
34. **L. Ruan** and F. Tang. Dynamic Establishment of Restorable Connections using p-Cycle Protection in WDM Networks. In *Proc. of 2<sup>nd</sup> Int'l Conf. on Broadband Networks (Broadnets'05)*, pages 147-154, Boston, MA, October 2005.
35. F. Tang and **L. Ruan**. A Protection Tree Scheme for First-Failure Protection and Second-Failure Restoration in Optical Networks. In *Proc. of 3<sup>rd</sup> Int'l Conf. on Computer Networks and Mobile Computing (Lecture Notes in Computer Science 3619)*, pages 620-631, Zhangjiajie, China, August 2005.
36. **L. Ruan** and Z. Liu. Upstream Node Initiated Fast Restoration in MPLS Networks. In *Proc. of the IEEE International Conference on Communications 2005 (ICC'05)*, pages 959-964, Seoul, Korea, May 2005.
37. M. X. Cheng, **L. Ruan**, and W. Wu. Achieving Minimum Coverage Breach under Bandwidth Constraints in Wireless Sensor Networks. In *Proc. of the 24<sup>th</sup> IEEE Conference on Computer Communications (INFOCOM'05)*, pages 2638-2645, Miami, FL, March 2005.
38. C. Liu and **L. Ruan**. Finding Good Candidate Cycles for Efficient p-Cycle Network Design. In *Proc. of 13<sup>th</sup> Int'l Conf. on Computer Communications and Networks (ICCCN'04)*, pages 321-326, Chicago, IL, October 2004.
39. **L. Ruan** and H. Luo. Dynamic Routing of Restorable Lightpaths: A Tradeoff Between Capacity Efficiency and Resource Information Requirement. In *Proc. of the 7<sup>th</sup> IFIP Working Conference on Optical Network Design and Modeling (ONDM'03)*, pages 537-548, Budapest, Hungary, February 2003.

40. H. Luo and **L. Ruan**. Load Balancing Heuristics for Dynamic Establishment of Restorable Lightpaths. In *Proc. of 11<sup>th</sup> Int'l Conf. on Computer Communications and Networks (ICCCN'02)*, pages 472-477, Miami, FL, October 2002.
41. **L. Ruan** and H. Luo. A Fast Lightpath Restoration Method Using Two Backup Paths in WDM Networks. In *Proc. of 2002 Int'l Conf. on Parallel Processing Workshops*, pages 183-189, Vancouver, Canada, August 2002.
42. X. Jia, X. Hu, **L. Ruan**, and J. Sun. Multicast Routing, Load Balancing and Wavelength Assignment on Tree of Rings. In *Proc of 2001 IASTED Int'l Conf. on Wireless and Optical Communications*, pages 239-244, Banff, Canada, June 2001.
43. **L. Ruan**, D-Z. Du, X. Hu, X. Jia, and D. Li. Approximations for Color-Covering Problems. In *Proc of 1st Int'l Congress of Chinese Mathematicians*, pages 503-507, Beijing, China, December 1998.