Sundaram Rajagopalan (Sonny)

318 Wharton Drive, Newark, DE 19711
Phone: (302) 229-0507 (cell) or (302) 738-6382 (home) or (302) 831-1131 (lab)
E-mail: rajagopa@cis.udel.edu

Research Strengths

Mobile ad hoc networks, distributed systems, fault tolerant communications networks, peer-to-peer systems, content distribution, satellite networks, military and tactical networks, new architectures for future communications networks.

Profile Summary

- Over 5 years of research designing, analyzing new protocols for wireless mobile ad hoc/hybrid networks
- Quick learner with multi-disciplinary perspective
- Efficient communicator and writer
- Statistical analysis skills
- Grant-proposal writer, able to come up with new and exciting ideas to work on
- Skilled mentor
- Over $3\frac{1}{2}$ years as a software consultant/systems analyst in corporations in USA/India

Education

- **Ph.D. in Computer and Information Sciences**, Fall 2006 (expected),
  University of Delaware, Newark, DE.
  Dissertation title: "Swarm intelligence methods for mobile ad hoc networks."
  Dissertation advisor: Dr. Chien-Chung Shen.
- **M.S. in Computer and Information Sciences**, May 2001,
  University of Delaware, Newark, DE.
- **B. Tech. in Civil Engineering**, August 1995,
  Indian Institute of Technology, Madras (IIT-M), Madras, India.

Grant Proposals

Participated in and contributed to the writing of the following funded grant proposals. The principal investigator for both projects is Dr. Chien-Chung Shen.

- **NSF ANI-0240398:** Ad hoc networking with Swarm intelligence (3 years).
- **NSF ANI-0347460:** (CAREER award) Survivable hybrid networks (5 years).

Publications

Journals

1. **ANSI: A Swarm Intelligence-based Unicast Routing Protocol for Hybrid Ad hoc Networks**, Sundaram Rajagopalan, Chien-Chung Shen, Accepted, In (Elsevier) *Journal of systems architecture*, Special issue on Nature Inspired Applied Systems (Feb. 2006).
2. **Protocol-Independent Multicast Packet Delivery Improvement Service for Mobile Ad hoc Networks**, Chien-Chung Shen, Sundaram Rajagopalan, Accepted. In (Elsevier) *Ad hoc Journal* (Dec. 2006).
3. **A flexible routing architecture for ad hoc space networks**, Chien-Chung Shen, Sundaram Rajagopalan, Girish Borkar, Chaiporn Jaikaeo, in *Computer Networks*, Volume 46, Issue 3, pp 389-410, October 2004, Special issue on Networking for the Earth Sciences.

Conference/technical publications

1. **A Cross-layer, Decentralized BitTorrent for Mobile Ad hoc Networks**, Sundaram Rajagopalan, Chien-Chung Shen, in *MOBIQUITOUS* 2006, July 17–21, 2006, San Jose.
2. **What does using TCP as an evaluation tool reveal about the behavior/performance of MANET routing protocols?**, Sundaram Rajagopalan, Chien-Chung Shen, in *IWCMC* 2006, July 03-06, Vancouver, Canada.

3. **ANSI: A Unicast Routing Protocol for Mobile Ad hoc Networks Using Swarm Intelligence**, Sundaram Rajagopalan, Chien-Chung Shen, in *ICAI 2005*, Las Vegas, June 27–30, 2005.
4. **Assignment and Deployment of Multi-level Actors for Sensor-Actor Networks**, Sundaram Rajagopalan, Chien-Chung Shen, UD-CIS TR 2005-19, Technical Report, University of Delaware, USA, June 2005.
5. **Poster: Protocol-Independent Packet Delivery Improvement Scheme for Ad hoc Networks**, Chien-Chung Shen, Sundaram Rajagopalan, in *MASS 2004*, Ft. Lauderdale, FL, October 23–27, 2004.
6. **Ad Hoc Networking with Swarm Intelligence**, Chien-Chung Shen, Chaiporn Jaikaeo, Chavalit Srisathapornphat, Zhuochuan Huang and Sundaram Rajagopalan, in proceedings of *Ant Colony Optimization and Swarm Intelligence, 4th International Workshop, (ANTS 2004)*, Brussels, Belgium, September 2004.
7. **Interrogation-Based Relay Routing for Ad hoc Satellite Networks**, Chien-Chung Shen, Girish Borkar, Sundaram Rajagopalan, and Chaiporn Jaikaeo, in *GlobeCom 2002*, Taipei, Taiwan, November 2002.

Research Experience

DEGAS networking group, Dept. of Computer and Information Sciences, University of Delaware, Newark, DE.

Sensor-Actor Networks Nov. 2004 – Mar. 2005

- Designed a protocol suite for Assignment and Deployment of Actors (ADA) in a Sensor-Actor Network. The problem was solved as a distributed task assignment problem with deadlines and resource constraints.

Ad hoc Networking using Swarm Intelligence/
Survivable Hybrid Networks Fall 2002 – present

- Investigating applications of swarm intelligence to problems in peer-to-peer systems for mobile ad hoc networks.
- Investigated the usefulness of using TCP loads to evaluate routing protocols for mobile ad hoc networks.
- Investigating distributed/localized fault-tolerance algorithms for mixed mobile ad hoc/robot nodes networks.
- Working on applying concepts of mobility harnessing to trajectory control problems in partitioned MANETs.
- Working on applying concepts of survivability and heterogeneous domain routing to message delivery in partitioned networks and disruption-tolerant networks.
- Designed and implemented a swarm intelligence-based packet delivery improvement service, PIDIS, for ad hoc multicast protocols.
- Designed and implemented a swarm intelligence-based unicast routing framework, ANSI, for mobile ad hoc networks.

Interplanetary Networks Spring 2002 – Summer 2002

- Design and study of *Interrogation-Based Relay Routing* (IBRR), a relay routing scheme for inter-planetary networks proposed by NASA.
- Developed and formalized the concepts of *Intentional Routing* (IR) and *Attribute-based Naming* (AN) for facilitating mission-specific routing capabilities for IBRR.

Professional Activities

- Journal reviewer, IEEE Transactions in Mobile Computing, Journal of Wireless Communications and Mobile Computing.
- Technical Program Committee member/reviewer, ICC 2006.
- Conference/workshop reviewer, ICCCN, 2003, 2005; ISCC, 2004; WiOPT, 2004; MWN Workshop, 2004.
- Member, ACM/IEEE student chapter.

Work Experience

Intern Summer 2000
Provident Mutual, Newark, DE.

- Designed and devised a lab configuration with multiple networks for testing emerging network technologies, designed DMZs, researched load balancing, and set up load balancers with optimal algorithm to handle traffic efficiently.

Software Consultant Jun. 1997 – Jan. 1999
Mastech Systems Corp., Oakdale, PA.
(At client sites in Newark, NJ; Austin, TX; and Newark, DE)

- Designed and developed CICS/COBOL code and analyzed projects for Y2K vulnerability. Designed and developed scripting tools for expediting Y2K compliance.

Assistant Systems Analyst Aug. 1995 – Jun. 1997
Tata Consultancy Services, Madras, India.
(For clients in Orlando, FL (*GE Capital Assurance*) and in Netherlands/Nottingham (*CCN* at Netherlands and *PTT* in Nottingham, UK).)

- Designed and developed code for CardPac applications and wrote REXX programs for converting RPG on S/38 machines to COBOL on IBM 3x/9x.

Teaching Experience

Dept. of Computer and Information Sciences/Dept. of Physics, University of Delaware, Newark, DE. Jan. 1999 – May 2003

- Funded in the capacity of both an instructor and a TA.
- Developed course materials for all levels of the undergraduate computer science curriculum.
- Conducted quizzes and exams and evaluated student performance.
- Handled lab sessions for courses in the Physics dept. and Computer and Information Sciences and guided student experiments.

Selected Projects

Part of course work at the Dept. of Computer and Information Sciences, University of Delaware, Newark, DE. Sep. 2000 – Oct. 2002

- *Decision Tree Learning Algorithm:* Developed a LISP package for generating a decision tree for learning problems with any number of attributes.
- *Graph Search Algorithms:* Developed a LISP package for performing a bi-directional graph search, and implemented various uni-directional graph search techniques.
- *Subsumption Architecture Algorithms:* Designed and developed code for a robot using an ATMEL AVR chip.
- *SNMP Agent:* Designed and developed an SNMP MIB and agent (in C) for generating management information at a remote host running the SNMP agent.
- *TCP/UDP Applications:* Designed and developed web servers/clients and a stock quote server using TCP/UDP programming in Java.

Computer Skills

- **Languages:** C/C++, LISP, Java/JavaScript, SPARC assembly, COBOL, RPG
- **Tools:** QualNet, GloMoSim, PARSEC, lex/flex, yacc/bison, MATLAB
- **Scripting languages:** bash, Perl, PHP, sed, awk, REXX, CLIST
- **Operating Systems:** Linux, Sun OS, Windows, MVS, OS/2
- **Other:** Linux system administration

Awards & Honors

- Student Poster Competition winner, IEEE LEOS High-Speed Interconnects Workshop, Santa Fe, NM, May 2006.
- Spring 2004 Deans list, University of Delaware.
- Top 1% of 125,000 students in the national Joint Entrance Examination, Indian Institutes of Technology, Summer 1991, India.