

## FROM BITS TO BOTS: Women Everywhere, Leading the Way

Lenore Blum; Anastassia Ailamaki, Manuela Veloso, Sonya Allin, M. Bernardine Dias,  
Ariadna Font Llitjós; Jeannette Wing, Carol Frieze, Katia Sycara

School of Computer Science  
Carnegie Mellon University

There has been much discussion about the “problem” of few women in computing and the incredible shrinking pipeline. In her keynote address at the Y2K Grace Hopper Celebration, Rita Colwell, Director of the National Science Foundation, cited well known confirming statistics. Yet one of the most stunning experiences of participating in a Grace Hopper conference is seeing incredible women everywhere, charting new directions and leading the way. Does one have to attend such a conference to experience this phenomenon?

The theme of our proposed session is: *ubiquity of computing is closely linked to the ubiquity of women in computing*. Indeed, for computing to have great impact and yield wide benefit in both obvious and *non-obvious* ways, it is critical to bring diverse perspectives to the table. Moreover, as computing becomes even more ubiquitous, more women will be attracted to the field.

In this two part session, *we plan to demonstrate how this symbiosis can be harnessed to help increase the participation, and the quality of participation, of women in computing within the microcosm of one’s own institution* .

For the past three years, a dynamic community\* of women in computing has emerged at Carnegie Mellon University (CMU). This community consists of undergraduate and graduate students, faculty and researchers in the School of Computer Science (SCS). There are a number of factors that have come into play in creating this community. Our thesis is that one of the most important is our School’s broad view of computer science as a multi and interdisciplinary endeavor ---including areas ranging from core programming, systems and theory, to language technology, human computer interaction, entertainment technology, machine learning, AI and robotics.

Part 1 of our session will comprise a series of short interdisciplinary talks to demonstrate the broad range of areas that women in computing are currently developing. Part 2 will comprise a panel discussion on the dynamics, issues and challenges involved.

\*Women@SCS (see: <http://www.cs.cmu.edu/~women>)

**Session Length: 1 ½ hrs**

**Audience: General**

## **PROGRAM**

### **FROM BITS TO BOTS: Women Everywhere, Leading the Way**

**Moderator: Lenore Blum**

#### **PART 1. Ubiquity of Computing (short talks)**

**Anastassia Ailamaki, “Understanding the hardware helps develop more efficient database systems.”** For the past twenty-five years we have hoped that database performance would follow the processors' doubling speed curve, following Moore's law. This improvement, however, is not reflected in database performance on modern processors. The reason is that database systems aggressively access memory, whose speed has fundamentally lagged behind processor speed, exposing severe latencies. By understanding the interactions between the software and the underlying hardware, we have invented high-impact modifications for the database software to become conscious about the processor and memory subsystem, therefore utilizing the resources optimally and significantly improving performance.

**Manuela Veloso, “Towards Autonomous Learning Robots.”** In the talk I will discuss what are the main issues involved in the development of autonomous robots. I will specifically address the challenges underlying groups of robots that may collaborate towards the achievement of their goals. The talk will be focused on learning algorithms for improvement of perception and world modeling.

**Sonya Allin, “Measuring Just Noticeable Differences For Haptic Force Feedback: A Tool for Rehabilitation.”** I will discuss results from an experiment designed to derive just noticeable differences (JNDs) for force using a paradigm that will ground future rehabilitative environments and methodologies. Specifically, the experiment revealed thresholds of sensitivity for force in healthy individuals and victims of stroke. These sensitivities will guide the development of therapeutic force feedback distortions for the rehabilitation setting. The extent of our therapeutic distortions will stay below our determined thresholds.

**M. Bernardine Dias, “Robots Everywhere: From exploration in the arctic to helping the elderly at home.”** The Robotics Institute at Carnegie Mellon is leading the way into new frontiers in the field of Robotics, and women are at the forefront of some of their most challenging endeavors. As part of this effort, I have helped design and build robots for projects ranging from an agricultural robot to help alleviate the labor shortage in the nursery industry, to a NASA sponsored rover to prove the concept of sun-synchronous circumnavigation for planetary exploration, to my thesis work of heterogeneous multi-robot coordination in dynamic environments using a market based approach. I will present a brief overview of some of my work as well as other graduate women's accomplishments.

**Ariadna Font Llitjós, “Knowledge of language origin improves pronunciation accuracy of proper names.”** In the same way we use language origin as a key to adapt

our pronunciation when facing a foreign proper name, speech synthesis systems can use this information to improve their pronunciation model. We extracted language features automatically from multilingual corpora and added them to our pronunciation models, which yielded an improvement in pronunciation accuracy of proper names. If time permits, I may also talk about on-going work in multi-lingual speech applications, which have experienced a boost since September 11's tragedy.

## **PART 2. Panel: Ubiquity of Women in Computing**

**Panelists: will include Jeannette Wing, Associate Dean of SCS; Carol Frieze, Women@ SCS Program Associate; Katia Sycara; the above Speakers; and a subset of students who will be attending the GH Celebration.**

---

## **BIOGRAPHIES**

### **Moderator:**

**Lenore Blum**, PhD M.I.T., Distinguished Career Professor of Computer Science at Carnegie Mellon and faculty advisor to Women@SCS, is nationally known for her work in increasing the participation of girls and women in mathematics and scientific fields. For almost 30 years she has directed educational outreach programs at Mills College, at the Mathematical Sciences Research Institute and now at Carnegie Mellon University. She was co-founder of the Math/Science Network and its Expanding Your Horizons' conferences, the Mills Summer Mathematics Institute for Undergraduate Women, President of the Association for Women in Mathematics, and a promoter of diversity and public understanding of science and technology in her roles as Vice-President of the American Mathematical Society and Chair of the Mathematical Section of the AAAS (of which she is a *Fellow*). Lenore also is co-Director of the new NSF-ITR funded ALADDIN Center for ALgorithm Adaptation, Dissemination and INtegration with the high level goal of improving the process of incorporating powerful algorithms into application domains. (See: <http://www.cs.cmu.edu/~aladdin>)

### **Speakers (Part 1):**

**Anastassia Ailamaki** received a B.Sc. degree in Computer Engineering (1990) from the Polytechnic School of the University of Patra, Greece, M.Sc. degrees from the Technical University of Crete, Greece and from the University of Rochester, NY, and a Ph.D. in Computer Science from the University of Wisconsin-Madison. She is currently an Assistant Professor at the Carnegie Mellon School of Computer Science. Her recent work on cache-conscious data placement received a best-paper award in VLDB 2001. Her current research interests include database system design and performance, cache-resident databases, internet querying and caching, workload characterization, and scientific workflow management systems.

**Manuela Veloso** is Professor of Computer Science at Carnegie Mellon University. She received her Ph.D. in Computer Science from Carnegie Mellon in 1992. She received a B.S. degree in Electrical Engineering in 1980 and an M.Sc. in Electrical and Computer Engineering in 1984 from the Instituto Superior Tecnico in Lisbon. Prof. Veloso's research is in the area of Artificial Intelligence and Robotics. Her long-term research goal is the effective construction of teams of intelligent robots where cognition, perception, and action are combined to address planning, execution, and learning tasks, in particular in uncertain, dynamic, and adversarial environments. Prof. Veloso has developed teams of robotic soccer agents in three different leagues that have been RoboCup world champions several times: simulation, CMU-built small-wheeled robots, and Sony four-legged robots. Prof. Veloso was awarded an NSF Career Award in 1995 and the Allen Newell Medal for Excellence in Research in 1997.

**Sonya Allin** (B.S. in Computer Science and B.A. Cum Laude in English, Columbia University) is a Ph.D. student in the Human Computer Interaction Institute. She is a student of Dr. Yoky Matsuoka (Robotics Institute) and Dr. Roberta Klatzky (Psychology). Her research interests revolve around motor learning and control, and in constructing devices that augment or facilitate learning and control, particularly for the disabled. She has also been involved in various educational literacy programs for children and adults. In this domain she has taught at Playing to Win, a community technology center in Harlem, NY; Venture House, a vocational rehabilitation center for the mentally ill in Jamaica, Queens; and Pathways to Housing, a housing agency for formerly homeless adults in New York City. Sonya spearheaded our forum on *Girls, Technology and Education* and currently is spearheading a collaborative effort of students and faculty to design constructive strategy for "Computing Post WTC." She is a NSF Graduate Research Fellow.

**M. Bernardine Dias** (B.A. in Physics and Computer Science with a minor in Women's Studies, Hamilton College, 1998) is a PhD student in Robotics at CMU. She was a member of the NASA funded team that designed, built, and tested a robot in the arctic this past summer for 24-hour sun-synchronous circumnavigation and is currently working on her thesis in multi-robot coordination using a market-based approach. Her future aspirations are to work on creative ways of infusing new technologies into developing communities in a culturally sensitive manner.

**Ariadna Font Llitjós** is a PhD student in Language and Information Technologies (LTI). She has an B.A. in Translation and Interpreting from Pompeu Fabra University (UPF, 1996), Barcelona, Spain, an M.S. in Cognitive Sciences and Language (UPF, UAB, UB, URV, 1999) and an M.S. in Language and Information Technologies (LTI, CMU, 2001). Her research interests are in natural language processing, machine translation, dialog systems, speech generation and machine learning methods. Recently, she has been working on making speech synthesis more natural and on the fast deployment of dialog systems.

## **Panelists (Part 2):**

**Jeannette M. Wing** is a Professor of Computer Science at Carnegie Mellon University. She is the Associate Dean for Academic Affairs for the School of Computer Science and the Associate Department Head for the Computer Science Ph.D. Program. She received her S.B. and S.M. degrees in Electrical Engineering and Computer Science in 1979 and her Ph.D. degree in Computer Science in 1983, all from the Massachusetts Institute of Technology. Professor Wing's general research interests are in the areas of formal methods, concurrent and distributed systems, and programming languages. Her current focus is on applying automated reasoning tools to specify and verify embedded systems for their fault-tolerant, security, and survivability properties. Professor Wing is the author or co-author of over 70 refereed journal and conference papers, has presented over 140 invited and conference talks, and is or was on the editorial board of seven journals. She is a member of the National Academies Computer Science and Telecommunications Board. She was a member of the DARPA Information and Science Technology Study (ISAT) Group and the National Science Foundation Scientific Advisory Board. She was on the Computer Science faculty at the University of Southern California and has worked at Bell Laboratories, USC/Information Sciences Institute, and Xerox Palo Alto Research Laboratories. She has also consulted for Digital Equipment Corporation, the Mellon Institute (Carnegie Mellon Research Institute), System Development Corporation, and the Jet Propulsion Laboratory. She is a member of ACM (Fellow), IEEE (Senior Member), Sigma Xi, Phi Beta Kappa, Tau Beta Pi, and Eta Kappa Nu. Professor Wing was elected an ACM Fellow in 1998.

**Carol Frieze** is a Carnegie Mellon alumna having received a Master of Arts in English and Cultural Studies in 1989. She taught Cultural Studies in the CMU English department for 4 years and also worked as a student academic advisor in the College of Humanities and Social Sciences. As the Program Associate for Women@SCS she works closely with the Women@SCS Advisory Committee and web site team to organize a wide range of professional and social activities/events. In a relatively short time the Committee has grown (by Oct. 2001 there were a total of 46 members--22 undergrads and 24 graduates). As more and more students participate in Women@SCS activities, the students' input and energy is transferred to the whole community. Indeed, women students have contributed to curriculum input, workshops, and student tutoring. On a first hand basis, and every day, Carol sees these talented women sharing their abilities, energy and creativity for the benefit of the greater SCS community, while all the time studying and working to achieve their academic goals.

**Katia Sycara** is a Research Professor in the School of Computer Science at Carnegie Mellon University. She is also the Director of the Advanced Technology Laboratory. She holds a B.S in Applied Mathematics from Brown University, M.S. in Electrical Engineering from the University of Wisconsin and PhD in Computer Science from Georgia Institute of Technology. She has given numerous invited talks, and has authored or co-authored more than 150 technical papers dealing with Multiagent Systems, Software Agents, Negotiation, Case-Based Reasoning and the application of these techniques to manufacturing, crisis action planning, scheduling and financial planning. She has served as the General Chair of the Second International Conference on

Autonomous Agents (Agents 98), as the Chair of the Steering Committee of the Agents Conference (1999-2001) and a member of the AAAI Executive Council (1997-99). She is a founding member and member of the Board of Directors of the International Foundation of Multiagent Systems (IFMAS), and is the Scholarship Chair of the American Association for Artificial Intelligence. She is a Founding Editor-in-Chief of the journal "Autonomous Agents and Multiagent Systems"; an Editor-in-Chief of the Springer Series on Agents; on the Editorial Board of the Kluwer book series on "Multiagent Systems, Artificial Societies and Simulated Organizations"; the Area Editor for AI and Management Science of the journal "Group Decision and Negotiation" and on the editorial board of ETAI journal on the Semantic Web. She has served on the Editorial Board of "IEEE Intelligent Systems and their Applications", "AI in Engineering" and "Concurrent Engineering: Research and Applications" She is a member of AAAI, ACM, and Senior Member of IEEE.

## STUDENTS

**The following students will be attending the GH Celebration. A subset will be on the Panel and all will be available to discuss issues and answer questions.**

### Graduate Students:

**Allison Bruce** (B.S. in Computer Science with a minor in Engineering Studies, Carnegie Mellon University, 2000) is a second-year Ph.D. student in Robotics. She is currently building a robot which responds in social situations with appropriate facial gestures and comments. Her research interests include multimodal robot interfaces to facilitate interaction between robots and people. Allison is a recipient of a Clare Boothe Luce graduate fellowship.

**Rose Hoberman** (B.A. in Computer Science, University of Texas at Austin, 2000) is currently a second-year Ph.D. student in Computer Science. Her research focuses on incorporating semantic information into existing statistical models of natural languages. As an AT&T grant recipient, she spent her previous summer developing techniques for spoken language understanding for use in a human-computer telephone dialog system.

**Maayan Roth** (B.S. in Computer Science, minors in Robotics and Engineering Studies, Carnegie Mellon University, 2001) is currently a first-year Ph.D. student in Robotics. Her research focuses on the coordination of teams of heterogeneous robots and she is specifically interested in space and planetary robotics applications. Maayan is an NSF Graduate Research Fellow.



**Undergraduate students:**

**Agata Bugaj** is a sophomore Computer Science major with a minor in French. Besides being on the Advisory Committee for Women@SCS, Agata is a Course Assistant and Tutor for the Introductory Programming classes at Carnegie Mellon. Last summer she worked at West Virginia University, managing the web page and setting up online courses for the Statistics Department. Her interests include music, languages, and traveling. Agata has been playing the violin for 14 years, and is Principal Second of the Pittsburgh Youth Symphony Orchestra. Although born in Warsaw, Poland, Agata's family now resides in Michigan.

**Sue Yi Chew** is a freshman in Carnegie Mellon School of Computer Science and hails from Kuala Lumpur, Malaysia. While yet to decide on a minor, she is considering a range of specializations from economics to psychology and AI. Her motto in life is to max effort and be among the best there is in my areas of interest, plus have fun while at it!

**Hui Lin Chin** is a Computer Science freshman in Carnegie Mellon University. She is also an international student from Malaysia and planning to minor in Computational Finance. Currently, she is the Secretary of BUDAYA (the Malaysian Student Organization) is part of the BUDAYA web page team. Her interests include community service organized by non-profitable organizations such as the Girl Guides' movement, computer science education among women and intellectual games such as chess.

**Anjali Gupta** is a sophomore undergraduate at Carnegie Mellon. She is pursuing a Computer Science major along with a Business Administration minor. Actively involved in the Women@SCS program, Anjali acts as the co-coordinator of the Big Sister/Little Sister mentoring initiative. She is also a course assistant for one of the introductory programming courses in Java. Anjali is also involved with the campus community as a member of the cultural organizations and the Judiciary board.

**Bingbin (Jennifer) Li** is a sophomore undergraduate at Carnegie Mellon University. She is pursuing a career in Computer Science and Business Administration. Jennifer originally came to the United States at the age of 10. She is actively involved with Women@SCS's advisory committee and web team. Last summer, Jennifer worked for Lockheed Martin Air Traffic Management. Her interests include piano and flute.

**Bernice Ma** is a sophomore undergraduate student at Carnegie Mellon University. In addition to majoring in Computer Science, she is also interested in minoring in Robotics and Biomedical and Health Engineering. This past summer, she worked with a professor at Carnegie Mellon to develop a fault diagnosis tool for NASA. During the school year, she works with the Women@SCS web team and is an active member of Women@SCS Advisory Committee.

**Leah Miller** is a senior undergraduate at Carnegie Mellon. She will graduate this spring with a degree in Computer Science and a minor in Business Administration. Leah has helped organize and construct the Living LEGO City with local children. She is a

teaching assistant for Technical Consulting in the Community, a course where students are paired with the executive director of a local non-profit and work to expand the capacity of the organization through a technical consulting process. Leah has been a leading member of the Women@SCS Advisory Council and has been involved in other efforts to improve and enrich the computer science community at Carnegie Mellon. Her interests include technology in children's education, the use of computer science and technology to affect social change, and studying and improving factors that contribute to the changing role of women in science and engineering.

**Denise Noyes** is a sophomore undergraduate majoring in Computer Science at Carnegie Mellon and is interested in pursuing a minor in Gender Studies and History. The past two summers she worked as a web designer, focusing on interactive Flash design and was responsible for handling all the technical aspects of the company. While at CMU, Denise is very involved with the Women@SCS Advisory Council where she helps to organize many events for the CS community and acts as a co-coordinator of the Big Sister/Little Sister mentoring program.

**Indrani Mondal** is a sophomore majoring in Computer Science and minoring in business and math at Carnegie Mellon University. She is very involved with different organizations at Carnegie Mellon including the Delta Gamma fraternity, "*Readme*," the Carnegie Mellon humor journal, the Women's Center, the Student Life office, as well as Women@SCS Advisory Committee. This past summer she worked as an precollege counselor, basically acting as a resident assistant as well as mentor for a group of high school juniors at Carnegie Mellon. She is very interested in learning about robotics, as well as graphics.

**Gail Ronen** is a Computer Science junior at Carnegie Mellon University minoring in Mathematics and Business Administration. Last summer, she was a Software Design Engineer Intern at Microsoft working with .NET technologies in mobile services. In past summers, she has interned at Digital5, an embedded systems solutions provider, and AT&T Labs working on audio handheld devices and microbilling projects. At Carnegie Mellon, she is one of the webmasters of the Women@SCS site and a member of the Women@SCS Advisory Committee. Her hometown is West Windsor, NJ but she was born in Haifa, Israel.