

Viterbi School of Engineering Research Innovation Fund Report

COMPUTATIONAL SCIENCE WORKSHOP FOR UNDERREPRESENTED GROUPS

Aiichiro Nakano

*Collaboratory for Advanced Computing & Simulations (CACs), Department of Computer Science, Department of Physics & Astronomy, Department of Chemical Engineering & Materials Science, University of Southern California
3651 Watt Way, VHE 610, Los Angeles, CA 90089-0242*

1. Summary of the Program

This fund has provided partial support for our annual Computational Science Workshop for Underrepresented Groups (CSWUG), in which undergraduate students and faculty mentors from underrepresented groups built a parallel computer from components and performed parallel computing exercises on it. Experts were invited to make presentations on the use of high performance computing and simulations (HPCS) in science and engineering. At the end of the workshop, each student/faculty participant was given a compute node to bring back to his/her institution. The CSWUG, which is partially supported by the Department of Defense (DOD) and National Science Foundation (NSF), will bring high visibility to USC Viterbi School of Engineering (VSoE) as a national center to:

- Spearhead the introduction of HPCS on emerging petaflops parallel supercomputers into defense and other research areas;
- Provide critically needed training in many-core parallel computing for a new generation of scientists and engineers from underrepresented groups;
- Create external funding opportunities (such as NSF-IGERT and DOD-MURI programs) through the integration of HPCS research and career development.

2. Outcomes and Impact

The eighth CSWUG was held on June 22-27, 2009 on the USC campus. Twenty undergraduate students and ten faculty mentors, primarily from Historically Black Colleges and Universities (HBCUs) and Minority Serving Institutions (MSIs), participated in the workshop. Two faculty and eleven graduate research assistants (one assistant for each group of 2 undergraduate students and a faculty mentor) from USC conducted the workshop activities.

The workshop provided the participants with hands on experience in parallel computing, Grid computing, and immersive and interactive visualization. At the workshop, student and faculty participants built a parallel computer from components (building PCs, installing software, and connecting PCs through a switch) and then used it to perform a number of parallel computing exercises.

Five experts were invited to make presentations on emerging opportunities for research and education in computational sciences. The speakers and topics were:

- Hideyuki Usui (Kobe University, Japan)—*Solar Power Satellites*
- Andrea Armani (Chemical Engineering and Materials Science, USC)—*Nanotechnology*

- Gaurav Sukhatme (Computer Science, USC)—*Robotics*
- Lin H. Yang (Lawrence Livermore National Laboratory)—*Quantum-level Simulations of Materials*
- Philip Maechling (Southern California Earthquake Center)—*Earthquake Research*

In addition, Associate Dean of Doctoral Programs, Margery Berti, from VSoE has given a lecture to encourage the students to pursue advanced degrees and gave them advice about selecting the right graduate school. Also, Senior Associate Dean for Strategic Initiatives, Prof. Cauligi Raghavendra, from VSoE spoke about the importance of diversity for the future science and engineering.

At the end of the workshop, each student and faculty participant received a computer to bring back to his/her institution, which is critically needed for their research and learning.

The CSWUG 09 was featured in the September 7, 2009 issue of *USC Chronicle* (“Complex Concepts Add Up—Science Workshop Encourages Students and Faculty to Pursue Research in Computing” by Leyla Ezdini, also in the July 14, 2009 issue of *USC News*, <http://uscnews.usc.edu/>).

3. New Directions

We will publish a workshop report that includes the summary of workshop activities and findings as well as profiles and career goals of all participating students. The workshop report will be mailed to all major universities, previously participated HBCU/MSI institutions, and funding agencies to enhance the visibility of USC-VSoE as a national leader of HPCS research and education. This in turn will create external funding opportunities, *e.g.*, through NSF-Integrative Graduate Education and Research Traineeship and DOD-Multidisciplinary University Research Initiative programs.

The future plans of the participants of this workshop are to seek support from NSF, DOD, DOE, and other funding sources to:

- Establish parallel computing infrastructures at their institutions;
- Form collaborative research groups for expanding interdisciplinary initiatives in high-performance parallel computing;
- Increase outreach activities among high-school students for recruitment into science and engineering disciplines;
- Improve and expand curricula in high performance parallel computing in applicable disciplines;
- Create satellite centers for training of faculty and students in high performance parallel computing to remotely participate in future workshops.