

High Tech Maui

Maui Garners Research Grants from the Air Force Office of Scientific Research



The MSSS Observatory includes the Air Force Maui Optical Station (AMOS), and the Ground-based Electro-optical Deep Space Surveillance System (GEODSS).

With grants totalling \$1.8 million, the Air Force Office of Scientific Research (AFOSR) has made a major commitment to support basic research at AMOS, the observatories atop Mount Haleakala.

The Air Force Research Laboratory/Directed Energy Branch Investigation has added staff to the site as part of its continued commitment to conducting basic research. Of the 13 research proposals submitted to AFOSR by AMOS researchers on Maui

(2 in FY2001, 11 in FY2002), 11 have been approved for funding. This is a strong showing; AFOSR usually funds just 1 out of 5 proposals submitted to them. In addition, AFOSR awarded a five-year Partnership in Research Excellence and Transition (PRET) grant to the University of New Mexico (UNM) for technologies supporting AMOS.

From the submissions received, the AMOS basic research review board chooses those that best fit the goals of both the funding source and AMOS. Considered are the quality and nature of the proposed topics, the relevance to the AMOS mission, and the amount of work that will be carried out on AMOS or by AFRL. Appropriate topics are then turned into multiple page white papers, which the review board ranks in order of preference and forwards to AFOSR for final selection.

The grants share the fundamental goals of producing faster, more robust imaging algorithms that will provide better information for the warfighter in shorter timeframes.

They include: Partnership For Research Excellence And Transition In Advanced Imaging Sciences; Nonlinear Image Processing Algorithm Characterization And Enhancement; Small Satellite Imaging, Characterization, And Orbital Prediction; Estimation Theoretic Analysis Of High Resolution Thermometry; Studies Of Atmospheric Turbulence Via Simultaneous Infrared And Visible Adaptive Optics Imaging; Space Environment Effects And The Optical Properties Of Spacecraft Materials Estimation Theoretic Tomography for Opaque Object Reconstruction Using Reflective Projections; Temporal Aperture Synthesis Imaging Using Millimeter Waves; New Approach To Programming Languages For Parallel Machines; Cluster Orbits With Perturbations Of Keplerian Elements (COWPOKE) Equations; Merging Chemo-Optical Computation Techniques And Novel Laser Actuated Opto-Mechatronic Materials: High Resolution High Bandwidth Super-Adaptive Optics; Ground-Based Optical Investigations Of Spacecraft And Ballistic Objects.

These studies also provide new ways to obtain functional information on satellites, such as higher-quality LWIR images, increased ability to determine health and status, better health and status information on satellites from non-imaging data as well as the means to characterize the coming generations of small satellites and higher quality orbital predictions, lowering the number of observations needed to maintain an orbit. HTM

Did you know?

Hawaii ranks 5th in the nation for the number of adults completing college; 85% of adults have a high school diploma, and one in five residents is fluent in both English and at least one additional language.



The Third Annual Meeting Visions 2002: Emerging Technology & The Meeting Planning Industry, will draw professional meeting planners and top technology experts to Wailea, Maui, December 5-9. Roundtable sessions and panel presentations will include topics on e-Conferencing, Internet-based Solutions, Data Management, Best Practices and Wireless/Wireline Communications. www.mautechnologyforum.com.

The Air Force Research Laboratory's Detachment 15 welcomes Lt. Col. Jeffrey McCann, who assumed command in July of the Maui High Performance Computing Center in Kihei and the Maui Space Surveillance System atop Haleakala. Most recently, he served as chief of the Air Force's Starfire Optical Range in New Mexico. The facilities employ 21 military and civilian personnel and more than 200 contractor personnel.

SuperComputer 2002, the largest conference on the topic, will be held November 11-16, 2002 in Baltimore, Maryland, with an expected 5,000 attendees. Dr. Bob Borchers, Chief Technical Officer of the Maui High Performance Computing Center (MHPCC), is on the planning committee and has long held a prominent position in the conference. As the largest supercomputer in the Department of Defense, MHPCC will share its expertise and knowledge with attendees.



The MHPCC Challenge Projects include researching the effects of turbulent airflow around aircraft and improving surface ship hull design.

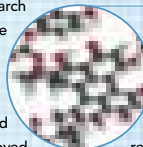
Maui High Performance Computing Center Provides Advanced Research Support for the U.S. War Fighter

Challenge Projects represent the most difficult research and development initiatives undertaken by the Department of Defense (DoD) and result in the next generation of weapons systems, advanced laser applications, vastly improved sensor and surveillance capabilities, and much more.

As a Distributed Center of the Department of Defense (DoD), Maui High Performance Computing Center (MHPCC) this year will support nine specific Challenge Projects for the DoD High Performance Computing Modernization Program (HPCMP). Over 3 million hours of computing time have been allocated to support these high priority research projects, primarily for the Air Force and Navy. The Air Force Challenge Projects support research in Radio-Frequency (RF) weapons design, the effects of turbulent airflow around aircraft, modeling the propagation of lasers through the atmosphere, and the design of new materials for products for improved jet fuel and anti-cancer agents. Challenge Projects for the Navy include research for improved forecasting of ocean circulation and climate conditions, improved surface ship hull design, and detailed environmental prediction models.

MHPCC's primary computing resources that are applied to these Challenge Projects include Tempest, a 53-node, 812-processor IBM Power3 system, and Huinalu, a 260-node, 520-processor Intel Pentium3 Linux Supercluster. The Tempest system is among the largest in the world, and

Huinalu is the largest cluster of its type within the HPCMP. In total, MHPCC has nearly 2,000 computer processors with a combined theoretical peak performance of 2.36 teraflops (trillions of calculations per second.) The size and power of MHPCC computers enable DoD researchers to simulate



Researchers are using computational chemistry and materials science design to study advanced materials. The molecule Calphostin (above) is of interest as potential anti-cancer drug.

entire aircraft and ship designs at high-grid resolutions while also engineering new materials by simulating large molecular structures and atomic interactions. In total, the advanced simulation capabilities provided by MHPCC allow scientists and engineers to attack problems that were previously not possible.

MHPCC is an Air Force Research Laboratory Center managed by the University of Hawaii. MHPCC is ranked in the top 20 supercomputing sites in the world and is one of the premiere HPC sites in the Department of Defense. HTM



TechOhana Brings Together Maui's High Tech Community

Last May, the Maui Research & Technology Center (MRTC) created a program to bring together people involved in the technology industry on Maui by providing virtual incubation services and an opportunity to network with peers and resource providers.

The TechOhana program consists of two tracks. The first track is a monthly networking event open to anyone interested in Maui's technology industry. Events are held monthly, and include a short presentation on a relevant topic in business or technology, followed by the opportunity to network with others interested in seeing the technology industry on Maui continue to grow. Each month, participants gather to hear keynote presentations ranging from a key member of the Maui High Performance Computing Center's founding team; Science Applications International Corporation (SAIC); a Research Professor from the Maui Scientific Research Center, and two candidates for Governor who focused on their vision for Hawaii's growing tech industry. Participants include technology company founders, executives or CEOs, investors, business service providers, technology workers, scientists, engineers, entrepreneurs, part-time residents or retirees in any of the above fields and students with business and technology majors.

The second track is designed for growth-oriented technology companies moving beyond the concept stage. This portion of the program allows selected technology companies who apply and are accepted an opportunity to affiliate with MRTC as "virtual tenants." Value-added services include:

- Access to a select network of TechOhana service providers willing to provide discounted or pro bono services to TechOhana members,
- Use of selected MRTC facilities and equipment such as conference rooms, projectors, short-term "offices for a day," mail delivery and package receipt, and the ability to leverage the MRTC brand.
- A monthly event exclusively for TechOhana virtual tenants, and executives from existing MRTC tenant companies, with attendance limited to business founders and executive staff. These events will likely have a theme, and allow ample time for networking and sharing of lessons learned and successes with peers in the industry.

TechOhana is organized by a partnership between the High Technology Development Corporation, the Hawaii Small Business Development Network, The County of Maui, and the Maui Economic Development Board, Inc.

To be placed on TechOhana's e-mail list for information on upcoming events, contact info@medb with "Subscribe to Maui TechOhana e-mail list" in the subject line. HTM

Maui Company Wins Third Place in International Business Plan Competition

This summer a Maui-based company, the Homeschool Learning Network (HLN), won 3rd place and \$20,000 in cash and services after a final presentation and awards ceremony at the Fusion 2002 Venture Capital Showcase.

Pacific Business Forums hosted "Fusion-2002: Hawaii's New Venture Showcase," a 3-month business plan competition to encourage and empower the next generation of entrepreneurs and business leaders locally. The competition drew venture capitalists and angel investors from the mainland and Asia. "We were thrilled and honored to win third place among such esteemed new business ventures," said Homeschool Learning Network President and CEO Patricia Carnabuci.

Carnabuci founded the Homeschool Learning Network, Inc., in September 2001 to empower home educators and their families with the knowledge and skills to excel in the 21st century. To accomplish this, HLN provides an engaging, interactive, and affordable online environment to the national home school audience. With an estimated one million home schooled students across the country, the one billion dollar industry is growing at 11% per year and is in need of a high-quality and safe e-education resource where students can learn and collaborate together. "We are definitely filling a much needed niche," Carnabuci explains. "Our mission is to improve our country's education and provide daily, interactive thematic units at a very low cost. None of our competitors are currently doing this."

Carnabuci created HLN based on her experience as founder of Education World, one of the top K-12 education portals online today, and of The Learning Zone, an e-commerce site for home schoolers. With a team of 13 experts, who have a combined 30 years of e-education experience, Carnabuci designed and implemented HLN based on the needs of home schoolers. HLN also recently created a strategic partnership with Homeschool.com, the largest portal for home school students, which Carnabuci expects will help drive membership.

A resident since 1996, Carnabuci has found Maui's advanced telecommunication infrastructure helpful, making it easy for her to successfully operate her business and work with her staff. In addition, Hawaii has proved to be the ideal location for this business because of the recent state legislation that provides tax credits to Qualified High Technology Businesses (QHTB) and their investors. "Without QHTB," said Carnabuci, "HLN would not have secured its initial round of funding." Carnabuci plans to pass on the benefits of QHTB to her second-round investors.

Before HLN, home schoolers were limited to collaborating with local home school groups and finding catalogs for expensive paper-based curricula. Membership into HLN opens up a whole new world. It provides daily thematic units with 5-8 lessons, including activities and worksheets for grade levels K-12 in topics ranging from Shakespeare, Castles of the World, Rocks and Minerals and "September 11, 2001 - Standing Together to Heal Our Children." Currently, HLN has released over 200 such thematic unit titles,

Maui Supercomputer Hosts Cadet Summer Intern Program



Who would have thought studying at an Academy for the U.S. Department of Defense would include a summer on Maui? That's what happened for 3 Air Force Cadets, 1 West Point Cadet, and 1 Midshipman from the Naval Academy this past summer at the Maui High Performance Computing Center (MHPCC). Each intern worked 3-5 weeks on a research project of their choice, such as: passive millimeter wave imaging; high performance visualization and data set analysis; Linux cluster scaling and performance analysis; and calibrating Maui Space Surveillance System mounts atop Mount Haleakala. The Cadets/Midshipmen gained practical knowledge of high performance computers, state of the art observatories, the Air Force, Air Force Research Laboratory, and Maui, while MHPCC benefited from the additional research talent.

Last December, MHPCC sent white papers to the Department of Defense Academies, detailing potential research projects, length of time, location, and prerequisites for applicants to understand the level of work. Cadets/Midshipmen at all the Academies competed for projects based on class rankings, locations, and field of interest. At the completion of the program, each Cadet/Midshipman presented a final paper to a broad audience of military, technical, and management personnel.

The High Performance Computing Modernization Office and Air Force Research Lab funded the Cadet Summer Intern Program. HTM

One of the cadets gets a hands-on demo of the laser and optical systems used to study the earth's upper atmosphere at the Maui Space Surveillance Complex from resident Air Force personnel, Capt Josh Snodgrass and MSgt Rob Medrano.

President Bush Honors Mentornet as Model for E-Mentoring

MentorNet, the leading-edge email and Internet network that links women engineering and science students with professionals in these fields, has received the 2001 Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring.

The four-year old, Silicon Valley-based non-profit is among 10 institutions and 10 individuals that were honored by President Bush at the White House.

The awards program, administered on behalf of the National Science Foundation, recognizes outstanding achievement for promoting participation in scientific and engineering careers.

"Women represent only about twenty percent of college enrollment in engineering programs," explains Carol Muller, MentorNet founder and executive director. "Not surprisingly, they also are significantly underrepresented in engineering and the related sciences workforce."

Since MentorNet began rolling out its program in 1997, it has emerged as the leading force in e-mentoring. The program has grown from serving 15 college and universities to more than 115 academic institutions from the Massachusetts Institute of Technology to Maui Community College in Hawaii. The organization now boasts more than 6,000 students and mentors.

Women In Technology (WIT), which is a project of the Maui Economic Development Board Inc., brought MentorNet to the State of Hawaii by recruiting students at Hawaii Community College on the Big Island; Honolulu Community College, Kapiolani Community College, and the Leeward Community College, all on Oahu; Kauai Community College,

Maui Community College, University of Hawaii-Hilo and University of Hawaii-Manoa.

Last year, the WIT team recruited female students at the University of Hawaii-Hilo to be mentees, where they signed up Crystal Kaneshiro, a Computer Science and Mathematics major. "I found MentorNet to be very helpful in planning the years after I graduate," said Kaneshiro based on her experience this past school year. "It gave me insight into the industry as to what I should expect and what I should strive to achieve. I got a lot of feedback on questions I have been wondering about since my freshman year."

Frances Driesbach, owner of Driesbach Data has been a mentor with MentorNet for the past two years. "Looking back, I might have made different choices when I was in school," says Driesbach, "I've been happy to mentor and share my industry experience and perspectives over the past two years and am looking forward to being a mentor again this year." HTM

and also provides state-based thematic units for Alaska, California and Hawaii with plans to incorporate all 50 states as the company grows.

"We use a proprietary Content Management System to enhance the production capabilities and user experience," explains Carnabuci. Members also have unlimited access to a librarian via email for any unanswered questions, record keeping documents to track progress and courses of study, a search engine with 20,000 home school related links, a curriculum library with over 2,000 rated and reviewed resources, and archives to over 2,000 pages of thematic units.

To build community, HLN members log on to their local learning environment. Once there, they can view the daily curriculum or choose a topic from the archive; view other students' poetry, art and writings in the online gallery; or work on an Endangered Species collaborative project, where each member across the country will report on a different species. Members can locate and network with others in their area to share ideas and plan field trips and activities.

By the end of 2002, HLN plans to hire 5-6 full-time staff with expectations to quadruple that number by 2004. "As the Homeschool Learning Network becomes more of a household name for home schoolers across the country, we plan to be an international collaborative e-resource for alternative educators worldwide," Carnabuci said. HTM



AMOS Technical Conference 2002 Leading Scientists and Engineers Gather on Maui

Over 300 scientists and engineers from around the globe, who are leading experts in space surveillance, participated in the successful AMOS Technical Conference which was held September 16-20, 2002 at the Outrigger Wailea Resort on Maui. Presenters submitted over eighty papers and posters, which proved to be very informative and highlighted relevant research being conducted in the fields of laser applications, high performance computing, orbital debris, astronomy, adaptive optics and imaging. Optional tours showcased the astronomical assets at the Mauna Kea Observatories on the Big Island, the Pacific Missile Range Facility on Kauai, the Maui High Performance Computing Center and the Maui Space Surveillance System atop Mount Haleakala.



An AMOS Conference highlight included a virtual flyover of Mars, which was a demonstration of The Virtual Universe Project by Eric DeJong of the California Institute of Technology's Jet Propulsion Laboratory.



Engineer Laura Stephens, a student at the University of Hawaii-Hilo, is helping the Women In Technology (WIT) team to recruit female students as mentees with MentorNet and encouraging them to pursue non-traditional careers.

Are you interested in the incubation/phase-in program at Maui Research & Technology Center, a project of the State's High Technology Development Corporation? Contact Steve Perkins, Program Manager, at steve@mrtc.org or (808) 875-2432.

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For more information, visit the High Tech Maui website at:

<http://www.hightechmaui.com>

Maui Community College is First National Center for High Performance Computing Technology Training

This summer, the National Science Foundation (NSF) awarded a 3-year grant to Maui Community College (MCC) to become the first training center in the country for high performance computing. MCC saw a need to provide a local skilled workforce for the Maui High Performance Computing Center (MHPCC), the largest and fastest supercomputer in the Department of Defense, so in 2000 it submitted a proposal to NSF for funding to establish a High Performance Computing (HPC) training program. NSF counter-offered with a planning grant for MCC to plan the formation of a national training program for an articulated Associate Degree in HPC technology. One year later, after extensive forums and meetings with HPC sites, technicians, related businesses and colleges, MCC is ready to begin the launching stage of their program.

As lead institutions, MCC and MHPCC created a consortium with Wake Technical Community College in North Carolina, Pellissippi State Technical Community College in Tennessee, and Contra Costa College in California. Each was chosen for its diverse student populations, partnerships with HPC sites and regional business and industry, and potential four-year college affiliations. These four community colleges, together with seven affiliate supercomputer sites and business partners, will constitute the first National Science Foundation Advanced Technology Education Center of Excellence for HPC technology. The National Center will partner with business and industry to develop skill set standards and competencies needed for certifying HPC technicians and for developing the Associate Degree. The Regional Education and Training Centers (RETCs), established at each community college, will develop curriculum in high-performance technology that will articulate with four-year college information science, computer science, and HPC technology programs. Additionally, it will include the establishment of 2+2 agreements with regional high schools' Tech Prep Programs.

The NSF grant supported a nationwide survey that revealed that within the next 2 to 5 years:

- 71% of surveyed business and industry will utilize high-performance computing
- PC-cluster use will grow by 9% and there will be a distinct shift offsetting the balance between PC-cluster and supercomputer use in favor of PC-clusters
- Industry will continue to struggle to recruit, train and/or retain HPC employees
- Based on survey findings and employment projections, the number of HPC positions for which associate degree holders will be eligible will be 164,397 – at minimum by 2008.

Industry researchers concur, the Beowulf concept (PC-Cluster) is an empowering force. It wrests high-level computing away from the privileged few and makes low-cost, parallel-processing systems available to those with modest resources. Research groups, high schools, colleges or small businesses can build or buy their own Beowulf clusters, realizing the promise of a supercomputer in every basement.

MCC will be responsible for the following:

- creating and administering a web-based certification examination for technical personnel
- overseeing curriculum development and teaching methodologies
- developing strategies for recruitment, retention and placement
- creating a national repository of PC-cluster software, curricula and training materials for HPC technician educational programs; providing professional development activities for college faculty, secondary teachers and business professionals
- developing and providing a consortium communications infrastructure, and
- supervising dissemination, evaluation and reporting activities.



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