

High Tech Maui

Improvements to National Defense System

UNDERWAY ON MAUI AND KAUAI



Pacific Missile Range

Few Americans will forget the opening days of the Gulf War. Live TV brought the technology of modern warfare into our homes. Air raid sirens wailed in darkened Saudi skies, as Iraqi Scud missiles descended towards their target. U.S. Army Patriot missiles destroyed nearly all the Scuds before they ever hit the ground.

Sadly, some of the missiles did hit their targets and American lives were lost. The threat of rogue nations launching missiles - possibly harnessed with weapons of mass destruction is ever-present.

The Maui High Performance Computing Center (MHPCC), in collaboration with the Pacific Missile

Range Facility on Kauai, is developing state-of-the-art software to continually improve the accuracy of our nation's defense system. MHPCC is under a task order contract to provide advanced weather modeling support for the Navy's Theater Ballistic Missile Defense (TBMD) program, which is developing and testing an advanced shipboard surface-to-air ballistic missile defense system over the next decade. The project's objective is to provide detailed weather data and infrastructure for enhanced missile trajectory calculations for PMRF test and evaluation and training range users. MHPCC is designing advanced weather prediction models for integration with the Navy's current Trajectory Analysis and Optimization System (TAOS) model software. Integrating TAOS with the new weather forecast model will provide for better planning for missile trajectories, results predictions, and debris fallout forecasting.

MHPCC is performing development activities in support of the Office of Naval Research (ONR) Future Naval Capabilities

(FNC) demonstrations of UESA radar and related technologies at PMRF. Under this activity, MHPCC has ported and developed parallel software program advanced radar signal processing and electromagnetic performance modeling packages to MHPCC computers, which has assisted in the evaluation of the current traditional Navy E-2C Hawkeye Airborne Early Warning radar system and its ability to host a new, advanced technology UESA phased array antenna being developed by the Navy. Also being developed is a multi-source data server for remote users to request and filter test data collected at PMRF via internet web site access. This would allow for near real-time transfer of data and processing results as well as remote visualization of PMRF data and use of instrumentation network information.

MHPCC's support of the Defense Modeling and Simulation Office's (DMSO) Pacific Synthetic Range study will augment PMRF efforts through the efficient integration of live and synthetic assets using modeling, simulation, and computing technologies to provide more effective training and testing at reduced costs. Currently, technology and trends definition support for the study phase and examination of the porting of the next generation of software for follow-on phases of work is in process. In the long-term, a full synthetic range model capability that can be employed at PMRF and other US military ranges is the objective.

PMRF's mission is to provide integrated range services in a modern, multi-dimensional environment, which ensures the safe conduct of training, test and evaluation, and R&D programs assistance in support of national defense objectives. PMRF provides the Fleet with realistic open ocean and near shore operations areas for aircraft, surface ships, submarines, and their associated weapons and electronics systems. The range controls over 42,000 square miles of open ocean range from the surface to unlimited altitude near the Hawaiian Islands chain. PMRF also includes over 1,100 miles of fully instrumented underwater ranges.



Missile launch at PMRF



1 The newly formed Maui Enterprise Forum, a consortium of public and private stakeholders in Maui's economy, is modeled on business forums held at Harvard Business School and MIT. The group provides the opportunity for entrepreneurs in Maui growth companies to present business plans for constructive critical review to an audience of peers and potential investors. The presentations and dialogue are web cast live, and beginning in February will be archived for viewing at [HTTP://mauienterpriseforum.net](http://mauienterpriseforum.net). For more information, contact David Fisher at 808-875-2404 or dfisher@maui.net

2 The second annual AMOS conference will be held September 10 - 14, 2001 at the Outrigger Wailea Resort on Maui. Scientists and engineers from around the globe who are leaders in space surveillance will present papers related to recent, present and planned experiments and technological developments taking place at the Maui Space Surveillance System. The technical sessions will focus on imaging and image processing, photometry and radiometry, LADAR and LIDAR, orbital debris, near-Earth objects, small portable telescopes, astronomy, and high-performance computing. <http://ulua.mhpcc.af.mil>

3 The successful Kama'aina Come Home program is again planned for Las Vegas on May 4 - 6 and September 20 - 22, 2001. A blend of cultural, academic, government and business interests, the multi-faceted program includes a business presentation and job fair, as well as a luau and performance by Kamehameha Schools Choir. The interaction focuses on issues and opportunities for kama'aina students and career professionals living on the Mainland who wish to return to live in Hawaii.

Maui Tech Companies

Showcased in PBS Series On Hawai'i Technology Industry



Stewart Cheifet

Computer Chronicles, a public television series that reaches 3,000,000 viewers internationally with 300 stations in the U.S. and 100 stations in other countries, will air its first ever 4-part series on "High Tech Hawaii" on consecutive Saturdays beginning February 3rd.

Stewart Cheifet, founder and host of Computer Chronicles, who has been called The Dean of Television Computer Journalists, pioneered the field 17 years ago when he created and launched the award-winning public television series to address the interests of computer enthusiasts. Past episodes have featured, among others, Taiwan, Hong Kong, India, France, and Israel. He spent 12 days in December capturing footage of the high tech industry on Maui, O'ahu, Kauai and Hawaii for the show. Working with the partners of Economic Development Alliance of Hawaii (EDA) — Maui Economic Development Board, Kauai Economic Development Board, Hawaii Island Economic Development Board and Pacific International Center for High Technology Research — Cheifet interviewed over two dozen industry insiders on the four Islands ranging from dual use enterprises such as Pacific Missile Range Facility and Trex Enterprises, to successful tech companies such as Oceanit and the Maui High Performance Computing Center to start-ups such as Micro Gaia and 1st Domain.Net. He also interviewed Governor Ben Cayetano and Maui Mayor James "Kimo" Apana.

Distance Learning
Technology Upgrades
Improve Opportunities
for Maui Students

For almost twenty years, distance learning technology has made it possible for students around the State of Hawai'i to attend college without setting foot on campus.

Now, a new statewide network upgrade of the outdated analog system will be based on TCP/IP protocols and provide each island with OC-3 connectivity for both interactive video as well as data connectivity. Microwave and/or fiber optics will connect all University of Hawai'i (UH) campuses and Maui Community College (MCC) Education Centers, and each location will have new routers and switchers. All existing UH Hawai'i Interactive Television System (HITS) and MCC SkyBridge classrooms will be equipped with MPEG coders, decoders and echo cancellers to provide high-quality video over the new Internet-based network, and the network will use advanced next-generation Internet technologies, including Quality-of-Service and multicast, to distribute video.

In 1982, MCC used funding from Title III, a federal education grant program, to install a 9-meter satellite dish, enabling it to broadcast telecourses on its own cable TV station for students living in the rural areas of East Maui (Hana), Lana'i and Moloka'i. In 1986, a grant from the National Telecommunications and Information Administration (NTIA) brought forth the SkyBridge, a full-motion interactive video teleconferencing system utilizing microwave transmission via Haleakala.

In the fall of 1989, the University of Hawai'i developed its own Hawaii Interactive Television System, which uses the same microwave technology to enable students from Maui, Kaua'i, and Hawai'i to work on B.A. and M.A. degrees from UH Manoa without moving to O'ahu. Maui students attend UH classes at Maui Community College campus, which houses HITS classrooms equipped with studio cameras, ELMO overhead cameras, 55" TV monitors, and computers with Internet access.

"The new high-speed Internet-based network will provide future capacity and flexibility for ongoing expansion of both interactive video as well as other forms of asynchronous distance learning."

Clyde Sakamoto,
Provost for Maui Community College and
University of Hawai'i Center

Pacific E-health Innovation and Hawaii Researchers

Researchers from Maui, the Pacific E-Health Innovation Center at Tripler Army Medical Center on O'ahu, Kaua'i and Hawai'i are collaborating on several innovative E-health projects. Funded by the Department of Defense, the projects are earmarked for research on improving medical treatment at remote military medical facilities that have short-term commercial applications that would benefit the public sector.

In conjunction with Tripler Army Medical Center, a telemedicine project designated as RAMS-MT (Remote Access to Medical Specialists - Maui Testbed) is managed and directed by Trex Enterprises located in the Maui Research & Technology Center. A close collaboration by experts throughout Hawai'i will result in a concept of operations (CONOPS) for medical technology transfer from Tripler Hospital.

One of the notable projects that RAMS is pursuing is the remote monitoring of ICU critical care patients. Currently, ICU monitoring devices display information in real time only to those watching the device. Device readings are not stored electronically, and physicians must spend hours wading through paper printouts to evaluate readings from the past. Monitoring devices could improve if readings such as EKG waveforms, blood oxygen levels, blood pressure, and others were digitally captured, analyzed and sorted until the medical professional was available, rather than the real-time requirement generally used. The system would also allow medical specialists to remotely monitor patient status in near real time via a secure Internet connection. By adopting the technology, remote medical facilities could have the input of expert specialists on emergencies as they happen. In less urgent scenarios, specialists could review and analyze information from the devices as their schedule allowed, perhaps saving the patient an in-person visit.

RAMS team members are also investigating the development of a decision support program designed to assist providers in interpreting patient monitoring information. The benefits to such an application are clear. The program could trigger an alarm when critical events occur, or provide treatment options based on information gleaned from the entire database of clinical information. Additionally, providers could choose to review only device data meeting specific criteria, without wading through hours of routine readings.

As part of the RAMS program, Trex Maui Sensors is developing methods of capturing, transmitting, and viewing digital radiographic images. The images would be transmitted via the Internet to a secure server, and read by the receiving physician on a high-resolution computer monitor. As in the ICU device project, software developed to recognize patterns and anomalies outside of the norm could assist the physician in interpreting the image.

Trex Maui Sensors has developed a specialized package of hardware needed for the remote capture and transmission of X-ray images. The hardware is destined for military service, and expected to enter the inventory of remote military facilities. The system is completely digital, without using bulky film or developer chemicals. The system consists of a small X-ray generator, a flat panel digital X-ray image sensor, and a PC using the familiar Windows NT operating system. All of the components of the system are FDA approved and used in other applications, and Trex is adapting the components for military field medicine use. The quality of the images is equal to traditional film when viewed on the high-resolution TFT monitors. Each of the digital images has an average size of approximately 12 MB, and a variety of remote transmission methods are being explored.

The telemedicine project with Tripler Army Medical Center is also examining ways of improving existing DOD E-health programs. A traditional tumor board is a group of physicians who gather regularly to discuss care options and treatment management of patients with cancer. Specialists at Tripler have formed an Internet based tumor board to service remote locations while saving time and money. Each week, the Internet Tumor Board (ITB) uses Internet meeting software to review digital photographs of tumors while participating physicians are connected via a conference call allowing physicians from all over the Pacific to communicate in real time. This has resulted in a reduced number of medical evacuations, better communication between primary care providers and specialists, and less disruption for seriously ill patients.

Taking it one step further, the Tripler Program is exploring methods of allowing physicians to post comments and suggestions for the tumor board patients as their schedule allows since physicians are not always able to fit the meetings into their schedules. A secure web site containing images of the cases of the week and comments from colleagues would allow the experts to collaborate without meeting in real time. ■

Maui High Performance Computing Center

ROLLS OUT LINUX SUPER CLUSTER

The Maui High Performance Computing Center has added one of the world's largest Linux super clusters to its inventory.

The Maui High Performance Computing Center has added one of the world's largest Linux super clusters to its inventory. At 256 nodes, each sporting two Pentium III 933 Mhz processors, the cluster is able to reach a theoretical peak speed of 478 billion floating point operations per second. The cluster runs on Linux, a variation of UNIX developed by the Finnish computer programmer Linus Torvalds. The nodes, or individual machines in the cluster, are networked together with high-speed Ethernet connections.

Super clusters bring two advantages to complex data crunching. First, even when the nodes used are quality workgroup servers or high end desktop PCs, they are still less expensive than enterprise class servers or supercomputers. As well, the cluster gains the synergy of parallel processing, where all the processors in the cluster are each simultaneously working on discreet portions of the same problem.

MHPCC is using the cluster to solve problems that lend themselves to parallelization, such as computer modeling and simulation, processing weather data and other natural phenomena, and computational chemistry.



PROJECT IMPACT Keeping Maui Safe

GIS Map of Hana Bay

When a disaster hits - whether it be a hurricane, flood, tsunami, wildfire, drought or earthquake - the last thing a homeowner or business wants to consider is what they should have done to save lives and reduce property damage. While Maui County has been fortunate with few major disasters experienced in recent years, the community is now taking pro-active measures to be prepared through Project Impact. An initiative of the Federal Emergency Management Agency (FEMA) begun in 1997, this program is changing the way America deals with natural disasters. Its goal is to reduce the personal and economic costs of disasters by bringing together community leaders, citizens, businesses and government to prepare for and protect against the ravages of nature.

With involvement from five active committees and 35 partner businesses and organizations, Project Impact has already carried out several worthwhile and necessary projects on Maui. Among these efforts are the Hazard and Risk Vulnerability Assessment (RVA) and the Multi-Hazard Mitigation Strategy (HMS), developed through a unique partnership between the County of Maui and its Project Impact program, the Rhode Island Emergency Management Agency, the National Oceanic and Atmospheric Administration/Coast Services Center, and NASA/Prescott College.

The RVA deals primarily with identifying critical areas on Maui that need strengthening and determining the vulnerability of these areas to natural disasters employing Geographic Information System (GIS) technology, data layered maps generated by the county departments with assistance from the Pacific Disaster Center. In addition, the team from NASA/Prescott College used their cutting edge modeling programs to provide 3-dimensional virtual tours of Maui island in various potential disaster scenarios. Their visualization helped underscore the need for hazard mitigation planning and action. As a result of this technology, data on areas such as airports; harbor ports; special need populations; economic centers; environmental, historic and cultural areas; and other critical sites can be accessed and the necessary precautionary measures planned for in advance.

The HMS is the action plan currently being built to address the potential problems and how to avert them. The process includes conducting an island-wide survey to identify the current strengths and weaknesses of Maui's disaster mitigation strategies.

Are you interested in the incubation/phase-in program at Maui Research & Technology Center? Contact Duane Kim, Program Manager, at duane@mrtc.org or (808) 875-2432.

High Technology Development Corporation
Ph: 808.539.3814 Web site: www.hitechhawaii.com
Maui Community College/University of Hawaii Center on Maui
Ph: 808.984.3213 Web site: www.mauicc.hawaii.edu

For more information,
visit the High Tech Maui web site at:

<http://www.hightechmaui.com>

Partner on high tech

health projects

Trex Portable Digital X-ray Prototype

Pacific Disaster Center Facilitates New Global Disaster Information Network

The Global Disaster Information Network (GDIN) is an international group established to facilitate the voluntary, timely exchange of information, worldwide, on all disaster management functions. The Pacific Disaster Center, located in the Maui Research & Technology Center (MRTC), is a participant in GDIN and is a regional sub-group of GDIN for Asia and the Pacific.

The aim of the new group, called the Asia Pacific Disaster Information Network (APDIN) working group, is to improve the access of emergency managers to a range of products and information services based on science, data, and information technology resources. One of several planned APDIN activities is an exercise in information sharing to be held later this year. By using a seminar/game exercise format and a complex Asia-Pacific disaster scenario, APDIN participants will explore how to identify, coordinate, and apply the information resources available within the region to improve emergency management decision-making.

The Pacific Disaster Center headquarters on Maui is a federally funded center designed to support government emergency managers with timely and reliable information on environmental hazards, such as fires, floods, and tsunamis and exists to bring new technology, tools, and processes to that community. The center gathers raw data from a wide variety of sources, including satellites, the National Weather Service, the Pacific Tsunami Warning Center, and the Hawaii Volcano Observatory. Highly specialized analysts, using custom computer applications, massage the raw data into useful information for disaster management customers. While based in MRTC, PDC has branch offices on O'ahu, one located at Fort Shafter and the other at the Diamond Head Emergency Operations Center. The PDC staffs in these offices provide support to and function as team members of FEMA, State Civil Defense, and U.S. Pacific Command located at Camp Smith. A robust fiber telecommunications infrastructure allows PDC to connect reliably to their satellite offices and easily communicate with customers via the Internet.



First Annual Meeting Visions Held at Wailea Resort

Meeting Visions 2000: Emerging Technology and the Meeting Planning Industry was held at the Wailea Resort December 7th through 11th. Presented by Maui Economic Development Board and Technology Meetings magazine, the conference focused on the latest technological advances and their application to the meeting planning profession.

The conference was kicked off with a well-received keynote address from Stewart Cheifet, host and managing editor of the award-winning Public Television Series *Computer Chronicles*. Cheifet presented "The Death of Distance - The Birth of E," focusing on how society's business and personal norms will continue their rapid change as we are even more electronically interconnected.

A total of 46 national leaders represented corporations and associations including Nortel, Dell, Oracle, IBM, Pacific Bell, Cisco, Kaiser Permanente, UCLA, Honeywell, Hewlett-Packard and Random House. The interactive roundtable sessions addressed five broad stroke topics: Wireless/Wireline Communications, Data Management, Internet, Imaging, and Smart Facilities. Over 25 presenters from companies such as Sun Microsystems, McGettigan Partners, The Venetian Resort, Verizon, and a host of Internet based planning solution providers shared their perspective and facilitated dialogue between the conferees.

High Tech Maui Newsletter Participants

Maui Economic Development Board, Inc., Editor
Ph: 800.298.6284 Email: info@medb.org Web site: www.medb.org
Maui Research and Technology Park
Ph: 808.873-8100 Web site: www.mrtp.com
Maui Research & Technology Center
Ph: 808/875-2320 Email: duane@mrtc.org Web site: www.mrtc.org
Maui High Performance Computing Center
Ph: 808.879.5077 Email: info@mhppcc.edu Web site: www.hmppcc.edu

University of New Mexico
Web site: www.unm.edu
Office of Economic Development, County of Maui
Ph: 808.270-7710 Web site: co.maui.hi.us
Air Force Research Laboratory
Ph: 808.874-1541 Web site: ulua.mhpc.af.mil
The Boeing Company
Ph: 808.875.4500 Web site: www.boeing.com

Computer Operator

Computer Operator Apprenticeship Program

Debuts LAN Training on Maui

With a community desire to bring Maui's apprenticeship programs into the high tech arena, the federally funded Women in Technology program spearheaded the formation of the Maui Apprenticeship Advisory Committee, bringing together leaders from the Hawai'i State Department of Labor & Industrial Relations (DLIR); Maui's largest employers - Hawaiian Commercial & Sugar (HC&S) and Maui Electric Company; small start-up tech companies; Labor Unions; the County Department of Economic Development; and Maui Community College. With strong energy and a collaborative network, the committee fast-tracked development of a proposal for a "computer operator" set of standards that would incorporate training for a local area networking specialty. The goal for this new apprenticeship program is to have statewide adoption and impact, creating a more robust and tech-ready workforce. Its approval marked only the second set of standards approved by the State Apprenticeship Committee Department of Labor and Industrial Relations in the last twenty years.

The computer operator apprenticeship program is open to both male and female students, yet the Women in Technology program which focuses on female students in the 11th and 12th grade felt it was a natural fit for their goals. Research confirms that an optimal learning environment for women in technology education is through team-based and hands-on teaching models. By bringing technology learning into the proven work experience, one-on-one instruction and mentoring environment that is defined by apprenticeship programming, the mission will be served admirably.

In fact, the formal recruitment and application process began in July and the final qualified list of applicants included 7 women among the 11 candidates. After the interview process, the top 2 candidates were women who were selected by pilot employers Maui Electric and MauiNet. The program will include 4000 hours on-the-job training and the companion curriculum will lead to a 2-year A.S. degree and certification from Maui Community College's Electronic and Computer Engineering Technology program.

WOMEN in TECHNOLOGY

Paradise

SCIENCE BEHIND

Hawai'i Nature Center's Interactive Nature Museum: Connecting Kids to Nature

For almost two decades, Hawai'i Nature Center, a non-profit organization, has been teaching children about our island's environment. Their dedicated efforts have helped to instill and encourage environmental ethics in the hearts and minds of thousands of Hawai'i's children and visitors who have experienced their unique hands-on approach to learning.

Hawai'i Nature Center's most ambitious project to date is the Interactive Nature Museum. Located in the heart of 'Iao Valley on Maui, this world-class natural science arcade is a place where nature is fun and science is cool. Featuring more than 30 state-of-the-art exhibits and live animal and stream displays, this interactive facility interprets the inspiring story of Hawai'i's natural history brought to life through important biological concepts - isolation, interdependence, biodiversity, dispersal and adaptation.

For visitors, the museum is an adventuresome and educational attraction for children of all ages. A towering glass solarium presents ever-changing views of the valley, while rushing water flows over rock formations into touch pools and aquariums of native streamlife. Rainforest explorations, dispersal arcade games, live insect and stream animal exhibits, and a dragonfly ride all encourage personalized experiences with nature in a safe and enriching setting.



Hawai'i Nature Center engages children in a wide array of activities.



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Maui Economic Development Board, Inc. • 590 Lipoa Parkway, Suite 103 • Kihei, Maui, Hawai'i 96753 U.S.A.

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