

Issued 2nd Friday of every month.

The September *APL News* will be devoted to recognition of employee service awards.

1	Kudos to Tom Sanford
2	Funding Received
3	New R/V in the Water New Library Books
5	Golf Tourney Winners



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NEWSLETTER OF THE APPLIED PHYSICS LABORATORY • UNIVERSITY OF WASHINGTON

Sanford Awarded Prestigious Chair

APL-UW proudly announces that Tom Sanford has received a Secretary of the Navy/Chief of Naval Operations Chair of Oceanographic Sciences award for 2008.

The Chair program stems from the recognition by the SECNAV and CNO that oceanography, from science and technology to operations, is a core Navy competency. The \$1.2M award provides four years of support for the Chair and at least two graduate students. The award recognizes Sanford's reputation as an international leader in the field, the broad support of his research programs across many sponsoring agencies, and his successful collaborations with scientists and engineers to develop instruments and collect field observations. Sanford plans to use the resources offered by the Chair to deepen his exploration of ocean responses to tropical storms and ocean processes in remote strong flows, and to emphasize new or expanded exploitation of sensors and systems based on ocean electric and magnetic fields.

As Chair, Sanford will participate in ONR departmental reviews, help to identify promising new opportunities in oceanographic sciences, and participate in the synthesis of recently completed ONR initiatives. His service as an advisor to the Chief of Naval Research and Navy departments will continue after the 4-year period, as the Chair is granted as a lifetime award.

"This very prestigious award, presented by Admiral Roughhead (CNO) and Donald Winter (SECNAV), is well deserved. Tom has led in understanding e-field in the marine environment and in developing unique e-field tools for measuring, monitoring, and sensing within the ocean, primarily to advance knowledge of the complex and coupled processes within that environment." – Jeff Simmen

Also named a Chair of Oceanographic Sciences this year is Professor Tommy Dickey of the University of California, Santa Barbara. Sanford and Dickey are the 11th and 12th chairs since the program's inception in 1984. They join an esteemed group: Robert Holman, William Kuperman, Walter Munk, James O'Brien, Carl Wunsch, Robert Ballard, John Orcutt, Arthur Baggeroer, Robert Weller, and our own Mike Gregg.



Tom at sea with the Absolute Velocity Profiler, his ocean density and velocity profiler based on e-field sensing.

Amazing Undergrad Scholars at APL-UW

Heidi Biggs

Several students are receiving support to conduct interesting and pertinent research with some of the brilliant scientific minds at APL-UW. The following are inspired undergraduates who are working their way through college while doing research here with APL-UW mentors.

Their funding comes from one of two scholarships: the Hardisty Undergraduate Scholarship, named to honor Patricia Hardisty, and the Boeing-APL Undergraduate Scholarship for Women, Underrepresented Minorities and Economically Disadvantaged Students. The Hardisty Scholarships are funded with internal Lab funds, and the Boeing Scholarships are funded by a generous grant from the Boeing Company. Both provide an hourly salary for up to 20 hours/week for the students (full time over breaks and summers) and a one-time book award of \$500. (Have you checked the price of a freshman physics book lately?)

Three students, **Robbie Burns**, **Kang Yu**, and **Susie Lu**, are working under the Hardisty Scholar Program and three, **Tamisha Downing**, **Charles Harris-White**, and **Ella Willard-Schmoe**, are

[continued on page 4](#)

Beware New Airline and Rental Car Fees

Delta Air Lines is doubling its fee to check a second bag on domestic flights to \$50 as part of a set of fee increases to offset the high cost of fuel. The changes will apply to customers who purchase a ticket for travel on or after 5 August. Fees for specialty items that require special handling, such as surfboards or ski equipment, will also increase on domestic and international flights, Delta said.

As of 17 July, airlines are imposing the following checked baggage fees,

(from the U.S. General Services Administration *Baggage Allowance Fact Sheet*.)

Airline	1st Bag	2nd Bag
Alaska	\$0.00	\$0.00
Delta	\$0.00	\$50.00
Frontier	\$0.00	\$25.00
Northwest	\$15.00	\$25.00
United	\$15.00	\$25.00
US Airways	\$15.00	\$25.00

According to various news agencies, rental car companies will soon start charging **\$8 per gallon** to refill cars upon their return. This cost can most easily be avoided by refilling

the tank yourself before returning the vehicle. If you opt for prepaying for gas, make sure you understand whether you'll be hit with extra agency fees.

Since smaller, fuel efficient cars are in high demand right now, be wary of being upgraded to a full size car or an SUV, which will greatly increase the cost of fuel. If you get stuck with a gas guzzler through no fault of your own, you can try asking the rental agency to pay for a tank of gas to help offset fuel costs.

New Arrival at Chickadel Home!

Proud father Chris reports: it took a while, but Gianetta (Gina) Lee Chickadel is here! She was born on Friday, July 25th, weighing 6 lbs and measuring 20" long. Everyone's doing well and enjoying her company.

The Chickadel boys enjoy their new baby sister.



Funding Received

Exploitation of Thermal Signals in Tidal Flat Environments, Chris Chickadel from ONR, \$80,000

Turbulence Parameterization and Lateral Mixing, Eric D'Asaro from ONR, \$47,930

Nonlinear Inversion: Supplement and Extension, Bob Odom from ONR, \$125,000

Nanophotonic Devices in Silicon for Nonlinear Optics, Bob Miyamoto from Mandex/ONR, \$23,000

An Experiment Comparing the Performance of Vector and Pressure Sensor Arrays, Dan Rouseff from ONR, \$137,233

Nanophotonic Devices in Silicon for Nonlinear Optics, Antao Chen from USAFOSR, \$80,000



APL-UW's New R/V Nears Completion

The Lab's new research vessel, to be christened the *R/V Jack Robertson*, made its first journey on Monday, 4 August. It was towed from the warehouse of the Little Hoquiam Shipyard, where it has been under construction since last fall, to a nearby inlet and launched. There is still some outfitting to be completed,



and sea trials to follow. Though a delivery date is not set in stone, if the remaining work and tests go as planned, it is hoped that the vessel will be in Seattle at the end of the summer.

New Books

Empirical Methods in Short-term Climate Prediction, by Huug M. van den Dool.
QC 997 V35 2007

Explosion and Blast-Related Injuries: Effects of Explosion and Blast from Military Operations and Acts of Terrorism, by Nabil Mohamed Elsayed and James L. Atkins.
RD 96.7 E97 2008

Geophysical Inverse Theory, by Robert L. Parker.
QC 808.5 P37 1994

Heat Conduction, by M. Necati Ozisik.
QC 321 O34 1993 (2nd edition)

Inverse Problem Theory and Methods for Model Parameter Estimation, by Albert Tarantola.
QA 371 T357 2005

Inverse Problems in Underwater Acoustics, edited by Michael I. Taroudakis and George N. Makrakis.
QC 242.2 I58 2001

Mastering MATLAB 7, by Duane Hanselman and Bruce Littlefield.
QA 297 H296 2005

MATLAB : An Introduction with Applications, by Amos Gilat.
QA 297 G48 2008 (3rd edition)

Notes on Acoustics, by Uno Ingard.
QC 225.15 I56 2008

Parameter Estimation and Inverse Problems, by Richard C. Aster, Brian Borchers, and Clifford H. Thurber.
QA 276.8 A88 2005 (Text and disc)

continued from page 1

supported by the Boeing Company Scholar Program.



Robbie Burns is working under the guidance of Peter Dahl. He is a physics major at the UW who just finished his sophomore year. After taking Dahl's freshman level discovery seminar called, "What Is Sound?" Robbie contacted him about possible research opportunities focused on the physics of sound. Peter invited Robbie to help analyze data from a study on the acoustic ecology of Puget Sound. Robbie is analyzing underwater ambient noise data collected by a PALD (Passive Aquatic Listening Device) by organizing it by frequency band to try to understand the distribution of frequency in ambient noise. Studied over time, the researchers hope to observe anthropogenic sources of ambient underwater noise and their effects on underwater ecology, specifically on endangered animals such as the Southern Resident Killer Whale.



Kang Yu is studying the uses of high-intensity focused ultrasound to measure intracranial pressure with Pierre Mourad. The potential medical application of such research would be to assess head and brain trauma accurately and at early stages in a head injury case. The theory guiding their research process follows that at higher intracranial pressures, the human brain is stiffer. Using an ultrasound transducer, the researchers are in effect 'tapping' the brain with a beam of ultrasound, measuring how indented the brain surface is by the beam. How quickly the brain responds tells Kang and company how stiff a brain is, and thus what the intracranial pressure is.

Currently, the team is conducting lab experiments on a chicken breast in a Coke bottle—a mock

brain, head, and brain cavity. The researchers can control the atmospheric pressure in the Coke bottle to simulate a pressurized brain cavity. The chicken breast's smooth surface and homogenous construction make for easier testing than the wrinkled and veined brain, so it is a good subject for initial testing and numerical model generation. Eventually the researchers hope to generate an algorithm for intracranial brain pressure that can be applied to a medical device, perhaps used by military and civilian emergency medical teams to quickly deduce the level of head trauma in patients. Kang admits to not knowing exactly where he sees himself going in the future but medicine and medical devices seem interesting to him and his work at the Lab will definitely advance any career path he chooses to take in those arenas.



Shan (Susie) Lu is an industrial engineering and art major who thought research would be the most interesting job she could have while at school. She found a posting by Antao Chen on an online UW forum and is now doing extremely proactive and productive work to generate zinc oxide nano wires. Susie and Antao are interested in the response of zinc oxide nano wires when exposed to DNT gases, which have a chemical compound very closely related to TNT but without the explosive properties. The possible applications of an accurate method of testing chemically for explosives could be valuable in airports, schools, and in the military.

Susie's self-guided research took her through many articles to find the best way to generate the zinc oxide nano wires. She discovered that quartz tube furnaces were one good way to consistently produce the nano wires—she has now built a tube furnace and worked out a reliable method of nano wire production.



Tamisha Downing has no major as of yet—she has just completed her freshman year at the UW. In Pierre Mourad's lab she's been studying high intensity focused ultrasound used to detect localized sources of pain by simulating candidate pain generation. Basically, they are taking a focused beam of ultrasound, pointing it at a painful area of the body, and trying to localize the specific place the pain is coming from. Accurately identifying the source of pain, instead of having a patient complain about general pain in a complicated and large area such as 'the lower back,' will speed diagnosis and expedite recovery. Tamisha's specific duties have been to prepare animals for testing and to expose the tested animals to ultrasound.

Their experimental device works by comparing ultrasound sensation between damaged and undamaged tissues. The current testing procedure is to start the ultrasound at a very low intensity and alternate sending the beam to a damaged and then non-damaged area while gradually increasing the intensity of the beam until sensation is achieved. It has been found that ultrasound will illicit sensation in damaged tissue before a non-damaged area.



Charles Harris-White has applied himself heartily in Tim Elam's lab at APL-UW. Charles is a technical communications major at the UW. When asked how a technical communications major got a job at the Lab he answered that he'd previously been working at the Mathematics, Engineering, Science Achievement (MESA) Program and was referred to APL-UW from there. Now Charles is learning the ropes of X-ray fluorescence testing.

Using an X-ray spectrometer, researchers can analyze the elemental

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composition of just about anything. Charles has been working to refine the previous APL-UW spectrometer to be more adapted to particular applications such as the detection of trace amounts of lead without picking up readings of lead in other nearby objects. Charles jumped into the project, picking up the concept of the spectrometer's functioning enough to redesign it, but also learning how to use the machine shop so that he could fabricate a new design. He is now learning Solid Works, a 3-D computer aided design program. He hopes to gain a large skill set working at APL-UW that can be carried into the modern field of technical communication, which deals largely with the user-computer interface.



Ella Willard-Schmoe hails all the way from Haverford College in Philadelphia, where she just finished her junior year as a physics major. This is her second summer at APL-UW on a Boeing scholarship. Ella works with Tim Elam on a project to generate a super radar resolution algorithm. The project's goal is to build a model that can fit the peaks in a radar spectrum and then remove them, allowing detailed weaker features to be detected.

Ella's contribution is to collect radar data from the RiverRad radar stationed on the fourth floor balcony, which points out to the University Bridge. The readings are translated

into a two-dimensional map of object placements. The bridge has a shiny corner guard that creates a peak in the radar return, which is typical of the types of peaks Tim's algorithm is being designed to neutralize.

Throughout all of my interviews, when I asked the students why the scholarships seemed important and how the experiences would forward their career paths, the general theme was how it is invaluable to be afforded the opportunity to conduct research. These students are learning about the process of applied science—how an idea moves from theory to experiment and refinement, and transitions toward an application.

12th Annual Golf Tournament

The 12th Annual APL-UW Golf Tournament got underway with a shotgun start on a beautiful sunny Saturday, 19 July. The tournament was held again this year at Flowing Lake Golf Course with 26 players participating. The field was comprised of the usual mix of Lab employees and family and friends. As always the event was sponsored by APLEA, which provided the bulk of the prize funds with additional money from a surcharge on each player's greens fees. Some exceptionally nice prizes were awarded again this year thanks to Laurence Tomsic.



The Callaway scoring system was used to determine the overall tournament winners. Bill Felton was the men's Callaway winner and Ashley Sandwith won the women's. They each won a new Precise HT-7 Hi Launch driver. The prize for the fewest putts, a new TourEdge BackDraft B6 putter, went to Lyle Gullings. A Huskies

golf bag towel was won by Scott Sandwith for the longest drive. Russ Light and Carol Felton each won a UW putter/hybrid club cover for winning the closest-to-the-pin holes.

Additional prizes were awarded by holding a raffle. Among the raffle prizes were men's and women's Precise 22-degree hybrid clubs won by Joe Fortuneau and Karliegh Sandwith, respectively. The remaining raffle prizes, consisting of coupons for two free rounds of golf at Flowing Lake Golf Course along with assorted golf balls and tees, were won by DeAnn Wells, Scott Tomchick, Chris Fields, Dick Pfaff, and Scott and Mason Gullings.

