



Making Waves

2003 Autonomous Underwater Vehicle Competition



A successful completion of the task required a vehicle control system, vision system, and acoustic direction finding system. The completely new Orca-VI had all of these systems working; however, they were not fully integrated and tested. After a year of testing the new vehicle, the Orca-VI team believes that they will be ready to try to regain their 1st place title.

MIT's Orca-VI AUV took 4th place out of 11 teams at the 6th annual Autonomous Underwater Vehicle Competition, organized by the Association for Unmanned Vehicle Systems International (AUVSI). This year's competition was held in the TRANSDEC Facility pond, part of the U.S. Navy's SPAWAR Systems Center in San Diego, California on August 7th-10th.

13SEAs president, Karl McLetchie, worked on the mechanical and hydrodynamic design of Orca-VI. He encourages students to work on next year's Orca-VII. Besides the all expenses paid trip to San Diego, students gain experience in all areas of AUV development; from electronics and programming to control and hydrodynamics.

The competition required the teams of students to build an AUV that would swim under a submerged gate, locate a lighted arrow on the floor of the pond and swim in the direction of that arrow to locate a "target" - a series of three platforms stacked on each other. The vehicle then had to drop markers on the platforms to earn points.

During the qualifying round, Orca-VI made it to the correct target, but failed to drop its markers in time, giving MIT a 3rd place standing. During the final round, Orca-VI was not able to choose the correct target and dropped back to 4th place behind Cornell, Ecole de Technologie Superieure, and Duke University.



Welcome to all
New Ocean
Engineering
Students and New
Navy Professor
Tim McCoy!

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How I Spent my Summer Vacation...

Kai McDonald '03

Having just graduated, I took this summer off to relax and travel. I spent most of July in Rio Nexpa in the state of Michoacan, Mexico, with a friend from home. Nexpa is a beautiful beach community on a world-class surf spot. When not surfing in the 80 degree water, I was living the simple life: eating fresh tropical fruits, reading books in the hammock of our beach cabana or exploring the wild coastline. Nexpa was a great, affordable vacation spot that I look forward to visiting again in the future. Other than the trip to Mexico, my summer highlights include camping trips to Big Sur and Mendocino with friends and family.

Tim Pennington '06

I have been living on my family's 27 foot sailboat which is kept on Sodus Bay about 45 min from my house in Rochester, NY. I teach sailing there at a children's camp called Sodus Bay Junior Sailing Association. For the first half of camp, I was teaching a class on keelboat sailing and Great Lake cruising. All went very smoothly with the class other than having the mast on our Bristol 27 fall while sailing in a 40 knot gust. Fortunately, no one was hurt and they tell me they will even have the boat fixed for next season. For about a month before the kids got out of school and started camp, I helped my dad build my family's new restaurant, the Pita Pit. Other than teaching and making pitas, I have been playing a lot on the bay... sailing, jet-skiing, and water-skiing with the other camp instructors. The furthest I have gone from home this summer was Fairhaven Bay on the south shore of Lake Ontario.



Tim Pennington (forth from left) and his sailing students at the Sodus Bay Junior Sailing Association.

Jeremy Chambers '04

I spent the summer down the road from school, working at Bluefin. I did a variety of different things including mechanical modeling, network administration, and a few programming tasks. I also worked on the design of pressure compensated batteries that are fabricated at Bluefin.

Jordan Stanway '06

This summer I stayed in Boston and worked with Tom Consi on a UROP following a dream... the development of an Artificial Gill. I went home for about two weeks in the middle of the summer. For fun, I have gotten my SCUBA certification, learned to sail, and started playing underwater hockey.

Anna Michel G

I spent the summer exploring and traveling. First, I went on a 20 day voyage on the University of Washington's ship, the R/V Thomas G. Thompson. We started the trip in Honolulu and ended in Seattle. We were on station at the Hawaii-2 Observatory, a



permanent deep ocean scientific research observatory where we used the ROV JASON II for geomagnetic and biological surveys and for maintenance of the observatory. Later in the summer, I spent ten days on the SSV Corwith Cramer with other MIT/WHOI Joint Program students. My final trip of the summer was to the Cascades with the WHOI geodynamics seminar. We hiked Mt. St. Helens all the way to the top and then got to slide down the volcano on glaciers! Between trips, I worked on my PhD research (the development of an in situ chemical sensor for studying hydrothermal vents) at the Woods Hole Oceanographic Institution.

Anna poses in front of JASON.

Addie Yandell '05

I spent my summer working as an intern in the hydrodynamics branch of the Naval Undersea Warfare Center (NUWC) in Newport, RI. I worked with Thomas Gieseke on a biomimetic 3D pectoral fin. I tested the forces and moments on the fin that resulted from four different motions. NUWC was a great place to work, and living with four other interns was a lot of fun. I really enjoyed living in Newport for the summer because it's right on the ocean. I spent most of my weekends at the beach with my roommates and different groups of friends who came to visit. I also did a fair amount of sailing, kayaking, running on the Cliff Walk, and going on open-water swims. As much as I rave about our nice 50 meter pool... nothing beats a 2 mile swim with waves all around, the sun on your back, and no walls in your way. It was a lot of fun, and after this summer I'm definitely not ready for another Boston winter!

How I Spent My Summer Vacation (cont'd)...

Meg Brogan G

This summer I had an Engineering Internship with the Marine Group at the ExxonMobil Development Company, in Houston. I worked on a design for a mooring system for a FPSO (Floating Production Storage and Offloading Vessel), which is being constructed at HHI for an oil and gas field off West Africa. I also worked on a feasibility and cost study for a possible FSO (Floating Storage and Offloading Vessel) for the Sachalin Island (NE Russia) area. These two projects have taken me to Paris and Holland. In general, Texas is a wicked great place to be, especially if you love hot weather as much as I do. The state is so diverse in its geography, and every part of it is beautiful. I've visited Dallas, San Antonio and Austin... the last two really made me wish I were going to Graduate School down here. For fun I have been playing a lot of sand volleyball and reading an awesome book called Structures: Why Things Don't Fall Down, which Sheila Saroglou '03 bought me for graduation. I know it sounds dorky, but it's not a dry mechanics book. It is really well written, very interesting, and full of neat digressions.

Matt Greytak '04

After working on my sailboat in my garage for a few weeks I drove down to Potomac, MD to start work at the Naval Surface Warfare Center at Carderock. By day I analyzed test data and by night I wine and dined in fabulous Washington DC and experienced other cultures. And in whatever free time was left I played with my new toy boat.



Matt's New Toy Boat.

Qiao Hu G

I lived at Falmouth, MA and worked on developing new features that could best classify video plankton images. I went fishing on weekends and caught some good fish.

Discover Ocean Engineering, 2003

Thanks to all the professors, staff members, and faculty who helped make the 6th Annual Discover Ocean Engineering Freshman Pre-orientation Program a success. This year 31 freshmen participated in the program, created and run by Dr. Tom Consi, which serves as an introduction to the field of Ocean Engineering and the Ocean Engineering Department. DOE was held from August 19th to August 22nd.

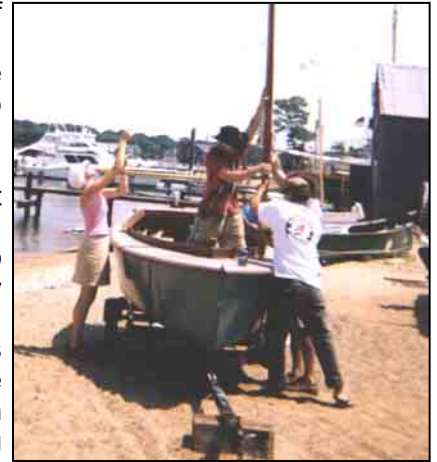
In teams of two the students built small ROVs called Sea Perches and tested them first in the Z-center pool and then in Boston Harbor while aboard the R/V Edgerton. In

Jessica Donnelly G

This summer I was in Krakow, Poland studying Polish at the Jagiellonian University. I also spent two weeks in the UK and two weeks visiting family in Poland. For fun, I hung out in the open-air cafes in the medieval market square and went sightseeing and hiking in Krakow and Southern Poland.

Gabe Weymouth G

I did a good bit of research for VFRL; developing a free surface RANS code to study breaking waves. On the weekends I went all over the east coast visiting friends... from Maine to Newport, New Jersey to Martha's Vineyard. The Vineyard trip was especially fun because my roommate from Webb was launching the wooden boat he has been building for the last year.



Gabe helps launch a friend's wooden boat.

Katie Wasserman '04

I lived in Boston this summer, visiting art museums and going to concerts. I also worked full time on iQuarium with Aaron Sokoloski (ME '05) and Audrey Roy (EECS '05). The most exciting iQuarium moment was when we got the computer vision working. You could walk in front of the camera and it would recognize a person there. I made a new, updated iQuarium website iquarium.mit.edu and an online prototype of the iQuarium user interface web.mit.edu/iquarium/www. I'm now working on the hydrodynamics information pages for the iQuarium. You can press a button and learn about the flow field visualization that you see on the screen.

In addition to creating the robots, the students toured several department labs including the Water Tunnel and the AUV Lab at Sea Grant. They also toured the New England Aquarium, went sailing on the Charles River, and were treated to a dinner cruise along the Boston waterfront.

Several Course 13 undergraduates served as mentors to the freshman during the program: Johanna Mathieu '04, Brian Mueller '04, Katie Wasserman '04, Maggie Loftus '05, Jesse Austin-Breneman '05, and Tim Pennington '06. Saagar Gupta (Course 6, '05) and Joe De Zengotita also served as mentors. Eda Daniel is the program administrator.

Congratulations...

to graduate student Stephen Licht on his recent engagement!

Looking for speakers...

for the 13SEAs seminar series. Email kmwm@mit.edu if you would be interested in presenting a talk to the OE department!

Alums, Do you have some interesting stories to tell?

If you would like to be our next alum spotlight please email jmathieu@mit.edu.

Awards!!!

13SEAs has been selected to receive the 'MTS Student Section of the Year' Award which will be presented at Oceans2003.

ROV Competition Results

The MIT 12-25 Class Team earned an award for 'Best Tether Management' at the New England Regional Competition. The MIT Open Class Team earned an award for 'Best Poster' at the National Competition. Unfortunately, neither team placed this year. The winners of the 12-25 Class Competition were Cambridge Rindge and Latin High School (1st), White Rock South Surrey Home Education (1st), and O'Donel High School/Avalon East School Board (3rd). The winner of the Open Class Competition was Lake Superior State University (1st), Monterey Peninsula College (2nd), and Galveston College/Ball High School (3rd).

MTS Summer Meetings



13SEAs members Addie Yandell and Johanna Mathieu enjoy their lobster dinner at the MTS Clambake.

The New England Section of the Marine Technical Society held two meetings this summer. The first was their annual Clambake Fundraiser, which among other things, supports student chapters such as 13SEAs. The bake was held at the Woods Hole Group in Falmouth, MA on July 10th. The speaker at the meeting was Paul McGuinness, a teacher at Cambridge Rindge and Latin School

(CRLS) as well as an active participant in MATE's ROV competition. His talk was about how to get high school students involved in Ocean Science and Engineering. The CRLS MATE ROV competition team also brought their first place ROV to show.

The August MTS meeting was held at MIT's Zesiger Athletics Center pool. The meeting focused on the ROV that MTS New England won in the MATE ROV Nationals raffle.



Addie's lobster.

Several MIT and CRLS students had the opportunity to drive the ROV around the pool and discuss potential future uses of the vehicle.

SNAME's June Meeting

The SNAME New England Section's June meeting took place at the famous New York Yacht Club in Newport, RI (winner of the first ever America's Cup, and continual sponsor of America's Cup racing). The topic of the meeting was a picture presentation given by T. J. Perotti entitled "The America's Cup from the Perspective of Team Dennis Connor (Stars and Stripes)."

T. J. Perotti was one of the designers of the boats, and his presentation detailing some of the history of America's Cup racing, the design, construction, and testing of the two boats for the Stars and Stripes team (including a broken hull of their favorite boat!), and the race itself. 13SEAs member Addie Yandell was able to attend this fun and educational meeting.

13.734 Design of Sailing Vessels

Another naval architecture course will be offered this fall, Design of Sailing Vessels taught by Professor J. Milgram. The class is currently oversubscribed, drawing students from all over the school of engineering. Ocean engineering undergrads and grad students are adding the class to their already full

schedules. The class meets Monday, Wednesday, and Friday 12:30-2 for the first 6 weeks. For the next three weeks, the class moves to an Athena workstation, and for the rest of the term, students work independently on their design projects. The class will be offered every other year.

Hamburgers, Hot Dogs, Pixie Sticks, and Fun!

On June 12th, students and faculty took a break from building AUVs, writing papers, and coding to enjoy the 13SEAs summer BBQ. The BBQ was a great way to bring together the many graduate students working on their research with the undergraduate UROPs who were spending the summer at MIT in an informal setting. Many thanks to Rick Rikoski (PhD 03), and graduate students George Katsoufis, Karl McLetchie, and Anna Michel for organizing this event. Special thanks to the Graduate Student Council for sponsoring the event.



George grabs his stomach in fear of another of Rick's burgers.



Mmmm... relish.



Dr. Consi and Professor Techet prefer bottled water to processed meat.



Hey, Gimme that Pixie Stick!



Yum... Yum.... Yum.... Too bad we don't have BBQs like this all the time!

Welcome New Course 13 Students!

Graduate Students:

Angelos Antonopoulos, 13A
 Marianne Bart, 13A
 Thomas Denucci, 13A
 William Greene, 13A
 Matthew Hawks, 13A
 Mark Johnson, 13A
 Cara La Pointe, 13A
 Chih-kuo Lee, 13A
 Thomas McKay, 13A
 James Mosman, 13A
 Michael Plumley, 13A
 Jan Rybka, 13A
 Brian Thomas, 13A
 Kai Torkelson, 13A

Peter Connor, 13B
 Eric Dresser, 13B
 Constantinos Hadjistassou, 13B
 Richard Smith, 13B
 Goskel Tenekecioglu, 13B
 Cale Holman, 13B

Yuanli Bai, 13M
 Vivek Jaiswal, 13M
 Stephen Laverty, 13M
 Keith Lim, 13M
 Jennifer Mann, 13M
 Tadd Truscott, 13M
 Andrew Wiggins, 13M
 Hongmei Yan, 13M

Celeste Fowler, 13WD
 Hyun Kim, 13WD
 Taiwei Wang, 13WD

Brendan Gotowka, 13WM
 Jasper Hartsfield, 13WM

Undergraduate Students:

Bridget Brett, 13U
 Heather Brundage, 13U
 Carlos Soto, 13U
 Jordan Stanway, 13U
 Timothy Pennington, 13U

Alumni Spotlight: Jim Czarnowski

Jim was born in Denver, Colorado in 1973 and then moved to remote Mammoth Hot Springs (less than 200 people!), in Yellowstone National Park, where he spent his formative years. At an early age he became fascinated with boats and airplanes. He would actually test his paper-mache remote controlled paddle wheeler and sailboats in a geothermally heated pond at the base of an active hot spring. Moving back to Colorado, he attended the University of Colorado and earned a BS in Aerospace Engineering and a pilot's license. Jim became very excited about bio-inspired technology while developing a fish-like human swimming aid. During research for the project, he learned of the exciting Robo-Tuna research occurring at MIT. Although he was already planning to attend Aerospace Engineering graduate school at Stanford or Cal Tech, he changed plans and came MIT to work with Professor Triantafyllou on bio-inspired oscillating foil propulsion. He furthered the progress of the Robo-Tuna by leading a team to create an oscillating foil propelled boat. "Proteus the Penguin Boat," (<http://web.mit.edu/towtank/www/flapfoil/index.html>), is a 4 degree of freedom robot capable of autonomous propulsion while varying kinematic foil parameters and measuring its power expenditure. The project became a very popular MIT press release and earned much national and international media attention as well as being one of 40 finalists for the Discover Magazine Invention of the Year Award.

After earning an MS in Ocean Engineering and an MS in Mechanical Engineering in 1997, Jim returned to Colorado where he formed a startup company to commercialize foil technology for small boat propulsion. Eventually resources dried up before the company could get on its feet and Jim went to work as a product development engineer for Invisible Structures (www.invisiblestructures.com), an innovative company manufacturing environmentally friendly storm water construction products. After a couple years of engineering work, Jim moved into management as



Director of Operations and finally as VP and GM of the company. Although the work was interesting, he still yearned to build boats.

In the fall of 2002, Jim learned that the Hobie Cat Company (www.hobiecat.com) in Oceanside, California was manufacturing human powered kayaks utilizing similar technology to the Penguin Boat. Although Hobie did not have any open positions at the time, it was too good of a fit to pass up and Jim moved to California to start work in December of 2002. Hobie Cat is a very innovative company with a relaxed work environment that makes Jim feel at home. In his first 9 months, he has redesigned the 30 year-old rudder attachment system, switching from a cast aluminum to injection molded plastic with better functionality as well as many other engineering tasks. Increasing the efficiency of the foil drive system as well as developing other innovative products are on the horizon. Jim recalls telling his friends and family about his work on the Penguin Boat at MIT and how many of them would say, "Sounds like fun but how will it ever help you find a job?..." Well, without the Penguin Boat experience, Jim would never have landed the job with Hobie.

On the personal side, Jim is very happy to be married to Jeanette, a wonderful woman from Idaho who's work as a veterinary technician comes in handy with the family dog, Pepperoni and cats Siamese and Thomasina. They live near the beach in Encinitas, California where their passions for Sailing, SCUBA, surfing and beautiful sunsets can be fulfilled. They miss their family and the beautiful mountains of Colorado but the ocean and opportunities in California are too hard to resist. They dream some day of cruising the world in a sailboat and retreating to a home in the Colorado mountains. Advice – take it or leave it – "Do what excites you and don't listen to those who question its practicality. Have patients, persevere, and when your opportunity presents itself, go for it!"



Awards, Awards, Awards!!!

Congratulations to the following students:

Meg Hendry-Brogan

SNAME graduate scholarship

ASNE graduate scholarship

Katy Croff

The Dieter Family MTS Student Travel Scholarship for Oceans 2003

Anna Michel

The Marine Technology Society Student Scholarship

Johanna Mathieu

AUSI UUST Student Paper Competition Winner

Robert Bruce Wallace Prize

Karl-Magnus McLetchie

AUSI UUST Student Paper Competition Winner

SNAME graduate scholarship

ASNE graduate scholarship

Matt Greytak

SNAME undergraduate scholarship

Katie Wasserman

ASNE undergraduate scholarship

MTS ROV Scholarship

Read about the work of OE students:

Addie Yandell

"Pectoral Fin Motions for Vehicle Control." T. Gieseke, A. Yandell, D. Hrubes, J. Walker, and N. Kato.

Published by the Autonomous Undersea Systems Institute in the 13th International Symposium on Unmanned Untethered Submersible Technology Conference Proceedings.

George Dikos

"The Term Structure of Second Hand Prices- A Partial Equilibrium Structural Model." G. Dikos, and H. Marcus. Published by the Journal of Maritime Economics and Logistics.

Gabe Weymouth

"RANS CFD Predictions of Pitch and Heave Ship Motions in Head Seas." G. Weymouth. Published by the Journal of Ship Research.

Johanna Mathieu

"A Chemical Sensor to Aid in the Search for Archaeological Sites." J. Mathieu. Published by the Autonomous Undersea Systems Institute in the 13th International Symposium on Unmanned Untethered Submersible Technology Conference Proceedings.

Karl-Magnus McLetchie

"Forces and Flow Visualization of a Three-Dimensional Flapping Foil." K. McLetchie, M. Flores, F. Hover, A. Techet, and M. Triantafyllou. "Drag Reduction of an Elastic Fish Model." K. McLetchie. Both published by the Autonomous Undersea Systems Institute in the 13th International Symposium on Unmanned Untethered Submersible Technology Conference Proceedings.

Student Spotlight: New Sophomores

Five new sophomores have declared Course 13: Bridget Brett, Heather Brundage, Timothy Pennington, Jordan Stanway, and Carlos Soto. Heather, Bridget, and Jordan share their backgrounds, Ocean Engineering interests, and extra-curricular activities.

Heather Brundage

I am interested in underwater exploration and robotics... ROVs and AUVs, mostly. I'm from Maryland, Laurel to be exact. Though, I was born in Las Vegas, and seeing as I visit my father there regularly, that is kinda my second home. My main extra-curricular is Theatre. I do technical theatre, lighting mostly, with MTG and E33. I'm on the board for both groups. I just designed lights for Into the Woods. I also sing with concert choir.

Jordan (Michael) Stanway

I'm interested in ships and especially subs. Also, I'm really interested in SCUBA technologies. My family is currently in Colorado. As for extra-curriculars, I'm in Sigma Nu, have a UROP building an Artificial Gill, SCUBA dive, play Underwater Hockey, and do just about anything else involving water.



Bridget Brett

My interests include structures (offshore platforms), container ships, tankers, and cruise ships. I'm from Reston, VA and my extra-curricular activities include Cross Country, Society of Women Engineers, Campus Crusade for Christ, traveling, snorkeling, and speaking Spanish. This year I will be the secretary of 13SEAs.



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We're on the Web!
web.mit.edu/13seas

Submit your news, notes, and OE anecdotes to:
13seas-news@mit.edu



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Prof. Alexandra Techet, MIT OE

Looking Ahead...

Date	What's going on?
Sept 19 th	Talk Like a Pirate Day: www.talklikeapirate.com
Sept 19 th	Lunch Seminar: Alum Todd Harland-White, Northrop Grumman
Sept 22 nd	No classes
Sept 22 nd -26 th	OCEANS 2003, San Diego, CA
Oct 3 rd	Lunch Seminar: Alum Shashank Karve, MODEC
Oct 3 rd	Add Date
Oct 13 th	No classes
Oct 17 th -19 th	Family Weekend
Oct 17 th -20 th	World Maritime Technology Conference and Exposition including SNAME's Annual Meeting, San Francisco, CA
Oct 30 th	Faculty Mixer & Student Poster Presentations
Nov 5 th	Lunch Seminar: Naval Surface Warfare Center
Nov 10 th -11 th	No classes
Nov 19 th	Lunch Seminar: iQuarium
Nov 19 th	Drop Date
Nov 27 th -28 th	No classes
Dec 5 th	13.018 Final Presentation

