



# Making Waves

## Exploring the "Reef": A Success for MIT

Contributed by Bridget Downey ('06)

The MIT ROV Team had a successful run at the 3rd Annual National ROV (Remotely Operated Vehicle) competition this summer. Twelve MIT undergraduates ventured to UCSB June 25<sup>th</sup> through 27<sup>th</sup> to participate in the Explorer class of the Marine Advanced Technology Society (MATE) and MTS organized event. Students from more than thirty-four schools in both the US and Canada entered, ten of which were matched up against MIT in the Explorer class.

While in last year's MATE competition MIT entered two separate ROVs to "navigate the mock-up of the titanic", students combined efforts this year to build one ROV (*Castor*) to "explore the coral reef." In the Explorer class, teams were given 20 minutes for the mission and were scored based on completion of tasks including: location of an acoustic pinger, a length measurement of the reef, detection and extraction of a fluid sample from the reef, and a temperature and depth measurement. Furthermore, teams were judged on an engineering interview, technical paper and poster.

MIT performed best in the underwater mission part of the competition and placed 2<sup>nd</sup> overall. The team was also given special recognition for Safety and Marine Sanctuary Awareness. The team attributes much of their success this year to not only beginning work on the ROV back in December, but also to the new team organization into sub-systems. Groups included controls, fluid sampling, video, propulsion, and more. The groups attended weekly meetings throughout the spring semester, headed by Jordan Stanway ('06) and supervised by Faculty Advisor, Dr. Franz Hover.



Course 6 student Brian Myhre ('06) and Course 13 students Tim Pennington ('06) and Jordan Stanway ('06) poolside at the competition in June.

Says Stanway, "I think it was a good, fun experience for all involved, and know that there will be a strong team again next year." A meeting in mid-September is already in the works.

The ROV Team is sponsored in part by MIT's Edgerton Center, ExxonMobil, and the Department of Ocean Engineering. The team's website can be found at <http://web.mit.edu/rov/www/index.html>.

- 13SEAs welcomes new Course 13 Students!

- Read about summer fun!

### Highlights:

Exploring the "Reef"	1
Alumni Spotlight	2
Summer Days	3
Announcements	4
Student Spotlight	5
Ogilvie Lecture	5
DOE	6
A Pirate's Life	7
Oceans 2005	7

## Alumni Spotlight in His Own Words: Gary Smith, '78

I got my degree in NA/ME, course 13, in 1978. My most recent position is Naval Architect for the Alaska Marine Highway System (AMHS), the State run ferry system that provides passenger and vehicle service to coastal communities of Alaska and connection to the lower 48 in Bellingham, WA. In this position I am the project manager for design and construction of 2 new fast ferries at the Derektor Shipyard in Bridgeport CT. The first vessel, the Fairweather, is now in service in Southeast AK and is doing very well. Performance is better than expected and warranty issues are relatively minor – a victory for a new type of vessel to U.S. Shipbuilding.

The Fairweather Class is intended to provide passenger and vehicle service between selected communities in SE AK and Prince William Sound they have round trips of approximately 150 to 300 miles. This allows use of speed to not only provide good service but to complete a daily run in less than 12 hours. This allows the crew to go home at night and reducing the cost replacement crew and berthing on board. Existing AMHS vessels cover routes of up to 2000 miles, and the crews live on board for weeks.

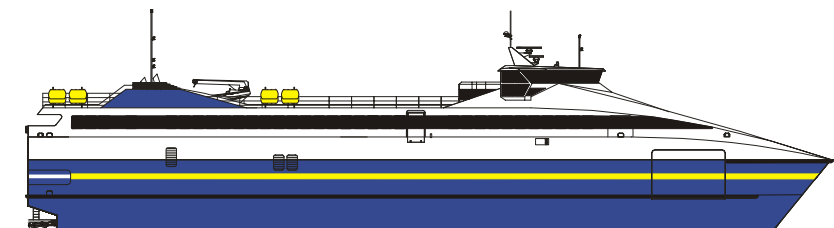
Simply put – this is a cool boat. Running at more than 35 knots through Alaska’s scenery, and doing so in quiet comfort, is a great experience. The process of design and construction has also been a great experience, primarily thanks to smart and dedicated team of Derektor Shipyards of CT, and the designers of record, Nigel Gee Associates of Southampton England.



Gary Smith in the starboard machinery space.

## The Fairweather Contract Performance Measures

Measure	Contract Requirement	Attained/Tested Value
Speed at 100% power – full load	36.5 knots	38.5 knots
Speed at 90% power – full load	35.0 knots	37 knots
Fuel consumption at 100% power	880 gallons per hour	855 gallons per hour
Fuel consumption at service speed, 32 knots	750 gallons per hour	710 gallons per hour
Noise – 1000 feet from vessel	60dBa	59dBa
Wake wash height at 32 knots	29 inches	27 inches
Load Capacity (Deadweight)	190 tons	200 tons



## How we spent our summer days...

### Katie Wasserman ('04 yeah, baby!!)

"I spent my summer in Houston, TX at ExxonMobil Upstream Research Company. I worked on: VIV of marine drilling risers - analyzing data from a model test. I worked with: Bill Frank, Michael Tognarelli, and Scott Slocum at Exxon URC. The greatest part about my summer was I went to Israel for a vacation, and it was hotter than Houston in the summer! Apart from my work, I spent time: relaxing, running, exploring downtown Houston, updating the iQuarium website via Remote Desktop connection to our webserver in the MIT museum. On the weekends I worked for Philmont Associates, a small Naval Arc. firm in suburban Houston."

### Mary Agnes Mullowney

Administrative Assistant to Professor Henrik Schmidt Ocean Engineering Headquarters

"I won tickets to see the final three shows of NBC's "Last Comic Standing," so for my vacation I went out to Los Angeles for a week for the tapings. I've performed stand-up comedy in Boston and I could really relate to that show (in the audience though I'd rather be on stage!)"

### Karl-Magnus Weidmann McLetchie: Master and Commander Emeritus of the 13Seas and Scourge of all the Other Seas ('02, MS '04)

"I spent my summer in the US and Canada working on re-entering society. The greatest part about my summer was the only thing I used a computer for was to check email. I spent time driving across the country, sailing, kayaking, and hiking. In August I joined the crew of the Schooner Liberty Clipper, a 125 ft replica of a 19th century clipper ship. We do cruises around the Harbor Islands until October and then sail to Key West for the winter. I'd love to see you all out for a sail, go to [www.libertyfleet.com](http://www.libertyfleet.com) for more info.

### Addie Yandell ('05)

"I spent my summer in San Diego, CA where I worked at the Space and Naval Warfare Systems Center, Maritime Surveillance Division. I worked on Towed Hydrophone Arrays, in particular I focused on the cable strum & cable design of the systems. I also designed a flow noise test for the hydrophones. The greatest part about my summer was meeting a ton of really cool people, getting to spend time with my family, & seeing my sister and some of my friends get married!!!!!! Oh, and being close enough to the ocean that I could go kayaking on my lunch break. ;o) Apart from my work, I spent time working on my tan (ahem, sunburn) and hanging out with my sisters and a bunch of friends I met in the area. I spent most of my free time at the beach or in someone's pool. The weather was awesome, so I tried to be outside as much as possible.



Karl McLetchie meets his match in Seattle.

### Dan Sura ('03, Candidate for Masters of Science in Ocean Engineering 2005)

"I spent my summer working at the Marine Hydrodynamics Lab at MIT working for Chryssostomos Chryssostimidis. The greatest part of my summer was finding promising results out of my graduate research. I'm working on Lorentz actuators for drag reduction and underwater acoustic communications. Also finding a new secret surf spot and successfully building a leak-proof water camera housing for surf video footage. Apart from my work, I spent free time playing my new Gretsch 5129 hollowbody guitar, building water cam housings for my camcorder, surfing, and scouting new surf spots. This summer really flew by for me!"

### Congratulations to Our New Doctors

#### Dr. Kelli Hendrickson

on the recent successful defense of her PhD  
“Navier-Stokes Simulation of Steep Breaking  
Water Waves with Air-Water Interface”

#### Dr. Oscar Pizarro

MIT-WHOI Joint Program Student in  
Oceanographic Engineering

On his successful defense of his thesis  
“Large Scale Structure from Motion for  
Autonomous Underwater Vehicle Surveys”



### Wedding Announcements

Congratulations to Bridget Brett  
who became Bridget Downey in  
June!

Congratulations to Jason Dahl who  
was married in July!



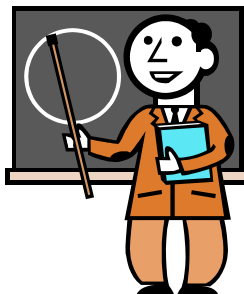
### Congratulations to Dr. Kelli Hendrickson

on the birth of her second daughter,  
Geneva Lee, born August 22<sup>nd</sup>!



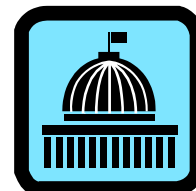
### Farewell Dr. Rich Kimball

13SEAs wishes Rich all the best and  
success as he leaves his current position  
of Research Engineer in the Department  
of Ocean Engineering and heads north to  
teach at the Maine Maritime Academy



### Welcome to MIT...

13SEAs congratulates and  
welcomes Dr. Susan Hockfield as  
16<sup>th</sup> President of MIT!





## **Student Spotlight: Matt Greytak...The Story of a True Ocean Engineer**

I spent most of this summer finishing work on a 15-foot wooden sailing dinghy that I started two summers ago in my garage in Newton, MA. The boat has similar lines to the Vanguard 15 performance dinghy, although the hull is fuller in shape. I designed the hull by eye in Solidworks. The hull is composed of interlocking cedar strips that run the length of the boat with a layer of fiberglass on the inside and the outside to make the hull rigid. The fiberglass layers are clear, giving the impression of a thick varnish coat. This construction technique is used in lightweight canoes and rowboats. Because sailboats have higher stresses than these lighter craft, I put in three bulkheads to add strength. The decking and seats are made from reinforced thin plywood attached to mahogany beams.

The first summer I worked on this boat I formed the cedar strip hull around the bulkheads and a set of molds. I could only spend a few weeks on the boat last summer before I went down to Washington DC for an internship. In that time I put a layer of fiberglass and three coats of epoxy over the outside of the hull. In order to finish the boat this summer I decided not to take on any internships. I fiberglassed the interior, built the daggerboard housing, fitted mahogany beams under the decks and seats, and attached the decking. With the internal structure complete I turned the boat upside-down, sanded the exterior epoxy coat until my arms were sore, and painted on six layers of varnish. Then I turned the boat back upright and painted one layer of epoxy and three layers of varnish over the entire topsides. Once all the fittings and the Vanguard 15 spars were in place, the boat was complete.

I first sailed the boat in late July on Squam Lake in New Hampshire. Apparently I am a better engineer than a boatbuilder because the hull had two large leaks. "Sail and bail" was the motto for the first cruise. Fortunately these leaks were easily repaired. The boat performs as I had hoped, and overall I think the project was a success, albeit an expensive and time consuming one. I have already begun fantasizing about building a mahogany runabout, but that will have to wait until I have a larger boatyard and a fatter wallet.



**Matt (black lifejacket) sailing with his brother Andrew (blue lifejacket)**

## **10th Annual T. Francis Ogilvie Young Investigator Lecture**

Each year the Department of Ocean Engineering recognizes the work of T. Francis Ogilvie and his many contributions to the Department and the Institute, and in particular his mentoring of younger faculty. The Department annually awards the T. Francis Ogilvie Young Investigator Lectureship in Ocean Engineering. This year the young investigator selected is Ocean Engineering Assistant Professor Alexandra Techet. The 10<sup>th</sup> annual lecture will be presented on Wednesday, October 27, 4:00 PM, at the MIT Faculty Club.

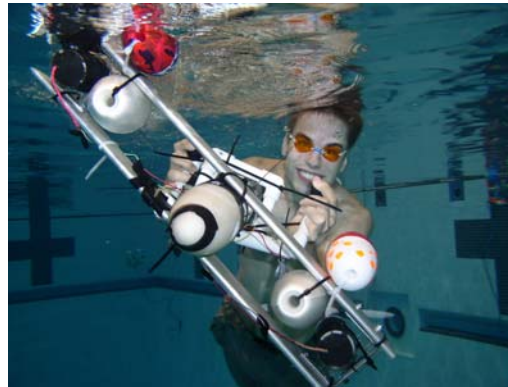
## Discover Ocean Engineering (DOE): Two freshmen perspectives

This year's DOE program began in high style with sailing on the Charles and a walking adventure into Boston -- but mostly, an opportunity to first meet the friendly mentors and the other excited students participating in the program. Even from such a good start, the social events at DOE were more and more fun each night, as we all knew each other better and joked around on a Charles River cruise and at various mentor-chosen (i.e., excellent) restaurants in Boston.

The real work started Thursday [8/26], when we began to assemble SeaPerch ROVs in teams of two, with plenty of mentors available to teach the use of newly encountered lab equipment like soldering irons and monkey dung, and to help first-time electricians in troubleshooting faulty circuitry. Brightly colored paints helped personalize the ROVs so each was individually recognizable.

Testing the robots in the Z-center pool was another learning opportunity in troubleshooting and fixing anomalies in the operations of the ROVs, adding to our small-scale appreciation of some problems and challenges faced by larger and more intense underwater vehicle applications. Tours of Ocean Engineering labs and presentations on current research [including the speaker at the Freshman Convocation, whose name I don't recall, but should be listed here, because his presentation was awesome and basically all about stuff we'd seen/talked about] were all the more fascinating because our hands-on experience gave us a starting point to put new research in context with implementations.

To culminate our DOE adventure, we had the chance to put our robots into action in a real environment, driving them underwater in the Atlantic off the docks at Woods Hole. The robots worked beautifully, allowing us to maneuver to the ocean floor and scoot around among seaweed, piles and surprised fish, following along through the camera feed from the ROV and catching occasionally glimpses of bright paint when nearer the surface. The thrill of actually controlling an underwater vehicle and seeing the ocean from a wholly new point of view was definitely the best part of the DOE program, but it was only part of the four full days of fun that felt like much more and let us get to know other freshmen and upperclassmen in the best possible way: by working together. ~Teresa Christian, '08



All of you can remember your first days at college as a freshman, and you understand that it can be a very intimidating and frightening experience for the unprepared. I knew that my experience would be no different, so I decided to sign up for a Freshman Pre-Orientation Program to help me get adjusted to life at MIT. Although there were many choices of programs, the one that stood out to me was Discover Ocean Engineering. This program was relatively short, it involved building something I could take home, and it provided ample time to socialize with fellow MIT students.

The Discover Ocean Engineering program kicked off in earnest on Wednesday afternoon with dinner at the sailing pavilion accompanied by upperclassmen mentors and faculty volunteers. I met many people briefly during this meal, but I was able to have a more in depth discussion later when we broke into groups to sail around the Charles River. Those activities were quite fun, and I felt that I was not alone for my first day at MIT. Afterwards, we took a walk around Boston with our mentors to get ice cream and visit the Boston Commons. This gave me more time to talk to people and a chance to actually tour some parts of the city.

The true fun started on Thursday with the construction of our Remotely Operated Vehicles and our dinner cruise. We split into pairs to create underwater vehicles out of PVC, motors, propellers, and a variety of odd parts. The construction itself was not difficult, but it did familiarize me with some of the finer points of soldering electrical connections. After a hard day of working on our vehicles we took a dinner cruise to the Boston harbor. Again, I talked with many fellow mentors and freshmen.

Almost all of the groups had finished construction on Thursday, so Friday was testing day. We tested our machines in the Z-Center pool to ensure that they were going to work in the real ocean environment. As an added bonus, we were allowed to swim with our machines. Afterwards, we toured some of the more interesting Ocean Engineering laboratories. I saw firsthand some of the work being done in applied and fundamental physics in the Ocean Engineering department at MIT.

The program finished on Saturday with our trip to Woods Hole Oceanographic Institute for the final testing of our machines. We mounted cameras on the robots so that we could observe some of the many creatures living on the harbor floor. This was a great conclusion to the past few days of work on our robots.

I felt that Discover Ocean Engineering was a very valuable experience because it familiarized me with MIT and Boston in an engaging manner. I now better understand ocean engineering, and I made some friends here at MIT. This program enriched my first days on campus, and it would come with my highest recommendation to any incoming freshman who feels overwhelmed by the experience that is MIT. ~Zachary Clifford, '08

## A Pirate's Life For Me...

### Course 13 Alum Karl McLetchie takes a break from Ocean Engineering to learn how to sail the high seas

Former Master and Commander of the 13Seas, Karl McLetchie, has joined the crew of the Liberty Clipper on which he sails as the Commander of the other seas. The ship, a 125' traditionally rigged schooner, sails from Longwharf for trips around Boston harbor and the harbor islands.

Despite developing a mild case of scurvy and suffering the loss of his right leg (I'll be pegleg) and his left eye, Karl is enjoying his time as a pirate, "I'm learning how to sail, meeting interesting people, and haven't used a computer or solved an equation in three months" boasts Karl. The MIT education is still proving itself to be very useful as a sailor; "the rest of the crew usually lets me add up our tips instead of cleaning at the end of the day because they know I'm good at math." At the end of September, The Clipper set sail for Providence for a month of repairs, and then will continue south to Key West for the winter. Barring any unforeseen seas or hostile natives, Karl will return to Boston in May to seek his fortune as an Ocean Engineer.

"Wherever we want to go, we go. That's what a ship is, you know. It's not just a keel and hull and a deck and sails. That's what a ship needs. But what a ship is... what the [Liberty] really is... is freedom." – Captain Jack Sparrow

For information on sailing with Karl in Boston or Key West go to [www.libertyfleet.com](http://www.libertyfleet.com).



Karl takes his dad for a sail on the Liberty Clipper

## Oceans 2004 Conference : MTS and IEEE/OES

Oceans 2004 will be held November 9-12<sup>th</sup> in Kobe, Japan. 13SEAs will be presented with the 2004 Student Section of the Year Award at this conference! In addition, many MIT students have been selected to present their research at the student poster competition!

### 2004 Student Posters:

A Dynamic Control System for a Model Planing Hull ~ Matthew Greytak

A Biomimetic Flapping Foil Underwater Vehicle ~ Stephen Licht

Force and Hydrodynamic Efficiency Measurements of a Three-Dimensional Flapping Foil ~ Karl-Magnus McLetchie

The Development of an Artificial Gill to Supply Oxygen to a Submerged Microbial Fuel Cell ~ Jordan Stanway

Amphibious Tetrapod ~ Daniel Walker

From Waves to Watts: A Wave Energy Conversion Device for the Charles River Basin, MA ~ Kathryn Wasserman, Johanna Mathieu, Matthew Greytak



**Making Waves Staff**

**Editors in Chief**  
Bridget Downey  
Anna Michel

**Contributors**  
Karl-Magnus McLetchie  
Zachary Clifford  
Teresa Christian  
Matt Greytak  
Gary Smith, '78

We're on the Web!  
[web.mit.edu/13seas](http://web.mit.edu/13seas)

Submit your news, notes, and OE anecdotes to:  
[13seas-news@mit.edu](mailto:13seas-news@mit.edu)

**13SEAs Officers** [13seas-officers@mit.edu](mailto:13seas-officers@mit.edu)

**Graduate President** Ms. Anna Michel  
**Undergraduate President** Ms. Addie Yandell

**Vice President/Social Chair** Mr. Gabe Weymouth  
**Secretary** Mrs. Bridget Downey

**Treasurer** Mr. Tadd Truscott  
**Advisors** Mr. Gregory Beers, MTS  
Dr. David Burke, SNAME/ASNE  
Prof. A.D. Carmichael, SNAME/ASNE  
Mr. John Irza, IEEE/OES  
Prof. Alexandra Techet, MIT OE

**GSC Representative** Mr. Dan Sura

**Assistant Social Chair** Jordan Stanway

**Watch your email for announcements about upcoming seminars given by Seagrant's own Rob Damus (BS '99, MS '01), OE's Senior Class presents their 13.018 design, and many more exciting talks!**

**Stay tuned for details about the fall faculty mixer and joint Mechanical Engineering Happy Hours!**

**Calling all Alumni!**

**Do you have fond memories of your time in Course 13? Do you have sea stories to share? Have you learned important life lessons in the jobs or Navy that you would like to share with current students and other alumni? If you would like to be our next alumni spotlight, email [bridget1@mit.edu](mailto:bridget1@mit.edu).**

