



Making Waves

The River Rat System

By Ms. Anna Michel, G (former MIT Sailing Team member)

For many Ocean Engineering students, past and present, MIT Sailing has provided a wonderful escape from the rigors of classes and research. While out on the river, it is impossible to think about the problem set due tomorrow and instead we find ourselves thinking about the next wind shift or how to tack the boat more smoothly. The MIT sailing program has taught many of us how to sail, how to improve our sailing and how to race. A group of MIT sailors, has recently started work on a project that will give something back to the program. OE Alum Rob Damus, OE graduate student Claudio Cairoli, and Course 6 graduate student Doug Decouto discuss the project with us here:

1. Describe the project in your own words.

The goal of this project is to track the location of MIT's sailboats racing on the Charles River in real-time using the Global Positioning System (GPS). This information will be graphically presented to interested parties throughout MIT along with the current environmental conditions on the river. The system will store the tracks of individual boats participating in sailing regattas; users will be able to review these tracks at their convenience for post race analysis and other educational purposes. The real-time data will also be used to track recreational sailors to ensure boating safety on the River. For example, the system can alert dock staff when boats stray too close to shore, or are in danger of sinking when capsized (flipped over).

The RiverRat system will have two main components: a sensor package mounted on each boat, and a data acquisition and processing station on shore, at the Sailing Pavilion. The boat's sensor package is contained within a waterproof housing. It primarily consists of a GPS receiver for tracking purposes, a microprocessor for data gathering and a radio frequency (RF) transmitter to communicate with the shore station. Additional sensors, like a compass can be accommodated. The microprocessor runs the client-side RiverRat software and in turn relays the GPS position information to the shore station via the RF link. On shore, the server-side software will filter the GPS data it receives



The RiverRat system will work with the new fleet of Tech Dinghys that has just arrived at the MIT Sailing Pavilion.

and paint the boat's position on a graphical depiction of the racecourse on different displays. The racing buoys located in the river will be equipped with a similar telemetry package, only their sensor suite might also include a wind vane and temperature probe. This meteorological data will also be communicated back to the shore station to be displayed on the virtual racecourse concurrently with the boat positions, thus giving a bird's eye view of the entire race.

2. How is this project funded?

The RiverRat project is one of the four projects funded this year by iCampus. This is an MIT-Microsoft alliance whose "radical purpose [is] to revolutionize the practice of higher education with the tools of information technology". The budget for the project is \$30,000, which covers all the hardware equipment plus UROP positions for some of the team members during the summer.

3. Where did you get the idea from?

During late senior year, driving home with Sailing Master Fran Charles, we got into a discussion about why sailing was lagging as being a recognized sport, and I (Rob Damus) proposed that it was because sailing is one of the few sports that you cannot gamble on (at least maybe people do, but it is not a prominent sport because of that). This was just one of many reasons - i.e. the US does have a lot of landlocked states, there is a large capital investment that comes with being a sailor, a

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- Next 13SEAs luncheon on April 8 at noon.
- Learn to Dive... see page 4 for details.

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Celeste Fowler

Celeste lived life to the fullest. "Awesome!" is how her current advisor at MIT/Woods Hole describes her. He's not the first to use that word about her. She was talented, brilliant, modest, kind, generous, courageous, a great friend who had great friends. During her final illness she averaged half a dozen visitors a day (some days there were too many to count) from as far away as California, Canada and England. An international conference call gathered participants from as far apart as Silicon Valley and Israel, and included people from rival computer companies ATI and NVidia in the same room, "something only Celeste could accomplish," noted one of her friends fondly.

Celeste was born at 6:44pm on December 4, 1971 at Bassett Hospital in Cooperstown, New York. She went through St. Mary's School, Oneonta, where she took part in a variety of activities. While there she was a member of several Odyssey of the Mind teams, one of which went to the state championships. She was an enthusiastic participant in the Healthy Hero Program, which raised money for health education in Oneonta schools. She swam at the Oneonta YMCA, and went to the Y's summer camp program as well.

In 1983 she and her partner, Amy Hawkins, took part in the girls' youth canoe race of the General Clinton Canoe Regatta, and won. In '84 and '85, when the girls' races were eliminated, they raced against the boys, and beat them. She spent six summers on Squam Lake at Singing Eagle Lodge, the same camp her mother attended for 12 years.

From St. Mary's Celeste went on to Berkshire School in Sheffield, Mass., graduating in 1990. The summer following her freshman year she spent 5 weeks in France, living with a farm family in Brittany for a month, and then savoring the treasures of Paris. It was probably here that her love of travel was kindled. She also was active in the theater program and sports at Berkshire, including cross-country skiing, field hockey, lacrosse and track and field events. She received many honors on graduation.

She completed her bachelors degree at Princeton University in three academic years. However, she graduated with her original class, in 1994, by taking a year off to work at the Geometry Center at the University of Minnesota doing computer graphics programming. During that year, while still an undergraduate at Princeton, she was honored to deliver at the SIGGraph computer industry conference a paper she had co-written. Some of her work for the Geometry Center can be seen at <http://www.geom.uiuc.edu/docs/forum/sos/>. Earlier, after her freshman year at Princeton, she spent a summer as an intern at Microsoft, even though it had been announced that "freshmen need not apply." While at Princeton she received her certification in SCUBA diving, which became a lifelong passion.

After graduating from Princeton with a Cum Laude degree in computer science, ("much to the surprise of some of my professors," she said) Celeste revisited Europe, then migrated west to work for Silicon Graphics computer systems (SGI) as a senior software engineer where, her friends have told us, she became highly respected within SGI and the computer industry for her creativity and skills as a programmer. Her travels for SGI included trips within the United States as well as to Spain and South America.

While living in the Silicon Valley area she indulged her adventuresome spirit, SCUBA diving in the lush Monterey Bay area, and traveling to dive in Hawaii, Fiji and the Gulf of Mexico.



Celeste aboard the SSV Corwith Cramer last summer.

She also enjoyed skiing, roller blading and playing ice hockey. She tried skydiving, and generally led an active and athletic lifestyle. She traveled to Africa, visiting Egypt, SCUBA diving in the Red Sea, and touring Tanzania.

After leaving SGI in 1999 Celeste volunteered her computer graphic skills to the Scripps Institution of Oceanography, where she worked with Jules Jaffe researching copepod behavior, and took part in a field expedition to the Bahamas. Her graphic animations of copepods can be seen on the Web at <http://jaffeweb.ucsd.edu/pages/celeste/copepods.html>

In 2000 Celeste joined AvantGo as a senior software engineer and a manager. A year or so later, after running in the 26 mile Honolulu Marathon, the grind of Silicon Valley, combined with the collapse of the computer economy, led her to leave that job and relocate to Kona, Hawaii.

In Kona she pursued her passion for SCUBA diving and photography, diving as many as four days a week or more, while also working for SeaPics.com, a stock photo company which offers some of her photographs on their Web site, <http://www.seapics.com>, enough of which sold to make her ineligible for amateur photo contests. She had an NOAA research diving certification, and worked with underwater photographer Doug Perrine.

Off the shores of Hawaii she dove regularly in the company of sharks, dolphins and whales. She had a deep and abiding respect for and love of the ocean, and the earth, campaigning tirelessly for the conservation of oceanic and terrestrial resources. She chronicled her diving adventures at http://celeste_fowler.blogspot.com/ and <http://www.celestefowler.com/DiveLog/>.

In 2003 she applied for and was accepted into the MIT/Woods Hole Oceanographic Institution joint program as an MIT Presidential Fellow and Ph. D. candidate, beginning in June of 2003. In her short time there she worked on a variety of projects, including CT scans of coral with Anne Cohen in the Geology and Geophysics Department (her illness prevented her from delivering a paper on the project in Hawaii) and imaging and robotics research at the Deep Submergence Laboratory in the Applied Ocean Physics and Engineering Department. Shortly after her death it was learned Celeste had won a prestigious National Science Foundation Graduate Research Fellowship for 2004.

Celeste had an irrepressible sense of humor. When her metastatic melanoma was diagnosed only 8 weeks before her death, she quipped "Well, at least they won't think I'm a

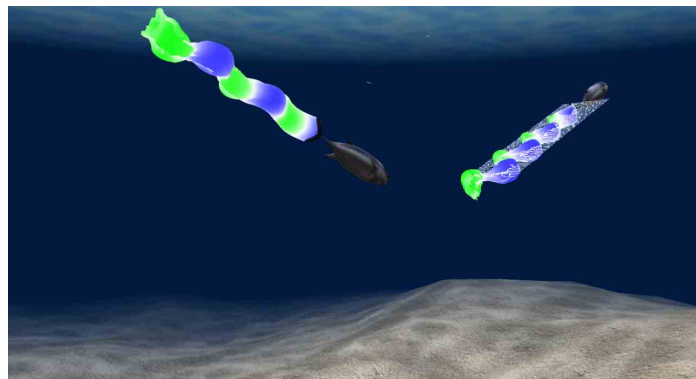
article continued on page 6...

iQuarium Unveiled!

By Ms. Kathryn Wasserman, '04

We invite you to visit the iQuarium, now open to the public in the Hart Nautical Gallery in Building 5. Meet a virtual tuna face to face, or follow one around the virtual ocean like a scuba diver. Virtual sunlight filters through surface waves as more tuna swim overhead and colorful flow fields unfurl behind them. Wave to the tuna and they follow your hand across the screen. Press a button to zoom in on the smaller giant danio fish and see the vortices spinning in their wake. Curious? Press the "info" button for an animated mini-introduction to hydrodynamics.

iQuarium kicked off its tenure in the Hart Nautical Gallery with a public unveiling ceremony. The Gallery quickly filled up with friends, family, students, staff, and faculty ready to give the iQuarium kiosk's glowing blue trackball a spin. The vibrant iQuarium display shines through the museum display cases into the Building 5 hallway, drawing passers-by into the Deep Frontiers exhibit. Since unveiling, students stop by to see and play with the iQuarium on their way to class.



Vortices appear before your eyes as iQuarium fish swim across the screen.

Another iQuarium exhibit is scheduled for installation in the Stata center student street, Fall 2004. Plans are in the works for interaction between the two iQuariums.

SNAME Paper Night and March Meeting

By Ms. Adrienne Yandell, '05



SNAME Paper Night Participants: Omri Pedatzur, Jennifer Stamp, Brian Lied, Greg Beers (SNAME chairman), Matt Greytak, Johanna Mathieu, and Todd DeVries.

The New England section of SNAME held a Student Paper Night at MIT on February 12th. The presentations consisted of short talks given by graduate and undergraduate students

entered in the SNAME Student Paper Competition. Student presentations were given by three MIT students, Omri Pedatzur presented his paper "Feasibility Study for a Littoral Corvette Ship" in the Graduate student competition. Undergraduates Matthew Greytak and Johanna Mathieu presented their paper "From Waves to Watts: A Wave Energy Conversion Device for the Charles River Basin", based on their 13.017-018 project.

Other presentations were given by undergraduates Jennifer Stamp ("Prediction of Roughness Penalties for Propellers and Hulls") from the UNH, Brian Lied ("A Design Plan for the Replacement of the Propulsion Plant on the USCG 65' WLR and 75' WLR, WLIC") of the USCG Academy and Todd DeVries ("Refinement of Procedures to Produce Low Cost Ship Models at the U. S. Coast Guard Academy") also from USCG Academy.

On March 11th SNAME held a meeting at the Massachusetts Maritime Academy at which Meg Brogan presented a paper ("Tension Leg Platform Design and Optimization for Vortex Induced Vibration") by her and Katie Wasserman entered in the student paper competition. Their talk was followed by a tour of the T/V Enterprise, Mass Maritime's new training ship.

Underwater Intervention in New Orleans

By Ms. Kathryn Wasserman, '04

MIT Course 13 was well-represented at the Underwater Intervention Conference from February 17-19, 2004 at the Ernest N. Morial Convention Center at the edge of the French Quarter in New Orleans, Louisiana. Katie Wasserman '04 was honored as the winner of the MTS ROV Scholarship Award for the 2003-2004 school year.

The conference technical sessions included a presentation by Justin Manley '96 called "AUV Applications Within NOAA" about commercial AUVs selected for various missions of NOAA's Office of Ocean Exploration. Conference goers visited the Prevco Subsea Housings booth on the exhibitor's floor, to see custom designed pressure housings and speak with John Head, '89, company President and Founder.

Kathy de Zengotita: 2pi Radians and 14 Years

By Ms. Meghan Brogan, G

I'm sure many of us are still feeling the pangs of losing our "momma" in OE admin: Kathy. I figured, rather than write an article bemoaning her departure, I would focus on the lucky train of events that brought her to us in the first place. This is an exciting story, so be prepared.

In 1989, 14 years ago, a young(er) Ms. Kathy de Zengotita first arrived at MIT. She was hired at, believe it or not, MIT Sea Grant as a part time librarian. Then, as she tells it, "the web came along"... "the web?" I say... "yeah, the world wide web"... "oh". [Still hard to believe there was life before the internet!]

Her new boss, Professor Chrys Chryssostomidis, encouraged her to teach herself HTML and so she created the first web site for the MIT AUV Lab. In fact, her web site had the first (in all of MIT) clickable map! Over the next seven years and multiple different promotions and job titles, Kathy eventually ended up working as the "communications manager" for Sea Grant. The lure of a non-academic job brought her to Cabot Corporation in 1996 where she stayed for 4 years. And in 2000, as so many did, she switched jobs again into a "Dot Com." Kathy met the unavoidable fate that awaited all who took that bait (except those lucky "yahoos" –no pun intended- at ebay and Amazon), and in 2001 ended up back at MIT, working again for Chrys, as the student administrator. Long story short: we got reeeeeee lucky.

However, as life often does, Kathy found herself at the precipice of another career transition... one which will forever scar those of us left behind to decipher all that cryptic admissions mumbo jumbo on our own. With ReRe Quin leaving MIT Sea Grant and poor Chrys without an administrative assistant, Kathy

made the decision to come full circle (or 2pi radians!) back to Sea Grant!

Knowing first hand, because my office is over here at Sea Grant, I can say that Kathy has made a smooth transition, and as she has informed all of us, is still there to answer those seemingly "unanswerable" departmental questions.

Post-article-note: Kathy's son, Joe Seaward, has just been accepted into the MIT Class of 2008. Congratulations!



Kathy and her son, Joe.

Congratulations February Graduates...

Angelo Boutsikas, SM
Richard Connell, SM
Jessica Donnelly, SM
Da Guo, SM
George Katsoufis, SM
Vaseleios Maroulis, SM
Brian Murphy, SM
Maira Papaioannou, PhD
Leon Patitsas, SM
Omri Pedatzur, SM
Talha Ulusoy, SM
Kathryn Wasserman, SB

13SEAs Luncheon Series

By Mr. Karl Magnus-McLetchie, G

13SEAs has hosted two exciting lunch seminars so far this term. On Friday, February 13th, Rod Evans from Science Applications International Corporation (SAIC) gave a talk. His presentation covered SAIC's role in the hydrographic survey of coastal waters and in the surveillance and security of harbors. He focused on SAIC's use of a Laser Line Scan System (LLSS) for search and recovery and on SAIC's work with NOAA to update US navigational charts.

On Friday, March 12th, MIT alums, Nick Hahn and John Gullotti, from General Dynamics Electric Boat (EB) presented the ins and outs of their company including a summary of their facilities and how a submarine goes from design to construction to launch. Hahn also spoke about new submarine propulsors that he has been working on. Gullotti discussed some of the welding issues EB faces in putting together such large structures.

13SEAs thanks Rod, Nick, and John for taking time away from their jobs to teach us more about working in the real world!

Speakers Needed!

If you or someone you know would like to give an Ocean Engineering-related talk to our department please contact Karl-Magnus McLetchie, kmwm@mit.edu. Speakers are needed for the Fall 2004 13SEAs luncheon lecture series. We love to hear from grad students, undergrads, alums, and others doing exciting research in our field.

Profile on New OE Sophomore Lauren Cooney

By Mr. M. Jordan Stanway, '06

Lauren is from St. Helena, California. She joined our department because "It's perfectly tailored to what I'm interested in, and the smaller classes, awesome students and faculty are wonderful. Plus, being an ocean engineer in a sea of MechE's is definitely a standout!" She may minor in MechE or Philosophy, and is also considering doing a fifth year for a Master's Degree.

Her passion is deepwater

exploration with underwater vehicles, and she has also recently become interested in acoustics. She is in charge of the acoustic sensing part of this year's MIT ROV for the MATE competition. She also has a UROP at MIT Sea Grant, with Chrys Chryssostomidis and Vic Polidoro. She plays Women's Rugby.



13SEAs Pirate Trivia!

By Mr. Tadd Truscott, G

- What is a Swashbuckler?
- Which animal did pirates use to bribe officials?
 - Parrots
 - Monkeys
 - Turtles
 - Exotic fish
- The captain of the ship was often:
 - The most educated.
 - The most experienced sailor.
 - The one who got the most votes by the crew and elected as captain.
 - The wealthiest.
- The most notorious pirates were from the South China Sea. Their leader was Captain Cheng who formerly was a:
 - Boy prince and 16 yrs. Old
 - A woman
 - A samurai
 - An escaped slave
- A pirate is someone who robs and plunders on the sea. So what is a "privateer"?
 - A pirate with 5 years of experience or more.
 - A pirate with a letter from the king to attack enemies of their country.
 - A pirate who is a citizen of no country and on plunders on his own.
 - Someone who buys pirate's goods to sell in his store.
- Buccaneers where pirates who:
 - Operated in the Caribbean only.
 - Operated off the Eastern US only.
 - Operated off England's shores only.
 - All of the above.
- Escaped black slaves from Panama who helped Francis Drake fight the Spanish were called:
 - Cimaroons
 - Blacdoons
 - Commonairs
 - Pamorians
- Blackbeard the pirate was known for his black beard. But he also:
 - Had a black crow as a pet.
 - Braided black ribbons in his beard.
 - Smoked a black pipe.
 - Carried a pistol with a black onyx handle.
- In pirate terms a "pink" was
 - A captured person pleading for his life.
 - A Dutch fishing boat.
 - A rose gold piece of eight.
 - A girl pirate.
- In pirate terms, a "waggoner" was:
 - The small rowboats tied to sides of a ship
 - The sailor in charge of getting supplies on the ship
 - A type of ship that had no cannons or defense
 - Sea atlas named after Lucas Waghenaer
- The best way pirates used to catch their victims' ships was:
 - Sailing fast and ramming the ship
 - Surrounding the ship with rowboats of pirates first for intimidation
 - Using female pirates as decoys
 - Flying a false flag to hide they were pirates
- The average age of a pirate was:
 - 16
 - 21
 - 24
 - 27

All trivia borrowed from:

<http://www.brownielocks.com/pirates.html>

And the book "Under The Black Flag" by David Cordingly, Random House, NY © 1995.

ANSWERS: 1. A flamboyant swordsman or adventurer. 2.A, 3.B, 4.B, 5.B, 6.A, 7.A, 8.C, 9.B, 10.D, 11.D, 12.D average death @ 31

Congratulations...

to Bridget Brett '06 on her recent engagement. Bridget will be getting married this June!

Free Shrimp!

To celebrate the discovery of evidence of "a body of gently flowing saltwater" on Mars, Long John Silvers is giving everyone a free giant shrimp on May 10th.

Check out:

www.ljsilvers.com/press/freeshrimp.htm

OCEANS 2004

Call for Student Posters for Oceans 2004. Abstracts due April 15th. Check out:

www.oceans-technocean2004.com.

Selected students will receive an invitation to present their posters at the conference. Attending students will be provided conference registration and lodging, as well as reimbursement for travel expenses.

Ahoy!

Heather Brundage '06 is learning first hand about oceanographic research as she sails the Pacific on the SSV Seamans Check out the location of the ship at

www.sea.edu/SEA2000/NewsUpdates2000/dailyreport.htm

Welcome...

to Steve Malley, our new Student Administrator.

On the Air...

Professor J. Kim Vandiver will be a guest speaker on WMBR's "Dinnertime Sampler" on April 7 from 6:30-8:00pm.

A Wave Energy Conversion Device for the Charles River

By Ms. Johanna Mathieu, '04



Seniors Jeremy, Kate, Matt, Katie, Brian, and Johanna stand with their device on testing day.

The next time you look out to the Charles River imagine thousands of buoys floating up and down in the waves, all connected by tether to the institute, and providing power for our campus. This idea might seem pretty farfetched but this year's Ocean Engineering seniors have built a device that might just make renewable energy from the river, or another body of water, a reality someday. As part of the course 13.018, Design of Ocean Systems II, they have designed, constructed, and tested a device able to convert wave energy into electric energy. The instrument was optimized for use in the Charles River.

The wave energy conversion device uses a linear generator to extract power from the river. As the hull of the device is forced up and down by the waves a magnet, attached to the hull via a spring, moves up and down inside a coil of wire. The spring/magnet system has been tuned to resonate with the peak

frequency of the waves in the Charles River to maximize the relative motion between the magnet and the coil. Changes in magnet flux due to the motion of the magnet induce a current in the coil. This current is dissipated over a resistive load in order to create a voltage, and ultimately power. An electronics and data acquisition system measure and record the power. The whole structure is approximately 5 feet tall and 2 feet wide.

Research first began last spring as part of the course 13.017, Design of Ocean Systems I. The students started by researching wave energy conversion systems and then performed analysis and experiments to determine which device would be the most appropriate for the Charles River. Next they quantified the power available in the Charles River using wave probes that they designed and built. Finally, they designed a device, called an Oscillating Water Column (OWC), they hoped would meet the challenge. At the start of 13.018, Course 6 Professor Steven Leeb met with some of the students and suggested they look into using a linear generator system.

Laboratory-based experimentation proved that a linear generator would not only be able to convert more of the river's small waves into electrical power, but also, it would be relatively simple to build compared to the OWC system. After some redesigning they built their system and, in late November, tested it in the Z-Center pool and in the river.

The results of the experiments were extremely promising. Though on the day of the test the waves in the river were small the device converted up to 57.9 milliwatts of wave power to

electricity. The peak efficiency of the device was 7.3% (peak RMS power: 1.45milliwatts; peak RMS efficiency: 0.068%). Unfortunately, this amount of power was less than the students had expected based on mathematical modeling. However, they later discovered that the spring/magnet system was not in resonance with the waves, which were at a very different peak frequency than that which had been measured repeatedly in the spring, and again in the fall. This indicates that if they were to ensure that the natural frequency of their spring/magnet system was in resonance with the frequency of the waves they could expect to get out much more power. Hopefully, an experiment to corroborate this hypothesis will be performed this spring.

Beyond writing up their findings the students have submitted a paper to the SNAME paper competition and will be submitting another to OCEANs 2004. The students involved in this project were Kate Baker, Jeremy Chambers, Matt Greytak, Johanna Mathieu, Brian Mueller, and Katie Wasserman. Dr. Tom Consi and Dr. Franz Hover were the instructors.



Converting waves to watts on Charles River.

Celeste Fowler (continued from page 2)

hypochondriac!" After Celeste had survived a particularly grueling round of chemotherapy someone cautiously sticking his head in her door was greeted with Mark Twain's line, "Reports of my death have been greatly exaggerated."

Finally her valiant heart did give out, a little after 11:15am, on Sunday, March 21, in the wonderful, caring Inpatient Unit of MIT Medical Services. With her were her parents, Dennis and Peggy Fowler of Otego, New York, and good friends from her high school years and Silicon Valley. She is survived by her parents, various aunts and uncles and cousins, her beloved cat, Flipper, and many, many friends all

over the world who all miss her intensely.

Memorial services were held at Woods Hole, Massachusetts, on April 3 at 2pm.

In lieu of flowers donations should be made in her name to the Monterey Bay Aquarium Splash Zone, a special exhibit to introduce children to ocean life. Please send checks to the Monterey Bay Aquarium, 886 Cannery Row, Monterey, CA 93940, and mark them "In Memory of Celeste Fowler." To our knowledge, this was the only cause to which Celeste personally contributed heavily, so we feel certain this would meet with her approval.

This obituary was written by her parents, Dennis and Peggy Fowler.

The River Rat System (continued from page 1)

general stigma about the personalities involved, etc...

So the conversation turned into how that could become possible and I suggested that if we could track the boats (I was working on an engineering project to track children at the time with GPS) then people would be able to place bets during the race, and this would make for a more dynamic gambling environment than most sports, where you bet once on an outcome - this had the potential to be used throughout a race and thus odds would be set as the race progressed. Definitely seemed more interesting than watching a regular race without such a system. We sketched out an idea that involved GPS, and used pager devices to telemeter the data back to shore...So that is where the idea was born...

But it was not until John Leonard (Professor of Ocean Engineering) asked if we wanted to write an iCampus proposal along these lines that it even made sense to try such an idea because of the large initial investment required.

4. What motivates you to work on this project?

It is fueled by the interest common to most of the team and advisory board members of sailing, and in particular of racing sailboats. Everybody is hoping to improve their racing skill by being able to review the race and figure out their mistakes.

I (Claudio Cairoli) think the biggest draw for this from an MIT/iCampus perspective, is that it really gives new coaching opportunities for racers. You can go from vague hand-tacking conversations about what was happening on the race course to just looking at the data and seeing what really happened; not only that, but seeing how situations evolve over time, like those diagrams in the sailing magazines.

5. What is the projected timeline for the project?

The project is intended to be one-year long. At the end of the first three months we want to have a working prototype of the sensor package that will eventually be mounted on the boats. At this stage it won't need to be waterproof as we will initially do testing on land. To reach this goal we need to define the specifications and requirements for the entire system as well as for each individual components, pick the individual components, and assemble the prototype. We also need to start working on the base station part, which means buy a desktop system and start developing the software. During the second three months, we will continue with the on-land testing of the prototype and with the design and implementation of the base station software, so that by the end the boats will be displayed as dots moving in real-time across the screen. We will also start working on the design of the waterproof housing and test mockups of it on the boat to identify the best position to mount it. Before the half-year mark we will start the on-water testing.

In the next three-month period, we intend to build one or two more prototype in order to test design variations suggested by the series of tests. Once we have more than one sensor, we can test the communication modules and related software to see if we can handle multiple sensors on the field. On the base station side, the development of the software will continue. By the end of the period we will have finalized the design of both the sensor packages. The last three months will be mostly spent on building as many sensor packages as time and the budget will allow, and we think it will be between 20 and 30. If time will allow we also would like to refine the software to make it more user friendly, by adding a nice GUI,

maybe a web page interface, so that users can remotely follow the races on the Internet.

6. How does this project make use of Ocean Engineering skills?

First of all, this is a project that directly builds on a robust subset of the core OE disciplines: mechanical, electrical, and software (we don't really need any hydro here, unfortunately...)

It will be used in the "marine" environment, thus we need to design a rugged, waterproof canister that has penetrations and will be collecting data. Not too much different than a robot, just no actuation (i.e. no motors and lifting surfaces).

The engineering "design spiral" is paramount for a good result. We will first frame the problem, analyze potential solutions, build a prototype and test and learn from the results. Then we will iterate again and have a better system in the end. This methodology is taught in classes like 13.017/018.

Adding a user front end and doing the algorithm development is consistent with classes like 13.470/1.124.

Our knowledge of boat dynamics will dictate proper location of the device (2.004, 13.015), and mechanical assembly comes from experience gained UROPing in the OETL and some MechE classes like 2.670.

The Team Members for the RiverRat Project are: Claudio Cairoli, Ph.D. Candidate in Course 13, who is also the PI for the project; Douglas DeCouto, Ph.D. Candidate in Course 6, CSAIL; Claudio Brasca, Graduate student in Course 6; JM Modisette, Junior in Course 16; Scott Torborg, Freshman; and Alessondra Springmann, Wellesley undergraduate. There is also an advisory board supervising the project: Robert Damus, Research Engineer at MIT's AUV Lab, OE BS '99, MS '01; Fran Charles, MIT Sailing Master; and Prof. John Leonard, Associate Professor of OE and CSAIL.

To learn more about MIT Sailing and iCampus visit their websites: sailing.mit.edu and icampus.mit.edu.

FOR SALE

13

13Seas T-shirts
\$10
Free For Members

Please contact Karl-Magnus McLetchie, kmwm@mit.edu if you would like to purchase a 13SEAs T-shirt!

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GSC Representatives Ms. Deanelle Symonds Mr. George Katsoufis	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
Advertising Coordinator Ms. Kathryn Wasserman	

Looking Ahead...

Date	What's going on?
April 1	13SEAs luncheon: Mike Utt (Unocal Engineering and Construction)
April 8	Hongye Liu's Thesis Defense
April 8	13SEAs luncheon: Tom Brewton (Maritime Management Consulting)
April 16-18	Campus Preview Weekend
April 19-20	Patriot's Day- No classes
April 22	Drop Day
April 22	SNAME Monthly Meeting
April 28	Mike Lombardi (Applied Subsea Technologies)
May 13	Last Day of Classes
May 17-21	Finals
May 21	SNAME Monthly Meeting
May 31	Memorial Day
June 4	Commencement

Highlights in the next Making Waves...

- The Ocean Engineering Department says goodbye to Dr. Tom Consi.
- Student Spotlight on Heather Brundage, '06 who has spent the semester at sea.
- Results of the SNAME Paper Competition

Look for the next Making Waves in June!

