



Making Waves

Faculty Spotlight: Professor Jerry Milgram

Contributed by Seth Clark '07

Professor Jerry Milgram has been an institution at MIT since 1956 when he first enrolled as a freshman. When he first arrived, tuition was only \$1600. While a student, he received two undergraduate degrees, a master's degree, and a doctorate, all from MIT. Since becoming a Professor, he has started three companies, worked on every America's Cup boat since 1964, and has worked on projects in a multitude of fields, including wave measurement, oil clean-ups, and the digital processing of holograms.

As an undergrad, Professor Milgram was unsure of what he wished to major in and so he dabbled in Chemical Engineering, Electrical Engineering and Naval Architecture. He was most interested in Naval Architecture and Electrical Engineering. He felt that the application of computer programming techniques to traditional naval architecture problems would be a

powerful and time-saving tool. After convincing his father to pay for a fifth year at MIT, he received a double major in Electrical Engineering and Naval Architecture. He stayed at MIT for his Master's Degree, writing a computational program for sail shapes for his thesis. For his Doctorate, he applied his skills in programming to marine hydrodynamics. With a Doctorate degree, but unfortunately short on money, he managed to get a contract from the Navy to build a "Compliant Water-Wave Absorber" for tow tanks. With the money he had left over, he was able to be hired as a post-doc and in 1967, was given a Professorship.

In the years that followed, Professor Milgram worked on dozens of projects, as well as started three companies. He once developed a boom system to collect spilled oil, which one of his sail-making companies ended up constructing for the Coast Guard. Another of his projects involved building a device to measure tiny ocean waves. One other ongoing project is to analyze ship accidents and determine what went wrong.

Professor Milgram is also well known for his work in sailboat design. He began designing boats in 1961 as part of his Master's thesis, but soon grew quite skilled in producing fair hull shapes and developed a good feel for what makes a fast sailboat.

Continued on next page.



*America³ crosses the finish line to win in 1992.
Photo copyright San Diego Union-Tribune.*

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Professor Milgram

He even built a sailboat of his own design that was so successful in races that the class in which he was sailing created a 10 point penalty exclusively for his boat. He was once interviewed and asked about his thoughts concerning the frustration of other skippers. He said, "I figure it's their money against my brains."

His most famous work involves the America's Cup races. While he worked for a syndicate for each of the America's Cups since 1964, he gained the most notoriety for his leadership in the design of America³, which won the 1992 America's Cup. He led a very serious team which spent the majority of their time testing. They had 15 different designs built as models, ran 40 tests for each boat, and each test was roughly 150 runs. Two boats ended up being superior to all of the rest, and the boat he recommended ended up being the boat which won. In 1995 he was asked to work for team New Zealand, but worked instead for the women's team of America³, which was the fastest defender, but it ended up losing its lead in a wind-hole. In 1998 he worked with Bruce Farr for Young America, which ended up losing after one of its hulls broke. In 2003, he was approached by team Alinghi, which is the current Defender, but declined the offer to move to New Zealand, and instead worked as a consultant. He chose not to work on the current America's Cup because he feels that it is no longer a gentleman's sport, and that \$100 million dollars is too much to spend on a sailboat.

He currently is working on three projects simultaneously. His first project began in 1997 and involves numerically recognizing three-dimensional images from holograms. This technology is to be adapted into an easy to use sea-going instrument for three-dimensional ocean scans. Such scans have already been tried in searching for and determining the species of plankton. The results of these scans were very positive. He is also working on a program which will predict the resistance of sailboats at any angle of heel, taking into account the angle of attack of all appendages. This program will hopefully be done by September. The third project he has going is working for the Navy to judge the seaworthiness of one of their new cruisers. This craft has a great deal of

tumblehome, which is good for deflecting radar, but reduces roll stability. Professor Milgram is the task leader for determining its overall seaworthiness and the likely-hood of it capsizing.

While Prof. Milgram has been involved in the ocean industry for roughly 50 years, he never confines himself to fixed areas of study. Currently he is interested in working to remove the America's dependence on foreign oil. He would like to see improvements in all areas of alternative fuels including solar, wind, fuel cells, and better batteries, but he feels that the key to reducing dependence is the development of synthetic liquid fuels. Work is currently being done on creating a coal-based liquid fuel, which has promising applications, but it is currently too under-funded to make any significant long-term strides. He also wishes to see an increased use of nuclear energy, along with improved nuclear safety systems to ensure the well-being and peace of mind of citizens.

In September of 2007 Professor Milgram will be retiring. Nearing the end of his career as a professor, he has taken time to look back and notice the changes MIT has made over the last 50 years. He has seen economic growth, certainly, but is dismayed by the expanse of bureaucracy and administration. The changes he has seen have not been all bad, but he is saddened to see the department of Ocean Engineering go. Professor Milgram has led one of the most extensive and diverse research careers that any professor could have wished for. Though he will be retiring in 15 months, he will continue to work at MIT for years to come.

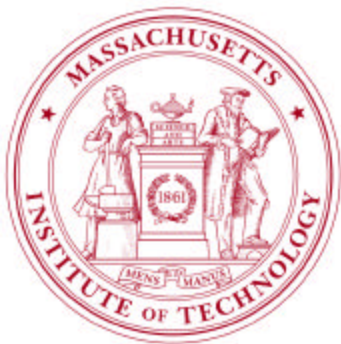


Prof. Milgram with the America's Cup.

Congratulations, Ocean Engineering Graduates!!!

Bachelor of Science

Heather Brundage
Bridget Downey
Timothy Pennington
Jordan Stanway



Lauren Cooney, course 2OE and Jessica Hagelstein, course 5, both members of the Class of 2006, at graduation.



What's up with the Graduating Seniors?

Heather Brundage

I'm taking next year off to do a bunch of internships/co-ops, then returning to MIT for a Masters in ocean engineering. I'm working at Johns Hopkins Applied Physics lab in Maryland over the summer and then Northrop Grumman's Oceanic Division in the fall. Hopefully in the spring I'll be interning with Raytheon Polar Services working on an ice breaking research vessel in Antarctica - but that isn't set in stone yet.

Bridget Downey

I will be working as a business analyst for Norbridge, a management consulting firm located in Concord, MA. One of the areas in which the firm specializes is transportation & logistics consulting, my main interest. I worked with Prof. Marcus and graduate student Bryan Nicholson for my senior project. We analyzed the actual operations of a dry bulk shipping company. Their activities involve a variety of vessels, bulk terminals, and cargos. The research involved collecting the relevant data over a period of several years and creating a computerized database. In addition, I analyzed the data in a variety of ways, in order to make recommendations as to how the company can improve their operational efficiency. Whatever I find myself doing next year, I am very excited to be graduating! I want to thank all of the OE folks here for making these four years a wonderful learning experience.

Timothy Pennington

For the summer I am back here in upstate New York. I am teaching sailing at the Sodus Bay Junior Sailing Association, a community based day camp for kids age 7-15. Specifically I am teaching a program on cruising in larger boats. My course includes topics such as provisioning, navigation, and off shore safety. I am also helping out in my parents' two restaurants, and possibly helping them to open a third location. I will also be using these three months to search for opportunities for next year. Ultimately I am looking to take a year or so off before returning to Graduate school for Naval Architecture. I am considering both entry level technical jobs at a naval arch type firms as well as some other less technical jobs in student affairs or philanthropy.

Jordan Stanway

I'm staying at MIT for Grad School, working with Prof. Techet in the Water Tunnel and the new Experimental Hydro Lab. I'll be hanging around Boston this summer, working on the MIT ROV, running tests on the contra-rotating thrusters I designed for my senior project, doing some upgrades on the water tunnel, and hopefully collecting a lot of data for my Master's Thesis. Somewhere in there I hope to fit some diving in, before Discover OE starts up in August.

Get to know your new 13SEAs Officers!

Jordan Stanway, President

I am a graduating senior from the OE program and I'm staying at MIT for Graduate Studies under Prof. Alex Techet. I love everything to do with the water, and that's why I chose OE and why I'm giving my all to making sure 13SEAS is an organization that OE students can use for support and that will also remind us to stop and have some fun every once in a while. If you have any suggestions for things we should do to make the organization better for you, please don't hesitate to get a hold of me.

Seth Clark, Vice President

I am currently finishing my junior year at MIT, working towards the completion of a B.S. in the department of Ocean Engineering. I will be applying to graduate school this fall to pursue a Masters of Science in Naval Architecture. Currently I am the founder and president of Wind-Wise, MIT's autonomous sailboat team. We are designing and building a two meter long sailboat to be sailed at the *Sailbot* competition, an autonomous sailboat regatta. I am the SNAME representative. I spend my summers working for Island Packet Yachts, a private yacht designer and builder in Largo, FL. While in Florida, I spend my free time volunteering at a local sailing pavilion where I fix boats and teach children how to sail.

Vicente Fernandez, Treasurer

I joined the MIT/WHOI Joint Program with the OE department two years ago. My undergrad was in mechanical engineering, so I suppose the merger with course 2 has brought me back to familiar grounds. I joined ocean engineering because of my interest in fluid mechanics and organismic biology. When I arrived, I started by working on Finnegan the Flapping Foil Vehicle. I've since transitioned to working with Professor Triantafyllou and others on a great thesis project investigating a new sort of sensor for AUV's inspired by the lateral line organ in fish. Since I grew up in the Midwest and I'm fairly new to ocean engineering, I'm still working on picking up some of the essential hobbies such as sailing and diving. I'm greatly looking forward to it.

Your new 13Seas Officers are:

| | |
|------------------------|-------------------|
| President: | Jordan Stanway |
| Vice President: | Seth Clark |
| Treasurer: | Vicente Fernandez |
| Secretary: | Evan Karlik |
| Reporter: | Julie Arsenault |

Evan Karlik, Secretary

I am originally from Bethesda, Maryland and first became interested in the watery realm of sailing and waterskiing on Deep Creek Lake, in western Maryland's panhandle. I am entering my fourth year in the 2OE program, though outside of classes I am actively involved in Theta Chi fraternity and Navy ROTC. I have been on dive trips with my fraternity brothers to the Bahamas and Cancun, and have also recently traveled to Germany and Israel. I aspire to enter Navy flight school in the near future.

Julie Arsenault, Reporter

I am entering my junior year in the 2OE program. I have always loved sailing catamarans and small sailboats and I have relished the opportunity to get out on the water. My interest in naval architecture certainly stems from my interest in sailing. I am spending the summer interning for JJMA, a naval architecture firm that is a division of Alion Science and Technology. I love to ski and sail, and am a member of both the Sailing and Ski teams.

Student Spotlight: Seth Clark, Leader of WindWise

As reported to Ashley Cantieny ('08)



Seth Clark, '07 works on the hull for WindWise's autonomous sailboat.

This summer, the first ever Autonomous Sailboat Competition (SailBot) was held by Queen's University in Kingston, Ontario. While the team from MIT (WindWise) had to pull out of the competition at the very last moment, the progress they made towards creating an autonomous sailboat sets them up to be a major player in next year's competition. The competition itself has two races, one fully autonomous navigation course where teams are awarded points for accuracy and time, and a match race regatta where two boats at a time compete (with remote control of rudder only) and points are awarded for number of races won in a series of races.

When Seth Clark (Course 13 class of 2007) was asked to head up a team from MIT, he assembled students from courses 13, 2, 2OE, 18, and 6 and split them into focused groups for programming/RC, sail design/running rigging, and standing rigging. Seth himself took on the task of hull design using the program Rhinoceros, which was donated by its creators for the team's use. After the hull design was completed, a plug was cut to create the molds for the hull and the deck. One of the main reasons WindWise had to pull out of this year's race was that a fiberglass hull could not be fabricated in time. While glassing the molds it was discovered that the release compound used between the plug and the fiberglass of the mold was ineffective. There was also not enough time to

build a keel fin for the boat. While most of the boat's components (mast, booms, spreaders, etc.) could be bought pre-made, the team found that a keel fin with the necessary specifications was just not commercially available.

Unfortunately, the MIT team joined the competition later than the other teams, and so the time they had to design, build, and troubleshoot the boat was limited. The team was able to make good progress in the other areas of the boat, especially in programming and sail design. The team plans to have the boat finished early in the fall term so that they can spend time testing and making modifications and upgrades to the boat so that it will be ready to win the 2007 race.

Seth Clark, '07 and Tim Pennington, '06 fiberglass the hull for the boat.



Summer is a time for barbeques, beach parties, socializing, and having fun. As MIT students, we might have a few problems getting conversations started. If you find yourself standing next to someone gorgeous that you're dying to talk to, but can't find just the right words to use, here are some ideas. Use at your own risk!

Did you know these nautical origins for commonly used expressions?

Footloose -

The bottom portion of a sail is called the foot. If it is not secured, it is **footloose** and it dances randomly in the wind.

Groggy -

In 1740, British Admiral Vernon (whose nickname was "Old Groggram" for the cloak of grogram which he wore) ordered that the sailors' daily ration of rum be diluted with water. The men called the mixture "grog". A sailor who drank too much grog was "**groggy**".

Three Sheets to the Wind -

A sheet is a rope line which controls the tension on the downwind side of a square sail. If, on a three masted fully rigged ship, the sheets of the three lower course sails are loose, the sails will flap and flutter and are said to be "in the wind". A ship in this condition would stagger and wander aimlessly downwind.

Slush Fund -

A slushy slurry of fat was obtained by boiling or scraping the empty salted meat storage barrels. This stuff called "slush" was often sold ashore by the ship's cook for the benefit of himself or the crew. The money so derived became known as a **slush fund**.



Pirate Jokes (perhaps corny and overused, but I still think they're funny...)

A pirate walks into a bar with a steering wheel down his pants, and he orders a drink. After serving a couple of drinks, the bar tender can't control his curiosity, so he asks the pirate "Don't you know there is a steering wheel down your pants?" The pirate replies "Yarr! And it's driving me nuts!"

Why couldn't the 12 year old get into the pirate movie? It was rated ARRRRR.

Two pirates are trading sea stories in a bar. The one is recounting the causes of his wounds:

"There we were, lining the gunwale, preparing to board the other ship, when they let loose with a broadside. A cannon ball took me leg clean off, nothing left. That's how I got the peg leg."

"Then, some years later, we had boarded a man-o-war, and this scoundrel sneaks up behind me, and as I swinging back with my sword, he cut me hand off. So that's how I got the hook."

"Then I was looking up in the sky, reading the clouds for storms, when a seagull shat in my eye."

The other pirate interrupts, "Oh come on, you don't lose an eye just because a gull shits in it!!"

To which the first pirate replies, "Arr, you do if it's your first day with a hook for a hand!"

And if things are going well, and you're feeling adventurous:

There was a pirate, and he had a parrot this big. *Place your hands about a foot apart.*
 And there was another pirate, with a parrot THIS big. *Widen your hands a bit.*
 And then there's a third pirate, with a parrot THHIS big. *Widen your hands a lot by putting your arm around the other person.*

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Looking Ahead...

Look for these upcoming events in the summer:

Mixer with WHOI
BBQ at Prof. Burke's
Dates TBD

And Coming soon to Theaters:

Your favorite pirate is back on July 7!

