Dear Friends of UPOP,

It is my pleasure to introduce this inaugural issue of uPOPTalk. I’ve been an enthusiastic supporter of UPOP since its inception in 2001—as a mentor, teaching assistant, and employer—and I’ve witnessed the growth of the program and the value it delivers. In my own career as an engineer, research scientist, and technology manager, I’ve observed how the most successful practitioners possess the powerful combination of engineering expertise and nontechnical professional skills. Our students receive the individualized coaching, industry experience, and practical tools that will prepare them to lead scientific and technological innovations in the 21st century.

This year has brought changes to the UPOP staff. Dick K. P. Yue, associate dean of MIT’s School of Engineering (1999–2007), has served as UPOP’s faculty director and avid champion since 2001. His vision and guidance were instrumental in the program’s development. This fall, he was named the school’s first director for International Programs. As UPOP expands its international presence, we will continue to benefit from collaboration with Professor Yue.

After six years as UPOP’s founding director, Chris Resto ’99 is leaving the Institute to launch a campus recruiting program for GETCO, a privately held electronic trading firm. Chris established enduring relationships with hundreds of students as well as faculty, employers, and industry partners. He was honored with the MIT Excellence Award in 2007. Everyone on the UPOP team wishes Chris the best in his new endeavors.

In this issue of uPOPTalk we offer updates and honor the contribution of two of our many supporters: mentor Tina Ghosh, and featured employer Barrett Technology.

Our success hinges on the participation of all our mentors, employers, and donors, and I invite you to contact me at 617.253.0055 if you’d like to deepen your involvement, or join us for the first time. I’d love to hear from you.

Sincerely,

Susann Luperfoy
National participation in workshop

Over two weeks in January, 204 students gathered for a pre-employment “boot camp.” Twenty-seven industry partners came from all over the country to mentor the UPOP students.

They worked with faculty from the Sloan School of Management and the School of Engineering to facilitate a series of interactive modules aimed at preparing students for their summer internships.

Topics included professional communication, leadership, process improvement, group decision-making, conflict resolution, supply-chain management, presentation skills, and robust engineering.

The event also featured guest speaker Bill Warner, founder of Avid, and luncheones with more than 100 employers where students could test-drive their newly developed networking skills.

The mentors represented a range of companies, such as IBM, Sandia National Laboratories, Pegasystems, 3M, MobiTV, and Aurora Flight Sciences.

FEATURED EMPLOYER

Barrett Technology:

“UPOP is amazing!”

Bill Townsend PhD ’88 grew up in Philadelphia’s treeless inner city, but that didn’t stop him from building a tree house. He built a “house” and rigged it up along the basement ceiling of his building. This tenacity would serve him well as the founder and CEO of Barrett Technology, a leading manufacturer of robotic arms and one of UPOP’s most valued employers.

After a youth filled with Legos, model airplanes, and Erector sets, Townsend landed at Northeastern University, and then MIT’s Artificial Intelligence department, where he earned a doctorate. Townsend focused on ground-breaking projects: building robots that could interact with people.

At the time (the early 1980s), this notion was a striking departure from the widespread perception of robots as huge, dangerous machines. Used primarily in large-scale industry (such as car manufacturing), they caused many accidents. As Townsend remembers, “the only way to protect people was to put a fence around the robots.”

But Townsend’s team envisioned a different, more delicate robot. The first haptic robot arm, named the Whole Arm Manipulator™ (WAM), was designed for surgical use. Townsend explains, “The surgeon and the robot hold the cutting tool together. The surgeon guides where the tool goes, and the robot gives hints, in a friendly, gesturing way, by projecting light forces against the surgeon accompanied by audible noises. When combined with human intuition, it is just amazing what the robots can contribute in terms of accuracy, consistency, and instant-time calculations.”

It took years, however, for the marketplace to respond to Townsend’s vision. When he started in 1988, “there were only one or two customers—in the whole world—for this kind of product. I sold two systems to NASA. And then, between 1990 and 2000, I was destitute. At times, the company existed in name only.”

Townsend’s unwavering belief in the technology finally paid off in 2000. Several leading universities understood that the WAM arm was the only product that could execute new types of human-interactive robotic tasks, and they asked Townsend to resurrect it.

“Success followed gradually and was marked in unexpected ways.

“I did an exit interview with one of our first interns, and asked him why he chose to work at Barrett. He said he’d chosen us because Guinness World Records named the WAM ‘the world’s most advanced robotic arm.’ I had no idea we were in the book!”

Interns have been a key part of Barrett’s development since its inception. According to Townsend, “giving interns well-defined projects is a great way for us to stay innovative. When one of us thinks ‘wouldn’t it be great if...’, we can get an intern to explore the idea.”

In 2003, UPOP asked Townsend to participate in the program.

“It was unbelievable!” he remembers. “The program seemed too good to be true! In the past, students were mostly looking for UROPs and we couldn’t give them academic credit for their work. But with UPOP, we could finally get MIT students. The UPOP program has been amazing, the preparation that they give the students is so important..."
in letting them understand the professional environment. And the students are on fire! It’s so much fun working with them.”

Placing interns at Barrett’s small, dynamic office provides them with valuable exposure to the different facets of the industry. The limited office space allows everyone to interact. Robot assembly is done on-site. As Townsend says, “real artisans are putting together the machines, and everyone is within 30 feet of them.”

During a typical day, the office’s quiet intensity is punctuated by laughter and smiles and cries of “all right!” when successes happen—or moans and groans when they don’t. When challenges arise, Townsend says, “everyone gathers around a single computer to solve the problem. It gets intense—almost like ‘ER’—with people brainstorming and throwing out solutions.”

The hard work is finally bearing fruit: 2007 was Barrett’s biggest year. It shipped several of the wAM robots to universities and industrial clients like GM. Its license-partner, Mako Surgical, shipped several of the wAMs at $750,000 each. “People think we’re bigger than we are,” he says. “We’re ten people, and we have fierce competitors world-wide. We have to build equipment that’s not just reliable but innovative, and to start solving problems before others are even recognizing them.”

Cultivating this kind of ingenuity results in an environment in which interns thrive. Ronda Devine, UPOP’s employer relations manager, considers Barrett a top employer. “They care about what the intern gets out of the experience, not just what they get out of the intern.”

### SPOTLIGHT ON A MENTOR

**Tina Ghosh**

“Mentoring is such great professional and personal experience”

You could say engineering is in her blood: Tina Ghosh’s father and sister are electrical engineers. But her love for it comes from the heart: since high school, she has focused on her studies—and her career—on the overlap between science and the environment.

Still, the journey to her current position as a risk analyst at the Nuclear Regulatory Commission (NRC) was anything but direct. Ghosh, who is a two-time UPOP mentor, holds a bachelor’s in engineering from Princeton University and a master’s (2000) and doctorate (2004) from MIT. “I didn’t know what I wanted to do for basically forever,” she says. “I did lots of internships, even during graduate school. I tried everything. I worked for a utility company, did energy consulting, worked at different nonprofits (including Green Peace) and a national lab. My very last internship was at the NRC. And I absolutely loved the interesting, challenging technical work, and the fact that I was also helping people. It’s a perfect mixture of things that I like, and I decided this was the place I wanted to work.”

According to its Web site, the NRC aims to regulate the nation’s civilian use of nuclear materials, and to protect the environment while ensuring “adequate protection of public health and safety.”

The NRC addresses three main areas: reactors, materials, and waste.

The nation’s high-level radioactive waste is currently stored at disparate reactor sites, and they are running out of space. Ghosh’s division is charged with oversight of the Yucca Mountain project. Located in Nevada, Yucca Mountain has been identified as a disposal site for all of the country’s spent nuclear fuel.

The NRC functions as the safety regulator, charged with evaluating the Department of Energy’s plans, determining whether they have technical merit, and establishing conditions for safety.

Day-to-day, this means a lot of research, computer models, risk assessment, and applied math. Ghosh and her team analyze data from subject-matter experts, laboratory research, field work, and literature reviews, and identify the most important risks to community health.

Ghosh develops extremely long-term risk assessment models, since the consequences from disposed nuclear waste may be felt hundreds of thousands of years in the future.

“Part of my specialty is to assess these uncertainties and unravel which are most important,” she says. “People are still determining how nuclear waste can be disposed of safely. There’s a lot of public opposition, and the NRC does a lot of work with the community. I’m on the technical side, and respond to the technical questions that arise in public forums.”

Mentoring UPOP students provides a welcome change of pace. During the January IAP workshop, she provided guidance to a small group, and participated in the delivery of the week-long course.

“I absolutely loved working with students. Sophomores are so energetic and enthusiastic, and it’s wonderful to see people who care so much about improving themselves.”

In addition to the rewards of supporting the students, Ghosh recognizes the personal benefits of serving as a UPOP mentor.

“I like facilitating the teachings of the modules,” she says. “It has helped my own professional development, and reminds me of useful concepts I learned before: group work, lean process design, communication. The UPOP week is a great reminder.

“I would highly recommend it—it’s such a great professional and personal experience.”
MINDING THEIR MANNERS

Etiquette class: key to professional success

What do you get when you put 150 UPOP students in front of a finger-food buffet? Minor chaos, yes—but under the expert tutelage of etiquette consultant Jodi Smith, you also get a lively “mocktail” party, replete with handshakes, pithy introductions, and networking.

You may ask why a cutting-edge program like UPOP incorporates the somewhat old-fashioned notion of etiquette.

The reason is simple: studies by The Carnegie Foundation, Harvard University, and the Stanford Research Institute all demonstrate that people skills account for 85 percent of an individual’s success in getting—and succeeding in—a job.

Interpersonal skills remain essential even given the increasing reliance on electronic communication (text messaging, Facebook, e-mail, etc.). According to Smith, “there is a shorthand with technology that doesn’t work face-to-face. For the vast majority of jobs, you need some social skills, the ability to get along with co-workers, clients or customers. And people generalize competence based on your behavior. If I meet you and you look presentable, if we shake hands and you come across as polite, I will presume that you are professionally competent, too.

“There’s no way an e-mail—or even a phone call—can get that same message across.”

College students are more and more receptive to Smith’s teachings. When she launched her practice in 1996, students “begrudgingly” attended her presentations. At the time, “social skills were less important because the job market was so hot: many new graduates could land a job just by demonstrating that they could breathe. But after the Internet bubble burst, social skills became a differentiator. Now, when employers have a choice between two students, both of whom are smart, technically competent, and involved in extra-curriculars, they’ll choose the one with better social skills, because that means less training on the employer’s part.”

Understanding this, students now participate eagerly, and Smith works with dozens of universities each year.

At her UPOP workshop, Smith shared tips on where to place a name tag (high up on the right side of your chest, so that a new acquaintance can see it without having to scan your body); how to network during a cocktail hour (eat a snack or a drink in your left hand so your right is free); and how to shake hands properly (using firm but not crushing pressure). But her mission lies beyond the basics of introductions and table talk.

At the heart of etiquette, says Smith, is self-respect.

“I want students to walk into their interactions and feel good about themselves, their attire, and their behavior. We show respect to others by presenting ourselves well and communicating with confidence.

“If students can do that, I know I’m doing my job.”

“...