Ceremonies and Celebrations
Recognizing inspirational women in engineering
attending,” Topol continues. “There are components that would teach you about bettering your future practices, maintaining and reducing the negative impact of existing technologies with the future in mind, as well as seeing what the near future is expected to look like from the point of view of different fields of science.”

After many months of planning by a team of seven and plenty of other volunteers, the event came together. Ghorani, chair of the planning team, says, “We couldn’t have accomplished what we had without all the volunteers who helped out. It was more than just their volunteer work, it was the great spirit and energy that they had to make this happen.”

The conference featured keynote speeches “10 Clean Technologies to Save Our World” by Dr. Tom Rand, advisor and practice lead at Cleantech MaRS, and “Innovation and Social Media” by Dr. Cindy Gordon, chief executive officer of Helix Commerce International Inc., as well as a workshop on making future financial goals a reality and a number of other enlightening speakers. A highlight of the day was the student poster session and competition, where both undergraduate and graduate students exhibited posters they’d created on topics such as bioengineering, robotics and automation, and power and energy. Three winners were chosen.

Ghorani adds that feedback from the event was very positive and that new IEEE memberships were generated as a result. In particular, the signing of Dr. Rand’s book, Kick the Fossil Fuel Habit, and the poster presentations were very popular. One conference goer, Ereena Baig, says, “All in all it was a great experience! It was well planned, well organized, very informative, inspirational, and a great networking event.” Another attendee, Farhad Sadeghi, writes that there was “an excellent selection of speakers with topics that are most relevant for today and tomorrow,” and is already looking forward to next year’s event.

Ghorani mentions that a key goal for the day was to create a gender-balanced environment since, by nature of the fact that women are a minority in the engineering field overall, they tend to be a minority at professional meetings. Perhaps most telling of the excitement surrounding the event? Attendees called for the next conference—which will become an annual meeting—to be two days instead of one.

—Leslie Prives

A Cup of Tenacity, a Sprinkle of Confidence, Mixed Well with Community

Your recipe for success as a female engineering student.

This year, I was asked to speak to the female freshmen engineering students at my alma mater, Auburn University. In reflecting back and preparing for this talk, I thought about the difficulty I had getting my first degree in engineering and starting thinking about all the things I wish someone had said to me when I started engineering school at the age of 17 so many years ago. This is what I told them that fall morning.

Thirty years ago, I left high school early to become an engineer, before taking calculus or physics, and my first experiences in these courses were at university-level rigor and pace. It was daunting. There were other impediments in the way as I sought my first degree in mechanical engineering, and being the only female in my class of mechanical engineering students was one of them. However, there was also an accumulation of luck that acted in my favor as a catalyst, the energy necessary to get the reaction going. Plus, I did make some wise decisions, and I worked very hard. Still, it’s really a wonder I completed my first degree in mechanical engineering. Graduating from Auburn University at the age of 22 with a bachelor’s degree in engineering was not something I did easily or on my own.

The research shows that nearly half of female engineering students starting out will not graduate with a degree in engineering. The same would be true for a group of freshmen male engineering students; nearly half of them do not graduate as engineers either. These dropout engineering students do not fail. There are no “weed out classes” designed to get rid of the engineering chaff. The studies simply show that half of incoming engineering students become discouraged, dissatisfied, and choose to study other things. Women are drawn to fields with social relevance, and early on in a four-year engineering program, women do not always perceive engineering to be a helping field. We need to reduce the number of engineering students who drop out. We especially need to reduce the number of female engineering students who leave because the engineering world needs the female perspective. Engineering is one of the most rewarding, lucrative, prestigious, and challenging college degrees one could ever choose. I hope you learn something from my story.

We all have stories, stories of how we got to this place we are today, this room, and this university. I wish I had the time to hear all your stories because they will each be unique, but with similar threads running through. I decided to be an engineer at age 13, the summer after eighth grade. It was not due to some fun robotics summer camp or a fabulous technology class in junior high or my love of math and science. At that time in my life, math and science were a bore. I chose at that tender age to become an engineer because my mother made me.
I did not necessarily want to be an engineer, and I wasn’t even sure what an engineer did. I had always wanted to be an artist, or perhaps a teacher, but not an engineer like my great Uncle Jerry. My mom, a single parent with three young daughters, wanted us to grow up to be self-sufficient, and she told me that I was not going to be an artist or a teacher, that I was going to be an engineer so I could support myself and my children someday. She told me I could paint on the weekends like Winston Churchill, and that if I really wanted to be a teacher, I could get a Ph.D. in engineering and teach at a university. That sounded prestigious, so I was game.

My mother took me one day that summer to meet a neighbor, Dr. John Goodling, an engineering professor at Auburn. He lived up the street, and we sat together in his screened-in porch drinking lemonade. He described all the fields of engineering, from textile to civil, but mechanical seemed most interesting to me. From a young age I had a keen interest in how mechanical things worked. From the age of five, I loved to fix broken things that I would rescue from the dumpster. Instead of rescuing stray cats, I was a child who rescued broken appliances. I was also creative and loved inventing through my artwork. So it made sense. Yes, I would be an engineer. It pleased my mother and after hearing Dr. Goodling describe mechanical engineering in glowing terms, it sounded fun to me.

My first bit of advice for you is this...

1) Listen to your elders. Sometimes they know us better than we know ourselves.

It was easy to listen to my mother, and do what she said, and only slightly unsettling that it was not my choice. Mom knew what I had in me. She knew my gifts and talents better than I did at that age. I was determined to be an artist, teacher, and engineer.

That summer, Dr. Goodling offered me a job working in his lab at the university. I worked for him after school all through high school. He paid me $2/hour cash out of his own pocket, and by the time I was a senior at Auburn High School, I was building thermocouples and helping his graduate students with their research on heat transfer.

Engineering school was a shocker. After getting through calculus, physics, and chemistry, I failed my first engineering class, statics. I was a visual learner and needed to see and touch things in order to understand them. Engineering education has come a long way in 25 years, but back then we had little contact with the phenomenon we were studying. We analyzed drawings on paper. It was confusing! Our courses were lectures, and for the most part, they were pretty boring. Honestly, I slept through most of my classes; they were just not engaging. I could not relate them to the real world, and so I would go home and try to teach myself from my textbook.

I had to be my own teacher. But you know, you are always your own teacher. Nobody ever really teaches you anything. Your professors may open the door or the book for you, but you have to construct your own understandings and social settings. Eventually I formed and joined study groups. Sitting around kitchen tables with my classmates, we figured the stuff out. Teaching is the royal road to learning, and when you have to explain something to your friends in your study group, it makes a lot more sense than it does sitting at the kitchen table alone. My senior year, Dr. Goodling offered me a job grading thermodynamics homework. If you want to really understand a course after you have taken it, grade all the homework in it the following year.

We each have our own learning style. Women tend to have a different leaning style from men, and male teachers often do not espouse the teaching styles that suit us best. Approximately 90% of engineering faculty are male, so it is good to be aware of this. There is a test you can take to determine your particular learning style. It may help you to know how you learn best, and seek out resources that help you augment your teachers’ teaching styles. My second bit of advice for you is this...

2) Take this learning style quiz designed by engineering professor Dr. Richard Felder (located at http://www.engr.ncsu.edu/learningstyles/llswb.html), and don’t put all the responsibility for your learning on your professors. They are your guide, but you must ultimately teach yourself.

Form study groups with each class you take.

When I was an engineering student, I didn’t think I was very smart. It felt like I was an imposter just posing as a smart engineering student. When I would make a good grade on a test or assignment, I didn’t think I deserved it. I actually thought that because I was a girl, the male professors were just being nice to me. Other students would see me meeting with professors during office hours, and they said I was brown nosing, reinforcing the notion that I didn’t deserve my good grades. The imposter syndrome is real, so be aware of your self-perceptions. Try your hardest to actually believe that you got where you are because of your hard work and your brains.

Recently I went to visit the woman who helped take care of me and my sisters after our dad left. She is 89 years old now, and I asked her what she remembered about me as a child. She said, “You were so smart. I remember the little yellow car that you were always fixing. I remember you could put your pants on and fix anything. You even fixed the washer and dryer! You were so..."
smart.” I told her that I never thought I was smart as a little girl. She asked if I believed it now. Even with a Ph.D., it’s still sometimes hard to believe.

As a nation, we rank low on tests of math, science, and literacy when compared to other developed countries. But do you know what we are #1 in? Confidence. While a deficit of confidence can be a stumbling stone, too much confidence can be as well. If you are too haughty, if you have too much confidence in yourself, you will blame others for your mistakes and not learn from them as much. While everyone is trying to help young people build self-esteem, too much confidence can steer you wrong. It’s good to believe in yourself, but it’s also good to know your weaknesses; from them you can grow and learn. My third bit of advice for you is:

3) You may make a bad grade here and there in engineering school. It’s hard! Don’t quit, turn your mistakes into learning opportunities. Take responsibility for your grades. Own them. You earn them by yourself, good or bad.

When I was a sophomore, an older engineering student told me that I should co-op for IBM in North Carolina. I had no idea what it meant to co-op, I had never lived away from my mom and sisters, and the only thing I knew about IBM was that they made typewriters. It didn’t sound too appealing, but he insisted I check it out. He said that he’d always regretted not taking that path. So I went to see Mr. Tom Padgett at the co-op office. At that point in my engineering career I had attained a whopping GPA of 2.0. I filled out the application, which I believe was edited by Mr. Padgett, interviewed with a man from IBM, and was hired.

Before I knew it, at the age of 18, I was in my little yellow car on the way to North Carolina to find a roommate and engineer typewriters. Only they weren’t typewriters, they were computers like I’d never seen. Personal computers. I wouldn’t personally own one of my own for over 15 years, but there I was in the spring of 1982 working with a team of brilliant engineers designing them. We were also designing a connecting device that would link personal computers together, for some reason I could not fathom. Why would you want your personal computer to have access to another person’s personal computer? It made no sense, but we were on the cutting edge of what would become the Internet, and I don’t think any of us could foresee that future. I was making more money in three months at IBM than my mother was in three months back home in Alabama. At the age of 18, I fulfilled my mother’s dream and became financially independent. I saw the real-world contexts and relevance of my engineering courses. My grades improved. I started making straight As each quarter I was back in school. I spent six quarters working for IBM during my sophomore and junior years of engineering school. The strongest advice I can give you is this:

4) Co-op. Please. You’ll make lifelong friends from different places, gain a new perspective on the world, and see what engineers really do. The money is fantastic, and the experience is priceless.

Sadly, by the time I graduated from Auburn, as the only female in my class of mechanical engineering students, I had few lasting friendships. With all the study groups and all the classes, I spent very little time purely socializing. Female engineering students work twice as hard as male students just to prove themselves, and they often take on leadership roles as well. Even though I was president of the student chapter of ASME (American Society of Mechanical Engineers), involved in the Pi Tau Sigma honor society, and helped organize the annual Engineering Day festivities, I made few lifelong friends. My male classmates wanted to hang out with me for one main reason—to get help with homework, which did not make for many true friendships.

You will have a richer and more rewarding experience the next four years, and you may just stick around longer and feel like coming back for reunions, if you feel like you belong, if you have lifelong friends you can confide in, friends who you know will always be there for you. Acceptance is central to our lives. People who feel isolated enter a very destructive loop, and you don’t want that. Reach out to your engineering sisters from your discipline and others. Form study groups with them. Seek each other out. I advise you to:

5) Join IEEE Women in Engineering and join your local IEEE Women in Engineering Affinity Group that supports female engineering students.

Women in engineering school face some unique challenges. They are often at the top of the class, excel in leadership, but still face some negative stereotypes. There remains a perception that attractive, well-dressed, feminine engineering students are not smart. Think about it, we have sexy and smart female doctors, lawyers, and even crime investigators on TV. Where are the smart, beautiful female engineers? Not on TV. Female engineering students want to be seen as intelligent and capable. However, if they are pretty, dress nicely, wear makeup or perfume, have trendy clothes, or are in a sorority, then they might not be perceived to be smart. Even women can carry around this prejudice and it’s scary when you realize that we can have prejudices about people who look like us.

I didn’t think this phenomenon still existed but research recently conducted on female engineering students showed that they made themselves less attractive, wore unflattering
clothes, and tried to neutralize their gender to fit in. Their professors and their peers perceived them to be less capable if they acted or dressed in a feminine way. Honestly, I never thought my college co-op roommates were very smart engineering students because they were so beautiful, fashionable, and feminine. It's obvious now, 25 years later, when I look at their achievements that I was very wrong. So, I avoided the women engineering group at my university. It was full of beautiful women who looked like sorority sisters. Either I didn't think I belonged or I thought I was too good for them, or maybe I just didn’t want to be associated with “that group” of not-so-smart engineering students. This is very embarrassing to admit, and I have deep regrets about it. Please...

6) Be aware of your stereotypes and perceptions and rise above them. Be yourself and do not hide who you are for fear that someone will think less of you.

After graduating from Auburn, I got my master’s degree in mechanical engineering from the University of Virginia. I worked as an engineer for a short period of time in the biomedical field but then decided to do something really different. It was very difficult to tell my mother... but after two engineering degrees I decided to become a middle school science teacher. I cofounded a middle school for girls in grades 5–8. We started our first year with 16 students in a beautiful renovated old brick building in downtown Charlottesville, Virginia. We decided on a rigorous program that included Latin, orchestra, the arts, and engineering. By the second year, I had grant money to fund an entire engineering education lab in the school, and all students took the class. I taught science to all students, including my two daughters, and incorporated engineering design into each science con-

tent area I could. The school became very popular in no time, and we were at capacity with waiting lists by our third year. I left after nine years to pursue my Ph.D., and the school is still a thriving. So are its graduates, including my daughters.

Thirty years later, with three grown children, a master’s degree, a Ph.D., and a job as a university professor, I am doing research funded by the National Science Foundation on how to best teach engineering to middle school youth. I do indeed, like Winston Churchill, paint on the weekends. Reflecting back, I’m sorry for some of the mistakes I made and opportunities lost. However, I’m proud of some of the really good decisions I made and opportunities I jumped at. I’m glad I took the advice of people who knew more than me and wish I’d had a female mentor at the time to give me even more advice on surviving and thriving in engineering school. And having this perspective, and being a teacher, I want to tell you all to take my advice seriously. Start networking now. Study together. Support one another. Form community. Realize this...

7) A degree in engineering is a master key to anything you may ever want to do in life.

It opens doors. People respect you. Stick with it! Whether you want to make solar energy economical, prevent nuclear terror, provide the world with access to clean water, engineer better medicines, design tools to see farther into space or peer closer at our DNA, design electronics for better communication, or even start an engineering school for kids, you are in a helping field. The world needs your help.

Take a cup of tenacity, a sprinkle of confidence, and mix well with community. You’ll do fine.

—Christine G. Schnitka