Back Issues
Past 2 Issues

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Monday, October 04, 2004

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Search Archives
Full Text Search

HOME
- Archives
Select a date
- News
- Sports
- dB Magazine
- Viewpoint
- Science & Health
  - *Your Health*
- Finance & Economy
- Week in Photos
- Interactive Special Features

Online Forums
Video / Audio
Newsletter

What's Bruin
View Print Edition
Corrections
About the DB
Contact Us
The Staff

DB Alumni Site
BruinClassifieds
Search Classifieds
BruinClassifieds
BruinWalk.com

Uneven equation

AMY TRANG HOANG/DAILY BRUIN
A toy robot named Ragobot moves toward fourth-year materials engineering student Sophia Wong on the terrain she's helping to build.

By **Menaka Fernando**
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It's not surprising that fourth-year materials engineering student Sophia Wong says she feels like she knows every girl studying in the school of engineering with her – there's not very many of them.

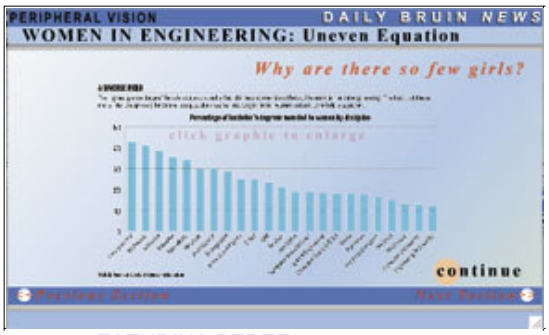
"I know all the girls. It's such a small world, you realize, within engineering," Wong said.

Wong is one of about 500 women in the Henry Samueli School of Engineering and Applied Science, equaling about 20 percent of the school's student population.

UCLA's numbers reflect the average number studying the field at colleges across the country. The numbers have also remained stagnant in the last five years and even seem to be experiencing a slight downturn in the most recent years at UCLA. Only 16 percent of first-years and 17 percent of transfers in the incoming class of engineers at UCLA are women.

When Wong began walking the halls of South Campus four years ago, these numbers became real to her.

When asked if she was surprised at the amount of girls in her classes, she said: "I had no idea that it was going to be this few. I knew that there would be the stereotypical classes filled with guys. But, I didn't know how real that was, until I actually came here."



ZATHRINA PEREZ/DAILY BRUIN SENIOR STAFF

FLASH: Interview Transcript

Though the current numbers remain low compared to the number of women enrolled in all the other UCLA schools, women in the field have come a long way.

After instruction in engineering began at UCLA in 1941, it took seven years before the field saw its first woman graduate. In 1948, Barbara Wynn became the first woman to graduate from the College of Engineering at UCLA. And in 1972, a study done by an associate dean of the school concluded that not enough female professional role models existed with women making up less than 1 percent of the practicing work force, according the

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engineering school's Web site.

Stephen Jacobsen, associate dean of the school, said when he was a student here in 1963, he doesn't believe there were women's rest rooms in the school. Though this may be an exaggeration, Jacobsen makes his point.

Studies abound on why women traditionally shy away from the field, organizations spring up frequently with the goal of recruiting the underrepresented, efforts are underway to change the face of K-12 education, while Wong simply hopes she's setting a good example to the diminishing number of aspiring female engineers.

Tucked away in the basement of Boelter Hall, Wong spends a Friday afternoon where she has spent many of her summer days – an electrical engineering lab hidden inside hallways whose paint has grown old and where nearby construction provides an obtrusive view of hard hats and dumpsters. Most students wouldn't end up here unless they had a made an erroneous turn on their valued campus maps on the first days of school.

But, Wong says she feels comfortable in her surroundings. There are rows of computers along the walls that enclose tables of wires, metals and microchips. Above, missing ceiling tiles reveal more wires and censors. And at each of the desks including hers, is an engineer hard at work. The only difference between Wong and her coworkers is that she's the only female that day.

Wong is one of few girls working on the Ragobot game project that uses nickel titanium alloys (material that when destroyed, can restore its original shape) to build the terrain that the robot destroys. The game could revolutionize the toy industry and the material could prove to be a substitute for hydraulic systems in the airplane industry, Wong says. There are two female full-time employees in the lab, with a third one on the way along with eight male students from both UCLA and Yale University.

Several factors result in fewer women choosing the field, ranging from high school education to cultural conditioning, experts say.

Jane Margolis, a researcher in the department of education and co-founder of a computer science training program for teachers in the Los Angeles Unified School District, says the problem of diversity at the university is an inherited problem from the K-12 levels of education.

The percentage of females taking the Advanced Placement Computer Science exam nationally is 17, and this number translates to low numbers at college, Margolis said.

The low numbers in high school often result from the culture of society in which engineering and computer science is typically associated with males.

"It is a field that has been culturally marked as a male," Margolis said. "Girls are surfing the Web and using (computers) as much as men, but are not pulled in as much," Margolis said.

Many believe that the field is simply misconceived.

The field of engineering includes numerous disciplines ranging from the conventional mechanical and electrical engineering to lesser obvious studies like agricultural and environmental engineering. Ironically, it is the lesser popular disciplines that attract the highest proportion of female students.

In a 2002-2003 survey conducted by the American Society for Engineering Education, the organization found that while about 15 percent of women received bachelors' degrees in electrical engineering, a significantly higher 42 percent women received the same degree in environmental engineering.

Engineering and related fields such as computer science are critical to subjects like biology and environmental health, Margolis said, but added that often, these interdisciplinary subjects go unnoticed.

Wong agreed that she never realized how diverse a field engineering could be.

Wong became interested in the field after a chemistry teacher in Piedmont Hills High School in Northern California recognized her talents. Before that time, Wong did not even know exactly what an engineer did.

"I thought they were the people who rode trains. I didn't exactly know what it meant at the time because I was 16," she said.

After receiving a $25,000 scholarship to study engineering in high school and doing research with a professor from Stanford University, Wong understood that engineering entailed a little more than train rides.

"The thing to tell (prospective women engineers) would be that you can do anything with it – whether it is materials or electronics or the environment," Wong said. "There's a class that studies dirt; if you are a civil engineer and that's fun to you. There are no limits at all what you can do with an engineering degree."

Jacobsen pointed out that engineering can be found in almost every surrounding.

When considering the creation of many objects, "God didn't deliver it, an engineer did," he said.

A May 2003 study in the University of Michigan sheds light on why so many women are still inherently limited in the choices they make.

The study reveals that choosing a math-based career is dependent on "how much (students) believe in the ultimate utility of mathematics, and how much they value working with and for people," said Jacquleynne Eccles – a UM professor and research scientist that helped conduct the study – in a press release.

While male students ranked the utility of math higher than females, girls also valued working with people more than guys.

"Given this data, it's not surprising that there are many more men than women in math-based majors and careers," Eccles also said in the release. "Boys' beliefs and values are pulling them toward those areas while girls' are pushing them in other directions."

Experts also say biological or genetic explanations for the different career choices men and women make are outdated and non-conclusive.

Carlos Grijalva, a pyschobiology professor, explains that trends of male and female career choices are always changing over time and that very little information exists that would be able to substantiate any one theory.

It has less to do with biology and more to do with upbringing, Grijalva speculated.

Jonathan Friedman and David Lee, graduate students in electrical engineering, believe the public image that is associated with engineers has done the field a disservice.

Engineers come in more shapes than "nerdy guys who like computers a lot," Lee said.

Whatever the reason, Wong said she's become accustomed to the fact that one in five engineering students is female. But that doesn't mean that she and several professionals don't hope the situation will change.

The institute that Margolis co-founded, along with the dean of engineering Vijay Dhir, aims at repairing the problem at its onset.

Professors from UCLA and UC Irvine provided high school teachers in the Los Angeles area with the technical skills and engaging teaching approaches to attract underrepresented students to the field.

Though the first steps have been taken to establish computer science courses in these high schools, it is still too early to tell whether the training will be successful, Margolis said.

Outreach efforts are being planned in the school of engineering, said associate dean Jacobsen, after showing a orientation video that aims at depicting the diversity within the school.

Jacobsen also said that budget cuts are a factor when it comes to recruiting underrepresented students into the school.

Though the call for change is widespread, Jacobsen says change is always gradual, recalling his days as a student in the 1960s, compared with today.

"It takes time," he said. "In 1969, I don't remember seeing many (women) at all, but we are gradually seeing more and more."

In an effort to speed up the process, some women engineers are taking matters into their own hands. Wong belongs to the national organization, the Society of Women Engineers that aims to recruit and retain female students.

Group members go to high schools and share their experiences as well as work to provide students with internship and job opportunities.

"By simply showing the women (in high schools) that it can be done ... we are not really not giving them anything other than giving them what our experience has been like."

But, some male students wonder how a female engineer's perspective is unique and are somewhat wary of a distinction being made between the sexes.

Working professionally with both male and female engineers, Friedman has not noticed a difference in the two, he said.

Friedman has worked with Wong on the Ragobot project and is respected by Wong for the work he does. She enjoys working with most of the guys in the school, she said as they are "nice and helpful."

Though the weeder engineering courses of her first year caused an ulcer, Wong has finally learned to balance work with fun with the myriad of hobbies she has.

Wong is writing her second mystery novel, loves to belly dance and keeps in touch with her non-engineering friends once in a while. Though she will receive a degree in materials engineering, her options are by no means limited – she wants to get a realtor's license, go to law school, or maybe go to business school.

"It's not so much what you learn in engineering, but the fact that you can go through it and survive. .... What you go through in the process of engineering says so much more than the degree," she said.