



## SJSU's Dr. Belle Wei - Shaping the global citizen

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**Dr. Belle Wei is Dean of the College of Engineering at San Jose State University.** Wei has a B.S. from U.C. Berkeley in biophysics, an M.S. from Harvard in applied mathematics and optimization, and a Ph.D. from U.C. Berkeley in electrical engineering. In between Harvard and her second sojourn at Berkeley, she worked for two years at Ford Aerospace.

Wei started out as a professor of electrical engineering at SJSU in 1987 and became a full professor in record time. By 1998, she was Chair of the Department of Electrical Engineering, and became Dean of the College of Engineering in 2002.

When Wei and I spoke by phone recently, she told me her journey into academia was not a given at the outset of her career. She said it required no small amount of soul searching to make the move into education. "However," she said, "I finally decided that a career in education would allow me to work on technology projects, but also give me the opportunity to innovate with young people and have an impact on their lives. At the time, I felt the one important and satisfying side of [working in] education was that it would give me that balance between research and teaching."

Today, Wei is enjoying her 19th year as a faculty member at San Jose State University, where her diverse interests range from VLSI design and optimization, to materials science, and the business and culture of technology and development in an increasingly global economy.

Topping it all, however, is her enthusiasm about the university: "I continue to be thrilled to have an opportunity to provide this rich educational experience to our engineering students. The best part of teaching here at San Jose State University is that we're at the heart of Silicon Valley. This is such a dynamic place! There are so many opportunities for collaborations and partnerships here, and the chance to work

with the very best and brightest in industry and academia. We constantly involve our students in this process, and are able to really see them flourish and blossom in this environment."

Stimulating technology opportunities notwithstanding, I asked Wei about the filter today that seems to be eliminating so much potential engineering talent here in this country, everything from prejudice against nerds and geeks, to the idea that engineering is just for that isolated, anti-social, math and science whiz.

Wei responded, "For whatever reason, people want to categorize other people, and that works against recruitment into engineering schools. In addition, there's unfortunately somewhat of a culture of exclusivity in engineering - an implication that lesser mortals need not apply."

Wei said San Jose State University is doing a lot to overcome those attitudes: "Because we do such an excellent job of reaching out to under-represented populations, we have women and Hispanic students who might not otherwise consider engineering as a viable career option. [In addition], forty percent of our student body is foreign-born. And that includes many Spanish-speaking students, students who are Vietnamese, Chinese, and so forth. Whether newcomers or first-generation Americans, these students share a similar experience. They have a particular 'agony' in common - the agony of being new and different."

Wei herself has a connection to that 'agony.' She emigrated to the United States from Taiwan with her parents at the end of high school, and she herself had to deal with the challenges of adjusting to a new life and a new culture far from the one she had grown up in. Quoted in the *San Jose Mercury News* in May 2003, Wei said, "We had the experience of a typical immigrant family. The kids helped the parents resettle because they didn't speak the language."

Now years later, Wei has combined her own hard-earned expertise in bridging cultures, her training in science and engineering, and her desire to further educational outreach for students at SJSU, by founding and continuing to lead a most extraordinary program within the College of Engineering - a visionary program closely watched by universities across the country.

### **To far-off shores**

San Jose State University's now-annual summer study tour of China and Taiwan - the Global Technology Initiative (GTI) - is one of the most high-profile parts of the opportunities Dr. Belle Wei and her associates at San Jose State University have assembled on behalf of their students.

Each year, immediately after the end of the spring term, 25 carefully selected SJSU engineering students travel with various faculty members to Taiwan and China to take a first-hand look at those emerging economies. With a million dollars in funding from a range of California-based companies, most "with strong business ties to both Silicon Valley and the Asia-Pacific region," the students, and their faculty guides, have an intense 2-week travel schedule that includes visits to a variety of industrial and academic locations on both sides of the Straights of Taiwan.

Wei told me, "The Global Technology Initiative provides students in the program with a distinctly life-altering experience. The students on this trip have an extraordinary opportunity

to meet industry leaders in Taiwan and in China - global technology leaders, in fact - and at the same time, are able to witness the manufacturing and engineering activities that reflect the realities of truly global cooperation and competition. We started the China trip two years ago, and each summer now are choosing 25 lucky students to travel on this all-expenses-paid tour of Taiwan and China, where we visit a combination of universities and business locations."

"The trip represents wide-spread support from Silicon Valley, comprised of this one-million dollar endowment. We see that as the most crucial part of the Global Technology Initiative, because it comes with the single-minded purpose of providing a global perspective to these lucky students, with a particular and timely emphasis on the Asia-Pacific technology environment. Importantly, the trip also represents a successful reaching out to under-represented student populations who, because of their environment and background, might not otherwise have the opportunity to be exposed to such a variety of experiences and geographies."

Wei told me the GTI scholars travel from Taipei, to Beijing and Shanghai, and other locations as well, visiting facilities associated with global companies such as Microsoft and Intel, and other smaller, regional companies. The students also have a unique chance to meet with Asia-Pacific investment firms to better understand the changes underway there, and the business opportunities available across the region.

She said, "The trip is a transforming experience for these students - a total paradigm shift. Without actually seeing these places in person, there would be no way for them to extrapolate from their experiences here and understand how dynamic and global those locations are there. Throughout their two weeks of travel, the students cross paths with a mixture of local residents, tourists, and people of all sorts of nationalities - Arabs, Japanese, Koreans, Chinese, a parade of people. Overall, it's an extraordinary experience!"

She added that it's not just about being tourists, however, for the GTI scholars; they're not done when they return home, because the group is required to report back formally to their classmates in San Jose. Through these presentations, Wei said, the audience at San Jose State University is clearly able to see what is going on in Taiwan and China through the eyes of the students who have taken the trip.

Wei said, "When we select the students for the GTI trip, we want to know that they will have a larger impact on the engineering student body at San Jose State University as a result of the project. Obviously, if they were chosen to take the trip, these students are already doing a good job with their studies. However, our GTI scholars [must also step up] as student leaders and share their experiences with their fellow students. Almost 200 people attend these [post-trip] presentations in an auditorium on the San Jose campus." She added that the presentations are very well received.

### **The tough questions**

At the risk of interrupting Dr. Wei's enthusiasm, I asked her at this point in our conversation to address the widespread perception in the U.S. that Asia's economic and technology advances portend the decline of North America's own prospects for the future.

Wei acknowledged the complexity of the question, and advised me to look at the situation within an historical context. She said it's not so far-fetched to compare China and India today with the early years in the United States. Wei said that, interestingly enough, one could almost describe the attitude in the emerging economies of China and India as a "Protestant work ethic."

She noted, "Countries like India and China have huge populations with lower skills. But at the same time, people in those [geographies] are hard working and willing to go the extra mile to advance and create better opportunities for their children."

Wei reiterated, there is a marked similarity between modern-day China and India and the hard work and self-denial that characterized the "founding fathers" in North America during the early colonial years and after the founding of the country. She said, "The students who go on our trip to China are deeply touched by the people they see there, people who are trying so hard to do a good job. Our students see how hard the young people in China are working to get an education - that across the whole region people really put this special emphasis on education. Our students also see that the Chinese are quite thrifty."

She said these are traits that were prevalent in the early years of the United States. It's true, however, that there is a difference, Wei said. China's is a controlled economy. But, she noted, the local leaders in China today - the mayors and the leaders of the various provinces - are doing a great deal to encourage their people to improve their lives and the lives of the entire society.

"Yes, from a technology perspective" she added, "It is difficult at times to innovate in a controlled economy, but that also depends on which domain you're looking at. China is a very big country, and each region has a different [personality]. Shanghai, for instance, is very exciting. Beijing is also very exciting, but it has a very different feeling than Shanghai."

She added, "In America, people follow their individual passions. They have an individual mission [and are encouraged to follow that dream]. In China, it is a more complicated situation, and a very different culture."

Wei's comments caused me to pull up my article from [DATE 2006](#), published here in *EDA Weekly*. Included in that article were some observations from **Dr. Dian Zhou**, Dean of the School of Microelectronics at Fudan University in Shanghai. Zhou is currently on leave from the University of Texas, and when I met him in Munich in March, our conversation centered on a discussion of the threat, or lack thereof, to North America from the emerging technology sector in China.

I read the following to Dr. Wei: "Zhou argued that people should see the rise of the semiconductor industry in China as a natural consequence of the maturing of the industry. He noted that as the auto industry in the U.S. matured, Japan emerged as a significant competitor and quickly learned to compete with quality products. The U.S. then turned to other industries to explore innovation and reap the financial rewards of being an early entrant in new markets. He argued that as the semiconductor industry matures, other countries including China will emerge as significant competitors, offering products of increasing quality as the years go by. That's the signal, Zhou says, that yet another new industry will be emerging from the innovative environment and practical, problem-solving mindset of the U.S. engineering community."

Wei responded: "Overall, Professor Zhou's observations are right. But although our environment here in the U.S. encourages innovation, we cannot take that for granted. You need technical talent to [pursue innovation], and that is true for any nation. [Whether China is emerging or not], we here in the United States cannot afford to be complacent. That makes our jobs [as educators] very challenging. We absolutely must continue to inspire our young people to pursue rigorous courses of study in the various fields of engineering. If the talent base is not here in the United States, [the innovation will decline]."

She went on, "Everything of course is relative, but I think there is a perception [that North America is losing its edge with the emergence of China and India], and there is a degree of reality to it. The technical jobs here are definitely going offshore. Although [in the universities] we cannot impact on that situation directly, we can certainly impact the young people [who are the future of the nation]. We cannot directly impact the influential people [who are making the decisions to send jobs off-shore] - that's an economic reality - but we can continue to refuse to see engineering education as a narrow education."

Wei insisted that it's not enough today for young engineers to just have a competitive technical edge over their peers, here or elsewhere in the world. She said she had recently had dinner with a business management consultant, who clearly distinguished between the 'hard'

skills and the 'soft' skills needed to succeed - scientific and analytical skills, versus interpersonal skills.

An engineering education, Wei said, must provide students with more than just 'hard' skills, analytical and problem-solving skills. It must also provide students with 'soft' skills, those interpersonal skills, which are crucial for success in business. In an overwhelmingly technology-based society such as ours, Wei added, we must not lose track and fail to train our engineers with all of the skills they will need to compete in a global economy.

She said, "For us, for the faculty in the College of Engineering at San Jose State University, we know that engineering skills are a tool, but you need to understand how to use them. You need to understand 'humanistic engineering' and how to reach out to other people. How to make that contact, and understand your purpose and the purpose of those around you."

Wei told me she recently read an article in *The Economist* that discussed the growing gulf between rich and poor in our society. She said it's clear that there is a kind of skillset that rich people have; millionaires have a certain type of educational background. The educational institutions in the United States, she said, have an obligation to reverse the growing gulf between rich and poor by ensuring that all of their students develop the integrated skillset needed for success in a complex, technical, and competitive world.

Then referring back to the changes underway in Asia, she said, "If you look at China, at all levels of leadership there, most of those people have a background in engineering. They are transforming their society. The current president, when he was growing up, says he saw his country as weak and had a sense of mission to change that. He wanted to become an engineer and learn how to build bridges in order to improve his country."

Wei noted that here in the United States, we need to similarly inspire our own students to have that same sense of mission. She added that in the era of Sputnik, and President Kennedy's Apollo project, young people had that sense of urgency, and that today it's imperative to re-ignite those attitudes by inspiring lots of people to pursue engineering because of the exciting opportunities for them at a personal level and at a global level, both in the technology and in the business of technology.

### **The presidential seal of approval**

As we closed our conversation, I asked Dr. Wei to answer an obvious, but potentially politically incorrect question. I asked her how she deals with the reality of academic snobbery that often characterizes university life, here in this country and all over the world. I suggested that someone such as herself, with credentials from Berkeley and Harvard, could hardly be unaware of this situation.

Wei responded easily: "I have been here at San Jose State University for many years, and I have had lots of opportunities to reflect on the differences. [I have concluded] that we have a different mission here at San Jose State University. Our environment here is new and unique, and I celebrate that."

She chuckled when I suggested her university must be doing something right because President Bush clearly singled out San Jose State University for a special visit during one of his rare visits to Silicon Valley earlier this year - completely bypassing both Stanford and Berkeley.

When I asked Wei about the significance of that visit, she said, "Students having the opportunity to 'hang' with President Bush would not have been news at all if it had been at Harvard, or even Stanford. The fact that he was here at San Jose State University is what was newsworthy."

"But really," she asked, "Why not? This is a very special place where we continue to delight in the fact that we can make these opportunities available to our students. We're talking about an education here that is a totally empowering experience for all of our students. And that is why I continue to be completely energized about being part of this place!"

**Right place, right time**

Let me close with a personal observation: Dr. Belle Wei is perfectly positioned to lead the next generation of engineers into the 21st century, and all of the challenges this era will entail: problematic ethnic and national differences, clashes between economies and economic models, competition for dominance in innovation, resources, and markets, and on top of all that, explosive advances at the interface between biological and human-engineered systems.

Someone like Belle Wei - fluent in the lingua franca of the life sciences, engineering, and industry - is exactly the person who should be shaping future technology leaders and global citizens of the world. Who better to head up the school of engineering seated at the epicenter of Silicon Valley?

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**Hot off the presses:**

***U.S. News & World Report*** has just bumped San Jose State University to No. 12 in the magazine's ranking of top undergraduate programs in engineering. Nice!

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*Peggy Aycinena is editor of **EDA Confidential** and a contributing editor to **EDA Weekly**. She has a degree in biophysics from U.C. Berkeley, and a degree in engineering from San Francisco State University.*