ENGINEERING STAR

Pat Sankar: Promoting Excellence in Engineering

[By Akbar Ali]

Pat Sankar, Ph.D., is a professor on a mission to promote excellence in the ever-expanding and dynamic field of engineering. With more than 25 years of research and software development experience, he stands as one of the most accomplished engineering professors in the nation.

Currently, Sankar serves as a course instructor for UC Irvine Extension's Engineering Certificate Program. In addition to his comprehensive knowledge of engineering, he is renowned for his expertise in digital signal processing and image processing technologies, holds a U.S. patent, and is an accomplished author whose writings have appeared in more than 70 journal publications and books.

Sankar's natural inclination has always been toward science and engineering.

"As a young student I had always wanted to do research and was always fascinated by computer science and engineering," he says. "My early work on computer vision and medical image processing naturally directed me to do research and teaching in electrical and computer engineering."

He credits his basic training in physics and mathematics as being both useful and essential to his transition into engineering, particularly when it came to digital signal processing, modeling, and simulation.

Sankar's journey to success began on the other side of the world, in India. He attended graduate school there before he immigrated to the United States in 1977. He holds a bachelor's degree in physics and two master's degrees in electronics and biomolecular physics. He received his Ph.D. from the prestigious Indian Institute of Science, located in Bangalore. At the time, the school was one of the few universities in the world allowing students to study a then little-known discipline designated vaguely as "computer science."

His introduction to America came when he was invited to be a visiting professor at the University of Maryland. Later, he assumed a research position at the University of California, Irvine, before making a name for himself in the industry.

While working on his Ph.D. thesis, Sankar was lucky enough to find himself in the midst of some of the finest researchers in India and the world at large, with whom he frequently collaborated. One of his fellow researchers had been a student of the late Nobel Laureate Sir C.V. Raman, whose work on the scattering of light and discovery of the inelastic scattering of photons (known as the Raman effect) earned him the Nobel Prize in Physics in 1930.

"I learned a great deal working in close proximity with such eminent scientists," Sankar says.

From there, Sankar went on to work as a visiting fellow at the Tata Institute of Fundamental Research, working closely with one of the founders of pattern recognition (the act of a machine taking in raw data and taking an action based on the category of the data), and also completed original work in computer vision, the science and technology of machines that see. Once he arrived in America, Sankar continued his work with many industry leaders and experts in digital image processing at the Universities of Maryland and California.

There have been many milestone moments in Sankar's career, but he gives special importance to four experiences:

While taking his graduate program prerequisites, he failed a course on coding theory at the Indian Institute of Science. The course evaluation included not only a written exam but also an interview with a team of instructors to evaluate the depth of the student's understanding of the subject.

Q. What do you do for fun?
A. Being with people.

Q. What is the last magazine you read?
A. Institute of Electrical and Electronics Engineers technical journals.

Q. What is your favorite TV show?
A. I have stopped watching regular popular TV shows for a while now.

Q. Who is your role model?
A. Any honest and humble person who strives his or her best to excel and help others excel in their field of choice.

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"I failed to correctly explain Gray code and was told to study and reappear for the interview in four weeks," he says.

Taking this rejection very personally, Sankar did better than simply study: he became a permanent denizen of the library, reading and researching everything he could about coding theory and in the process becoming something of an expert. Because of his extensive research, he went further than was required:

"I wrote a paper extending Hamming code to non-binary words, which was accepted for publication in IEEE proceedings as a communication in a record time of three weeks. Needless to say, I passed the interview when I presented the manuscript of the IEEE proceedings with the letter of acceptance from the editor."

His computer science Ph.D. thesis centered on the subject of organic chemistry and was entitled "ALWIN-Algorithmic Wiswesser Notation for Organic Compounds." The university at the time utilized three thesis examiners in its evaluations, one from the university and two experts from abroad. As luck would have it, one of the examiners of Sankar's work was Dr. Wiswesser, who was the inventor of WLN (Wiswesser Line Notation).

Sankar recounts, "Though he had retired and settled in the suburbs of Maryland, Dr. Wiswesser agreed to be my thesis examiner and carefully read the manuscript and wrote a 33-page review. It ended with the statement 'This is not only a work of science but a work of art.' I cherish such a compliment from a giant of such intellect."

Sankar is also very proud of the experience he shared with his colleagues in developing an algorithm for "rendering 3-D images at least an order of magnitude faster than the current well-known refinement algorithm at that time called the 'Oslo algorithm.'" The original authors of the Oslo algorithm later used the work done by Sankar and his colleagues to modify their approach, though they failed to acknowledge their vital contribution. This doesn't bother Sankar much; he says "the self-satisfaction of accomplishing that feat was much more than peer-group appreciation."

Sankar's leadership positions have also proven memorable:

"When I joined a software company I was given the challenge to lead a team to port 2 million lines of code (a mixed bag of FORTRAN II, IV, C, C++, and Java) from Unix to Windows NT. I inherited a team which had dwindled from 10 to 2.5 members, and the CEO was on record that the software would be delivered in six months. I had to work [with] at least 10 OEM partners and support hundreds of peripheral devices. The software was delivered in five and a half months, ahead of schedule."

Because of all this success, both as a private engineer and as a professor, Sankar offers the following advice for aspiring engineers:

"There is no substitute for excellence. It is not enough to work hard; one needs to work *smart*. One cannot work in isolation. One should be the ultimate team player, without always cringing for recognition. Do the best you can. Help and encourage everyone. Recognition will come in due time, even if you do not want it. Stay on top of the technology. Be ahead of the crowd and on the cutting edge."

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