



Robert J. Marks II

Alumnus takes his research beyond the ivory towers

Robert J. Marks II thrives in higher education, but don't go building him any ivory towers. He is not one to limit his activities to his lab.

The 1972 electrical engineering graduate is a teacher, researcher, editor, businessman, song writer and cartoonist. In his spare time, he was able to return to campus this spring to receive a Distinguished Young Alumnus award.

Teaching and research anchor Marks in his position as professor of electrical engineering at the University of Washington.

"I like the interaction with students," Marks said. "I like their exuberance, especially at the undergraduate level. Graduate students act stuffy and make sure you are impressed by them."

"Exuberance" is the feeling Marks carries over to his research activities: "I love the discovery process of invention... the brainstorming and seeing it put into application. There's a certain intangible feeling a person gets on creation. It's a feeling of accomplishment. One of the things that drives human nature is the ability to conduct a job well done. It's the carrot that keeps many of us going."

Research, Marks believes, must be accountable and applicable.

These days, Marks focuses his discovery in the area of artificial neural networks. Neural networks are highly connected systems patterned after the neuron networks in the human brain. To envision how a neural network operates, Marks says to envision a board with thousands of dots on it and then connecting those dots with lines so they all talk together.

The concept of artificial neural networking first came about during the 1940s, but it only boomed in the last 10 years because of technology advances.

Neural networks learn by example. They gain wisdom through experience, Marks said.

Examples of neural networking applications include predicting loads for power companies; work with speech recognition; detecting plastic explosives at airports; and grading meat quality in slaughterhouses.

Marks likes to see his work applied beyond the halls of academia. He applies his work through two of his own companies. One is Multi Dimensional Systems Corporations. It develops and licenses algorithms for time frequency measurements. Marks is also a part owner of Financial Neural Networks. This company focuses on developing the use of neural networks to predict stock market activity.

In addition to his own ventures, Marks consults with other businesses, and he holds two patents in the area of neural networks.

Marks believes higher education will have to interface more with business and industry. "In the U.S., we're seeing a shift from government-sponsored research," Marks said. "Research universities are going to have to interface more with industry. Professors are going to have to be a little less ivory tower and more cognizant of what's going on in the business world."

Such awareness has a two-fold purpose, according to Marks. It will benefit students in the classroom with real-world applications, and it will help professors raise necessary research dollars.

As far as actual core curriculum classroom changes in two decades, Marks said the only significant change has been the increased dependence on the computer as a tool in engineering education. "Otherwise, the fundamentals are pretty much the same," he said. "The first courses electrical engineering students take today contain roughly the same material I took at Rose-Hulman."

On the personal side of life, Marks continues two hobbies — cartooning and song writing — he started as a student at Rose-Hulman. His cartooning graced the pages of the *Technic* and the *Thorn*. Today, he limits his cartooning to caricatures of his colleagues at faculty meetings. Song writing continues to be a creative outlet. Using a guitar, Marks has penned songs for a variety of occasions. He has written a song for his wife and each of his three children.

Music has been a continued interest for Marks. During his student days, he worked for the campus radio station. He even helped spearhead an "underground" program on Terre Haute station WPFR during his Rose-Hulman graduate studies in 1972-73. Music that hit the airwaves via Marks' show included Led Zepplin, Frank Zappa, Janis Joplin and Jefferson Airplane.

After obtaining his master's in electrical engineering in 1973, Marks went to work for the Crane Naval Weapons Support Center as a reliability engineer.

In 1975, Marks returned to higher education to obtain a Ph.D. in electrical engineering from Texas Tech University. After completing his doctorate work in 1977, Marks went to the University of Washington and has been there ever since.

During his career, Marks has published over 100 journal and proceeding papers in the areas of signal analysis, detection theory, signal recovery, optical computing, signal processing, fuzzy systems and artificial neural processing.

Honors that have come Marks' way include being named a Fellow in the Optical Society of America and being named an IEEE Distinguished Lecturer. Active in IEEE, he is the editor of *IEEE Transactions on Neural Networks*, and he was co-founder of the IEEE Circuits & Systems Society Technical Committee on Neural Systems & Applications.

Marks is co-founder of the Christian Faculty Fellowship at the University of Washington and he serves as faculty adviser to the college's Campus Crusade for Christ.

— by Bryan Taylor