



# Southern Minnesota Section Newsletter

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## **Soft Computing with Applications**

Soft Computing (SC) is a mathematical field comprising the following paradigms: neural networks, fuzzy set theory, and genetic algorithms.

The term *soft computing* refers to problem-solving techniques using approximate models for approximate reasoning and randomized search. This parallels the remarkable ability of the human mind to reason and learn in an environment of uncertainty and imprecision. In contrast, hard computing refers to solving techniques using precise models for symbolic logic reasoning, classical numerical and search methods.

Each of the SC components has salient characteristics that make it best suited for specific applications. While neural networks are strong in learning and adaptation, fuzzy set theory represents knowledge via fuzzy if-then rules and hence allows for precise output inference using imprecise input. Genetic algorithms bring systematic random search approaches that significantly increase the likelihood of finding globally optimal solutions.

Leveraging these characteristics in hybrid combination, often with optimization, contributes directly to fields such as system identification, feedback control, pattern recognition, fault detection and others. It is also this combination that is the essence underlying intelligent systems.

This talk will relate SC to conventional artificial intelligence, expert systems, and the idea of semi-sentience; briefly introduce SC components; and present some industrial and academic applications.

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## **UM Short Courses**

The University of Minnesota is offering two 2-day short courses taught by Jim McLinn at the St. Paul campus. A course on FMEA (Failure Mode and Effect Analysis) and FTA (Fault Tree Analysis) will be given March 13-14, and a course on Weibull Analysis will be presented on April 23-24. Both courses run from 8:30 a.m. to 4:30 p.m. each day. Tuition is \$895. For a brochure and registration form, contact [rmartin@cce.umn.edu](mailto:rmartin@cce.umn.edu) or call 612-624-3492.

## **IEEE Section Meeting**

Nick Chbat, Mayo Foundation

### **Soft Computing**

Monday, February 25, 6:30 pm  
Mayo Medical Sciences Building  
(321 3rd Avenue SW, Rochester)

☞ Pizza at 6:30; Meeting at 7:00 ☜

*Nick Chbat joined the engineering team at the Mayo Clinic in October 2001. At Mayo he leads special projects in medical engineering, in conjunction with Mayo Foundation physicians and researchers. Previously he was a researcher at General Electric Corporate Research and Development for six years, developing algorithms for modeling, automatic controls and machine health monitoring for several GE businesses. He was awarded the center's highest technical team achievement award in 2000. He has six US patents, with others pending.*

*He earned M.S. and Ph.D. degrees at Columbia University, where he focused on neuro- and fuzzy control applications to robotics using optimization and genetic algorithms. During his doctoral studies he was also an associate professor of engineering at Manhattan College, where he had earned his bachelor's degree, in mechanical engineering with a minor in computer science.*

*He is an associate editor of International Journal of Intelligent Automation and Soft Computing. A member of Sigma Xi, Pi Tau Sigma and ASME, Nick has organized, chaired or reviewed various IEEE and ASME symposia, sessions and papers.*

*Nick is co-author of the forthcoming book, Discrete-Time Feedback Control Problems Using MATLAB<sup>®</sup> and the Control System Toolbox (Brooks/Cole Publishing, 2002).*

## Coulee Region Engineering Societies Event

Justin Ulland, University of Wollongong

### Formula SAE-A Engineering Design Competition

Tuesday, February 19, 6:00 pm  
Logan High School's Weess Theater  
1500 Ranger Drive, La Crosse, Wisconsin

☞ Pizza & socializing to follow ☜



The Formula SAE® competition challenges student members of the Society of Automotive Engineers (SAE) to design and build small formula-style racing cars. Restrictions on the car frame and engine challenge the knowledge and creativity of the students. The cars are built by the team over a period of about a year. Teams from about 100 colleges around the world bring their cars to the annual competition, where the cars are judged in a series of events, including technical inspection, cost, presentation, engineering design, solo performance trials, and high-performance track endurance.

*Justin Ulland is a 1998 graduate of La Crescent High School who is studying mechanical engineering and English at the University of Wollongong in New South Wales, Australia. During his junior year he was part of the UW team that designed the Steel City Racer for the 2001 Formula SAE-A competition. Justin is currently working at Trane Co., during his summer break.*



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