

Interview with Editor-in-Chief of *IEEE Transactions on Fuzzy Systems*

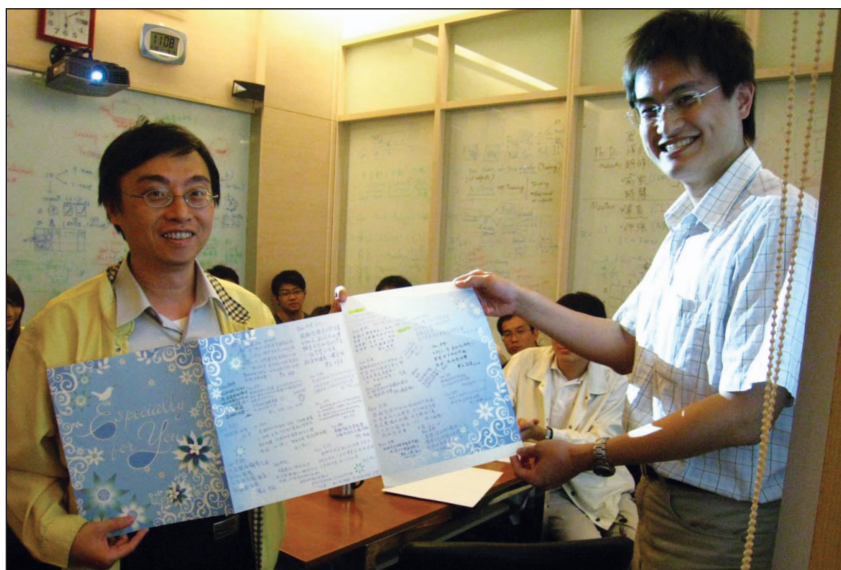
Editor-in-Chief of *IEEE Transactions on Fuzzy Systems (TFS)* Professor Chin-Teng Lin from Taiwan's National Chiao-Tung University, shares his vision on immediate plans to broaden the scopes of TFS.

Born to a blacksmith father and raised in a hardworking family in Tainan, the southern part of Taiwan, Professor Lin remembers watching his father at work and practicing what he saw in the field. But it was through his parents' constant support that led him to be the successful person he is today.

"Even though my parents did not receive higher education, they encouraged me to study in the U.S. When I was a child, my mother encouraged me to think independently and to think out-of-the-box. Such practice was engraved in my mind and has affected many aspects of my life. In research, I exercise the same practice. It has helped me explore new areas and accept new-found knowledge." said Professor Lin.

According to Professor Lin, there are three areas of research that paved the way for what he is today; Artificial Intelligence (AI), Computational Intelligence (CI) and Brain-like Intelligence (BI). These areas of research were intertwined throughout Professor Lin's career as he was fortunate to work with prominent researchers in these areas.

"When I was an undergraduate student from 1982 to 1986, several hands-on courses on robotics covering



Li-Wei Ko (right) presents a card signed by students of Chin-Teng Lin (left). Students (in the background) express their appreciation for their advisor/professor, Dr. Lin.

automatic control, computer vision, AI, and microprocessor inspired my devotion of machine intelligence. My Ph.D. advisor, Professor George Lee, opened my eyes to CI fields in fuzzy systems and neural networks. We published a paper on Fuzzy Neural Networks (FNN) in *IEEE Trans. on Computers* in 1991, the early era of this field. We then wrote a FNN textbook together, published by Prentice-Hall in 1996. During this period, I also received the enthusiastic support of Prof. Lotfi Zadeh in FNN researches."

"After receiving my doctoral degree, I returned to Taiwan to start tenure-track faculty position and research efforts in CI and its applications at NCTU. When I was appointed

as the Director of NCTU Brain Research Centre in 2003, I branched into BI in computational neuroscience; my researches have embraced brain dynamics and the pursuit for Brain-inspired CI. What benefited me the most during this period is the international cooperation between NCTU and universities abroad. The interdisciplinary cooperation at home and abroad plays a pivotal role at each transition of my research areas."

Embarking on this field was not a tough call to make. "In my early days, I had shown strong interests in biology, psychology, and later on engineering. When I arrived in West Lafayette of India for my graduate studies at Purdue University in 1988, I was given the

book, *Parallel Distributed Processing: Explorations in the Microstructure of Cognition* by James L. McClelland, David E. Rumelhart and the PDP Research Group. This book has opened my eyes on the “Connectionism”, representing a set of approaches in the fields of artificial intelligence, cognitive psychology, cognitive science, neuroscience, and philosophy of mind. I have been deeply intrigued by the book due to its cross-disciplinary nature. Later on, the pioneering work of Bart Kosko on Fuzzy Cognitive Map and Jim Bezdek on Fuzzy C-means further inspired me to seek for the synergism of low-level learning (e.g., neural networks) and high-level human-like thinking (e.g., fuzzy systems) into a functional unit with higher machine IQ. These have motivated me to concentrate on CI in general and on hybrid CI such as FNN in particular.”

With his appointment as Editor-in-Chief of *IEEE TFS* starting January 2011, Professor Lin has big plans to broaden the scopes of *TFS*. “I am honored to accept such a position. The position provides challenging opportunities to serve the IEEE Computational Intelligence Society (CIS). I would like to take this opportunity to thank the AdCom of the IEEE CIS for supporting my EIC appointment. Special thanks go to Gary Yen, CIS President; Xin Yao, CIS VP Publications; and former EICs of *IEEE TFS*, James Bezdek, James Keller, and Nikhil Pal.”

“My immediate plan would be putting together a team of associate editors to broaden the scopes of *TFS*. To reflect the rapid growing of brain research and smart living technologies, I would like to expand the spectrum of *TFS* at both ends; at the basic research end, *TFS* can explore the interface of cognitive-neuroscience and fuzzy logic while at the application end, *TFS* can encourage the full-span applications of fuzzy logic in smart living technologies from household devices to urban planning. In the long run, this would keep *TFS* in the main stream of next-generation intelligent systems, efficiently enlarge the

domains of our authors and readers, and provide a platform for interdisciplinary cooperation/interactions of intelligent systems.”

Apart from that, Professor Lin has planned a list of activities to advocate the growing readership of *IEEE TFS*.

□ Broaden the Scope of *IEEE TFS*: To reflect the rapid growing of brain researches and smart living technology nowadays, we will consider to expand the scope spectrum of *TFS* at both ends: at the basic research end, *TFS* can explore the interface of cognitive-neuroscience and fuzzy logic; at the application end, *TFS* can encourage the full-span applications of fuzzy logic in smart living technologies from household devices to urban planning. This not only keeps *TFS* in the main stream of next-generation intelligent systems including “iIT (intelligent information technology)”, but it can also efficiently enlarge the domains of our authors and readers, and provide a platform for interdisciplinary cooperation/interactions of intelligent systems.

□ Establish a new article type for interdisciplinary researchers: As described in its scope, *TFS* considers articles on engineering applications. At the time of submission an author has to specify whether the manuscript should be treated as an application type of contribution or not. An innovative application must satisfy at least one of the specified requirements. Following the same spirit, we can consider to establish a new type of paper contributions—interdisciplinary type by setting some proper criteria. This could efficiently attract researchers from diverse areas to get involved in CIS through *TFS*.

1) Further Reduce the Submission-to-Publication (SUB-to-PUB) Time: We shall make sure the efficiency of the 3-stage review process: (1) EIC: the manuscripts received by the EIC will be sent to appropriate AEs in 1–2 days; (2) AE: prompt AEs to invite reviewers within 3–4 days with active tracking and assistance

from EIC’s office; (3) Reviewers: a tracking system with back-up reviewer mechanism will be designed in the current review reminding system to avoid abnormal review delay. Moreover, a *quick-review* procedure will be strengthened to screen about 20% manuscripts to reduce the burden of AEs and reviewers, and focus on the rest manuscripts to ensure review quality and timing. This can be done by forming a kernel AE team (*Area Chairs*) covering areas of *TFS*’s interests.

2) Promote Real-time Index of Forthcoming *TFS* Issues: Currently, *TFS* has a very efficient mechanism for “*Rapid Posting*” of the already accepted articles via the IEEE *Xplore* website. These are almost final versions of the papers that are to appear after copy editing. Despite the unavailability of issue numbers and page numbers, “*Rapid Posted*” articles can be cited by other authors. We shall make promotion to take good use of this mechanism. The link to the “*Rapid Posted*” articles will be made very handy in the CIS Web Pages, newsletter, and various related academics media.

3) Add More Attractive Features and Functionalities to *TFS* WebPages: In addition to the item of “*Top documents accessed*” in the current *TFS* WebPages, to further increase the impacts of *TFS*, the transaction WebPages will be designed more creatively by adding some attractive features such as “*Papers on Emerging Technologies*”, “*Papers in Interdisciplinary Research areas*”, “*Feature Articles*”, “*Papers to be Published*”, “*Top 30 Most Popular/Cited Papers*”, and “*Annually Top Downloaded Papers*”—these papers will be grouped based on topic/theme so that readers can easily find what they want and this grouping will be consistent with the grouping mentioned in item 4 next.

4) Organize *TFS* Papers in Groups: The papers published in an issue can be grouped based on the topic/theme. This can help readers to find

easily what they are looking for, it can help AEs to find potential reviewers easily and of course it is likely to have a positive influence on the impact factor because the papers get more visibility.

- 5) Continue to Grow the Impact Factor (IF) of *TFS*: Some of the key strategies to improve our impact factor will be: (1) To further reduce SUB-to-PUB time as mentioned in item 1 above; (2) To increase the visibility of the accepted/published papers through various channels such as (a) “Real-time Index of forthcoming *TFS* issues” as mentioned in item 2 above, (b) “Attractive Features on *TFS* Web Pages” as mentioned in item 3 above, and (c) “Grouping the papers in *TFS*” as mentioned in item 4 above; (3) The EIC along with the AEs will try to ensure that every submitted manuscript present the new findings with respect to the state of the art. This will not only help to assess the quality of the contribution but also will minimize unnecessary work by the reviewers; (4) Analyze the academic impacts of other peer-reviewed journals in related areas and single out our strengthens.
- 6) Enhance the Quality and Impact of our Publications by Encouraging Special Issues on Emerging Technologies: CIS is at the heart of many disciplines seeking for machine intelligence. We should take advantage of this pivot position, and stay ahead through continued embracing of emerging technology development in such fields as large intelligent systems, smart living environments, service engineering, distributive medical mechatronics, cognitive ergonomics, smart power, green systems, etc. This could be accomplished cooperatively with the CIS Technical Committees and by publishing thematic special issues.
- 7) Encourage Publication of Basic Research Results with Breakthroughs and Innovations: While focusing on new technologies, we should continue to provide the



CT Lin and his family, (from left to right) wife Juliet Fan and children Che-Huai, Sheng-Ku, and Che-Chi.

highest recognition to the researchers working on relevant fundamental fuzzy theories. Laying the necessary biology/neuroscience and mathematical/physical foundations has been a source of pride and has brought great respect to our society.

And it sure looks like a busy, but happy year ahead for Professor Lin and his family.

Five minutes with Professor Chin-Teng Lin

1) What or who is your greatest inspiration?

Several people throughout my career have inspired me to pursue my research works; however, if I have to name one person, it is Prof. George Lee, my Ph.D. advisor at Purdue University. He has directed me to conduct researches in fuzzy neural networks. He also has given me a lot of freedom and guidance to explore this new area. Through this opportunity, I have established a solid foundation in fuzzy systems, brain science and later on machine intelligence.

2) Can you elaborate on your research works?

My research works focus on biologically inspired information systems, which cover the aspects of sensation, perception, reasoning, decision-making, and

learning of biology as well as machine intelligence. Representative areas include fuzzy neural networks with structure and parameter learning, fuzzy term understanding in natural language processing, robotics and intelligent sensing, brain-computer interface, and NBIC (Nano-Bio-Information technologies and Cognitive science). The real-life applications of these basic researches are also conducted in three on-going large-scaled research projects: (1) Smart City and Home—developing smart living technologies to improve health and save energy; (2) Intelligent Transportation Systems—developing vision-based intelligent technologies to improve safety and efficiency of vehicle transportation; and (3) Cognition and Neuroergonomics—developing devices to enhance human behavioral decision making under several forms of stress and cognitive fatigue.

3) Where is your research likely to take you from here?

The next step of my research is to develop and demonstrate fundamental transitional principles of operational neuroergonomics to enrich the CI realm. By gaining a better understanding of how human brain, body, and sensory systems work together to accomplish tasks in daily operational environments, we could develop basic principles for translation of basic brain

CURRICULUM VITAE

Profile:

- Chin-Teng (CT) Lin

Personal qualifications:

- Ph.D., Electrical and Computer Engineering, Purdue University, USA, 1992
- M.S., Electrical and Computer Engineering, Purdue University, USA, 1989
- B.S., Control Engineering, National Chiao-Tung University, Taiwan, 1986

Current position:

- University Chair Professor, Department of Electrical Engineering & Department of Computer Science, National Chiao-Tung University, Taiwan, 1992–present
- Director, Brain Research Centre, National Chiao-Tung University, Taiwan, 2003–present

Professional experience

- AdCom member, IEEE Computational Intelligence Society, 2008–present
- Provost, National Chiao-Tung University (NCTU), Taiwan, 2007–present
- Chair, IEEE Taipei Section, Region 10, 2009–2010
- Deputy Editor-in-Chief, *IEEE Transactions on Circuits and Systems*, 2006–2007
- Dean, College of Computer Science, NCTU, Taiwan, 2005–2007
- Associate Dean, College of Electrical and Computer Engineering, NCTU, Taiwan, 2003–2005

- Associate Editor, *IEEE Transactions on Fuzzy Systems*, 2002–2010
- Chairman, Chinese Fuzzy System Association, 2002–2003
- Chairman, Department of Electrical and Control Engineering, NCTU, Taiwan, 2000–2003
- Associate Dean, Office of Research and Development, NCTU, Taiwan, 1998–2000

Institutions where you have taught and conducted research

- Department of Electrical Engineering, NCTU, Taiwan, 1992–present
- Department of Computer Science, NCTU, Taiwan, 2005–present
- Brain Research Center, NCTU, Taiwan, 2003–present
- Swartz Center for Computational Neuroscience, UCSD, USA, 2003–present

Most notable award or recognition

- Elected IEEE Fellow, 2005
- Appointed as the Editor-in-Chief of *IEEE Transactions on Fuzzy Systems*, 2011
- Outstanding Research Award granted by National Science Council (NSC), Taiwan, 1997–present
- Outstanding Engineering Professor Award granted by the Chinese Institute of Engineering (CIEE), 2000
- Taiwan Outstanding Information-Technology Expert Award, 2002
- Ten Outstanding Rising Stars in Taiwan, 2000

reasoning and neuroscientific knowledge into optimal design of fuzzy human-system interfaces for complex operational settings. This, so-called “transitional brain and neuroscience”, could enrich the basics and applications of CI realm not only on fuzzy systems, but also on neural networks and evolutionary computation. The impact applies to individuals, groups and society.

4) What is your most memorable experience while carrying out your research work?

In carrying out research work, the most memorable experience is when my research topic got published by top leading journals. This is the moment I treasure the most. It represents the validation and recognition of my research work.

5) How long have you been involved with the Society and in what capacity?

I joined IEEE as a student member in 1988 when I was a doctoral student at Purdue University. I became a regular member in 1991, a senior member in 1999, and a fellow in 2005. “Volunteerism” is the key for my services to IEEE. As a 23-year veteran, I find my involvement to be professionally and personally rewarding. The path I have embarked on consists of membership services (e.g., Chair of IEEE Taipei Section), publications (e.g., AE of TFS since 2002), technical activities (e.g., CIS FSTC Chair), conferences (e.g., General Chair of FUZZ-IEEE), and operations (e.g., CIS AdCom).

6) Are you able to tell us more about your family background and life in general?

My wife is a judge. At work, she and I seek for the truth and present them in words. I enjoy spending time with my family. We like to travel, play board games and read.

7) What advice will you give to interested authors to submit their research works?

To fully exercise your creativity and imagination based on the scopes of *TFS* for a research topic, conduct a thoroughly research review, make major contributions clear, ensure the results to be substantiated, and make papers professionally presentable. Don't be afraid to seek for advice from the specialists.

8) Favorite book and why

The Perfection of Wisdom Sutras, The Prajnaparamita is my favorite book. I have

read it many times, and every time I read it, I discover something new. I have learned that nothing can be predicted about anything; I have developed the wisdom to distinguish from right to wrong. When I experience obstacle in my research or personal life, I use what I have learned from the book to mediate. This helps me to clear my mind, to get new perspectives, and to encounter the difficulties. I see myself released from the physical presence, from the problem, and from the situation. In turn, I become a person who I want to be. The Prajnaparamita is powerful in pursuing true intelligence. The book has guided me through many obstacles.

9) Favorite pastime and why

My favorite pastime is meditation and going to a hot spring. I meditate almost every day. The reason I like meditation is that I can practice it at home, at work and in my office; I do not need anything

extra. When I meditate, I remove myself from where I am. I focus on my breathing; I think of nothing. Meditation helps me concentrate, gives me inner strength and stays healthy.

Going to a hot spring is another favorite pastime because I can totally relax my body. All the muscle pains, jet lags, and colds are gone from a soak in the hot spring. I am also able to meditate at the same time.

If meditation relaxes my mind, soaking in the hot spring relaxes my physique.

10) Favorite food and why

My favorite food is Japanese cuisine. The style of Japanese cuisine is to preserve its original flavor and use as little seasonings as possible in cooking. The food is usually served fresh whenever possible; hence, you can taste the sea salt in fish, earth in rice and soil in vegetables. I love Japanese cuisine. Whenever I have it, I feel I am in heaven.

11) Most memorable vacation

My most memorable vacation is when my family and I took a cruise from Vancouver to Alaska in the summer of 2009. We visited the beautiful towns of Ketchikan, Juneau, and Skagway. This is the first time my three children took a cruise; they were very excited about the big boat. The gorgeous nature beauty and creatures in Glacier Bay and Denali National Parks impressed them a lot. During the trip, we spent a lot of time doing things together as a family. I cannot remember when the last time we had an uninterrupted 14 days together was.

12) Most rewarding experience

I find the most rewarding experience is when my students who have graduated visit me at school and tell me how valuable they have learned from me in the fuzzy logic area and how my teaching has influenced in their career.



Publication Spotlight (continued from page 11)

“This paper combines a genetic algorithm with schedule transition operations to find large, disjoint sets of sensors that cover a target area. The resulting sensor network is energy efficient, which extends its operational lifetime. Experimental results are presented for networks with up to 1000 sensors.”

IEEE Transactions on Computational Intelligence and AI in Games

Automatic Generation of Game Level Solutions as Storyboards, by Pizzi, D. Lugin, J. Whittaker, A. Cavazza, M., *IEEE Transactions on Computational Intelligence and AI in Games*, Vol. 2, No. 3, September 2010, pp. 149–161.

Digital Object Identifier: 10.1109/TCIAIG.2010.2070066

“The paper describes a novel tool based on interactive storytelling technologies including AI planning systems to aid designers of open-ended multi-resolution action-adventure games. The utility of the approach is demonstrated with an in-depth example from a recent commercial video game of this genre.”

IEEE Transactions on Autonomous Mental Development

Integration of Action and Language Knowledge: A Roadmap for Developmental Robotics, by Cangelosi, A. et al., *IEEE Transactions on Autonomous Mental Development*, Vol. 2, No. 3, September 2010, pp. 167–195.

Digital Object Identifier: 10.1109/TAMD.2010.2053034

“This position paper proposes that the study of embodied cognitive agents, such as humanoid robots, can advance our understanding of the cognitive development of complex sensorimotor, linguistic, and social learning skills. Four key areas of research challenges are discussed: 1) how agents learn and represent compositional actions; 2) how agents learn and represent compositional lexica; 3) the dynamics of social interaction and learning; and 4) how compositional action and language representations are integrated to bootstrap the cognitive system. The review of specific issues and progress in these areas is then translated into a practical research roadmap.”

