

Association of Professional Engineers and Geoscientists  
of the  
Province of Manitoba

# Merit Award

presented to

**Dr. Howard C. Card**

B.Sc.E.E., M.Sc., Ph.D., FIEEE P.Eng.

*Dr. Card obtained his B.Sc. and M.Sc. degrees from the University of Manitoba in 1968 and 1969, respectively. His M.Sc. thesis concerned the effects of ionizing radiation on the electrical properties of transistors. The applications were primarily in electronics for the space program. He then moved to England under an Athlone Fellowship from the United Kingdom Department of Trade and Industry. He received a Ph.D. degree from the University of Manchester (UMIST) in 1971. His Ph.D. studies were based on modeling of semiconductor devices. He developed a model for quantum-mechanical tunneling in these devices which is still popular today, with application to photovoltaic solar cells, light emitting diodes, and high-speed integrated circuits. While at UMIST, Dr. Card also held a post-doctoral fellowship (1971-1974) working for Mullard Labs (later Philips) where he developed new non-volatile memory technology. This work, performed in conjunction with Ferranti Ltd., resulted in devices similar to present-day EEPROMs. His next appointment in 1974 was as Assistant Professor at the University of Waterloo, where he mainly worked on CAD models for integrated circuit design. In 1975, he moved to Columbia University in New York City, where he was appointed Associate Professor in the Department of Electrical Engineering and Computer Science, to take over Jacob Millman's electronics teaching program. Dr. Card's research at Columbia was in electronics, photovoltaic energy conversion, optical communications, microchip design and biological modeling. He also worked for IBM at the Watson Research Centre in Yorktown Heights, New York, and for Bell Laboratories in Holmdel and Murray Hill, New Jersey. During this time, he was a member of the well-known Columbia Radiation Laboratory.*

*In 1980, Dr. Card returned to the University of Manitoba, where he now holds the rank of Distinguished Professor. He currently teaches the second- and third-year electronics courses to all electrical and computer engineering students. His research is in adaptive pattern recognition and mobile robots, based upon artificial neural network models. He is also interested in modeling the mechanisms and behaviour of simple animals, and in the general relationships between biology, physics and computation. During a sabbatical year at Oxford, he developed a model of learning in snails, which may be employed in simple robots that learn by example.*

*Dr. Card was Chairman of the 1984 Gordon Conference on MIS Systems and the 1987 Canadian Conference on VLSI, as well as serving on the program committees for many other conferences. He reviews for more than 20 academic journals and several government agencies, and has over 250 refereed publications. He has supervised more than 30 graduate students and has taught over 15 different courses in device physics and modeling, electronics, circuits and systems, signal processing and communications, and computer engineering hardware and software. His graduate students have started several Manitoba companies in electronics and software. His teaching awards include the Stanton Award for Excellence in Teaching and the UMFA-UTS Award. He also holds several research awards including the Rh. Institute Award for Multi-disciplinary Research, the Sigma Xi Senior Scientist Award, the NSERC E.W.R. Steacie Memorial Fellowship, the ITAC-NSERC Award for Academic Excellence and Fellow of the IEEE.*

*In awarding the Merit Award to Dr. Howard Card, the Association acknowledges his outstanding scholarly achievements, including the direct advancement of the profession of engineering in Manitoba.*

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