2nd PRO-CHIP WORKSHOP

December 1, 1989

Hanover

Program as of October 11, 1989

December 1, 1989 (Friday)

8:30	Registration / Poster mounting
9:00	Welcome and Indroduction by L. Hamm (Porsche AG)
9:15	PRO-CHIP Overview by B. Höfflinger (IMS Stuttgart)
9:30	PROMETHEUS-Video
	Session 1: Hardware for sensing, chairman D. Estève (CNRS Toulouse)
10:00	Recent advances in tyre/road-friction monitoring ahead of tyre by U. Eichhorn (TH Darmstadt)
10:20	Development of a 2-D velocity meter by A. Johansson (Swedish Institute of Microelectronics Kista)
10:40	Obstacle detection by D. Estève
11:00	Coffee break
	Session 2: Technology support and Hardware for actuating and indicating, chairman B. Höfflinger (IMS Stuttgart)
11:30	A fast, latch-up free charge pump circuitry aimed at driving a smart power high-side switch by J. Buxo (CNRS Toulouse)
11:50	Electromechanics by M. Lajoie-Macenc (CNRS Toulouse)
12:10	Susceptibility evaluation of integrated circuits vs. Electro Magnetic Interference by V. Pozzolo (Politecnico di Torino)
12:30	Lunch break
	Session 3: Hardware for intelligent processing, chairman P. Weissglas (IM Stockholm)
14:00	Systolic arrays for real time image processing by P. Pirsch (Uni Hannover)
14:20	Noise-like coding in associative memories by S. Bottini (IEI-C.N.R. Pisa)
	Session 4: Hardware for communicating, chairman G. Conte (Politecnico di Torino)
14:40	Physical Layer for the CAN Bus by W. Kuntz (TZ Furtwangen)
15:00 to 18:00	Poster session
	and in parallel
15:00 to 16:00	Meeting of PRO-CHIP Steering Committee and PRO-CHIP Advisory Council

IO Institute for Microelectronics Stuttgart, Allmandring 30a, D-7000 Stuttgart 80.
Phone: +49/711 685 5838, *Fax:* +49/711 685 5930

ATTACHMENT 2 - PAPER

Title of the contribution:

NOISE-LIKE CODING IN ASSOCIATIVE MEMORIES

Name(s) of author(s):

Sergio BOTTINI

Full address with phone and fax number of the author responsible for correspondence:

Dr. Sergio Bottini, Consiglio Nazionale delle Ricerche
Istituto di Elaborazione della Informazione,
Via S. Maria 46, I-56126 PISA Italy.
Phone: +39-50-553159, FAX: +39-50-554342

What are the new results in your paper (one or two sentences)?

The noise-like coding, which is a method for orthogonalizing information items entering an associative memory, is applied to a number of paradigmatic classes of problems. Orthogonality of the keys is a condition which supports both scalability to larger-size problems and implementation with available technologies.

Summary (in English):

During the sixties and the seventies, a number of mathematical models of distributed associative memories were proposed all based on a common principle of correlation (Steinbuch, Kohonen, Willshaw, Gabor, Bottini). As is known, these models essentially share with neural network machines a Hebb-like mechanism for the modification of the storage elements. On the other hand, a peculiar condition for associative memory models is the quasi-orthogonality of the keys, which prevents crosstalk in the recall. Thus, unlike, for example, the multilayer networks with back-propagation, it is here possible to store the various associations between keys and items as single distinct events (i.e. without having to reiterate their exhaustive presentation to the system many times until the convergence to error-free recalls).

Orthogonalization of the information items entering a memory system can be achieved through noise-like coding (Bottini). In this paper, we will show how the noise-like coding can be successfully applied to some paradigmatic classes of problems. As this coding is context-dependent, it enables the spontaneous (linear) capabilities for generalization of an associative memory to be balanced with (nonlinear) capabilities for specification. This is a central issue for associative memories. An ideal associative memory should, in fact, be required to produce an invariable response up to a given type and degree of incompleteness of the key, whereas, beyond relatively sharp limits, it should suddenly begin to yield a different, more specific, response. It will be furthermore shown that orthogonal keys make a straight scalability to larger-size problems possible. Performance evaluation of this memory for storage efficiency, fault tolerance, and the amount of computation required will be given. This memory could be implemented using available technologies, and, in general, would benefit from any degree of parallelism embodied in the hardware.

Remarks: