Annual Report of the
McLeod Institute of Simulation Sciences Gyor Center

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Research Activities & Projects

A new target architecture, mainly for the implementation of digital signal processing algorithms, which consists of multi-direction FIFO memories as main components were investigated and applied. A *VHDL simulation environment* was developed, which makes a semi-switch level logic simulation of extracted schematic descriptions possible. If the final verification of the FIFO-based VLSI circuits is a logical simulation of the schematic description previously proved by an LVS (Layout Versus Schematic) program, *special multi-level logical models are necessary*. These models have to be such as to enable their simulation to detect the typical design errors. The new VHDL package consists of a new multi-value model for the type 'bit', and semi-

switch level component models. The package was tested in a design process of a *digital CNN array processor chip*.

In close cooperation with the Hungarian MISS Center R&D work is undertaken in various other fields of application. The simulation tool and methodology is based on the AI controlled CASSANDRA simulation system elaborated at the Hungarian Center. Recently research projects in cooperation with the West Hungarian Research Institute, Center of Regional Studies dealing with the simulation of the development of regions and previously a simulation model for education in the field of railway systems have been elaborated.

Education

'*Application of VHDL simulation in architectural design of reactive systems*' is one of the most important course, which is proposed for our students oriented to *embedded system engineering*.

In the course '*Designing Reactive Systems*' a lot of new VHDL packages were developed to model the different basic architectures, which are known as typical target architectures of reactive systems.

A two-semester course '*The Methodology and Application of Simulation*' – for undergraduate and graduate students of various faculties – is taught.

Center publications

T. Hidvegi, P. Keresztes and P. Szolgay,
> An Accelerated CNN-UM (CASTLE) Architecture by using the Pipe-Line Technique
> Proc. of IEEE CNNA'02, Frankfurt, vol. pp. 355-362

P. Keresztes
> Studies on Digital CNN Architectures
> Proc. of 7th Korean-Hungarian Seminar on Soft Computing
> Budapest, Hungary, October 2002.

P. Keresztes, T. Hídvegi, G. Sebestyen
> Special Design Tools on FIFO-based VLSI Target Architectures and their Application
> Accepted paper on INES '04, Cluj, Romania

A. Javor, G. Szucs, G. Meszaros-Komaromy
> Elaboration and Application of a Simulation Model for the Investigation of the Development of Regions (in Hungarian)
> Study of results achieved in the National Social Sciences Research Project, 2003-2004.

Center simulation tools

V-SYSTEM/VHDL Windows Version 4.4

Based on the close cooperation with the Hungarian MISS Center the AI controlled simulation system CASSANDRA (Cognizant Adaptive Simulation System for Applications in Numerous Different Relevant Areas) developed there is used both in education and research.

The hardware configurations on which our simulation softwares run are PCs and Workstations.

Budapest, June 9, 2004.

Prof. Peter Keresztes Ph.D.
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