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Russian DSP developer scouts RISC partnership

By Peter Clarke, EE Times

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LONDON — Research Center Module, a design group and intellectual property licensor based in Moscow, is moving its 64-bit NeuroMatrix digital signal processor to a 0.25-micron process technology and is looking for a partnership with a Western RISC-processor provider to help its DSP technology penetrate key applications. Fujitsu Microelectronics Europe GmbH (Frankfurt, Germany), which will build the next version of the NeuroMatrix, has been a licensee of the architecture since October 1999 and also has rights to the ARC RISC processor. But executives from RC Module are believed to be approaching ARM Holdings, MIPS Technologies and Tensilica in an effort to get the best possible deal.

Dmitri Fomine, marketing manager for the ASIC and silicon intellectual-property (IP) design center of RC Module, said Italian automaker Fiat has expressed an interest in an image recognition and classification system based on the NeuroMatrix Core (NMC).

"We would like to penetrate the automotive market with Fujitsu," said Fomine. "We believe that together with our software capabilities we can."

While a partnership with ARM could help RC Module penetrate the automotive market, ARM has largely turned its back on DSP coprocessors since the commercial failure of its Piccolo digital signal processing unit.

RC Module's NMC is a 32-bit general-purpose RISC processor and a 64-bit DSP vector coprocessor that supports multiple operations on operands of variable bit length. While the five-stage pipelined RISC performs control functions and basic math, the vector processor is RC Module's claim to fame.

Neural-net emulation

The flexible operation of the vector coprocessor includes support for 1- to 64-bit processing. That capability, covered by a Russian patent, helps it accelerate neural-network emulation. The coprocessor can perform one to 288 multiplications and accumulations in one processor cycle depending on word length.

The present device, the NMC6403, manufactured for RC Module by Samsung Microelectronics in a 0.5-micron CMOS process technology, performs up to 14.4 billion small-word multiply-accumulate cycles per second at a 50-MHz clock frequency.

Fomine said the next chip, the NMC6404, will include 2 Mbytes of on-chip memory and a reorganized off-chip bus structure to reduce the system chip count. In 0.25-micron CMOS from Fujitsu Microelectronics Europe, the NMC6404 is expected to clock at 133 MHz, Fomine said.

The 6404 is now expected to be available by mid-2001. Previously RC Module had said Fujitsu would have the chip in production by the third quarter of this year.

RC Module was founded in 1990 and has roots in providing neural-network software for military applications. The company built up a portfolio of target-identification software before turning to the commercial market and developing hardware acceleration for its software offerings.

The company now has the NeuroMatrix TrafficMonitor application available to run on the NMC. The software, applied to roadside camera data streams, can be trained to identify vehicle types — motorcycles, passenger cars, vans, buses and so on — and then count the recognized objects to provide real-time statistics on traffic density and average speed in each lane or stretch of roadway.

"Fiat has already asked us whether this can be deployed in a moving vehicle," said Fomine. Samsung is also considering the NMC for use in 3G terminals, but Fomine acknowledged that RC Module's adequate but anonymous RISC is not as popular or as well-supported, in terms of development tools, as some Western companies' equivalents.

Along with developing its NMC series of DSP chips as proof of feasibility, RC Module is keen to pursue an IP-licensing business model. Its core was taken into the Synopsys IP Catalyst program in October.



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