Many-core computer research wins 'best paper' at HiPEAC

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A novel approach to reducing the energy consumed by computers has brought international recognition to two University of Delaware graduate students.

Elkin Garcia and Daniel Orozco, doctoral students in the Department of Electrical and Computer Engineering, won “best paper” for their work at the 6th International Conference on High-Performance and Embedded Architectures and Compilers (HiPEAC) 2011 workshop on Programmability Issues for Multi-core Computers (MULTIPROG).

Held this year on Heraklion, Crete, Greece, HiPEAC is a central annual networking event for computing systems researchers in Europe.

The paper, entitled "Energy efficient tiling on a many-core architecture," details a simple but powerful model for describing the energy consumption of an emerging class of many-core architectures, and then uses this model to minimize the energy consumption of a parallel program based on the way the computations are tiled.

Energy consumption is a major cost in supercomputing, explains Orozco, with power and energy efficiency representing two main design constraints in creating new parallel computer architectures.

“We've developed a new parallel algorithm that reduces the total energy consumption by 75 percent over naive tiling structures. This approach could be applied to extend the battery life of portable devices and to

decrease the requirements of cooling systems on modern computers," explains Orozco, a fifth year doctoral student working under faculty adviser Guang R. Gao, Distinguished Professor of Electrical and Computer Engineering.

"This work will impact scientific programs in future generations, where the dominant design factor is likely to be energy consumption and not speed or cost per computer," says Garcia, one of a growing number of students pursuing graduate degrees at UD as a result of the UD-Colombian University summer exchange program.

He and Orozco hope to extend their research, conducted under funding from the National Science Foundation (NSF), to other algorithms and study its impact on energy consumption, while also investigating the relationship between optimum tiling on increasing performance versus energy efficiency.

"The paradigm shift to parallel (multi-core) computing systems has created a momentum in the research community to tackle the most pressing problems for this technology that future computing systems will face," adds Per Stenstrom, professor of computer engineering at Chalmers University of Technology in Gothenburg, Sweden, who helped organize the MULTIPROG workshop.

"The work done by Prof. Gao's students offers a method for how to bring down the energy consumed when utilizing the computational performance of future multi-cores. The importance of the problem and the quality of the research contribution were key factors in awarding the paper."

Provided by University of Delaware