Lockheed Martin To Develop Advanced Cognitive Computing Architecture

Lockheed Martin initiated a two-year, $6.6-million study contract to develop a Polymorphous Computing Agent Architecture (PCAA) that will perform cognitive tasks for military systems.

Sponsored by the Defense Advanced Research Projects Agency (DARPA) through the Air Force Research Laboratory, PCAA will enable computers to leap ahead of traditional information-processing capabilities used to perform cognitive tasks, such as deduction, reasoning, and learning. The contract was awarded September 2004.

Computer architectures cannot effectively support real-time, data- intensive, multiple mission environments. The PCAA technology will make military computing applications significantly more flexible and agile. It will enable computing systems to approximate and deduce information without human operators and, thereby, support multiple mission tasks.

The PCAA will be an important enabling technology for the Department of Defense, because it can transition into many applications, including intelligence analysis systems and unmanned aerial vehicle control.

"Traditional computing systems are inflexible. They are incapable of adjusting to changing environments and situations that programmers and systems designers have not previously considered," said Dr. Boris Gelfand, Lockheed Martin Advanced Technology Laboratories. "By morphing both its hardware and software components and their interactions, PCAA will address a wide range of flexible requirements and fulfill mission tasks that require cognitive processing at previously impractical levels."

The ability of PCAA technology to morph the processing behavior of a single computer allows it to address scalability limitations of current architectures. These architectures usually require multiple processors for each task, which degrades processing power, adds weight, and consumes space on various platforms. The PCAA technology will provide significant increases in computational power and capability to process cognitive tasks compared to the very limited capabilities of current embedded and distributed systems.

The PCAA contract is part of DARPA's Architectures for Cognitive Information Processing program.

Lockheed Martin Advanced Technology Laboratories is the program's system integrator and leads a team that includes Lockheed Martin Aeronautics, Lockheed Martin Integrated Systems and Solutions, University of Pittsburgh, University of Texas, Soar Technology, California Institute of Technology, Micro Analysis and Design, Carnegie Mellon University, Cornell University, Altarum Institute, and Reservoir Laboratories.

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