A Robust Infrastructure

Such computing muscle requires a robust cyberinfrastructure to support it—the kind that Rensselaer possesses in abundance. Already blessed with approximately 1,000 processors in department- or center-managed clusters, the Institute's computing power saw a major expansion in 2005 with the advent of a campuswide machine room, currently containing five parallel clusters and more than 600 processors.

These processors communicate via a high-speed local campus network that in turn connects to a fiber ring linking key facilities in New York's Capital Region. The ring, in turn, is connected through the New York State Education and Research Network (NYSERNet) to the world's key research networks.

Three Partners, One Focus

The focus on nanotechnology represents an ideal confluence of interests for the partners involved. "This is an obvious and natural choice for all partners," Shephard explained. "New York state has made large strategic investments in the physical aspects of nanoelectronics. Adding the modeling technologies—and the horsepower to support the computational needs of this modeling—addresses a critical need and provides New York with a real competitive advantage."

IBM stands to gain much from CCNI as well. "Modeling is central to IBM's ability to develop its next generations of nanoelectronics devices," said Shephard, "since the time and money needed to develop the fabrication facilities for a new design requires that the design be right the first time."

With the confluence of interest and expertise in nanotechnology—and the robust Rensselaer computing and networking infrastructure—the CCNI can provide essential solutions for industry. "Technical and cost constraints are limiting the growth of the semiconductor industry and nanotechnology innovations," Shephard said. "Computational nanotechnology is absolutely essential for decreasing the time and cost of going from concept to commercialization. By producing new predictive design tools, CCNI will play a major role in driving nano industries to the next level."

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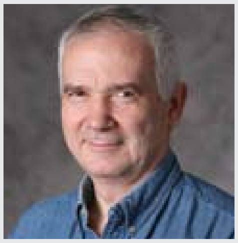
—Mark Shephard, director of Rensselaer's Scientific Computation Research Center (SCOREC)

Implementation of the CCNI

The Rensselaer CCNI team of faculty members, professional staff, and administrators are working on CCNI implementation in several parallel efforts: the design of the CCNI facilities at the Rensselaer Technology Park, the detailed CCNI computational systems, the definition of the CCNI research and development program, and the definition of a broad set of CCNI partnerships with industry, government agencies, and other academic institutions.

ⓘ | www.rpi.edu/research/ccni

Ostrogorsky Wins Major DOE Grant for Radiation-Detecting Materials



MANE professor Aleksandar Ostrogorsky has been selected for a three-year, $783,000 grant from the Department of Energy's National Nuclear Security Administration. The primary goal of his project is to develop better semiconductor materials for the detection of nuclear radiation, primarily gamma rays and X-rays.

Ostrogorsky will use the grant to investigate novel wide-bandgap semiconductor alloys based on mercury iodide (HgI2). While mercury iodide is excellent for gamma rays, he noted, "it also has drawbacks, including inferior mechanical properties. Furthermore, it cannot be produced by solidification from the melt and must be grown from the vapor phase. So we are trying to alloy HgI2 with compounds such as cadmium iodide, with a goal of obtaining materials that will combine the advantages of mercury iodine with improved mechanical properties."

Ostrogorsky's co-investigator, Professor A. Burger from Fisk University in Nashville, is a well-known expert on the design, fabrication, and evaluation of electronic devices. The two institutions will cooperate in growing single crystals of wide-bandgap semiconductor alloys and using these alloys to fabricate better radiation detectors.