Fighting Moore's Law: Semiconductor Group Tackles Nanoelectronics

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The Semiconductor Industry Association and the National Science Foundation are teaming up to launch a new effort to accelerate research into nanoelectronics.

The Semiconductor Research Corporation (SRC), which is based in RTP, is setting up a subsidiary to run the program at the request of the SIA. It will be called the Nanoelectronics Research Corporation (NERC). The SRC has funded more than $500 million in research projects since its formation in 1982. It has worked with the NSF on nanoelectronics research since 2003.

The NSF and the industry trade group will each provide $1 million in funding for the project. The SRC launched a Nanoelectronics Research Initiative last winter. Its six industry participants (AMD, Freescale Semiconductor, IBM, Intel, Micron Technology, and Texas Instruments) are providing the funding.

The NERC represents the first steps to be taken by the NRI.

"For the first time, the U.S. government and the U.S. semiconductor industry are collaborating on long-term research on nanoelectronics," said Paolo Gargini, the director of technology strategy for Intel who is the chair of the NRI. "This is a very big deal over some very small structures. With these tiny nano transistors we will be able to build 10 billion transistors in the space of a period made by a ballpoint pen."

The objective of the effort is to develop "novel computing devices" less than 10 nanometers in size.

"These results will enable the semiconductor industry to extend Moore's Law, a 40-year-old prediction that the industry can double the amount of transistors on a computer chip every few years, far beyond the year 2020 when the potential limits of the current industry technology … may be approached," the SRC said in a statement.

"The global semiconductor industry is facing a critical technology transition over the next 10 to 15 years," said George Scalise, the president of SIA. "The technology leaders of 2020 will be determined by actions taken today. The incubation period for new technologies is typically 15 years, making it essential for us to support basic research on nanoelectronics today."

The SRC will be responsible for both the NERC and the Microelectronic Advanced Research Corporation, which was launched in 1998.

"We are rapidly approaching the time when the laws of physics will limit our implementation of Moore's Law," Scalise said when the nanoelectronics initiative was launched. "Most scientists now agree that our ability to continue the scaling of CMOS technology – the dominant technology of the semiconductor industry for the past 20 years – will reach its ultimate limit sometime before 2020. We are now in a worldwide race to develop new technologies that will enable progress in semiconductor devices to continue at the pace we have seen for nearly 40 years.

"The Nanoelectronics Research Initiative will attempt to link research efforts by leading universities, the federal government, and the US semiconductor industry in a mission-oriented effort to continue the rate of progress that has prevailed since the mid 1960s," he added.

NRI council members include Intel's Gargini; Hans Stork, Texas Instruments (vice-chair); Craig Sander, AMD; Betsy Weitzman, Freescale Semiconductor; John Warlaumont, IBM; and Mark Durcan, Micron Technology.

"If we are successful, in the year 2020 the United States will continue to lead the world in the area of advanced electronics as our industry continues to drive the growth of our economy," Gargini said in a statement.

Hans Coufal, an executive with IBM since 1981 and a holder of 13 patents, is the director of the NERC and also will lead the NRI technical program group.

Larry Sumney, president of the SRC, and Pushkar Apte, vice president of technology programs for the SIA, will coordinate activities between those two groups and the nanoelectronics efforts.