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The Nanoelectronics Research Initiative and Beyond CMOS Research Activities in the US

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The six leading Semiconductor Companies in the US have joined forces with Federal and State government to form the Nanoelectronics Research Initiative in 2005. The goal is to find new information processing paradigms, systems and devices which will extend Moore's Law functional scaling into the indefinite future. The research activities are guided by 5 central research vectors which define the scope and content of the program and are listed below.

1. Computational state variables other than electronic charge
2. Non-equilibrium systems out of equilibrium with the thermal environment
3. Novel information transport mechanisms
4. Nanoscale thermal management
5. Directed self assembly of complex heterostructures

The current NRI research effort consists of 56 projects at 25 universities and 3 research centers in a coherent program where each project is aligned with one or more of the research vectors. During the past two years, significant progress has been made in a number of areas including spin wave, generation, detection and characterization, room temperature DMS materials, femtosecond magnetic domain switching characterization, improved MQCA structures, multiferroic and, magnetoelectric materials and devices, non-conformational metal insulator phase transitions in VO_2 and ferromagnetic ring nanodevices. A brief discussion and references will be provided.