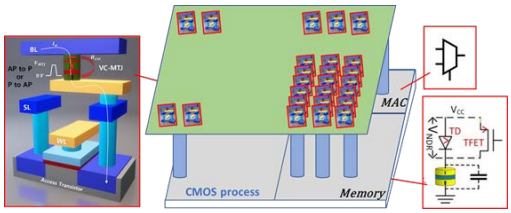
The University of California, Los Angeles has been awarded up to $5.9 million over four years by DARPA to develop a novel energy efficient computing system suitable for the big data era.

The project, called Spintronic Stochastic Dataflow Computing (SSDC), supports the FRANC (Foundations Required for Novel Compute) program within DARPA's Electronics Resurgence Initiative (ERI) aimed at solving fundamental challenges confronting the growth of microelectronics long after Moore's law is over.



Spintronics stochastic dataflow computing.

The SSDC project is a collaborative effort between three faculty of the UCLA Electrical and Computer Engineering department – Prof. Kang L. Wang, Prof. Puneet Gupta, and Prof. Sudhakar Pamarti – who are experts in nanotechnology, computing systems and design automation, and integrated circuit design. Led by Prof. Sudhakar Pamarti, it brings together spin-based voltage-controlled magnetic memory technology (MeRAM) and an unconventional stochastic computing (SC) paradigm to resolve the dreaded "memory bottleneck" problem. The memory bottleneck represents the limited bandwidth and high energy cost of moving data between the processing and memory units and is arguably the most important challenge confronting moderning computing systems, especially in big data applications.

The SC employs a stochastic alternative to traditional number representation (using long random binary bit streams instead of fixed- or floating-point) to enable ultra compact processing hardware. The MeRAM, developed by Prof. Kang Wang's group exploits the voltage controlled magnetic anisotropy property to achieve the best reported combination of energy, speed, and density among existing and emerging non-volatile memory technologies.

The combination of ultra-compact SC hardware and the dense, non-volatile MeRAM integrated on the same Silicon die offers great energy and latency improvements. The SSDC project aims to demonstrate up to 60x energy reduction for example data intensive machine learning tasks.