Open internship position

Title:
Exploiting Non-Volatile Memories for Aggressive Energy Reduction in Embedded Systems

Keywords:
Non-Volatile Memories, STT-MRAM, Memory Hierarchy, Magnetic Logic, Cache Memory Architectures, Compiler Analysis, Energy-Efficiency, Embedded Systems

Description:
Major issues encountered in integrated circuits for advanced technology node include high leakage current, performance saturation and increased device variability. For battery-powered embedded systems, energy consumption is a high critical metric. The energy consumed by memory activities is generally not negligible in the overall system energy cost. The memory architecture design should be therefore carefully considered in connection with data management across the different levels of memory hierarchy. Non-volatile memories [1] (NVMs) such as Magnetic RAM have very attractive properties in that they can be the golden solution to address challenge. Thanks to their non-volatility, NVMs have zero leakage power.

This internship aims to build an energy-proportional memory architecture system model that is capable of adapting the non volatile feature of considered memories with data storage requirements in the memory, depending on the executed workloads. These requirements could be identified via static or dynamic analysis performed by a compiler. Spin Transfer Torque[2] (STT) RAMs are considered as target NVMs in the current study due to their maturity and presence in consumer electronics. There are already several existing simulation and energy/latency estimation tools for NVMs, such as NVSim or CACTI that could serve for investigating the problem during this internship.

The duration of the internship is between 3 and 6 months in the LIRMM lab, which is a cross-faculty research entity of the University of Montpellier and the French National Center for Scientific Research (CNRS). Located in Montpellier (France), LIRMM is one of the largest multi-disciplinary research laboratory in Europe. Its Microelectronics department carries out cutting-edge research in the fields of design and testing integrated systems and micro-systems, with a focus on architectural aspects, modeling and methodology.

Contact:
Applications (including a CV, academic records, motivation letter and appreciation letters if available) are to be sent to the following person:

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[1] https://en.wikipedia.org/wiki/Non-volatile_memory
[2] http://www.mram-info.com/stt-mram