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**Hybrid spintronics and straintronics: A paradigm for ultra-low-energy computing**[1] KUNTAL ROY, SUPRIYO BANDYOPADHYAY, Electrical and Computer Engg., Virginia Commonwealth University, Richmond, VA 23284, JAYASIMHA ATULASIMHA, Mechanical and Nuclear Engg., Virginia Commonwealth University, Richmond, VA 23284 — We have shown in the past that the magnetization of a two-phase multiferroic single-domain nanomagnet can be electrically switched (flipped) with very little energy dissipation at low temperatures. This heralds a new energy-efficient magnetic logic and memory technology [Appl. Phys. Lett., 99, 063108, 2011, Phys. Rev. B, 83, 224412, 2011, Nanotechnology, 22, 155201, 2011]. Here, we extend our low-temperature result to room temperature where thermal noise can cause switching failures and increase average energy dissipation and switching delay. Using Monte Carlo simulations of switching trajectories described by the stochastic Landau-Lifshitz-Gilbert (LLG) equation, we show that even at room temperature, nearly error-free *fast* switching is possible with very low dissipation. The energy dissipated to switch an appropriately designed nanomagnet with $> 99.99\%$ probability at room temperature is only $\sim$400 kT for a switching delay of sub-nanosecond. This is enabled by the complex interplay between the in-plane and out-of-plane excursions of the magnetization vector which *aids* switching. This work is supported by the NSF under grant ECCS-1124714.

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Kuntal Roy
Electrical and Computer Engg.,
Virginia Commonwealth University, Richmond, VA 23284

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