For Release October 26, 2015 12:00 PM s ignificantly
faster than conventional computers.

, Fla (October 2, 2015) – Researchers from College of Engineering at University of South Florida

In this work “Non Boolean computing with nanomagnets for computer vision applications” published in Nature Nanotechnology[1] the USF research team has harnessed the energy minimization nature of nanomagnetic systems to solve the quadratic optimization problems that arise in computer vision applications, which are computationally expensive. By exploiting the magnetization states of nanomagnetic disks as state representations of a vortex and single domain, the team has created a modeling framework to address the vortex and in-plane single domain in a unified framework and developed a magnetic Hamiltonian which is quadratic in nature. The implemented magnetic system can identify the salient features of a given image with more than 85% true positive rate. This form of computing, on average, is 1,528 times faster than IBM ILOG CPLEX (an industry standard software optimizer) with sparse affinity matrices (four neighbor), and 468 times faster with denser (eight neighbor) affinity matrices. These results show the potential of this alternative computing method to develop a magnetic coprocessor that might solve complex problems in fewer clock cycles than traditional processors.

The research team is comprised of faculty, alumni and students of electrical engineering and computer science and engineering. Associate professor in electrical engineering Sanjukta Bhanja; alumnus Dinuka Karunaratne, ’13 PhD in electrical engineering, and currently at Intel; Ravi Panchumarthy, doctoral candidate in computer science and engineering; Srinath Rajaram, ’14 PhD in electrical engineering and currently at Micron; and computer science and engineering professor Sudeep Sarkar.

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