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IIT Roorkee researchers make breakthrough in memory device technology

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A team of researchers from the Department of Physics and Centre for Nanotechnology at IIT Roorkee has developed a high-density, energy-efficient and four-logic state memory device named Magnetoelectric Random Access Memory (MeRAM).

The device could provide a massive boost to overall computing processes and memory-intensive tasks like video and multimedia signal processing, pattern recognition, virtual reality, artificial intelligence and machine learning.

Davinder Kaur Walia, a professor at the Department of Physics and Centre for Nanotechnology, said "MeRAM has immense potential to be used in future memory chips for almost all electronic applications, including smart phones, tablets, computers, microprocessors, and for large data storage."

The device was constructed in the Functional Nanomaterials Research Laboratory using magnetron sputtering technique. MeRAM's key advantage over existing technologies is that it combines extraordinary low energy with very high density, high-speed reading and writing times, and non-volatility--the ability to retain data when no power is applied", she added.

"The world is rapidly moving towards faster, smaller and quantum technologies which has created an ever-increasing demand for small and more efficient devices and technology. Our focus was to achieve a four-logic state as we knew that then we will be able to create a device which could probably usher in a new technological revolution."

Kaur Walia also said, "To achieve this, we used a new material called Ferromagnetic Shape Memory Alloys (FSMA) and the concept of composite barrier were chosen which helps us in achieving the goal of distinguishable memory logic states. The current ultimate memory cell has shown a tremendous improvement of nearly 140 per cent in the memory functions."