



## NEUROMORPHIC AND ISING COMPUTING USING SPINTRONIC DOMAIN-WALL DEVICES AND SPINTRONIC OSCILLATORS

*Prof. Debanjan Bhowmik, Department of Electrical Engineering, Indian Institute of Technology Bombay (IITB)*

**Friday, January 5, 2024 at 4 p.m**

**Hybrid: Lecture Theatre AG-66, TIFR Mumbai**

**YouTube Live: <https://youtube.com/live/z04sXnAXcq8?feature=share>**

With the scaling of conventional-silicon-transistor devices almost reaching saturation, conventional machine learning/ neural networks implementations hitting a major bottleneck (due to the separation of memory and computing units in conventional computers, popularly known as the von Neumann bottleneck), and solution of different combinatorial optimization problems taking enormous amount time on conventional computers, various unconventional computing paradigms have emerged recently, like neuromorphic computing and Ising computing, which make use of novel materials beyond silicon and devices beyond transistors. Neuromorphic computing is about solving machine learning tasks on brain-inspired energy-efficient hardware, while Ising computing is about solving combinatorial optimization algorithms heuristically on unconventional hardware. Magnetic materials and related nanomagnetic and spintronic devices are very important for both these computing schemes. Motivated by this, Prof Debanjan Bhowmik has carried out extensive amount of work on spintronics-based neuromorphic and Ising computing through both experiments and simulations. He will present his major research findings in this talk, along with providing a general introduction to this field of research.

*Debanjan Bhowmik is currently an Associate Professor in the Department of Electrical Engineering, Indian Institute of Technology (IIT) Bombay. He obtained his PhD degree from the Department of Electrical Engineering and Computer Sciences, University of California Berkeley, in 2015, working in the field of nanomagnetism and spintronics. He worked as a faculty member in Department of Electrical Engineering, Indian Institute of Technology (IIT) Delhi, from 2017 to 2021, and then joined IIT Bombay in January 2022. His current research interests are in implementing machine learning/optimization algorithms for edge-computing applications through emerging devices and architectures, with specific emphasis on spintronic implementations of the same.*

